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NEW PERSPECTIVES ON SPACE LAW

The Proceedings of the 53rd IISL Colloquium On The Law of Outer Space

Young Scholar Session

Edited by: Mark J. Sundahl, V. Gopalakrishnan

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Preface

Tanja Masson-Zwaan and Oscar Fernandez Brital

The book before you contains papers by a new generation of space law scholars presented in the second 'Young Scholars Session' of the 53rd Colloquium on the Law of Outer Space that took place in Prague, Czech Republic in 2010. As that year marked the 50th anniversary of the IISL, it was decided to publish these papers in a special publication.

The Young Scholars session was held for the first time in Daejeon, South Korea in 2009. The decision to dedicate one session each year to the new generation was made by the Board of Directors upon a proposal of the IISL Directorate of Studies. The young scholars session is combined with another new feature in the IISL Colloquia, the Nandasiri Jasentuliyana Keynote Lecture on Space Law, also initiated in 2009. This one-hour lecture, in honour of one of the two IISL Emeritus Presidents, is given each year by a renowned scholar and is aimed at a large audience. The 2010 lecture focused on the history of space law and some eminent pioneers, and was delivered as a joint effort by Dr. Doyle, Processor Kopal and Professor Hobe – these papers are also included in this book. Combining this keynote lecture with a session dedication to young space lawyers proved a successful concept, and this three-hour session, held as the opening event of each IISL Colloquium, has attracted full rooms so far.

The increased attention of the IISL for young space law scholars must be seen in the context of two earlier efforts. The first of these started already in 1992 with the first Space Law Moot Court Competition held during the World Space Congress in Washington, D.C. The competition was later named after former ICJ President and former IISL President Judge Manfred Lachs – who was also a much-appreciated teacher. The competition, currently in its 20th year, has motivated and inspired hundreds of students from all over the world to study space law, and many of them have grown to become recognised experts in the field.

The other effort to involve the younger generation started in 2001, when the first I.H.Ph. Diederiks-Verschoor Award for Best Paper by a Young Author was granted to a young Brazilian scholar. This award, initiated by Oscar Fernandez Brital (Argentina) in honour of the Institute's first President Emeritus, has since then been granted annually. It is given to the author of the best paper accepted for presentation at the Institute's Colloquium. Authors must not be older than 40 years and may not have published more than five papers in the Proceedings of IISL Colloquia. The award consists of a medal and a prize, and has so far been given to young scholars from Brazil, Australia, Singapore, Japan, the UK, Hong Kong, Italy, Russia and Belgium. 2011 marks the 10th anniversary of the creation of this award. Yet another reason to celebrate!

The extension of this attention for, and encouragement and recognition of young scholars by means of the Young Scholars Session was both necessary and useful. It is a well-known fact that many space lawyers are blessed with a (very!) long life, looking at for instance the respectable ages of the late Eugène Pépin, or more recently Eilene Galloway, who until the very end of her

almost 104 years continued to write excellent analyses on space law. Many of the Institute's current active Directors or Members have witnessed the early days of the space age, and those of the Institute. They are an immense resource of knowledge and experience and are treasured by all. On the other hand, it is essential to make room for new talent, to enable the new generation to develop, to become more deeply involved with the Institute, to build up their experience, so that they can eventually take the lead and carry the torch. We must continue to find ways to nurture the space lawyers of tomorrow. The Young Scholars Session is the third step on this path, and will be followed very soon by more.

An interesting feature of the Young Scholars Session in 2010 is that authors have been 'teamed up' with a mentor who advised them on their paper where necessary and served as 'sparring partner' in the final drafting processes. We would like to pay tribute to these mentors, for having accepted to take on this task and dedicated time to the excellent young authors whose papers you can read in this publication. Their names are listed, along with their mentees, elsewhere in this book.

Thanks are also due to the editors of this book. First, Professor Mark Sundahl of Cleveland State University (Ohio, USA) who also serves as Assistant Executive Secretary of the IISL, for having coordinated the publication process and liaised with authors and mentors. His patience, hard work and many ideas have helped this new initiative to be realised. Second, Mr. Gopalakrishnan from ISRO, India, who kindly accepted to co-edit with Mr. Mark J. Sundahl and help in the publication process. We are most grateful to the Indian Space Research Organisation (ISRO) for its generous support in sponsoring this publication. It is wonderful that India, a country where the average age is about 25, took up this effort. India has the greatest number of participating teams in the moot court competition's Asia Pacific round, and their performance is outstanding. But students in India and other emerging space (law) powers suffer from the lack of available research resources, and therefore this book will be a welcome addition to them, especially considering the way in which this book will be published.

Since it is important to keep up with technological developments in this increasingly digital era, the IISL has decided to publish this book as its very first e-publication. Besides a very limited number of printed copies, the book will be made available to all as a free electronic publication, that can be downloaded from our website at www.iislweb.org. This way, the papers by the new generation of space lawyers can reach the largest audience, and thus generate ever more interest in our fascinating field of activity. But we are convinced that the 'older' space lawyers will also be inspired by the words written by the young scholars; we thank them for the wise lessons they teach us, because, "who dares to teach must never cease to learn".

Happy reading!

The Hague/Buenos Aires, July 2011

Mentors

The successful publication of this volume and the quality of the papers herein is to a large extent due to the generous contributions of time and intellectual guidance by the scholars listed below who served as mentors to the authors.

Axelle Cartier

Dr. Stephen E. Doyle

Prof. Dr. Frans G. von der Dunk

Prof. Dr. Elisabeth Back Impallomeni

Prof. Dr. Ram Jakhu

Prof. Sergio Marchisio

Tanja L. Masson-Zwaan

Dr. Sylvia Ospina

Prof. Dr. Kai-Uwe Schrogl

Prof. Dr. Mark J. Sundahl

Prof. Dr. Maureen Williams

A Concise History of Space Law: 1910-2009

Stephen E. Doyle

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1. *Pre-Sputnik space law concepts*
2. *Post-Sputnik development of space law*
3. *Space law off the earth*
4. *Conclusions and observations*

The 100-year long history of space law is broadly internationally based. First mentioned in a journal article in Paris, in 1910, space law was an amorphous idea without shape or substance for more than two decades. In 1932 the first comprehensive monograph appeared, presenting important, fundamental concepts. Brief commentaries appeared in the 1930s and 1940s. The first doctoral dissertation dealing with space law appeared in 1953. By 1954 expanding international exchanges were occurring among jurists and commentators who were concerned about the needs for clarifications and definitions of law for anticipated human activity in outer space.

When Sputnik-1 was launched on October 4, 1957, earlier proposed concepts were no longer abstract or academic ideas. Nations had begun placing functioning objects in space beyond the atmosphere, and concepts began to be considered for inclusion in a new body of relevant law to regulate the activities of humankind in space. Following the launch of the first Sputnik the world community began to address possible principles, requirements, and contemplated prohibitions as law.

Development of space law during the 20th century evolved in four interrelated phases: (1) the development of concepts of space law before Sputnik: from 1910 to 1957; (2) the clarification and adop-tion of basic applicable laws: from 1957 to 1966; (3) the expanding uses of space and national and international laws and regulations to manage such uses, which has been a process continuing since the late 1950s; and (4) the regulation of human activities beyond the atmosphere, including eventually development of law to manage settlements and societies existing off the Earth. Regulation of such activities in space has only recently been seriously addressed.

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This paper highlights some contributions in each phase. Space law has enjoyed contributions of numerous jurisconsults, pragmatists and innovators. The "law" that has emerged is mercurial, hard and soft, national and international, accepted and debated. As Judge Vladlen Vereshchetin described the situation during the 52nd IISL Colloquium in Korea in 2009:

> Postmodernist legal theory and legal philosophy are awash with different concepts *vis-á-vis* the nature of law and its definitions. The same is true of the related categories of legal norms, legal relations and so forth. For some scholars, law encompasses every normative order, irrespective of its recognition as law by States and whether or not it is binding and enforceable. For others the very notion of a legal norm is untenable. They conceive law as a permanent process of decision-making.[1]

In this paper, space law is considered the cumulative body of national and international legislation, regulations, treaties, agreements, and conventions, created to enable, manage, and regulate world-wide, regional, and national commercial, civil governmental, and national or regional defense activities in or related to outer space.

1. Pre-Sputnik Space Law Concepts

During the first half of the 20th century there were only a handful of papers and one significant monograph proposing concepts of space law. The first paper in 1910[2] was by a Belgian lawyer, Emile Laude.[3] Laude not only believed a new law would govern new juridical relations, he also wrote: "The problem of the ownership and the use of Hertzian [radio] waves will be posed one day." Laude concluded his brief discourse concerning

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[1] V. Vereshchetin, "The Law of Outer Space in the General Legal Field, Commonalities and Particularities," a paper presented at the 52nd Colloquium on the Law of Outer Space, Daejeon, Korea, October 2009, to appear in the *Proceedings of the IISL for 2009.*

[2] E. Laude, "Questions Pratiques," Vol. 1, *Revue Juridique Internationale de Locomotion Arienne* 16-18, Paris (1910). The comment was translated into English as NASA Technical Memorandum NASA TM 77513, Wash., DC, August 1984. For comment text in English and more detail, see Doyle, S. E., *Origins of International Space Law and the International Institute of Space Law of the International Astronautical Federation*, 1, Univelt, San Diego, 2002.

[3] Emil Laude was born on May 15, 1878 in Bruges, Belgium. Having earned a law degree (JD) from the University of Brussels on October 13, 1904, he was named to the Bar in Brussels on October 29, 1904, under the patronage of Schoenfeld, a well known Belgian lawyer of the day. Laude eventually attained independent status at the Bar and was admitted to practice before the Court of Appeals of Brussels on 18 September 1907.

"practical questions" with a declaration that "The term Law of Space will thus be the generic term."[4]

The second paper[5] appeared in the USSR in 1926. V. A. Zarzar, a senior official of the Soviet Aviation Ministry, presented a paper at an air law conference held in Moscow. In the final portion of his paper, Zarzar states his primary theme: "Questions of international public air law, thus, are solved by conventions in accordance with the principle of complete sovereignty of nations over their air space."[6] The definitional question which Zarzar explicitly raised was not discussed: "We will not attempt to define the altitude at which the international zone begins." This issue was to become a central focus for later commentators.[7]

Once it was understood that the air space and outer space were legally and physically separable operational environments, it was clear that legal regimes to apply to these two areas should be substantially different. Laude (1910) and Zarzar (1926) recognized the basic altitude and operational differences between air and space flights and declared the need for separate legal regimes to regulate use of air space and outer space.

In 1931-32, a prescient and perspicacious Czechoslovakian lawyer, writer, inventor and engineering professor assembled an impressive survey of the emerging problems of space law. Vladimir Mandl followed developments of rocketry in Germany and in other countries, and saw the legal problems emerging long before they were noted by other jurists. Mandl's monograph on space law, the world's first, was published in German in Leipzig,[8] but its author was a German-speaking Czechoslovakian lawyer, in Pilsen. Mandl's 1932 monograph,

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4 From "Questions Pratiques", *op. cit. supra* note 2, at 18.

5 Zarzar, V. A., "Mezhdunarodnoye Publichnoye Vozdushnoye Pravo" (Public International Air Law); in *Voprosy Vozdushnogo Prava, Sportnik Trudov Sektsii Vozdushnogo Prava Soyuza Aviyakhim (Soyuz Obshchestv Druzhey Aviatsionnoy i Khimicheskoy Oborony i Promyshlennosti)* [Problems of Air Law, a Symposium of Works by the Air Law Sections of the USSR and RSFSR Unions of Societies for Assisting Defense and Aviation and Chemical Construction], vol. 1, pp. 90-103, SSSR i Aviakhim RSFSR, Moscow, 1927.

6 Zazar, *op. cit*., note 5. Zarzar's paper was translated for NASA by Leo Kanner Associates; see NASA TM-76913, dated June 1982. For text in English and more detail, see Doyle, S. E., *Origins... op. cit.* note 2, at 2-4.

7 See, for examples, the survey of early commentators' views on the upward extent of national sovereignty in Lay, S. H., and Taubenfeld, H. J., *The Law Relating to Activities of Man in Space* 39-51, an American Bar Foundation Study, University of Chicago Press, Chicago, 1970.

8 Mandl, V., *Das Weltraum-Recht: Ein Problem der Raumfahrt*, Mannheim, Berlin, Leipzig; J. Bensheimer, 1932, 48 pp.

containing the world's first comprehensive survey of space law, is being elaborated in a separate paper of this Colloquium by Vladimir Kopal.[9]

In Leningrad, USSR in 1933, at a conference dealing with air law, the Soviet legal scholar, Y. A. Korovin, presented a paper addressing human penetration of the stratosphere using hot air balloons, and related legal problems. His paper, entitled "Conquest of the Stratosphere and International Law," was subsequently translated and published in a French public international law journal.[10] Korovin's article cited all the potentially harmful aspects of over flights, including: optical and infra-red reconnaissance, aerial bombing, contraband delivery, and other potential injury to subjacent population and property by over-flying aircraft. Having clearly established the unquestionable acceptance and universal applicability of the principle of sovereignty in navigable superjacent airspace, Korovin believed that the altitude or speed of an overflight could not change its legal status.

Thus, prior to 1939, there was an established consensus that sovereignty must prevail with regard overflights in the airspace. But Laude (1910) Zarzar (1926) and Mandl (1932), conceptually asserted that above the airspace, in what was earlier termed "the ether," the physical nature of flight (speeds and altitudes) would be so totally different from comparable aspects of aeronautical flight, that flights in "the ether" would be practically beyond the control of subjacent states. Thus, flight in "the layer of unbreatheable gas" or "beyond the airspace" would be and should be free of and unrestrained by considerations of sovereignty over the airspace. The notable dissenter was the Soviet scholar Korovin (1934), who believed that altitude and speed notwithstanding, over flights of national territory at any speed or altitude could involve threats to safety and security of states, and states have a right to defend and protect their national integrity by any appropriate means available to them, "from the seizure of the crew...to reprisals of all kinds."

One aspect of overflight not dealt with by writers until the mid-1950s was the question of "peaceful use" of outer space, and whether or not a concept of State sovereignty would involve denial of overflight for peaceful or scientific purposes.[11] Was there to be a concept

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[9] See also Kopal, V. Vladimir Mandl: "Founding Writer on Space Law," in Durant and James (eds.) *First Steps Toward Space* 87-90, Smithsonian Institution Press, Washington, DC, 1974.

[10] Korovin, E, "La Conquête de la Stratosphère et le Droit International," *Revue Générale de Droit International Public 675-686*, Paris, vol. 41, no. 6, November-December 1934.

[11] The issue of "peaceful uses of outer space" has remained a perplexing and unresolved issue of definition for many decades. See Jasani, B., (ed.) *Peaceful and Non-peaceful Uses of Space: Problems of Definition for the Prevention of an Arms Race*, published for UNIDIR by Taylor and Francis, New York, London, 1991, 179 pp.

of "innocent passage" at extreme altitudes that would parallel the maritime concept of "innocent passage" of a ship transiting through national territorial waters?

A shroud of secrecy fell over most rocket technology development in Europe and the USSR during the 1930s as military officials of governments began to realize the potential contributions to national military efforts offered by liquid and solid fueled rocketry. In the USSR applications of rocketry were being demonstrated to assist aircraft take-off and for tactical ground-to-ground barrage rocketry, and, in Germany, programs were under development for advanced rockets that could extend the historical range of artillery by carrying warheads to targets at distances of hundreds to thousands of kilometers from the launch site. By 1939, the world stage was well set for the military development and applications of rocketry which occurred during the Second World War.[12]

Two papers appeared in the 1940s. The first apparent writing in the English language dealing with state sovereignty at extreme altitudes is in a paper presented to the British Interplanetary Society in London on October 5, 1946. "The Challenge of the Spaceship," subtitled "Astronautics and Its Impact upon Human Society," was written and presented by Arthur C. Clarke.[13] The paper contains an assessment of the impact upon society of emerging space flight, and explains that there must be an upper limit to national sovereignty because

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[12] The interested student can find detailed and reliable accounts of the history of this period in Ley, W., *Rockets, Missiles and Space Travel,* (revised and enlarged edition with additional satellite data) The Viking Press, New York, 1958, 528 pp.; supplemented by Zaehringer, A., J., *Soviet Space Technology*, Harper & Brothers, New York, 1961, 180 pp. See also Von Braun, W. and Ordway, F. I., *History of Rocket and Space Travel,* 3rd ed., Thos. Y. Crowell Co., New York, 1975; Dornberger, Walter, *V-2; Der Schuss ins Weltall. Geschichte einer grossen Erfindung* (*V-2, The Shot into Space. History of a Great Invention*), Bechtle Verlag, Esslingen, 1952, 295 pp. This history of the Peenemünde R&D program was later published in English language versions as *V-2* by Hurst and Blackett, London, 1954; and Viking, New York, 1954, 281 pp. See also, Ordway, F. and M. Sharpe, *The Rocket Team*, Crowell, New York, 1979, about the assembly, transport and work of the German ex-patriot rocket team that came to the United States, later republished by Apogee Books, Burlington, Ontario, Canada, 2003, 324 pp; Ley, W., *Rockets, Missiles and Men in Space,* rev. ed., Signet Books, New York, 1969, the final edition of a series of revisions by Willy Ley that spanned 25 years from its original publication as *Rockets: The Future of Travel Beyond the Stratosphere,* Viking Press, New York, 1944. Wernher von Braun and Frederick Ordway collaborated on *History of Rocketry and Space Travel*, Crowell, New York, 1966, 244 pp.; with revised editions in 1969, 276 pp.; in 1975, 308 pp.; and with Dave Dooling as a co-editor in 1985, 308 pp. For early rocketry in the USSR, histories are gradually emerging in the annual historical colloquia of the International Academy of Astronautics, being published by the American Astronautical Society in that Society's Historical Series, published by Univelt, San Diego.

[13] Arthur C. Clarke was at the time the President of the British Interplanetary Society. He had not yet begun his writing of popularized technical explanations of spaceflight, nor was he yet recognized for any of his eventual world-famous science fiction.

otherwise "in the course of a day, [on a rotating globe] every country will lay claim to a large portion of the Universe!"[14]

Another significant early concept appeared on August 28, 1948. The US Department of State released a brief announcement that stirred no attention among students of astronautics. Entitled "Discussions Asked on Territorial Problem of Antarctica," the release read:

> The Department of State has approached the Governments of Argentina, Australia, Chile, France, New Zealand, Norway, and the United Kingdom informally with a suggestion that a solution for the territorial problem of Antarctica be discussed. It is the viewpoint of the Department of State that the solution should be such as to promote scientific investigation and research in the area. The Department of State has suggested that this can perhaps be done most effectively and the problem of conflicting claims at the same time solved through agreement upon some form of internationalization. The Department of State expects that the question is one which will require an extended exchange of views, consideration of suggestions, and probably reconciliation of varying viewpoints. Until such exchange of views and necessary further study is completed, it is not believed that any useful purpose could be accomplished by a conference on the subject, and no such conference is contemplated at present.[15]

The suggestion to consider a form of internationalization as a means of promoting scientific investigation and research in the Antarctic area would become an important concept in the formation of a later, largely unprecedented international arrangement.[16]

The first US legal commentary on space law appeared at the US Naval War College in Newport, Rhode Island, in December 1948. Distinguished air law expert, John Cobb

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[14] 14 Clarke, A. C., "The Challenge of the Spaceship," VI *Journal of the British Inter-planetary Society,* 1946-47, pp. 66-67.

[15] *Dept. of State Bulletin*, September 5, 1948, p. 301.

[16] The US plan led to a Washington conference in 1959, beyond the scope of this study, which produced the *Antarctic Treaty*. The importance of the Antarctic analogy for space law is presented in Jessup, P., and H. J. Taubenfeld, *Controls for Outer Space and the Antarctic Analogy*, Columbia University Press, New York, 1959. An interested student should see also US Congress, Hearings before the Senate Committee on Foreign Relations, *The Antarctic Treaty,* 86th Cong., 2nd Sess., GPO, Wash., DC (1960). See also, Taubenfeld, H. J., "A Treaty for Antarctica," in *International Conciliation*, No. 531, Carnegie Endowment for International Peace, New York, (January 1961) pp. 245-322.

Cooper, presented an invited lecture on the topic of "International Air Law." At the end of his lecture Cooper added a short section headed "Future Use of Guided Missiles above the Airspace." With the statement of a hypothetical case reminiscent of a case given by Arthur C. Clarke about 26 months earlier in London, Cooper presented a problem to the Naval War College and requested assistance of the officers on duty there. He postulated the supposition that countries A and C, whose land territories did not touch at any point, were at war. A neutral country B occupied the surface territory between A and C. If country A started bombarding country C with guided missiles passing through flight-space over country B at an altitude considered beyond the airspace and at a height where country B would find it impossible to intercept such guided missiles or otherwise prevent their passage over its territory, Cooper asked: "Had the neutral rights of country B been affected?"

Cooper said his scientific friends were convinced that rockets or other guided missiles may be propelled from the earth to the moon within a comparatively few years, and the problem presents curious political and geographic difficulties.[17]

Cooper put the "upper limit" issue before a class of officers of the United States Navy. There is no record of any response from his audience. Less than 26 months after raising the issue at Newport, Cooper had developed a tentative, conceptual solution to the problem. He wrote that it was important and urgent to reach international agreement on the upward limit of national sovereignty before repeated rocket flight operations were begun into areas beyond airspace. Cooper's first detailed analysis of the airspace definitional question was presented in Mexico City in 1951 and became a standard reference.[18]

In May 1949, a British engineer published a letter which contained an opinion encapsulated in a small phrase that would become a central focus of controversy in space law during the ensuing 50 years. The letter, written in defense of the Moon, declared in a chastisement of the US Government that "the Moon is not their property...it is the common heritage of

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[17] 17 Cooper's original double-spaced manuscript presentation is on file in the library of the US Naval War College in Newport, R. I. See also, Cooper, J. C., "International Air Law," in Vlasic, I. A. (ed.) *Explorations in Aerospace Law,* McGill University Press, 1968, at pp. 266-267.

[18] Cooper, J. C., in an address delivered at the *Escuela Libre de Derecho* in Mexico City on January 5, 1951; also in Cooper, J. C., "High Altitude Flight and National Sovereignty," 13 *International Air Transport Association Bulletin* 46, June 1951; Vlasic, I. A., (ed), *Explorations in Aerospace Law: Selected Essays by John Cobb Cooper 1946-1966*, McGill University Press, Montreal, 1968, see author's note at p. 257.

man."[19] Additionally, in a French pamphlet published in 1949, being an introductory survey of the emerging field of "astronautics," Lionel Laming observed that "the conquest of space may mean that all the solar system, and not only the Earth, deserves to be considered as the heritage of mankind."[20] Concepts of space law were emerging in different countries, some in parallel, some reinforcing others; but until 1950 national astronautical programs and legal thinking were generally confined in separate language channels. There were a few efforts at cross communication and no institutions worked on a sustained basis to span the frontiers or linguistic boundaries of national astronautical programs.

In Germany in 1950, a distinguished and renowned air law scholar arrived at the University of Cologne to accept appointment to the Law Faculty. Prof. Dr. Alex Meyer's lectures on Public Law and Air Law became a formal part of the University's published curriculum in 1951. "In 1952 the work of the Research Department of Air Law found a new medium through editing a journal of its own, the quarterly *Zeitschrift für Luftrecht* (Journal of Air Law)."[21] From this strategic position, Alex Meyer was to become more widely and internationally recognized as one of the learned students of space law addressing the emerging issues. Prof. Meyer became one of the major early commentators on emerging concepts of space law.

In Montreal, P. Q., Canada, another academic institution welcomed a new educator, Prof. John Cobb Cooper. McGill University is co-located in Montreal, Canada, with the headquarters of the International Civil Aviation Organization (ICAO) and the International Air Transport Association (IATA). Along with these seats of world governmental and industrial cooperation in civil aviation, with the assistance of the Ford Foundation, McGill University established in 1951 an Institute of Air Law, which in 1957 was expanded and renamed the

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[19] 19 From "Correspondence" to the *Journal of the British Interplanetary Society,* vol. 8, no. 3, May 1949, pp. 131-32, in a comment entitled "Man and His Mark." Ralph Andrew Smith was one of the original Guarantors of the Society and served continually on the Council from its inception to the time of writing this letter and thereafter. For the text of Smith's letter see Doyle, S. E., *Origins … op. cit. supra* note 2, at 18-19.

[20] Laming, L., *L'Astronautique,* Presses Universitaires de France, Paris, 1950 at 94. Lionel Laming is identified in the work as a Licentiate in Sciences and an Engineer. Arthur C. Clarke reviewed this pamphlet in the *JBIS* as follows: "This little book – the third to bear this title – is a good popular introduction to the subject. It deals briefly but accurately with rocket principles, atomic energy, navigation, physiological prob-lems, and the solar system. The concluding chapter discusses some of the applications of astronautics, and there is an interesting glossary." In *JBIS,* June 1950 at p. 209.

[21] Bittlinger H., *History of the Institute of Air and Space Law at the University of Cologne*, a pamphlet of the Institute, English by Angela Ritter and Karen Tanner, University of Cologne, 1989.

Institute of Air and Space Law.[22] Cooper was the initial Director of this first institute in North America dedicated to the study of international air law, and from 1957 forward to the study of air and space law. In parallel with McGill, in 1951 Prof. Nicholas Mateesco Matte established a francophone course of study in international air law at the University of Montreal. Similarly, in 1957, Mateesco's course was expanded to include air and space law. In response to the post war explosion in international civil aviation, as well as later emergence of astronautical use of rocketry, a slowly forming cadre and infrastructure for training of specialists in aviation, and then space law, was being built during the 1950's at Cologne and Montreal.

During the 1950s the flood gates were opened and space law articles and papers began to appear with increasing frequency. Significant comments on space law were published by the Deputy Director of the General Legal Division of the United Nations, Oscar Schachter, in "Legal Aspects of Space Travel," published in the *Journal of the British Interplanetary Society* (*JBIS*).[23] Like other English language space law commentators of the early 1950s, Schachter limited his commentary and reactions to other English language writers. International forums, such as the International Astronautical Federation, only began to appear in the early 1950s; consequently there were still relatively few interlingual exchanges of views among the early pundits on space law.

Concerning early Soviet interest and participation in the IAF, Robert Crane reported[24] that, in response to invitations to attend the early astronautical congresses, scientists from the USSR sent only brief notes of regret. Some informal correspondence was maintained with select Soviet scientists, but the USSR did not move to join the IAF until after the formal announcement in July 1955 of the planned Soviet satellite program for the 1957-58 International Geophysical Year. With proposals from several of its constituent organizations, the Executive Committee of the International Council of Scientific Unions (ICSU), decided in 1951 to establish the *Comité Spécial de l'Année Géophysique Internationale* (*CSAGI*) to begin planning for a comprehensive international cooperation to study the Earth. Eventually known as the International Geophysical Year of 1957-58,[25] this program stimulated the first launches of man-made vehicles used to study outer space.

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22 See details and history at *http://www.mcgill. ca/iasl/*; last visited April 25, 2010.

23 Schachter, O., "Legal Aspects of Space Travel," Vol. 11, No.1, *JBIS* 14–16, January, 1952.

24 Crane, R. D., "Background of the International Institute of Space Law," Haley, A. G., and M. D. Schwartz (eds.), *Proceedings of the 4th Colloquium on the Law of Outer Space*, Univ. of Oklahoma Research Institute, Norman, Okla., 1963, 153-170, at pp. 154-155.

25 See Sullivan, Walter, *Assault on the Unknown*, McGraw-Hill, New York, 1961, chapter 2; and J. Tuzo Wilson, *IGY: The Year of the New Moons*, Alfred A, Knopf, New York, 1961, chapter 1.

An unnoticed but important diplomatic event established a significant precedent in international law on July 21, 1950, when the US and the UK signed an agreement that took immediate effect, permitting the extension of the US Missile Test Range southeastward from Cape Canaveral, Florida through the airspace of the Bahama Islands.[26] This appears to have been the first international agreement to permit test and later operational uses of rockets passing through the superjacent airspace of a non-launching government. This agreement led to the US construction of downrange stations on islands such as Grand Bahama, Grand Turk, Antigua and Ascension. Future downrange stations eventually were added at sites as far distant as Pretoria, South Africa.

The International Astronautical Federation (IAF) has an important place in the history of space law. The Federation created the first major international forum for the early, regular exchange of views among interested pundits about the development of space law. Although the early congresses of the IAF concentrated for the most part on technical papers on engineering aspects of astronautics, almost from the outset, interested lawyers presented papers.

The Third International Astronautical Congress (IAC) convened in Stuttgart, Germany on September 1, 1952. A legally significant paper presented at that Congress received little notice at the time. Prof. Dr. Alex Meyer, the Director of the Air Law Institute at Cologne, delivered the paper. Meyer's first published paper on space law, entitled "Space Law," was a short set of prefatory remarks combined with a brief bibliography, prepared to introduce the topic of space law to the readership of the new legal journal being established in Germany to deal with air law. "Space Law" appeared in the first volume of the University of Cologne's *Journal of Air Law*.[27] Meyer's first discoursive paper on space law, "Legal Problems of Flight into the Outer Space," was presented at the Third IAC in Stuttgart.[28]

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[26] See *An Agreement between the United States and the United Kingdom regarding the establishment by the United States of a high altitude interceptor range in connection with the operation of the Bahamas Long Range Proving Ground for guided missiles*, signed at Washington, DC and entered into force on July 21, 1950. 1 UST 545; TIAS 2099; 97 UNTS 193. See also the exchange of notes at Washington, DC, on February 24 and March 2, 1953 related to this agreement at 4 UST 429; TIAS 2789; 172 UNTS 257; and an amendment extending the flight testing range in an exchange of notes at Washington, DC, on April 1, 1957, entering into force on that date, at 8 UST 493; TIAS 3803; 288 UNTS 364.

[27] Meyer, A., "*Weltraumrecht*" [Space Law], *Zeitschrift für Luftrecht,* vol. 1, 1952, pp. 234-236.

[28] It appeared in English as "Legal Problems of Spaceflight," in the *Annual Report of the British Interplanetary Society,* 1952, pp. 353-354.

Meyer's work was an influential statement dealing with several issues that were receiving increasing attention, including the upper limit of national sovereignty and the possibility of the use of space for military purposes. Meyer's address was reproduced later in a 1961 US Congressional symposium of papers about space law.[29] The paper was presented to an international audience of experts from astronautically active countries. It drew on sources in English, French and German language publications, and it demonstrated that the thinking of many commentators in several countries should be taken into account in developing legal positions on spaceflight. A comparison of Meyer's 1952 paper with Mandl's 1932 monograph shows substantial agreement by Meyer with Mandl's thoughts in many subject areas, except Meyer's insistence that outer space should not be allowed to become a theater of military operations. The paper by Meyer became a model and stimulant for other commentators. It was distributed during the 1952 IAC and it was repeated later or described in other sources in several languages.[30] Thereafter, more inter-language citations began appearing in legal commentary on space law.

In 1953 the world's first known doctoral dissertation on legal aspects of space flight was submitted to and approved by the Faculty of Law and Political Science of the Georg-August University in Göttingen, Germany by Welf Heinrich, Prince of Hanover. Entitled *Air Law and Space*, the dissertation offered a thesis that "the entire area beyond the atmosphere would have to be considered free territory both on technical grounds founded on the law of nature and for reasons of legal construction and policy."[31] Heinrich paid attention to and cited both Mandl's 1932 monograph and recent works by Alex Meyer. Drawing on analogies from both air and maritime law, and acknowledging that analogies are imperfect, Heinrich asserted that elements in the existing law could be useful to regulate space flight. Heinrich's work was little known outside Germany until later in the 1950s when it became known to the American lawyer, Andrew G. Haley. Haley was so impressed with the scope and content of Heinrich's dissertation that he arranged a tour across the United States in November 1957,

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[29] US Congress, *Legal Problems of Space Exploration: A Symposium*, prepared for the use of the Senate Committee on Aeronautical and Space Sciences, 87th Cong., 1st Sess., Doc. No. 26, GPO, Wash., DC, March 1961, pp. 8-19.

[30] See as examples, Meyer, A., "Legal Problems of Space Flight," in the *Annual Report of the British Interplanetary Society,* 1952, pp. 353-354; also in *Zeitschrift für Luftrecht*. in English (1953) p. 31, in German (1953) p. 43.

[31] Heinrich, W., *Air Law and Space*, translated and reproduced in the *Saint Louis University Law Journal*, Spring 1958, pp. 11-69; reproduced in U. S. Congress, *Space Law: A Symposium*, prepared at the request of Lyndon B. Johnson, Chairman, Senate Special Committee on Space and Astronautics, 85th Cong., 2nd Sess., Committee Print, GPO, Wash., DC, Decemberm 31, 1958, pp. 18-76, Conclusions at 73-76, this quotation at p. 74.

in the wake of Sputnik 1, during which Haley and Heinrich spoke about space law at four major universities, seventeen law schools, and fifteen social or specialist groups ranging from chambers of commerce to bar associations and section meetings of the American Rocket Society.[32] Following the US tour, the two men toured Europe together continuing speaking at universities and other professional forums. As a result of these tours, Heinrich's dissertation eventually became more broadly known and read. Like Meyer's work it contained a broad base of well researched and documented commentary and opinion. Heinrich cited and discussed the earlier works of Fauchille, Mérignhac, Meyer, among numerous other early air law pundits; and Mandl, Cooper, Schachter and Meyer on aspects of space law. Heinrich did extensive research in German and French periodicals and current newspapers, and extended the prior analyses of both air law and space law aspects of sovereignty in airspace, discussing implications at various altitudes.[33]

Another article published in Europe during 1953 presented views generally parallel to those of Welf Heinrich.[34] Publishing in Paris in a French periodical, Joseph Kroell wrote about some practical problems of international public law in space.[35] Kroell consolidated earlier commentary into a list of "principles" on which the international community, in some appropriate forum, could begin to take definitive action in order to create a relevant body of law. Although the UN was being increasingly mentioned, there was no consensus on how to, or in what forum to involve the UN in development of space law.

During the 1950s, it was clear to informed observers that significant needs would arise for radio frequency management and the international allocation of sufficient radio frequencies to meet the communications, tracking, and telemetry requirements of capabilities in astronautics. Several works explain and describe radio frequency's criticality to the processes

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[32] A paper entitled "Law of the Space Age" was presented in two parts: Part 1 by Heinrich and Part 2 by Haley. See the brief notice about this trip in *Astronautics,* November 1957, p. 88. The tour was stimulated by the public interest in development of space law generated by the USSR and US publicly announced programs of space-flight and the successful orbiting of Sputnik-1 in October 1957. See also, Heinrich, W., *"Eine Reise in Sachen 'Weltraumrecht,' Eindrücke und Erlebnisse einer Vortragsreise Staaten von Amerika im Jahre 1957"* (A Trip on the Matter of Space Law, Impressions and Experiences of a Speaking Tour in the American States in 1957), in *Beiträge zum Luft- und Weltraumrecht; Festschrift zu Ehren von Alex Meyer,* Carl Heymanns Verlag KG, Köln, 1975, pp. 385-395.

[33] "Air Law and Space," *op. cit. supra,* note 40.

[34] Heinrich, W., "Die Rechtprobleme de Welt-raumes" [Legal Problems of Outer Space) in *Weltraumfahrt*, vol. 4, no. 4, Oct. 1953, which contains a summary of the content of his doctoral dissertation submitted at the University of Göttingen earlier in the year.

[35] Kroell, Joseph, "Eléments créateurs d'un droit astronautique" (Formative Elements of an Astronautical Law), *Revue générale de l'air* (Paris) Année XVI, nos. 3-4, 1953, pp. 222-245.

of space flight, and the characteristic nature of satellite and other uses of radio frequency in support of space flight operations.[36] In April 1954, Commissioner George Sterling, US Federal Communications Commission, presented his views to the American Rocket Society National Capital Section on needs for regulation of satellite uses of radio frequency. This early, authoritative statement evidenced some US Government concern about the need for rules and regulations for emerging astronautical radio frequency requirements. Sterling's short paper did not propose solutions so much as it called attention to emerging issues that would require national and international attention of regulators. The global nature and impacts of radio frequency uses in astronautics are repeatedly manifest in the paper.[37] Commissioner Sterling's concern was not widely shared by his colleagues, nor was there any major effort made by the United States to address these emerging issues in the international forums concerned with astronautical radio frequencies. The issues of appropriate US national and international action for radio frequency regulation were to become a central theme in the writings of Andrew G. Haley later in the decade.[38] In April 1954, Sterling's was the earliest call by a senior government official for attention to the political and technical complexities and legal implications of international and national astronautical uses of radio frequency. This need had been pointed out far earlier by Laude (1910) and Zarzar (1925). By 1954 astronautical radios were being designed into launch vehicles and proposed earth satellites. The use of radio telemetry and control was required for spaceflight.

In March 1955, the US National Committee for the International Geophysical Year (IGY), established by the National Academy of Sciences in February 1953, issued a feasibility study endorsing the idea of a US earth satellite project in a report to the US National Academy of Sciences and the National Science Foundation.[39] This endorsement was followed by a detailed earth satellite program developed by the National Committee for the IGY.[40]

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[36] See White, R. L., and H. M. White, Jr, *The Law and Regulation of International Satellite Communication*, Artech House, Boston, 1988, 309 pp.; Smith, M. L., *International Regulation of Satellite Communication*, Martinus Nijhoff, Dordrecht., 1990, 245 pp.; and the sources cited therein.

[37] Sterling, G. E., "Utilization of Radio Frequencies in Connection with Rockets", a presentation before the National Capital Section of the American Rocket Society, Washington, D. C., April 2, 1954. published in *Jet Propulsion*, vol. 24, no. 5, September-October, 1954, pp. 322-23

[38] See, for example, Haley, A. G., "Law of Outer Space—Radio Controls Urgently Needed," a paper delivered to the Symposium on Outer Space, Committee on Aeronautics of the Federal Bar Association of New York, New Jersey and Connecticut, at the Association of the Bar of the City of New York, October 9, 1958; printed in US Congress, *Space Law, A Symposium*, *op. cit.* note 31 at 458-471.

[39] US Congress, *A Chronology of Missile and Astronautic Events,* a report of the House Committee on Science and Astronautics, 87th Cong., 1st Sess., H. R. No. 67, GPO, Wash., DC, March 1961, at p. 21.

[40] There are numerous books, studies and reports that grew out of and describe the IGY. Two reliable books are Sullivan, W., *Assault on the Unknown*, McGraw-Hill, New York, 1961, 460 pp.; and Wilson, J. T., *IGY: The Year of the New Moons*, Alfred Knopf, New York, 1961, 360 pp.

During the early 1950s organizational activity and publications on space law appeared also in Latin America. Two prominent persons in the region were Professors Teofilo Tabanera and Aldo Armando Cocca of Argentina.[41] In Europe two lawyers compiled extensive articles on the emerging issues of space law. British barrister Cyril Horsford[42] wrote an inquiring exposition of many emerging issues,[43] and C. Wilfred Jenks[44] produced a survey of the emerging issues.[45] Once the US and the USSR publicly announced their intentions to launch satellites as part of their IGY programs, the multiplication of articles on concepts and aspects of space law increased exponentially. The US Government, on July 29, 1955,[46] and the Soviet Government, on July 30, 1955,[47] formally announced independent intentions to launch earth satellites as part of their respective research programs in the IGY.

At the annual meeting of the American Society of International Law in April 1956 an evening symposium was held on the topic "International Air Law." In fact it was a significant international roundtable on space law.[48] A strong international panel with wide audience participation discussed many space issues.[49] The annual International Astronautical Congresses held during the 1950s also had increasing participation by lawyers addressing space law issues.[50]

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41 See S. Doyle, *Origins, op. cit.* note 2, at 35-37.

42 Horsford was appointed later and served many years as Deputy Clerk of the Privy Council.

43 Horsford, C. E. S., "The Law of Space," *JBIS*, May-June 1955, pp. 144-150; reproduced in US Congress, *Symposium, op. cit. supra,* note 28, at 23. For a text review see Doyle, S. E., *Origins... op. cit. supra* note 2, at 37-39.

44 Assistant Director General of the International Labor Organization in Geneva.

45 Jenks, C. W., "International Law and Activities in Space," *International and Comparative Law Quarterly*, Jan. 1956, 99-114; reprinted in US Congress, *Symposium, op. cit. supra,* note 28, at 33-45. For a text review see Doyle, S. E., *Origins... op. cit. supra* note 2, at 46-51.

46 *Public Papers of the Presidents of the United States: Dwight D. Eisenhower, 1955*, GPO, Wash., DC, 1959, p. 148. *Department of State Bulletin*, August 8, 1955, p. 218.

47 US Congress, *A Chronology, op. cit.* note 39, at 22.

48 See Cooper, J. C., "Legal Problems of Upper Space," *Proceedings of the American Society of International Law*, Wash., DC, 1956, pp. 85-93. [Cooper's paper and the evening's discussion are contained in the *Proceedings* of the Society meeting and they are reproduced in US Congress, *Space Law: A Symposium*, prepared at the request of Hon. Lyndon B. Johnson, Chairman, Senate Special Committee on Space and Astronautics, 85th Cong., 2nd Sess., Committee Print, GPO, Wash., DC, December 1958 at pp. 122-149. Cooper's paper is also reproduced in Vlasic, I., A., (Ed), *Explorations in Aerospace Law: Selected Essays by John Cobb Cooper 1946-1966*, McGill University Press, Montreal, 1968, pp. 268-278, but the panel discussion is omitted.]

49 For a précis of the evening, see Doyle, S. E., *Origins ... op. cit. supra* note 2, at 51-59.

50 In the same source, see accounts of the IAF annual meetings and papers presented at 23-71.

Lawyers Spoke Early at
International Astronautical Congresses

Congress Location	Year	Speaker
Stuttgart	1952	A. Meyer
Innsbruck	1954	A. A. Cocca
Rome	1956	Pépin, Cocca, Haley, *et al*.
Barcelona	1957	Pépin, Haley, Cooper, *et al*.
The Hague	1958	1st Colloquium*

*Annual Colloquia followed thereafter.[51]

A particular session, held in Rome in 1956, became quite historically significant.[52] At that session, the American lawyer Andrew Haley was highly distressed by the apparent lack of availability of earlier papers and communication among interested lawyers discussing concepts of space law. Haley was later elected President of the IAF, and in that role, he played a major part in the stimulation and creation of the International Institute of Space Law.[53]

A Japanese article appeared in May 1956 dealing in part with space law.[54] This was among the earliest of the Japanese commentaries. Similarly, on the eve of the first space flight in 1957, two interesting papers appeared discussing the potential relevance and value of maritime analogies for development of space law.[55] In 1955, works on astronautics in the

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51 See Doyle, S.E., *Origins... op. cit.* note 2, at 27.

52 Also in that source, see the recapitulation of the 1956 IAF space law session at 61-70.

53 See a summary of the creation of the IISL in Doyle, S. E., *Origins... op. cit.,* note 2, at 80-93. See also Pépin, E., *International Institute of Space Law of the International Astronautical Federation: A Brief History*, AIAA, Reston, VA, 1982, 115 pp.

54 Taoka, R. "Airspace Sovereignty," a presentation to the Third Japanese Aviation Law Society's General Assembly, May 1956, translated from the original Japanese by Arthur C. and T. Kobayashi. The text was published in Japanese as *Kuiki no ryoyuken* (Territorial Sovereignty Over Airspace) in *Kûhô* (Journal of Air Law), no. 2, Tokyo, October, 1956, pp. 1-30.

55 Ward, C. M., "Projecting the Law of the Sea into the Law of Space," in *JAG Journal,* March 1957, pp. 3-8; and Yeager, P. B., and J. R. Stark, "Decatur's Doctrine: a Code for Outer Space," in the *Proceedings of the US Naval Institute*, September 1957, pp. 931-937; both works are reproduced in *Senate Symposium, op. cit.*, note 29.

Soviet literature began appearing.[56] And in 1956 Soviet and East European writings on space law emerged and multiplied rapidly.[57]

2. Post-Sputnik Development of Space Law

The decade of the 1960s involved the initiation and substantial successes of the United Nations' Committee on the Peaceful Uses of Outer Space (COPUOS) in drafting applicable space law. The secretariat support for UN space related activities was provided through a staff, which came to be known in 1992 as the Office of Outer Space Affairs (OOSA) in the UN Secretariat. During the 1960s the USSR and the US were dominant in spaceflight activities. For subjects on which these two powers could agree, it was possible for the United Nations to formulate and obtain general assent to international agreements relating to spaceflight activities. COPUOS was a unique organ of UN in which there was no voting. Decisions were taken by consensus, *i.e.,* the absence of objections.

The first, most significant of the relevant UN-produced instruments, a Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space,[58] was adopted unanimously by UNGA in 1963. COPUOS then proceeded to elaborate five treaties implementing the declaration. This COPUOS effort continued during the 1960s and 1970s producing the:

- *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies;*[59]
- *Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space;*[60]
- *Convention on International Liability for Damage Caused by Space Objects;*[61]

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[56] Kucherov, B., *Astronautical Sciences and Aviation in the Soviet Union: A Bibliography*, Library of Congress, Washington, DC, 1955.

[57] See the 1961 bibliography by R. D. Crane of more than 150 works on legal problems of space exploration by residents of the USSR and Eastern Europe, in Crane, R. D., "Guide to the Study of Communist Views on the Legal Problems of Space Exploration and a Bibliography," in the *Senate Symposium, op. cit*. note 29, at 1011-1036.

[58] *General Assembly Resolution 1962 (XVIII)*, adopted unanimously on 13 December 1963.

[59] General Assembly Resolution 2222 (XXI), adopted on 19 December 1966, opened for signature on 27 January 1967, entered into force on 10 October 1967.

[60] General Assembly Resolution 2345 (XXII), adopted on 19 December 1967, opened for signature on 22 April 1968, entered into force on 3 December 1968.

[61] General Assembly Resolution 2777 (XXVI), adopted on 29 November 1971, opened for signature on 29 March 1972, entered into force on 1 September 1972.

- *Convention on Registration of Objects Launched into Outer Space;*[62] and the
- *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies.*[63]

As time passed, more countries became interested in space activities, and the size of COPUOS increased. As the size increased, obtaining consensus on the content of formal treaties became substantially more difficult.

UNCOPUOS Growth through Time

Resolution #	Date	# of Members
1348 (XIII)	1958	18
1472 (XIV)	1959	24
1721 (XVI)	1961	28
3182 (XXVIII)	1973	37
32/196	1977	47
35/16	1980	53
49/33	1994	61
56/51	2001	64
57/116	2001	65
59/116	2004	67
62/217	2007	69

After 1980 the COPUOS oversaw the drafting, formulation and adoption of four additional General Assembly resolutions containing declarations of principles:

- *Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting*, adopted on 10 December 1982 (UNGA Resolution 37/92);

[62] General Assembly Resolution 3235 (XXIX), adopted on 12 November 1974, opened for signature on 14 January 1975, entered into force on 15 September 1976.

[63] General Assembly Resolution 34/68, adopted on 5 December 1979, opened for signature on 18 December 1979, entered into force on 11 July 1984.

- *Principles Relating to Remote Sensing of the Earth from Outer Space*, adopted on 3 December 1986 (UNGA Resolution 41/65);
- *Principles Relevant to the Use of Nuclear Power Sources in Outer Space*, adopted on 14 December 1992 (UNGA Resolution 47/68); and the
- *Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking Particular Account of the Needs of Developing Countries*, adopted on 13 December 1996 (UNGA Resolution 51/122).

The COPUOS continues meeting annually, monitoring progress of States and international organizations in the use and exploration of outer space, and reporting to the General Assembly.

In parallel with UN development of space law, starting in the 1950s, significant international organizations appeared to facilitate international cooperation and the exploitation of space technology. Selected organizations generated by space related activities include:

IAF	1952
ICSU/COSPAR	1958
UN ad hoc COPUOS	1958
UN Space Unit (Secretariat)	1959
UNCOPUOS	1959
IAA/IISL	1959
ESRO & ELDO	1962
INTELSAT (Interim)	1964
INTELSAT (Permanent)	1971
INTERSPUTNIK	1971
ESA	1975
EUTELSAT	1975
ARABSAT	1976
INMARSAT	1979
Multiple NAVSATS	1970-1980
EUMETSAT	1986
UN/OOSA (Secretariat)	1992

After Stephen Gorove joined the faculty of Law at the University of Mississippi in the mid-1960s, the UMiss Law Faculty became increasingly engaged in the study of and hosting meetings concerning the development of space law.[64] Today the University of Mississippi Law Faculty hosts the National Remote Sensing and Space law Center and the world's only periodic journal devoted exclusively to space law.[65]

As technology developed and national programs matured, national governments established laws and national organizations devoted to the management and or regulation of national activities in space. Among the countries establishing national entities are:

Legislation or Decree[66] in	**Year**
USSR*	1946
USA*	1958
France*	1961
Japan*	1969
Norway	1969
Sweden	1982
UK	1986
Canada	1990
Argentina*	1991
Russian Federation*	1992
Ukraine*	1992
South Africa*	1993
Brazil*	1994

64 See Landon, M. de L., *The University of Mississippi School of Law: A Sesquicentennial History*, UMiss, 2006, at pp. 126-127 and 174-175.

65 *The Journal of Space Law*.

66 For the texts of national laws see the website at *www.oosa.unvienna.org*; click on Space Law, then National Space Laws, then country name.

Spain	1995
Australia*	1998
Germany*	1998
Chile	2001
Belgium	2005
Republic of Korea*	2005
The Netherlands	2006

* Adopted later additional laws

In the US and in other countries, although the national legislature provides formal bases for space systems and program funding, national policies are often found in Governmental Directives, Executive Orders or Decrees. These executive instruments allow national leaders flexibility to adjust national policies as technologies and circumstances change and warrant.[67] The foregoing list of national laws identifies generally when the formal law-making dealing exclusively with space began in each country, but it never ends.

The technology advances, programs change, and circumstances change to an extent that supplemental laws are required to maintain appropriate coverage. Because the national laws in US are most familiar to me, and because US offers an example of how legislative requirements change with time, I review here the sequence of significant changes in the legislative bases of space law in the United States. A similar account could be constructed in many other countries, particularly in those pursuing a dynamic set of national space programs, including launching vehicles, operating tracking and telemetry stations, remote sensing, communications, navigation, space science and national defense operations. Laws in these areas will undoubtedly change with time.

The first major law in the United States was the *National Aeronautics and Space Act of 1958*,[68] which established NASA, and set out basic national policies concerning activities

[67] See as an example, Hall, R., Cargill, "The Evo-lution of U. S. National Security Space Policy and its Legal Foundations in the 20th Century," 33:1 *Journal of Space Law*, 1 (2007).

[68] Public Law 85-568, dated July 29, 1958.

in or related to space. This was followed by the *Communications Satellite Act of 1962*,[69] which authorized creation of the Comsat Corp. and proposed the establishment of a global communication satellite system (which was eventually Intelsat). Annual acts authorize and appropriate funding to support space programs. As the effort to land on the moon approached, the US Congress added a special paragraph in the 1969 appropriations bill, which was in effect a disclaimer.

> A House and Senate conference committee agreed on the final version of the bill on 4 November 1969 which included a provision that "the flag of the United States, and no other flag, shall be implanted or otherwise placed on the surface of the moon, or on the surface of any planet, by members of the crew of any spacecraft ... as part of any mission ... the funds for which are provided entirely by the Government of the United States." The amendment, in deference to the Outer Space Treaty, concluded with the statement "this act is intended as a symbolic gesture of national pride in achievement and is not to be construed as a declaration of national appropriation by claim of sovereignty."[70]

The next significant law adopted by the US Congress was the *International Telecommunica-tions Satellite Act of 1978*,[71] anticipating the creation of the International Maritime Satellite Organization. Increased use of national and international programs of remote sensing of the Earth led to US adoption of the *Land Remote Sensing Commercialization Act of 1984*,[72] and that same year the US Congress adopted the *Commercial Space Launch Act*.[73] As we noted earlier, neither technology nor relevant circumstances remain static, and four years later the Congress adopted the *Commercial Space Launch Act Amendments of 1988*. In 1990 Congress considered creation of patents in space and adopted an act to provide for patents made in outer space.[74] In 1992, questions of remote sensing were revisited.[75] Law-making and national policy formulation and articulation continue with regularity, but forms of law and policy declarations vary widely from country to country.

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69 Public Law 87-624, dated August 31, 1958.

70 Platoff, A. M., "Where No Flag Has Gone Before: Political and Technical Aspects of Placing a Flag on the Moon," a paper presented to the 26th Meeting of the North American Vexillo-logical Association, October 11, 1992, San Antonio, Texas; having been prepared for the Lyndon B. Johnson Space Center under contract NAS9-18263, August 1993.

71 Public Law 95-564, dated 1 November 1978.

72 Public Law 98-365, dated 17 July 1984.

73 Public Law 98-575, dated 30 October 1984

74 Public Law101-580, dated November 1990, an Amendment to Patent Law for Patents Made in Outer Space.

75 Public Law 102-555, dated 28 October 1992, the *Land Remote Sensing Policy Act of 1992*.

There is another area of law in which we should address developments, particularly during the past half century, and that is in the making of treaties, conventions and the creation of international organizations. Each of the international organizations identified above requires a convention, a statute or a treaty to establish its legal nature and status. In addition to basic creating and enabling agreements, there are the general regulatory treaties, such as the five UN treaties identified above and the *1963 Nuclear Test Ban Treaty*.[76] These sources prohibit placing in space or on celestial bodies nuclear or other weapons; weapons tests; establishment of military bases, installations or fortifications; or military maneuvers.[77] For a comprehensive survey of the status of signatures and ratifications of the significant international treaties relating to activities in outer space, see the annual reports of the IISL Standing Committee on the Status of International Agreements Relating to Activities in Outer Space contained in the IISL annual *Proceedings*.[78]

The scope and details of space law were well surveyed and captured by various pundits as the law developed. Among significant early commentators were Mandl, Korovin, Meyer, Heinrich, Lachs, Kopal, Haley, Vereshchetin, Diederick-Verschoor, Jasentuliyana, along with others, too numerous to mention. The *World Wide Space Law Bibliography* of Kuo Lee Li is probably the most comprehensive current space law bibliography available today. A comparably comprehensive, current survey of space law is in the recently published Lyall/ Larson treatise on space law.[79] For teachers, an excellent introductory text is available in Isabella Diedericks-Verschoor's introduction to space law.[80]

3. Space Law Off The Earth

The literature relating to law for human settlements and life off the Earth is gradually increasing as possibilities of such activities near. An early, insightful work addressing the issues of living in space was a work by George Robinson in 1975.[81] Isaac Asimov, in the

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[76] *Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water*; done at Moscow on 5 August 1953, and entered into force on 10 October 1953. 14 UST 1313; TIAS 5433; 480 UNTS 43.

[77] See particularly Article IV of the *1967 Outer Space Treaty*, note 59, *supra*.

[78] For example *see Proceedings of the International Institute of Space Law, 2008*, AIAA, Reston, VA, 2009, at pp. xvii-xxx.

[79] Lyall, F. and P. B. Larson, *Space Law: A Treatise,* Ashgate, Farnham, Surrey, 2009.

[80] Diederiks-Verschoor, I. H. Ph., *An Introduction to Space Law*, Kluwer, Deventer/Boston, 1993, rev. ed. 1999, 266 pp.

[81] Robinson, G. S., *Living in Outer Space*, Public Affairs Press, Wash., DC, 1975, 119 pp. At that time Robinson was the Assistant General Counsel of the Smithsonian Institution in Washington, DC.

Introduction, labeled it "a fearless, intelligent thorough-going consideration of the inevitable future, based upon [Robinson's] recognition of the need to determine the true nature of man in outer space… ." Three years later, in addition to his tens of articles on the subject of man in space, Robinson collaborated with J. C. Glenn on another forward looking book.[82] In 1986, in collaboration with Harold M. White, Jr., Robinson produced his most impressive work on human life and law in outer space.[83] We are not here addressing the issue of other life forms in space, on which a great deal of literature has emerged during the last fifty years.[84] We are concerned with humans in space, and law and regulations that do and will apply to them there. Thoughtful works dealing with the law and other aspects of man in space are slowly multiplying.

4. Conclusions and Observations

Spaceflight has stimulated many responses since its inception over 50 years ago. We have seen bilateral, regional and global cooperation at levels never before realized in such a short span of years. Space law has been an enabling part of the mix of events that have led to this unprecedented spirit of cooperation and information sharing. Some of the shared benefits of nations agreeing to work together using resources located in or at least partly in outer space are:

- enhanced understanding of the Earth/Sun relationship, its nature, and importance;
- enhanced understanding of the solar system, the planets, moons and the space beyond;
- global real-time communications (Internet);
- global real-time television;
- global real-time meteorological information;

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82 Glenn, J. C., and G. S. Robinson, *Space Trek: the Endless Migration*, Stackpole Books, Harrisonburg, PA, 1978, 223 pp.

83 Robinson, G. S., and H. M. white, Jr., *Envoys of Mankind: A Declaration of First Principles for the Governance of Space Societies*, Forward by Gene Rodenberry, Smithsonian Institution Press, September 1986, 316 pp.

84 A general literature search under the topic "Search for Extraterrestrial Intelligence" (SETI) or under the topic "Life in Space" will produce numerous profound and significant studies, including many works sponsored or published by NASA.

- nearly global navigation services;
- verifiably accurate global cartography;
- global resources' identification and location;
- global monitoring for defense purposes; and
- monitoring of sea ice and coastal waters.

The exploitation of these benefits has led to a greater integration of the global community, greater interdependence among states, and greater understanding of the nature of our cultural and religious differences. Humanity has come a long way toward greater understanding, tolerance and peace, especially during the past 50 years; but we still have a long way to go. With the foundation of space law, and the international cooperation it reflects and encourages, I believe, We have encouraging prospects for humanity's future. ■

The Life and Work of Professor Vladimír Mandl – A Pioneer of Space Law

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In an excellent lecture "A Concise History of Space Law" presented by Dr. Stephen E. Doyle (USA, Honorary Director of the International Institute of Space Law) at the 61st International Astronautical Congress in Prague, 2010, the speaker mentioned the name of a Czech lawyer, Professor Vladimír Mandl, as author of the world's first comprehensive survey of space law.[1] On that occasion, Dr. Doyle referred to my special contribution on the life and work of this pioneer of space law, which dealt with this subject in some greater detail. Its text follows.

Vladimír Mandl was born on 20 March 1899 as son of Dr. Matous Mandl, an estimable attorney-at-law in Plzen (Pilsen), the city, which was at that time apart of the Austrian-Hungarian monarchy and since 1918 became one of major industrial cities of Czechoslovakia (now The Czech Republic). After studies at the Pilsner high school, Vladimír Mandl entered the Czech Faculty of Law, Charles University of Prague, where he graduated on 21 November 1921. He first practiced at a district court in Prague, but later on, having successfully passed the advocate examinations, he opened his own legal office in Pilsen. Thus, though he was originally thinking of engineering studies, he decided to follow his father's legal career.

At the Law Faculty in Prague, he became a member of the seminar on civil law procedure, which was led by an outstanding scholar, Professor Václav Hora. In 1926, Mandl wrote a monograph on Czechoslovak civil law. Nevertheless, his original technical vocation soon turned his interest to legal problems created by industrial and technological

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[1] Stephen E. Doyle, "A Concise History of Space Law", *2010 Proceedings of the IISL* (forthcoming 2010).

developments of the 1920s and 1930s. At first, he published a series of articles, and in 1929 a monograph, on legal aspects of motor vehicles.[2] Then, it was natural that his attention was drawn to aviation, which led him to write a monograph on air law published in Pilsen, 1928.[3] His work was in fact the first treatise on this subject written in Czech language. Another of his air law studies was printed in German under the title "Das tschechoslowakische Luftverkehrgesetz (Czechoslovak Law of Aviation)". Later on, Mandl also published some articles in the French journal of air law.[4] His literary involvement in the field of aviation and air law was followed by a practical step. Like some other air law scholars, he acquired a pilot license.

Vladimír Mandl submitted his study on air law as a habilitation thesis in order to become a docent at the faculty of Mechanical and Electrical Engineering, Czech Technical University of Prague. Documents deposited in the Archives of the Universities of Prague give evidence that Mandl's knowledge and scholarly work received high evaluations by the Accreditation Commission to the end that he received the unanimous approval of the examiners. On 30 April 1930, he delivered a test lecture before the Board of Professors of the Faculty on "Liability of Contractors for Damage", a subject that was discussed at that time because of the conclusion of the 1929 Warsaw Convention on Unification of Certain Rules for the Liability of International Air Transport Operators. And on 30 September 1932 the granting of *venia docendi* for the subject "Law of Industrial Enterprises" by the Faculty was confirmed by the Czechoslovak Minister of Education.[5]

In the meantime, Vladimír Mandl passed his postgraduate studies at the Faculty of Law of the University of Erlangen (Germany), where he worked out and successfully defended the thesis "Zivilistischer Aufbau des Schadenersatzrechtes" (The Civil Law Structure of the Right of Indemnification). On this basis he was granted another doctorate at that University in 1932.[6]

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2 "Automobilovy zakon z 9.srpna 1908 a jeho reforma (The Automobile Act of August 9, 1908 and Its Reform), Praha, 1929.

3 "Letecke pravo" (Air Law), Plzen, 1928.

4 E.g. "Le Parachute" dans La revue générale de droit aérien, Paris, Nos 2, 3, 4/1935.

5 Decree of the Minister of Education No. 89212/)1-IV/3 of September 30, 1932. More about Mandl's habilitation and appointment in V. Kopal, "Vladimír Mandl -Founder of Space Law", Proceedings of the Eleventh Colloquium on the Law of Outer Space, International Institute of Space Law of the IAF, October 17-18, 1968, New York, p. 358.

6 G. Reintanz, uVladimír Mandl – Father of Space Law", ibidem, p. 363.

By that time, Mandl was already much occupied by a new field of human technical endeavors – the rise and development of activities in outer space. Influenced by the publications of the contemporary thinkers on rockets as the means for access to space, Mandl finished in 1932 two works. One was "Problem mezihvezdne dopravy" (The Problem of Interstellar Transport), which was published in Czech in Prague.[7] It also included Mandl's design of a high-altitude rocket on the basis of which he applied for and was granted a patent.[8] The other was a monograph on legal problems of space activities that he wrote in German, in order to offer his ideas and conclusions to a wider circle of readers in Europe. It was not possible to find a publisher for his legal study in Czechoslovakia. Neither was it easy to do so in Germany. Finally, he found a German publisher, which, however, agreed to print it at Mandl's own cost. About 25 copies of the 500 printed pieces were really sold.

Vladimír Mandl's monographical study "Das Weltraum-Recht: Ein Problem der Raumfahrt (The Law of Outer Space: A Problem of Space Flight)"[9] may be assessed as his most significant work by which its author entered the history of astronautics and particularly of space law. In this concise monograph, having only forty-eight printed pages, he enshrined his thoughts on the legal regulation of future space activities, many of which have not lost their relevance up to date and reflect in the present legal regime of outer space.

Attention should be drawn first to his concept of the law of outer space as an independent legal branch, based on specific instruments of space flights and governed by different principles than are those of the law of the sea or the law of the air. Although Mandl did not underestimate the examples of the other legal branches for analogies in special cases, he stressed the need for a specific regulation of legal problems of astronautics. From this point of view he considered in the first part of his monograph problems of civil, criminal and international law nature.

Not less interesting is the second part of the study, called "Future". It is not a kind of science-fiction, but a number of serious prognoses which in our age become apart of reality.

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7 "Problem mezihvezdne dopravy" (The Problem of Interstellar Transport), Praha, 1932.

8 Patent 52236, Class 45d, granted in Czechoslovakia on 25 September 1933.

9 "Das Weltraum-Recht: Ein Problem der Raumfahrt. Von Dr. jur. Vladimír Mandl, Rechtsanwalt in Pilsen" (The Space Law: A Problem of Space Flights), 1932, J. Bensheimer, Mannheim – Berlin –Leipzig.

For example, Mandl rejected the then usual idea of sovereignty in space without limits and affirmed that sovereignty of States applies only to the atmospheric space. Beyond the "territorial spaces" a vast area begins which is "independent on any terrestrial State power and is *coelum liberum*".[10]

The concluding part of Mandl's considerations is preceded by his prediction of a new surprising progress in physics, chemistry and engineering which will correspond to a similar epoch of the 19th century – in fact a vision of the scientific and technical revolution of our times. Moreover, as a consequence of penetration of mankind into outer space, Mandl envisaged a substantive change of relations between the State and its nationals, which would not be based on State domination, so that both the State and its nationals would become equal subjects. According to Mandl, the territory will lose its importance as one of the basic elements of each State and new national communities consisting of personal elements only will emerge. People will retain such new nationality when going to outer space and other planets. Finally, space law will become a new set of norms which will be "quite a different phenomenon than is the present law of jurists."[11]

Starting from the academic year 1933-34, Professor Mandl was teaching his course on the Law of Industrial Enterprises at the Czech Technical University in Prague. His last lectures are recorded in the university curricula for the academic year 1938-39. In March 1939, the troops of Nazi Germany invaded the Czech part of Czechoslovakia and in November the same year, all Czech universities were closed by the occupants. Thus Vladimír Mandl's teaching was also terminated.

He still continued his participation in the then efforts of Czech scholars and engineers to build a National Technical Museum in Prague by search of documents and collection of objects for the aeronautical part of the Museum, which he started during the second half of the 1930s. At that period, Mandl also visited and reported on the foreign air collections, such as the Air Museum in Moscow (1937) and the Smithonian Institution in Washington (1938). Of course, he was also familiar with the aeronautical collections in Paris and Munich. He was still thinking about the aeronautical collection in Prague during his "involuntary holidays", as he called it in a letter from the tuberculosis sanatorium in Ples near Prague.

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[10] *Ibidem*, p. 33.

[11] *Ibidem*, p. 48.

During 1940, his health condition was deteriorating. Professor Mandl died on 8 January 1941 in his age of uncompleted forty-two years and was buried at the Central Cemetery in Pilsen.

Vladimír Mandl was the first author who approached future legal problems of space flights as a legal scholar and attempted to establish a system of ideas and legal principles to govern space activities 25 years before their real beginning. Therefore, it was agreed by the Board of Directors of the International Institute of Space Law to hold in his memory the finale of the 19th Manfred Lachs Space Law Moot Court Competition in the city of Plzen (Pilsen), where Vladimír Mandl was born and worked for most of the years of his life. ■

Vladimír Mandl, Alex Meyer, Welf-Heinrich, Prince of Hanover, Friedrich Wilhelm Von Rauchhaupt
Early Writings in German on the Young Discipline of Space Law

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Director, Institute of Air and Space Law, University of Cologne

This year's Nandasiri Jasentuliyana lecture in Prague is primarily devoted to the history of space law with a specific focus on the work of *Vladimir Mandl.* Therefore, the author's contribution will first come up with an evaluation of *Vladimir Mandl's* opus magnum, the pioneer work entitled "Das Weltraumrecht – Ein Problem der Raumfahrt" (Space Law – A Problem of Space Flight) of 1932. Moreover the work of another pioneer of space law will be described. *Alex Meyer* (1879 – 1978) belonged to those who had accompanied the development of space law from its early days. As early as 1952 Meyer published his first article on space law, entitled "Legal problems of Space Flight" in the Annual Reports of the British Interplanetary Society (1952, pp. 353–354), as well as an article, entitled "Weltraumrecht" (Space Law) in the German Journal of Air Law, vol. 1 (1952, pp. 234 – 236).

Finally, this article will not only try to evaluate their pioneer contributions to the development of space law. It will also include a brief look into the work of *Friedrich von Rauchhaupt* and the *Prince of Hanover*.

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1. Introduction

My presentation intends to give an overview on the early German writings of space law. I will exemplify the important contributions made in German to the science of space law by first highlighting, of course, one of the earliest writer's contribution. This was the Czech national *Vladimír Mandl's* pioneer work "Space Law – A Problem of Space Flight" which was published in German as early as 1932.[1] Moreover, some of the works of *Alex Meyer* will be assessed who for almost 25 years had been the Director of the Institute of Air and Space Law, reopened by him in 1951 at the University of Cologne. Finally, the work of *Friedrich Wilhelm von Rauchhaupt* shall be given a quick consideration in this regard as well as a brief account is given to the doctoral thesis of the *Prince of Hanover*. Of course, the limited place available does not make it possible to come up with very long evaluations and contributions of the various works of these authors. Rather it is the aim of this presentation to paint the picture of the contribution to the young discipline of space law made in German, which is quite impressive for different reasons: The work of *Vladimír Mandl* is so impressive because it was so early and so informed when he wrote about space flight and space law. The work of *Alex Meyer* accompanied the increasing international space law from its very beginning in the late 1950's. And the same can be said for *Friedrich Wilhelm von Rauchhaupt* and the *Prince of Hanover* who, with the scope of their writings, made an interesting contribution to this young scientific field.

2. Contributions of the Authors

2.1 Vladimír Mandl (20.3.1899 – 8.1.1941)

The career of *Vladimír Mandl* has already been described. *Vladimír Mandl* became only 40 years old. He was an advocate, a pilot as well as active in the scientific field. His most important work is the earliest contribution on space law published in 1932 and entitled "Space Law – A Problem of Space Flight". It is published in German and gives a surprisingly wide-reaching overview on the possible scope of what could be considered space law at that time. You may be aware of the fact that in 1932, air flight had just taken off the ground with the main international conventions in place, namely the Paris Convention of 1919 and the Warsaw Convention of 1929. *Mandl* had, by the way, edited a commentary on the Czechoslovakian Air Code of 8 July 1925. This is a fine work which, at the level of science of 1929, gives an overview of the then valid national air law of Czechoslovakia.

[1] Vladimír Mandl, Das Weltraumrecht – Ein Problem der Raumfahrt, J. Bensheimer, Mannheim/ Berlin/Leipzig, 1932.

Most important in our respect is of course *Vladimír Mandl's* small book on space law. It is a book of just 50 pages filled with many fresh ideas. As has been said, it is remarkable because it was published 25 years before the first space flight took place by the launching of the artificial satellite Sputnik 1 in 1957. Right at the beginning[2], *Mandl* makes it clear that space law is something that needs a completely fresh look to be taken. It would be an area of law that would include public law as well as private law[3]. With regard to a definition of space object, this would be difficult because analogies to the automobile sector or to international sea law would fail. Therefore, the only possible analogy would be the one to air law[4]. Here, *Mandl* points to the national air laws of Germany, the United States of America, and France.

Then, *Mandl* asks in Part I of his book the very interesting question how to apply air law to human activities in outer space. His answer is that this should be done by analogy whereby he pleads not for a general, but only for a special analogy just in cases that really fit.[5] Therefore, the respective provisions of Article 1 paragraph 1 of the German Air Code which is comparable to provisions (paragraphs 905, 906) of the German Civil Code (BGB) could be applied by analogy also to space flight: so one could say that any proprietor of land was entitled to prohibit the overflight only up to such altitude that he could effectively control.

Moreover, *Mandl* strongly pleads for a deviation from the general German Civil Code provision of paying damages for liability based on fault because in general transportation law there would be more provisions allowing for such liability not being based on fault.[6] Such result would also be supported by the respective provisions of the French Code Civile (Art. 1384) and of the Italian Codice Civile (Art. 1153). Finally, he insists on the State's sovereignty over the airspace as already being part of customary international law, which would also be valid for space flight although no concrete international agreement had been drafted yet.[7]

The second part of this remarkable book is devoted to the future.[8] *Mandl* expects from legislators to become active and to react to new challenges of space flight by first

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2 Note 1, p. 1.

3 Note 1, p. 3.

4 Note 1, p. 6.

5 Note 1, pp. 7, 8.

6 Note 1, pp. 10, 11.

7 Note 1, pp. 18, 19.

8 Note 1, pp. 20-31.

fundamentally revising international air law.[9] There should be the requirement of a license for any launcher[10]. Third party liability should be strict liability whereas in the framework of contracts, liability should be applicable only on the basis of fault[11].

Great expectations should be based on the entry into outer space in terms of exploiting its rich resources. But *Mandl* does not elaborate whether or not it would be legal to extract and use of those resources. One must assume that he is of this opinion because one cannot find any opposite statement. Moreover, *Mandl* elaborates on spaceports: space flight being privileged it would be easier for people being engaged in this domain to expropriate property for building new spaceports than this would be possible in other fields.[12] Very importantly, States should reflect about the upper limit of their sovereignty.[13] Until now (1932), there would be no upper limit of airspace. Airspace would be regarded as belonging to the territory as its "component part" (see Art. 97 of the German Civil Code). According to the doctrine of territorial government, airspace would end where the air would end.[14] And then there would come outer space where no sovereignty would govern.[15] Any spaceship would still have its nationality comparable to airships.[16] Moreover, it would be legal to build stations in outer space, but spaceships should not be used for warfare purposes.[17] In a sense, you can very clearly see here modern ideas and unresolved questions like the one of the delimitation of airspace and outer space.

Then *Mandl* continues that still tremendous efforts would be necessary in order to make spaceflight a reality.

Furthermore, very interestingly in the fourth subdivision of this second part, *Mandl* starts to reflect on the consequences of spaceflight for government and for the State. He anticipates that from the moment on where it is relatively safe that one can live in outer space or on celestial bodies and that the living conditions would be bearable for human beings, many people on Earth would decide to eventually settle down in outer space.[18] But

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9 Note 1, pp. 20, 21.
10 Note 1, p. 23.
11 Note 1, p. 25.
12 Note 1, pp. 29, 30.
13 Note 1, p. 31 et seq.
14 Note 1, p. 32.
15 Note 1, p. 33.
16 Note 1, p. 33.
17 Note 1, p. 33.
18 Note 1, p. 38 – 41, 41-42.

what would be the consequence? Would such be a loss of nationality when he/she would conquer outer space and settle down? Or would one need to terminate such nationality? *Mandl* negates both questions and develops a very important principle,[19] namely that citizens travelling by spaceships through outer space would carry with them their nationality. This would have as a consequence that onboard a spaceship the nationality of the sending State would still be the leading one.

But – and this makes his remark very interesting – he finds it only logical that it would not be possible to continue with the same notion of State and of law when new spaces beyond sovereignty would be opened for colonization.[20] As soon as any national would be free to escape from State sovereignty on Earth by conquering outer space, both, the new colony in outer space as well as the former "State", would lose this quality. *Mandl* compares them to private society (Privatgesellschaft)[21] which would have certain claims vis-à-vis the individual, but which would leave the individual in a relatively free position.

This interesting new idea shows that *Mandl's* work was not confined to the elaboration of parallels through analogy to existing law and particularly air law, but that he was very creative. And if one takes a critical look at *Mandl's* pioneer work on space law, it is astonishing how much realism he brings in here. The issue of delimitation is still not solved by today, the idea of carrying nationality into outer space, the designation of outer space as being beyond national jurisdiction, all these are concepts that still exist and were legal principles only 25 years later. Thus, *Mandl* was a visionary who without any doubt paved the way for any further fruitful thinking.

Besides this fundamental work, it should be mentioned that *Mandl* in his rather short life published other books in German. As mentioned, there was the Commentary on the Czechoslovakian Air Code published in 1929[22], a book on the German Civil Law of Damages published in 1932[23], a book on the natural theory of law published in 1936[24], a book on procedural law of marriage of 1926[25], a book entitled "Essays of a European Technocrat"[26] which deals with measuring the economic situation to natural science methodology specially based on physics.

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19 Note 1, p. 43 et seq.

20 Note 1, p. 44.

21 Note 1, p. 44.

22 Stiepel, Reichenberg 1929.

23 Marcus, Breslau 1932.

24 Ebering, Berlin 1936.

25 Pilsen 1926.

26 Wetzel Publishing, Los Angeles 1936.

And finally, another small book is worthy of being mentioned which is entitled "The Rocket for the Exploration of Great Heights – A Contribution to the Problem of Spaceflight" published in 1934.[27] This little work aims at having some fresh look at the rocket problem. I was already stimulated by the research of *Tsiolkovsky, Oberth* and most recently *Goddard,*[28] to the works of which *Mandl* refers. His booklet is just a reflection of existing sources, pointing them to current problems. In a first part[29], the author very succinctly describes the then modern rocket techniques which do still exist as a basis. When he describes a rocket consisting of several stages, he considers it possible to reach a height of approximately 250 km.[30] This well illustrated little booklet of 15 pages shows *Vladimír Mandl* not only as a lawyer, but also as a technical expert in space flight.

In summary, one is just amazed by the tremendously rich work of this sophisticated thinker. An expert in air law, in German marriage law, and other fields of law, he is also very knowledgeable in space science, rocket technology, and offers, in 1932, a tremendously innovative study. His plead for new rules, not derived by analogy, for a regime of strict liability, jurisdiction in outer space, and for nationality is all based on the assessment of outer space being legally different from the sovereignty-based system of the airspace. Having seen this so clearly is a remarkable achievement in the year 1932.

2.2 Alex Meyer (15.12.1879 – 21.8.1978)

Alex Meyer was born even 20 years before *Vladimír Mandl*. He lived for almost a century. Born in 1879 in Berlin, he died in 1978 in Zurich. Although *Alex Meyer* became famous as an air lawyer, he did also important research in the field of space law. And it is clear that his profound knowledge and work of the first era of his career had a great impact on his work in space law. Both *Mandl* and *Meyer* shared practical expertise and experience. Whereas *Vladimír Mandl* worked as an attorney, *Alex Meyer* started his career as a judge in what is today the Polish City of Szczecin (Stettin). After his service in the army from 1914 to 1917, he was serving in the Ministry of the Interior and Justice in Germany in Düsseldorf. In 1939, he got a call from New York University, but the German authorities did prolong the requirements for the granting of a visa to the United States for *Alex Meyer* so long that he had to refuse the offer. In 1939, *Meyer* emigrated to Zurich. After the Second

[27] Hachmeister, Leipzig/Berlin 1934.

[28] Note 27, p. 3.

[29] Note 27, pp. 3-7.

[30] Note 27, p. 11.

World War, he came back to Germany and installed himself in Cologne. He initiated the re-opening of the German Institute of Air Law which had been founded in 1925 by Prof. *Otto Schreiber* in Königsberg (Kaliningrad). In 1953, he became Honorary Professor at Cologne University and taught there until 1974. His more than 200 publications cover basically air law subjects. Here under consideration are, however, the 22 publications that are devoted to space law questions.

What makes his contribution so interesting is the fact that *Meyer's* publications start five years earlier than space flight began. Here we find a publication in the new German Journal of Air Law (today German Journal of Air and Space Law, ZLW) of the year 1952. This article more or less served as the justification for *Alex Meyer* as editor of the German Journal of Air Law to devote his Journal also to questions of space law matters. For this, he continued the description of the various technical problems involved and quoted *Vladimír Mandl* who some 20 years before *Meyer's* writings simply believed in space flight and in space law.

Meyer himself outlines in this paper which was read to the 3rd International Astronautical Congress in Stuttgart of 5th September 1952 the major problems of the future discipline of space that had to be identified[31]. First, he answers the question of the overall usefulness of a distinct science of space law in the affirmative. He particularly denies any possibility of analogies from air law simply because the fundamental structure of the sovereignty-free outer space would thus not allow for analogies. It would still be very important to have an insight into the positioning of a boundary which *Meyer,* in 1952, thinks to place at an altitude of 200 to 300 km above sea level. Thus, the questions of the legal nature of outer space, the legal obligations in the conduct of space activities, and the legal treatment of so-called space stations are at the forefront of *Meyer's* interests. He correctly identifies outer space as not being subject to any State's sovereignty.[32] In principle, no analogy from any other law should be used.[33] There would be no right of overflight by rockets through foreign airspace even in the process of launch or landing.[34] The placement of space stations would at least be possible over the High Seas.[35] Any establishment of a space station in outer space would, on the one hand, have to acknowledge that outer space is free of the State's sovereignty.

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31 Rechtliche Probleme des Weltraumflugs (Legal problems of space flight), in: Zeitschrift für Luftrecht (1953), pp. 31-43.

32 Note 31, p. 34.

33 Note 31, p. 37.

34 Note 31, p. 38.

35 Note 31, p. 40.

On the other hand, stations in outer space would be subject to the jurisdiction of the respective launching State. And finally, *Meyer* very correctly observes the great potential of outer space to become a theatre of war which leads into his very clear conclusion that any future legal instrument should have provisions on the prohibition of the use of force in outer space.[36]

One can thus see very clearly how farsighted *Meyer's* considerations were. He insisted that the legal status of outer space had very clearly to be distinguished from the airspace. Moreover, *Meyer* made use of the concept of jurisdiction.

Thus, in another paper published in the German Journal of Air Law in 1958[37], *Meyer* critically discussed some of the writings of Prof. *John Cobb Cooper*, at that time the Director of the McGill Institute of Air and Space Law. In his paper entitled "Critical remarks on recent discussions concerning legal problems of outer space", *Alex Meyer* strongly objects to *John Cobb Cooper's* proposal of a contiguous zone between airspace and outer space, comparable to the contiguous zone between the coastal sea and the High Seas. Rather, he insists on outer space being free of any sovereign rights. With this, he rejects a proposal of *Hingorani* of allowing exercise of sovereignty in outer space. *Meyer* considers it important to come up with an international agreement that should demarcate the boundary between airspace and outer space. He considers the International Civil Aviation Organization as an appropriate organization for drafting this agreement.[38]

Of great interest is, furthermore, a paper again published in the German Journal of Air and Space Law in 1962[39] in which *Alex Meyer* particularly assesses some opinions of *Quadri* and *Chaumont*. Their functional approach to air and space law that would make air and space one functional unit under one legal order and would differentiate according to the respective activity, i.e. the functions that would be fulfilled in the aerospace medium, would not be a satisfactory one. According to *Meyer,* the significant difference of airspace with State sovereignty and outer space as a sovereignty-free area would make a different legal treatment necessary. The delimitation–necessary only when commercial space

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36 Note 31, p. 42, 43.

37 Kritische Bemerkungen zu neueren Erörterungen über die Rechtsprobleme des Weltraums, in: Zeitschrift für Luftrecht (1958), pp. 194-207.

38 Note 37, p. 204.

39 Die Bedeutung der Festsetzung einer Grenze zwischen Luftraum und Weltraumgebiet – Kritische Bemerkungen zu den Arbeiten von Chaumont und Quadri, in: Zeitschrift für Luftrecht und Weltraumrechtsfragen (1962), pp. 106-121.

transportation would become feasible[40] – would be difficult to make because, according to *Meyer*, there was no "natural physical boundary"[41]. *Meyer* strongly submits that there is a close relationship between State territory and airspace which would find its expression in Art. 1 of the Chicago Convention where contracting States "recognize" the State's sovereignty over the territory.[42]

In a later publication *Meyer* summarizes the topical questions concerning space law.[43] He thereby excludes the possibility of the existence of other intelligent life in our solar system.[44] Therefore following would be the topical questions: the right to overfly State territory by a spacecraft, the scope of human activities in outer space, the question of legal responsibility. If one takes up this concept in the conduct of space activities, the scope of rights of States when landing on a celestial body, and finally the legal treatment of space objects coming back from outer space on Earth. *Meyer* stresses that, based on a resolution of the International Law Association, time would be ripe for the codification of some space law provisions. There should be some kind of responsibility for the conduct of space activities incumbent upon the "holder of responsibility".[45] But it would be important that no sovereign rights in outer space or on celestial bodies would be created.[46] In his article "aerospace sovereignty and outer space developments" published in the German Journal of Air and Space Law in 1965[47], *Meyer* again expresses his reservation against the functional theory as proclaimed by Prof. *John Cobb Cooper*.

In another long article on "Space Law and Government" published in the German Journal of Air and Space Law – a review of the book of *Andrew Haley* under the same title, *Alex Meyer* addressed all critical questions of space law of that time. Among those, only some will be highlighted here. There is, for example, the limited scope of any possible analogy to air law or to the law of the sea to which *Haley* as well subscribed. *Andrew Haley* as well as *Alex Meyer* were, however, both very critical of a general transit right in air law

40 Note 39, p. 114.

41 Note 39, p. 117.

42 Note 39, p. 120.

43 Die Raumfahrt als Ursache rechtlicher Probleme, in: Raumfahrt wohin?, 1962, pp. 166-179.

44 Note 43, p. 167.

45 Note 43, p. 173.

46 Note 43, p. 178.

47 Die Staatshoheit im Luftraum und die Entwicklungen im Weltraum – Bemerkungen zu der Abhandlung von Professor Cooper, Das Abkommen von Chicago nach 20 Jahren", in: Zeitschrift für Luftrecht und Weltraumrechtsfragen (1965), pp. 296-311.

as well as in space law. As to the delimitation between airspace and outer space, *Meyer* is closer to *Haley's* proposal to use the van-Karman line for demarcation and raises again doubts against functional approaches of *Chaumont* and *Quadri*. Without an own statement remains Meyer's report of *Haley's* idea of a registration of space vehicles, but he very strongly supports any concept of opening outer space for peaceful purposes only.[48] Finally, with regard to liability and responsibility, *Meyer* supports *Andrew Haley's* idea of a strict liability as the basis of liability for space activities.[49]

Furthermore of great interest is the commentary of *Alex Meyer* on the Outer Space Treaty of 1967, published in the German Journal of Air and Space Law of that year.[50] In his brief analysis, *Meyer* first summarizes the drafting history.[51] Among the provisions of the Outer Space Treaty, *Meyer* stresses the importance of Article IV on the peaceful uses of outer space and of Article VIII on the duty to give back a space object after its return to Earth. He regrets that the Treaty does not contain any delimitation between airspace and outer space and maintains that the rules on responsibility of States would be not sufficient.[52] These ideas are reiterated in an article on the term "peaceful" in the light of the Outer Space Treaty, a paper prepared for the Colloquium on Space Law at the 19th Congress of the IAF and published in the German Journal of Air and Space Law of 1969[53] as well as in a paper entitled "Legal Problems of Outer Space – A Contribution to the UN Space Conference in Vienna of 1968, published in the German Journal of Air and Space Law of 1969.[54]

Finally worth mentioning is the paper the almost 95 years old *Alex Meyer* gave instead of a farewell lecture in 1974 at the occasion of his retirement from his function as Director

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48 Note 48, p. 20.

49 Note 48, p. 22, 23 et seq.

50 Der Weltraumvertrag, in: Zeitschrift für Luftrecht und Weltraumrechtsfragen (1967), pp. 65-77.

51 Note 51, p. 65, 66.

52 Note 51, p. 71, 72.

53 Die Auslegung des Begriffs „friedlich" im Lichte des Weltraumvertrags, in: Zeitschrift für Luftrecht und Weltraumrechtsfragen (1969), pp. 28-39.

Rechtsprobleme des Weltraums – Ein Beitrag zur UN-Weltraumkonferenz in Wien (14.-27. August 1968), in: Zeitschrift für Luftrecht und Weltraumrechtsfragen (1969), pp. 10-27.

54 Welf-Heinrich Prinz von Hannover, Luftrecht und Weltraum, Hannover 1953.

Introduction: A light from the past to show up the legal problems of our age of space, in: Colloquium on the Law of Outer Space 1958, pp. 1-4.

World Space Law: The Basic Principles for its Codification, in: Colloquium on the Law of Outer Space 1959, pp. 125-128.

of the Institute of Air and Space Law and Professor of air and space law at the University of Cologne. The lecture basically focuses on air law developments, but *Meyer* also mentions that as of the time of his writings in 1974 space law was commonly recognized. There were, at that time, three international agreements, namely the Outer Space Treaty, the Rescue Agreement, and the Liability Convention and some principles on remote sensing and direct broadcasting by satellites in work. *Meyer* gave an overview on the development of the Institute that since 1960 was an Institute of Air and Questions of Space Law.

2.3 Welf-Heinrich, Prince of Hanover (1923 – 1997)

The first legal dissertation on matters of space law was successfully defended in 1953 by *Welf-Heinrich Prince of Hanover:* entitled "Air Law and Outer Space"[55] it made some important legal observations concerning the new area of outer space. The Prince considers outer space to be a free area to which by analogy some of the air law rules could be applied. Moreover he *inter alia* develops the concept of jurisdiction and control over objects placed in outer space.

2.4 Friedrich Wilhelm Von Rauchhaupt (13.8.1881 – 28.1.1989)

Finally, some of the work of *Friedrich Wilhelm von Rauchhaupt* shall be mentioned. *Von Rauchhaupt* was professor of international law at the University of Heidelberg. Although his oeuvre with more than 200 publications reaches from German civil law over the law of Spain and of the United Kingdom to some questions of legal theory, the basis was certainly laid in public international law and in his later career, in a growing way also in space law. One should not forget that, comparable to *Alex Meyer*, he was already in his late seventies when the space age started – he passed away only at the age of almost 107 years.

After early writings on "A light from the past to show up the legal problems of our age of space" in 1958[56] or "World space law: the basic principles for a codification" in 1959[57], and the short note on "The problem of damages in space law" from 1961[58], he published a first programmatic writing in German, entitled "Über Weltraumrecht" (On Space Law) in 1962[59]. *Von Rauchhaupt* compares mankind conquering outer space with Spain in 1492

55 Über Weltraumrecht, in: Zeitschrift für Luftrecht und Weltraumrechtsfragen (1962), pp. 227-233.

56 Note 59, p. 230.

57 See e.g. The Law of ESRO and ELDO, in: Colloquium on the Law of Outer Space 1966, pp. 210-212.

58 The Space Law 1957 – 1967, in: Colloquium on the Law of Outer Space 1967, pp. 222-229.

59 Note 62, p. 228.

conquering America and thus a need for a new law. Neither air law nor the law of the sea would really fit, but space law had to be a law *sui generis*. *Von Rauchhaupt* refers very solidly to the question of delimitation[60], to the question of sovereignty of States in outer space and to the need for having a law of damages either in outer space or on Earth. He very much misses the existence of a general international law on traffic with the respective regulatory consequences eg.: in the area of avoiding collisions in outer space.

Furthermore, besides two short articles on the law of ESRO and ELDO[61], both being published in 1966, in the volume of the 1967 Beograd Colloquium on the Law of Outer Space we can find a summarizing article on "The Space Law 1957 – 1967".[62] *Von Rauchhaupt* paints the picture of 10 years of development of space law and regards it as success of the Outer Space Treaty which just had been adopted that nuclear weapons in outer space would be stopped.[63]

Moreover, it is interesting that in his later writings *von Rauchhaupt* comes back to theoretical questions, for example about the sources of space law. Here he lists besides other sources and at a very prominent place the divine law. Such divine law would be the basis as God's creation had also incorporated the "big bang".[64] This divine law would not be negotiable and not changeable by human will, thus surmounting any natural law. *Von Rauchhaupt* has reiterated his ideas of the determining factor of divine law in many other publications ever since.[65] This divine law could be found in the New Testament of the Bible. Sometimes legislators would take up formulations from divine law.

Thus, *Friedrich Wilhelm von Rauchhaupt* remains remembered as a strong propagator of the notion of divine law.

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2 The Divine Law in the Totality of Outer Space Law, in: Colloquium on the Law of Outer Space 1970, pp. 353-357.
See e.g. Divine Law and Human Law of Nature in the Law of Outer Space, Colloquium on the Law of Outer Space 1972, pp. 206-213 and The Present State of the Law of Outer Space, in: Colloquium on the Law of Outer Space 1973, pp. 281-286.

61 See e.g. The Law of ESRO and ELDO, in: Colloquium on the Law of Outer Space 1966, pp. 210-212.

62 The Space Law 1957 – 1967, in: Colloquium on the Law of Outer Space 1967, pp. 222-229.

63 Note 62, p. 228.

64 The Divine Law in the Totality of Outer Space Law, in: Colloquium on the Law of Outer Space 1970, pp. 353-357.
See e.g. Divine Law and Human Law of Nature in the Law of Outer Space, Colloquium on the Law of Outer Space 1972, pp. 206-213 and The Present State of the Law of Outer Space, in: Colloquium on the Law of Outer Space 1973, pp. 281-286.

3. Summarizing Perspective

As you can see, the writings in German on the early doctrine of space law have been very diverse. Already in 1932, *Vladimír Mandl* discovered in an astonishingly clear way, the problems that could arise and offered solutions far beyond his time. He even anticipated some solutions that later became international space law (no sovereignty, distinct body of law, jurisdiction and control). Also, *Alex Meyer*, who up to the advent of the space age was very active in the field of air law, very clearly emphasized from the beginning, the fact that space law was an independent new discipline that required completely new solutions – the main reason being the non-existence of State sovereignty in outer space. The possible analogies to air law were furthermore looked at in the early work of the *Prince of Hanover*. Finally, *Friedrich Wilhelm von Rauchhaupt* made his own contribution by putting space law in a transcendental perspective thus making us aware of the fact that humankind can only regulate behavior of humans not in all parts of Universe, but only in those areas which we have a minimum knowledge about. This shows that the task of approaching the more regulatory aspects of the universe is a huge, perhaps not achievable goal. But it demonstrates as well that growing scientific exploration and application may create a need for new legal regulation.

The four scientists have, each with an own methodological approach, paved the way for a deeper understanding of the new legal field of space law. For this achievement we owe them our sympathy, gratitude and appreciation. ■

The Commercial Exploitation of Outer Space and Celestial Bodies – A Functional Solution to the Natural Resource Challenge

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Abstract

Most proposals on the exploitation of natural resources in outer space are based on the assumption that space resources correspond to physical phenomena, the legal regime of which should vary depending on the environment from which they originate. Mineral reserves on celestial bodies are considered appropriable while in contrast the orbit-frequency spectrum should remain unencumbered by exclusive rights. It is argued here that such a physical distinction between outer space and celestial body resources is untenable both in law and in practice. This article therefore suggests a more comprehensive approach to regulating space resources, based on a functional interpretation of the space law regime. This approach is based on the fact that the category of natural resources is principally defined by its potential as a source of economic value after transformation by human activity. It should thus be governed by a uniform regime determined by the basic principle of free and undisturbed use of outer space by all States. The criterion of scarcity implicit in this principle is sufficiently flexible to efficiently regulate the exploitation of the wide

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array of natural resources in outer space, as is illustrated by the regime of the geostationary orbit.

1. Introduction

The current space law treaties do not conclusively determine the exploitation of natural resources and the issue is subject to much controversy among legal scholars. Most proposals on the exploitation of natural resources in outer space are based on the assumption that space resources correspond to physical phenomena, the legal regime of which should vary depending on the environment from which they originate.[1] Mineral reserves on celestial bodies are generally considered appropriable while in contrast most authors contend that the orbit-frequency resource should remain unencumbered by exclusive rights.

The above approach to space resources presupposes that it is both possible and necessary to distinguish between the appropriation of natural resources of celestial bodies and other space resources. To determine the tenability of this assumption, the article shall ascertain (1) whether it is possible to define the notion 'celestial body' (section I); (2) whether the non-appropriation principle can be deemed applicable to natural resources (section II); (3) what should be understood by the notion 'natural resources' in the context of outer space and what legal principles guide the exploitation of these resources (section III).

It shall be argued in this article that the presuppositions underlying a selective application of the non-appropriation principle to space resources are untenable, unwarranted and insufficient in light of the main goal of the space law regime to spur the free and undisturbed use of outer space by all states.

2. Defining Celestial Bodies

2.1. Relevance for the legal regime of natural resources

In the years preceding the finalisation of the 1967 Treaty on principles governing the activities of states in the exploration and use of outer space, including the Moon and other celestial bodies (hereinafter: 'Outer Space Treaty' or OST), the need to define the notion 'celestial body' was raised frequently.[2] Whatever matter such definition would comprise, it

[1] The term 'phenomenon' is used here to indiscriminately indicate all material and immaterial components of outer space, subject to further qualification.

[2] See the reports of the Working Group III of the International Institute of Space Law (hereinafter: IISL) on the legal status of celestial bodies, published in the 1962-1966 IISL Proceedings of the colloquium on the law of outer space (hereinafter: 'IISL Proceedings').

was argued that celestial bodies were physically markedly different from their largely void surroundings and should therefore be subject to a separate legal regime. The main space law resolutions in force at the time did not undermine this contention as they referred to 'outer space *and* celestial bodies' when defining the scope of their provisions, thus leaving open the possibility of installing two separate legal regimes, determined by the physical characteristics of their subject matter.[3]

The legally binding Outer Space Treaty left the conceptual quandary unsolved as it neglected to define any of its operative notions for fear of rendering its provisions obsolete in the light of unforeseeable scientific and technological advances. Nevertheless, scholarly effort to accurately delineate the various physical components of outer space dwindled significantly after the OST came into force. This was likely due to the decision of the drafters to substitute all references to 'outer space and celestial bodies' with the formula 'outer space, *including the Moon and other celestial bodies*'.[4] The inclusive reach of the notion 'outer space' understandably reduced the need to define its component parts, as any provision on 'outer space' was *ipso facto* also applicable to the celestial bodies contained therein.[5]

It follows that most space law provisions are indiscriminately applicable to both the material and immaterial components of outer space. Nevertheless, some provisions of the Outer Space Treaty still distinguish between outer space and celestial bodies, such as Article IV OST on the military uses of outer space, as does the entire 1979 Agreement governing the activities of States on the Moon and other celestial bodies (hereinafter: 'Moon Agreement' or MA). The need to define what exactly constitutes a 'celestial body' is therefore still raised by contemporary scholars[6] when discussing the limits of the peaceful uses of outer space[7]

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3 See the Declaration of legal principles governing the activities of States in the exploration and use of outer space in UNGA Res. 1962 (XVIII) of 13 December 1963; UNGA Res. 1721 (XVI) of 20 December 1961 on international co-operation in the peaceful uses of outer space.

4 On the significance of this substitution, see B. Cheng, "Introducing a new term to space law: 'Outer void space'", 11 *Korean Journal of Air & Space Law* 1999, 321-324.

5 The 1967 report of the Working Group IIIreveals a consensus that the OST severely diminishes the need to come up with a definition of what constitutes a celestial body.

6 See, for example, V. Pop, *Who owns the Moon?*, Berlin, Springer, 2009, 47-58.

7 B. Cheng, "Properly speaking, only celestial bodies have been reserved for use exclusively forpeaceful (non-military) purposes, but not outer void space", in M.N. Schmitt (ed.), *International law across the spectrum of conflict*, Newport, Naval War College, 2000, 80.

8 See, for example, R. Oosterlinck, "Tangible and intangible property in outer space", 39 *IISL Proceedings* 1996, 276.

or when determining the scope of the Moon Agreement.[8] Importantly, the MA is the only convention that contains specific provisions on natural resources in space. It is thus often considered vital to define the celestial body concept in order to define the legal regime governing the exploitation of these resources.[9] The following sections will determine whether it is indeed possible, necessary and advisable to give an accurate definition of the celestial body notion in this context.

2.2. A priori definition

The outer space environment hosts innumerable variations of matter in widely varying physical configurations, ranging from infinitesimal particles of dust and gaseous substances to vast land masses with solid surfaces that make up the stars and planets. It is difficult to sustain that this entire range of physical manifestations should be classified as celestial bodies from a legal point of view. Some scholars have therefore advanced a number of more or less arbitrary *a priori* criteria to legally define a subcategory thereof as celestial bodies.

First, it has been argued that the celestial body concept should comprise only certain astronomical categories, such as stars, planets and their satellites. Expanding it to comets, meteoroids and micrometeoroids would broaden the notion to inordinate extents.[10] A scientific delimitation appears untenable for defining a legal concept, however, as law is only interested in regulating the activities of man. Indeed, it is commonly acknowledged that the meaning of the legal notion 'celestial body' should not necessarily correspond to that of its scientific equivalent.[11] It therefore stands to reason that the notion can also not be defined by reference to the scientific *subcategories* that make up the concept, as this would merely defer the problem. Furthermore, scientific taxonomy itself is susceptible to constant revision. The reclassification by the International Astronomical Union of Pluto as a Trans-Neptunian dwarf planet rather than as a full-fledged planet is the most recent

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9 I.H.Ph. Diederiks-Verschoor, "The legal status of artificial space objects", 24 *IISL Proceedings* 1981, 93; K.U. Pritzsche, *Natürliche Ressourcen im Weltraum – das Recht ihrer wirtschaftlichen Nutzung*, Frankfurt am Main, Peter Lang, 1989, 89-91; A. Górbiel, "Twenty years of the international space law development in the United Nations", 50 *Nordic Journal of International Law* 1981, nr. 16.

10 G.P. Zhukov, "The problem of the definition of outer space", 10 *IISL Proceedings* 1967, 273; G. Gál, *Space law*, Leiden, Sijthoff, 1969, 186-187.

11 E. Vassilievskaïa, "Les problèmes juridiques de la mise en valeur de la Lune et des planètes", in A. Piradov (ed.), *Le droit international de l'espace*, Moscow, Editions du Progrès, 1976, 148.

example of such scientific whimsicality.[12] As the primary aim of formulating definitions is to enhance legal security, little would be gained by defining the celestial body concept with reference to related notions that are themselves amenable to constant change. Finally, little agreement exists among legal scholars as to which scientific categories should be retained for defining celestial bodies. A scientifically inspired interpretation of the notion thus appears untenable.

Most authors therefore dispense with the method of astronomical classification and immediately focus on the physical properties of the material phenomenon at hand, relying solely on such qualities as the body's size or mass to determine its legal status. As such, Fasan argues that celestial bodies are all material objects that can be transported *in toto* through outer space.[13] A similar criterion was retained by the Working Group III of the International Institute of Space Law on the legal status of celestial bodies, which defined these bodies as all '*natural objects in outer space, including their eventual gaseous corona, which cannot be artificially moved from their natural orbits*'.[14] The transportation criterion, however, disregards the potential of future technological developments that may well allow for the displacement of objects of such magnitude as to completely deprive the category of celestial bodies of any content.[15] The inclusion of gaseous coronas in the definition of the Working Group III has also been denounced for running counter to common sense,[16] as these phenomena rather resemble parts of outer space *sensu stricto*.[17]

Indeed, what little agreement exists as to the interpretation of the notion 'celestial body' is typically derived from the normal meaning of a *body* as being an individualized form of

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12 IAU General Assembly Resolutions B5 and B6 of 24 August 2006, available at http://www.iau.org/static/resolutions /Resolution_GA26-5-6.pdf (accessed 4 August 2010). See also L.I. Tennen, "Legal implications of the IAU Resolutions on planet definition: Some preliminary observations", 49 *IISL Proceedings* 2006, 526-529.

13 E. Fasan, *Weltraumrecht*, Mainz, Krausskopf, 1965, 113.

14 See Art. 1 of the Draft Resolution of the Working Group III, 1965 IISL Proceedings, 352.

15 See the comments of Haley and Sztucki in the discussions of the Working Group III in the 1965-1966 IISL Proceedings; R. Frohn, *Internationalisierung von Himmelskörpern*, Berlin, Verlag, 1969, 69; M.G. Marcoff, *Traité de droit international public de l'espace*, Fribourg, Editions Universitaires de Fribourg Suisse, 1973, 242.

16 See the comments of Sztucki, *supra* note 15.

17 When used without further qualification, the notion 'outer space' in this article includes the Moon and other celestial bodies. The phrase 'outer space *sensu stricto*' denotes the part of outer space that does not comprise the celestial bodies. No legal content is attributed to this notion as such; it should only be read in relation/contrast to the concept 'celestial body'.

matter that distinguishes itself from the surrounding environment through its mass and structure.[18] Criteria for further delimiting the notion cannot rest on any sound legal, technological or scientific basis and are therefore unwarranted. However, it appears that even a general definition of celestial bodies as denoting all objects in space that distinguish themselves through their material manifestation, is undercut by the Moon Agreement, which provides that '*[f]or the purposes of this Agreement reference to the Moon [and other celestial bodies within the solar system, other than the Earth,] shall include orbits around or other trajectories to or around it*' (Article 1 (2) *jo.* (1) MA).[19]

The integral applicability of the legal regime of celestial bodies to the orbits around them appears irreconcilable with the generally accepted classification of orbits around the Earth as intrinsic parts of outer space *sensu stricto*, as was stressed time and again by the community of States in their denunciation of the 1976 Bogotá Declaration (see *infra*).[20] The fact that the Moon Agreement expressly excludes the Earth from the class of celestial bodies to which it is applicable (Article 1 (1) MA, see *supra*) does not change this finding, for the physical characteristics that determine the manifestation of orbits around Earth are no different from those that make up the trajectories around the Moon and other celestial bodies. Moreover, it has correctly been stated with respect to the geostationary satellite orbit (hereinafter: GSO) that orbits are not so much physical phenomena as they are fictions that exist only by virtue of the path created by artificial space objects navigating through void space.[21] It follows that, depending on the applicable rules, orbits should be considered parts

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[18] See E. Vitt, "Begriffsdefinitionen", in K.-H. Böckstiegel (ed.), *Handbuch des Weltraumrechts*, Cologne, Heymann, 1991, 51-54; F.G. Rusconi, "An essay on the lawful concept of heavenly bodies", 9 *IISL Proceedings* 1966, 58; A.D. Roth, *La prohibition de l'appropriation et les régimes d'accès aux espaces extra-terrestres*, Paris, Presses Universitaires de France, 1992, 103; P. Delville, "Réflexions sur le principe de non-appropriation de l'espace extra-atmosphérique et des corps célestes", 63 *Revue Française de Droit Aérien & Spatial* 2009, 138; M. Lachs, "The international law of outer space", 113 *Recueil des Cours* 1964-III, 51; J. Kish, *The law of international spaces*, Leiden, Sijthoff, 1973, 47.

[19] Art. 1 (3) MA further specifies that '*[the Moon] Agreement does not apply to extraterrestrial materials which reach the surface of the Earth by natural means*'. This provision does little to clarify the meaning of the term 'celestial body', however, as it is merely intended to exclude meteors and meteorites from the scope of the Moon Agreement. This does not preclude these same objects from being considered celestial bodies when still in outer space (*i.e.* meteoroids).

[20] Declaration of 3 December 1976 of the first meeting of equatorial countries, ITU Doc. WARC-BS (1977) 81-E.

[21] See the submission of Belgium in reaction to the Bogotá Declaration in the UN Committee on the Peaceful Uses of Outer Space (hereinafter: UN COPUOS), referenced in S. Gorove, "The geostationary orbit: Issues of law and policy", 73 *American Journal of International Law* 1979, 452-453.

of outer space *sensu stricto* or as intrinsic components of celestial bodies, while their reliance on artificial Earth satellites should in theory subject them to the legal regime of space objects.[22] It follows that an *a priori* classification of physical phenomena in outer space cannot be sustained for defining the scope of applicability of potentially diverging legal regimes.

2.3. A functional definition

The above section has argued the untenability of scientific, astronomical and purely physical criteria as a means of distinguishing between the myriad components of outer space as subjects of separate legal regimes. This does not imply, however, that the entire realm of outer space, including the Moon and other celestial bodies, should be guided by a uniform set of rules and principles. The difficulties encountered in defining the celestial body concept merely serve to show that the legal regime applicable thereto cannot be delineated by virtue of a prior definition of its subject matter. Conversely, it stands to reason that such prior definition is unwarranted if one chooses to delineate the material scope of space law provisions on the basis of their respective content, *i.e.* if one takes a functional approach to defining the component parts of the outer space sphere, depending on the applicable provision. For example, Article XII OST provides that '*[a]ll stations, installations, equipment and space vehicles on the Moon and other celestial bodies shall be open to representatives of other States Parties to the Treaty on a basis of reciprocity*'. It is clear that this provision can only apply to land masses in space that allow for the settlement of such bases as are contemplated by the provision. Therefore, if a natural object in space is sufficiently large and solid to sustain a base, it should be considered a celestial body for the purpose of this provision.[23] If it does not meet these requirements, the question of whether or not the object at issue constitutes a celestial body becomes irrelevant, as the provision cannot be deemed applicable. Similar considerations determine the applicable scope of other provisions, such as Article 8 (2) MA, which explicitly allows states parties to the agreement to land their space objects on celestial bodies.

The functional approach avoids the need for a prior classification of material phenomena in space and has therefore been suggested by a number of authors in order to escape the definitional dilemma of celestial bodies.[24] This is not to say that the approach is completely

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[22] See, for example, W.N. White, Jr., "Real property rights in outer space", 40 *IISL Proceedings* 1997, 370.

[23] E. Vitt, *supra* note 18, 53.

[24] I. Csabafi and S. Rani, "The law of celestial bodies", 6 *Indian Journal of International Law* 1966, 196; A.S. Piradov, *International space law*, Honolulu, University Press of the Pacific, 2000, 114; M.G. Marcoff, *supra* note 15, 240; G. Gál, *supra* note 10, 186-187; E. Vitt, *supra* note 18, 51-54.

devoid of any consideration for the physical characteristics of these phenomena, however, for the activities that can be undertaken on celestial bodies are often defined by virtue of their physical composition. This renders it at times rather difficult to distinguish between a functional approach and one that relies on a physical delimitation between celestial bodies and other parts of outer space. For example, Gál considers celestial bodies to be all astronomical objects that are sufficiently large to allow for manned *c.q.* unmanned landing and which cannot be deviated from their orbit,[25] while Cocca argues that celestial bodies should at least be amenable to occupation.[26] As opposed to these definitions, however, the functional approach does not primarily depend on the physical qualities of the various components of outer space to rigidly determine the applicable regime, but rather allows for a more flexible regulation of human activities in space, in keeping with the characteristics of the specific spatial phenomenon with which it is concerned.

A functional approach is thus more in line with the central goal of the space treaties, which is to encourage the exploration and use of outer space, including the Moon and other celestial bodies.[27] The very titles of the Outer Space Treaty and the Moon Agreement already clarify that the principal aim of these treaties is to regulate the *activities* of States in outer space and on celestial bodies, rather than to determine the *legal status* of these extraterrestrial phenomena as such. There is thus little reason to apply a uniform definition of celestial bodies to a wide range of human activities that by their aim are geared toward different phenomena in space. It follows that, if two provisions are both by their wording applicable to celestial bodies only, their practical scope can nevertheless comprise two separate subcategories of material objects, should this be warranted by the concrete activity regulated by the provisions at issue. For example, it is clear that the celestial bodies referred to in Article XII OST should be capable of supporting a space station or other installation of human fabrication, thus rendering the provision only applicable to natural objects in space of a rather large magnitude with a stable composition and a solid surface. On the other hand, the nature of the activity of installing a weapon of mass destruction on celestial bodies as prohibited by Article IV OST allows extending the coverage of the provision to a much wider category of material objects in space than Article XII. Limiting its coverage to merely those celestial bodies that are suitable for landing and erecting space stations as envisaged by other provisions would render it vulnerable to circumvention and thus rather ill-suited for regulating the activity at hand.

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[25] G. Gál, *supra* note 10, 186.

[26] A.A. Cocca, "Legal status of celestial bodies and economic status of celestial products", 5 *IISL Proceedings* 1962, 4.

[27] See Art. I, para. 2, OST and the preambles of the OST and the MA.

Conversely, provisions of the Outer Space Treaty that are applicable not only to celestial bodies, but also to the outer space surrounding them and in which they are included, do not depend on any delimitation of the term 'celestial body' in order to determine their material scope, given the encompassing nature of the phrase 'outer space, including the Moon and other celestial bodies'. Most provisions of the OST for their operability thus do not rely on a definition of what constitutes a celestial body, regardless of whether this should be a functional definition or one formulated *in abstracto*, *provided* these provisions are also *applied indiscriminately* to all phenomena in outer space for the activities they regulate.

This point should be well understood. For various reasons explicated above, it has been argued that the functional approach is the only means of interpreting the scope of the current space law provisions by which can be arrived at a workable legal regime for the various components of outer space. As this approach is defined by the practical implications of the activity regulated by a given provision, it presupposes that provisions that do not by their wording or by their activity discriminate between outer space *sensu stricto* and celestial bodies are also applied indiscriminately to these phenomena in practice. For example, as Article I, para. 1, OST refers to 'outer space, including the Moon and other celestial bodies' when proclaiming that activities therein shall be carried out for the benefit of all countries, the practical application of this provision does not pose any problems *only* if it is indeed applied indiscriminately to both outer space *sensu stricto* and to the celestial bodies contained therein. If, hypothetically speaking, a practice were to arise that for some reason would limit the application of this provision to celestial bodies alone, however, the only way of arriving at a workable regime in this respect would be by defining these bodies *in abstracto*, for the scope of the provision cannot be deduced from the nature of the activity concerned. Regardless of whether such practice could be justified by arguing the emergence of a norm of customary international law or through the conclusion of a new treaty, the discriminative application of a norm regulating the activity of States governed by Article I, para. 1, OST would not be practicable as it has been argued that an *a priori* definition of physical components of outer space is untenable.

The above interpretation of Article I OST so far remains firm within the realm of legal hypotheses. The problems illustrated by the example, however, are by no means illusory. This becomes clear when one looks at the current interpretation of the principle of non-appropriation as codified in Article II OST. It is telling, in this respect, that the need to define the notion 'celestial body' is typically raised when determining the applicability of this principle.

3. Implications for the application of the Non-Appropriation Principle

3.1. Indiscriminate application of the principle

Article II OST states that '*[o]uter space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means*'. This provision is repeated *verbatim* in Article 11 (2) of the Moon Agreement, albeit understandably limited to the Moon and other celestial bodies.

The exact meaning of Article II OST has been subject to many controversies, particularly as regards the interpretation of the notion 'national appropriation'.[28] The material scope of the non-appropriation principle as applying to both outer space *sensu stricto* and celestial bodies, however, appears sufficiently clear to withstand scrutiny and has indeed never been challenged explicitly. Nevertheless, the need to define the notion 'celestial body' is most often raised with specific reference to the need to clarify the scope of application of the principle of non-appropriation.[29] The apparent logic behind this argumentation presupposes that by limiting the notion 'celestial body' to a subcategory of material phenomena in outer space, the corporeal objects that escape this classification should be amenable to appropriation, for they are too insignificant to constitute celestial bodies, yet at the same time cannot be assimilated with outer space *sensu stricto* because of their material manifestation. As such, it has been argued that '*[pursuant to the non-appropriation principle of Article II of the OST, celestial bodies cannot be appropriated. In practice, should (some) asteroids and comets be considered celestial bodies, they would fall under this prohibition;* per a contrario*, if they are not celestial bodies, they may become the object of […] property rights'].*[30] Similarly, the abovementioned proposals that define the category of celestial bodies by reference to their capability of being captured and transported as a whole, clearly presuppose that natural objects that can *de facto* be appropriated should also *de iure* escape the application of the non-appropriation principle. In other words, underlying the need for defining celestial bodies is the contention or implied supposition that there is a third category of phenomena in space, solely defined by its physical characteristics, that eludes the general prohibition of Article II OST.[31]

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[28] In general, see S. Freeland and R. Jakhu, "Article II", in S. Hobe, B. Schmidt-Tedd and K.-U. Schrogl (eds.), *Cologne commentary on space law*, Cologne, Heymann, 2009, 44 and references.

[29] See, for example, I. Csabafi and S. Rani, *supra* note 24, 213; V. Pop, *supra* note 6, 47-58; E. Fasan, *supra* note 13, 112-113; G. Gál, *supra* note 10, 201.

[30] V. Pop, *supra* note 6, 50.

[31] See also S.M. Williams, "Utilization of meteorites and celestial products", 12 *IISL Proceedings* 1969, 180.

For several reasons the above argumentation must be categorically refuted. First, the contention that micrometeoroids and other small corporeal particles in outer space should constitute an intermediate category of phenomena in space amenable to appropriation is in flat contradiction with the comprehensive reach of the term 'outer space, including the Moon and other celestial bodies' as used expressly in Article II OST. Whatever natural objects the category of celestial bodies might encompass, it is clear that any material phenomenon eluding this classification should be subsumed under the overarching category of outer space (*sensu lato*).[32] Second, whatever meaning is attributed to the phrase 'outer space, including the Moon and other celestial bodies' in Article II OST, this interpretation should also be extended to other provisions in the Outer Space Treaty that have a similarly defined scope. Altering the meaning of Article II OST by re-interpreting its material scope thus appears an overly broad and unwarranted measure likely to produce unintentional external effects, as it would exclude an entire range of material phenomena from space law entirely. Finally, even if it could in theory be argued that the non-appropriation principle does not apply to all components of outer space, it is practically impossible to define a subcategory of cosmic matter that is amenable to appropriation, for various reasons stated above; no scientific, technological or physical criteria can accurately define the contours of such a category, nor can they be deduced from the wording of the provision itself or from the activity regulated by it. It follows that however Article II OST should be interpreted, the provision must be applied indiscriminately to all physical components of outer space.

The Moon Agreement, for the States that have become party to it, obviously does not alter this assessment. To be sure, Article 11 (2) MA limits the application of the non-appropriation principle to celestial bodies alone, yet this is simply because the general aim of the agreement is to regulate only the activities of States undertaken on these bodies. Moreover, the lack of any clear definition of what constitutes a celestial body according to the Moon Agreement and the safety net provided by Article II OST implies that even those cosmic elements that are not subject to Article 11 (2) MA remain non-appropriable pursuant to the OST. The preamble of the Moon Agreement further clarifies that the agreement was mainly intended to further refine and develop the principles of the Outer Space Treaty with respect to celestial bodies and should thus be read in conjunction with the latter instrument.[33]

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[32] A. Górbiel, "L'étendue du terme 'le corps céleste' dans le droit international public", 34 *Revue Française de Droit Aérien & Spatial* 1980, 248; E. Vassilievskaïa, *supra* note 11, 149; A.D. Roth, *supra* note 18, 102-103.

[33] See also C.Q. Christol, *The modern international law of outer space*, New York, Pergamon, 1982, 378.

The largely repetitive nature of the Moon Agreement is even often cited as one of its main deficiencies.[34] This suggests that the scope and wording of Article 11 (2) MA should not affect the interpretation of the non-appropriation principle in the OST.

The above merely wishes to clearly establish the inclusive reach of Article II OST as a uniform provision applying to both celestial bodies and outer space *sensu stricto*, irrespective of the meaning to be attributed to either component.[35] By no means is it implied that the non-appropriation principle should also prohibit property rights in natural resources of outer space, including those of the Moon and other celestial bodies. It *does* imply, however, that whatever the outcome of the discussion on the applicability of Article II OST on natural resources, it should be the same for the resources of both celestial bodies and outer space *sensu stricto*, for these categories of resources can only be defined by reference to the physical environment in which they are found.

3.2. Appropriation of natural resources

A great deal has been written about the applicability of Article II OST to natural resources and scholars appear deeply divided over the subject. Some authors categorically deny the right of States to appropriate any form of space resources, as the general and encompassing wording of Article II OST does not allow differentiating between outer space, including celestial bodies, and the natural resources thereof.[36] A second school of authors renders the applicability of the non-appropriation principle dependent on the type of resources concerned. One such author is Pritzsche, who, in a detailed study on the legal status of natural resources in outer space, argues that both the resources of outer space *sensu stricto*, such as orbits, and the mineral reserves in place on celestial bodies should be considered non-appropriable, while a third category of so-called *eigenständige Ressourcen*, such as solar energy and natural resources removed from celestial bodies, cannot be considered subject to Article II OST.[37]

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[34] S.E. Doyle, "Issues of sovereignty and private property", in M. Benkö (ed.), *Luft- und Weltraumrecht im 21. Jahrhundert*, Cologne, Heymann, 2001, 316-325.

[35] See also G. Gál, *supra* note 10, 192.

[36] S. Gorove, "Limitations on the principle of freedom of exploration and use in the Outer Space Treaty: Benefits and interests", 13 *IISL Proceedings* 1970, 74; E. Brooks, "Control and use of planetary resources", 11 *IISL Proceedings* 1968, 342.

[37] K.U. Pritzsche, *supra* note 9, 87-96. Similar: M. Will, *Solar power satellites und Völkerrecht*, Stuttgart, Boorberg, 2000, 142-143.

Such categorization is difficult to sustain, however. As far as the separate classification of solar energy is concerned, it has already been argued that there are no legal grounds for devising *ad hoc* categories of physical phenomena that inexplicably elude application of certain key provisions of space law. Moreover, it is obvious that solar energy originates from the Sun and should thus in principle be covered by the same legal regime as other natural resources removed from celestial bodies. The argument according to which natural resources no longer in place on celestial bodies should be appropriable is widely shared among legal scholars. This is confirmed by Article 11 (3) MA, which expressly limits the applicability of the non-appropriation principle with regard to celestial bodies to natural resources 'in place'. At the same time, however, most authors, as well as the international community in general, vehemently oppose any type of durable and exclusive rights vested in natural resources that do not originate from celestial bodies, such as orbital positions and sections of the radio-frequency spectrum.[38] As such, the property claims of the equatorial countries in the 1976 Bogotá Declaration to the natural resources of the sections of the geostationary satellite orbit 'above their territories' were nearly unanimously condemned as a violation of Article II OST.[39] Similar outcries were heard upon the registration and subsequent leasing of several orbital slots by Tonga in the 1990s.[40] Such a dichotomy between natural resources of celestial bodies and other space resources cannot be sustained in light of the indiscriminate phrasing of Article II OST and the untenability of defining the respective physical environments from which these resources originate.

It has merely been argued so far that the non-appropriation principle cannot distinguish in its application between natural resources of celestial bodies and other space resources. This is not to say, however, that all space resources should be considered non-appropriable. Rather, it supports the view that Article II OST simply does not apply to any type of natural resource in outer space. Most authors agree that the prohibition of national appropriation only relates to the establishment of titles with regard to territorial areas of outer space and celestial bodies.[41] The main purpose of the non-appropriation principle is to avoid territorial

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38 J.C. Thompson, "Space for rent: The International Telecommunications Union, space law, and orbit/spectrum leasing", 62 *Journal of Air Law & Commerce* 1996, 306-308; S. Cahill, "Give me my space: Implications for permitting national appropriation of the geostationary orbit", 19 *Wisconsin International Law Journal* 2001, 231; P.A. Salin, "Orbites, fréquences et asteroïdes à l'heure de la commercialisation des activités spatiales", 26 *Annals of Air & Space Law* 2001, 179.

39 J.C. Thompson, *ibid.*

40 D. Riddick, "Why does Tonga own outer space?", 19 *Air & Space Law* 1994, 21.

41 C.W. Jenks, "Property in Moon samples and things left upon the Moon", 12 *IISL Proceedings* 1969, 148; B. Cheng, "Le Traité de 1967 sur l'Espace", 95 *Journal du Droit International* 1968, 568; S.M. Williams, "The law of outer space and natural resources", 36 *International & Comparative*

conflicts in outer space so as to guarantee the free exploration and use thereof in accordance with Article I OST. Article II OST neither mentions nor excludes the natural resources originating in the space environment and should thus be considered inapplicable thereto.[42] This was confirmed by the discussions on the Moon Agreement, in spite of and partially even due to the opposition to this convention. Article 11 (3) MA clearly states that natural resources of the Moon and other celestial bodies can be appropriated once removed from their place. As it was argued that the Moon Agreement should be interpreted in line with the Outer Space Treaty and Article II OST does not distinguish between the natural resources originating from celestial bodies and other space resources, one must conclude that no resources in outer space are *in se* non-appropriable. The debate on whether or not the Moon Agreement installed a moratorium on the exploitation of natural resources only confirms this view. Article 11 (5) provides that '*States Parties to this Agreement hereby undertake to establish an international regime […] to govern the exploitation of the natural resources of the Moon as such exploitation is about to become feasible*'. Ample evidence suggests that this provision does not imply that the exploitation of natural resources on celestial bodies can only be initiated after said international regime is established.[43] This activity should thus be considered lawful under the Moon Agreement, even though the international regime of Article 11 (5) MA has yet to be erected.[44] Moreover, the moratorium issue underscores that the appropriation of space resources was not considered prohibited by the Outer Space Treaty either. As a moratorium entails the temporary prohibition of a previously allowed activity, the mere fact that the issue was raised during the negotiations on the Moon Agreement presupposes by definition that Article II OST was deemed inapplicable to natural

Law Quarterly 1987, 146; D. Goedhuis, "Some recent trends in the interpretation and the implementation of the rules of international space law", 20 *Columbia Journal of Transnational Law* 1981, 219; S. Gorove, "Sovereignty and the law of outer space re-examined", 2 *Annals of Air & Space Law* 1977, 321; W.N. White, Jr., "Interpreting Article II of the Outer Space Treaty", 46 *IISL Proceedings* 2003, 175; S. Hobe, "Adequacy of the current framework relating to the extraction of natural resources in outer space", 32 *Annals of Air & Space Law* 2007, 126.

42 K.U. Pritzsche, "Die Nutzung natürlicher Ressourcen", in K.-H. Böckstiegel (ed.), *supra* note 18, 567.

43 See the submissions of the US to the UN COPUOS and the understanding adopted by the Committee itself in its 1979 report: C.Q. Christol, *supra* note 33, 298-303; M.L. Smith, "The commercial exploitation of mineral resources in outer space", in T.L. Zwaan (ed.), *Space law: Views of the future*, Deventer, Kluwer, 1988, 52.

44 This view was confirmed by the replies received to the questionnaire submitted by Goedhuis to the Space Law Committee of the International Law Association in 1982: see S.M. Williams, *supra* note 41, 145-146.

resources in space.[45] In this respect, the vehement opposition to the MA due to the allegedly implied moratorium only confirms that space resources should be subject to appropriation pursuant to the OST. It follows that there is no legal ground for *a priori* barring the appropriation of the orbit-frequency spectrum and other natural resources of outer space *sensu stricto*.

For several reasons it cannot be argued that the specific wording of Article 11 MA limits the legitimacy of appropriating natural resources to those that physically originate from celestial bodies, such as mineral reserves found in the lunar regolith. First, it has been shown that the lawfulness of appropriating natural resources of celestial bodies does not depend on Article 11 MA but is immediately implied by Article II OST, the general wording of which does not legally or practically allow for a rigid distinction between the physical environments of space resources. Second, the qualification by the Moon Agreement of the natural resources of celestial bodies as the 'common heritage of mankind' (hereinafter: CHM) cannot justify a separate treatment of these resources as regards the applicability of the non-appropriation principle. Article 11 (1) MA clearly states that '*[t]he Moon and its natural resources*' are the common heritage of mankind. Thus, whatever meaning is to be attributed to the disputed CHM concept, it must determine the legal status of both the celestial bodies and of their natural resources. As it is universally agreed that the Moon and other celestial bodies as such cannot be appropriated, the implications of the CHM qualification cannot comprise the amenability to appropriation.[46] Third, the specification in Article 11 (3) MA that the non-appropriation principle applies only to natural resources 'in place' on the Moon should not be interpreted as limiting the scope of the provision to material resources found on or underneath the surface of celestial bodies. The criterion merely serves to confirm that claims on natural resources of celestial bodies are illegitimate when not directly linked with their actual exploitation, as this would be tantamount to establishing sovereign claims over areas of these bodies; the very exploitation of these resources renders them subject to appropriation. The 'in place' criterion is thus less an indication of the physical location of natural resources on celestial bodies than it is a specification rendering the establishment of property rights on these resources conditional on their exploitation (see further *infra*). Furthermore, Christol has convincingly argued that the provisions of the Moon Agreement do not solely apply to natural resources materially 'in place' on or

[45] S. Hobe, *supra* note 41, 124-125; M.L. Smith, *supra* note 43, 47; S. Gorove, *supra* note 21, 449-450.

[46] Interestingly, both the Argentine and US drafts of the MA limited the CHM qualification to the natural resources of celestial bodies, excluding celestial bodies as such.

beneath the surface of celestial bodies, as the latter concept also comprises immaterial components given the inclusion of orbits and other trajectories in space in Article 1 (2) MA (see *supra*).[47]

It cannot be argued that international practice has given rise to a norm of customary international law altering the interpretation of the non-appropriation principle so as to exempt only natural resources of celestial bodies from the prohibition to vest property rights in outer space. Despite the ambitious plans of major spacefaring nations in this direction, no actual large-scale commercial exploitation of celestial body resources has taken place so far. Conversely, the orbit-frequency spectrum is being used intensively on a daily basis; orbital positions and radio frequencies have been and continue to be leased and auctioned in various countries. If anything, international practice thus appears to support the emergence of a customary norm that affirms the tradable nature of the orbit-frequency spectrum, rather than that of mineral reserves on celestial bodies.

Finally, the selective application of Article II OST so as to exclude only the natural resources of celestial bodies cannot be attributed to a particular interpretation of the notion 'national appropriation' contained in this provision. The exploitation of the orbit-frequency spectrum essentially amounts to the temporary use of a non-depletable spatial resource that does not significantly deteriorate after intensive use. Exploiting natural resources of celestial bodies, on the other hand, more often than not takes the form of an irreversible destruction through consumption of a depletable mineral reserve. Were the notion 'national appropriation' in Articles II OST and 11 (2) MA to apply to natural resources, it would therefore appear more likely to prohibit the exploitation of celestial body resources than it would the everyday uses of the orbit-frequency spectrum that have so strenuously come under attack in recent years.[48]

What has been established so far is that the non-appropriation principle is not applicable to any type of natural resource in space. The question still remains whether the exploitation of these resources is in fact an allowable use of outer space. Article I, para. 2, OST broadly proclaims that '*[o]uter space, including the Moon and other celestial bodies, shall be free for exploration and use by all States*'. While the exact interpretation of the notion 'use' in this provision is disputed, most authors agree that it includes the commercial exploitation

47 C.Q. Christol, *supra* note 33, 305-308.

48 See S. Gorove, "Interpreting Article II of the Outer Space Treaty", 37 *Fordham Law Review* 1969, 353.

of natural resources.[49] Main arguments in favour of this interpretation are the permissive and enabling nature of the Outer Space Treaty in general and the open phrasing of Article I, para. 2, OST.[50] Legislative history also supports a broad reading of the notion 'use' in this provision, as it was preceded by a reference to 'exploration and *exploitation'* in UNGA Resolution 1348.[51] In any event, Article I OST does not expressly prohibit the commercial exploitation of natural resources. It should thus be considered permissible pursuant to the general rules of interpretation, subject to restrictions found in other provisions of space law.[52]

As we have seen, such restrictions do not immediately flow from Article II OST. This is not to say that all natural resources in space should be appropriable in all circumstances. It is merely argued that the exploitation of natural resources is an allowable use of outer space and celestial bodies, the appropriation of which is not prohibited *per se*. The legal regime of natural resources in space (section III) is ultimately determined by a proper understanding of the space resource concept (III.I) and of the space law principles that can be usefully applied thereto (III.II).

4. The Legal Regime of Natural Resources

4.1. A functional definition

The notion 'natural resource' does not have a clearly defined meaning in international law. The Outer Space Treaty does not expressly address the issue and the only international space law instruments that contain explicit provisions on natural resources fail to define it in any way. Article 11 of the Moon Agreement is largely limited to declaring natural resources of celestial bodies the common heritage of mankind (*supra*), while the other reference in international space law, Article 44 (2) of the Constitution of the International

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49 E. Brooks, *supra* note 36, 344; E.G. Vassilievskaïa, "Notions of 'exploration' and 'use' of natural resources of celestial bodies", 20 *IISL Proceedings* 1977, 476; S. Hobe, *Die rechtlichen Rahmenbedingungen der wirtschaftlichen Nutzung des Weltraums*, Berlin, Duncker und Humblot, 1992, 66; K.U. Pritzsche, *supra* note 42, 565; K.-H. Böckstiegel, "Legal implications of commercial space activities", 24 *IISL Proceedings* 1981, 26; E.R.C. van Bogaert, *Aspects of space law*, Deventer, Kluwer, 1986, 41.

50 S.E. Doyle, *supra* note 34, 315-316.

51 UNGA Res. 1348 (XIII) of 13 December 1958 on the question of the peaceful use of outer space. The negotiation history of the OST further confirms this reading: see S. Hobe, "Article I", in S. Hobe, B. Schmidt-Tedd and K.-U. Schrogl (eds.), *supra* note 28, nr. 14.

52 K.-H. Böckstiegel, "Die kommerzielle Nutzung des Weltraums", in K.-H. Böckstiegel (ed.), *supra* note 18, 279.

Telecommunication Union (hereinafter: ITU), merely obliges its Member States to '*bear in mind that radio frequencies and any associated orbits, including the geostationary-satellite orbit, are limited natural resources*'.

The unqualified reference to the general notion 'natural resources' in two instruments regulating physically different environments appears to confirm that the notion's meaning transcends categorisation and that there is no legal ground for distinguishing between the resources of celestial bodies and other space resources.[53] The above provisions also clarify that any legal definition of natural resources should not be limited to tangible resources alone. Definitions suggested in literature that focus on the material characteristics of space resources should thus be dismissed, for they would exclude orbital positions and radio frequencies, in manifest contradiction to the clear language of Article 44 (2) ITU Constitution.[54] Most authors therefore advance a broad definition of space resources, comprising both tangible and intangible resources.[55] For example, PRITZSCHE interprets the notion as referring to '*alle materiellen oder immateriellen Teile, Bestandteile und körperlich oder räumlich abgrenzbaren Erscheinungen des Weltraums einschließlich der Himmelskörper […], die Gegenstände wirtschaftlicher Nutzung sind oder sein können*'.[56] Equally comprehensive is the definition advanced by WILL, who extends the notion to cover every material and immaterial object and phenomenon in outer space, including orbits, points, solar rays and radio frequencies.[57]

Pursuant to these definitions, any component particle of outer space can theoretically be considered a natural resource.[58] As such an all-encompassing interpretation would derive the qualification of 'natural resource' of any practical relevance, however, the notion should be further circumscribed. Most authors do so by requiring that a particular phenomenon in

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53 Council Regulation (EC) No 44/2001 of 22 December 2000 on jurisdiction and the recognition and enforcement of judgments in civil and commercial matters, OJ L 012 , 16 January 2001, p. 0001 – 0023. See also A.D. Roth, *supra* note 18, 79.

54 See, for example, the definition in R.V. Dekanosov, "Weltraum, Himmelskörper, ihre Ressourcen und der Begriff 'gemeinsame Erbe der Menschheit'", in Institut für Staat und Recht der Akademieder Wissenschaften der UDSSR (ed.), *Weltraum und Recht*, Moscow, 1985, 19.

55 See the excellent dissertation on the legal regime of space resources in M.S. McDougal, H.D. Lasswell and I.A. Vlasic, *Law and public order in space*, New Haven, Yale UP, 1963, 749.

56 K.U. Pritzsche, *supra* note 9, 17.

57 M. Will, *supra* note 37, 59-60.

58 L. Perek, "Outer space as natural resource", in R.-J. Dupuy (ed.), *The settlement of disputes on the new natural resources*, The Hague, Nijhoff, 1983, 222.

space produce an economic value upon transformation through human use in order to be considered a space resource.[59] A similar criterion is used to delineate the natural resource concept in international law in general.[60] This also corresponds to the definition of natural resources in Black's Law Dictionary, the relevant entry of which refers to '*any material from nature having potential economic value*'.[61]

It follows that the category of natural resources in space is defined by virtue of its susceptibility to exploitation, rather than by certain predefined physical characteristics. This is in line with the functional definition of the celestial body concept suggested earlier. As any phenomenon in outer space can theoretically be considered a natural resource, every single particle can in principle be categorised both as a component of a celestial body *c.q.* outer space *sensu stricto* and as a natural resource, depending on the particular context. A physical conception of natural resources would thus render impracticable any application of Article II OST, as it has been established that this provision does not apply to natural resources. Furthermore, Article II OST also prohibits the national appropriation of outer space 'by means of use'. Rendering this provision applicable to phenomena that exist only by virtue of their amenability to a certain use would be nonsensical and would disproportionally limit the legitimacy of human activities in outer space. Indeed, the principal use of outer space consists of artificial satellites being placed in orbit around Earth. This activity has been characterised as a use of a limited natural resource by the ITU Constitution. The application of Article II OST to natural resources would thus render unlawful the principal activity undertaken by states since the dawn of the space age. This can barely have been the intention of the drafters of the OST, in particular as this activity was already commonplace at the time of the negotiations.[62]

Natural resources are defined by their use. It follows that the legal regime of these resources flows directly from the general principles of the Outer Space Treaty on the exploration and use of outer space. The main tenets of this legal regime will be discussed in the next section.

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59 M. Miklódy, "Einige Bemerkungen zur Frage der Eigentumsrechte an Mineralschätzen der Himmelskörper", 22 *IISL Proceedings* 1979, 177, referring to a similar criterion proposed by Vassilievskaïa; A.D. Roth, *supra* note 18, 79.

60 See S. Paquerot, *Le statut des ressources vitales en droit international*, Brussels, Bruylant, 2002, 15.

61 Black's Law Dictionary, 9th ed., 2009.

62 R. Wolfrum, "Einzelne Formen der Nutzung des Weltraums: Geostationäre Umlaufbahn", in K.-H. Böckstiegel (ed.), *supra* note 18, 364.

4.2. Proposal for a flexible legal regime on space resources

Thus far we have argued that it is untenable both in law and in practice to rigidly distinguish between various types of natural resources in space based solely on the physical environment in which they occur, as the applicable law does not distinguish on this basis either. This is not to say that all space resources should be governed by the exact same legal regime. Rather than resorting to an artificially bifurcated application of the non-appropriation principle, however, the legal basis for a flexible differentiation between space resources can be found in other criteria implicit in the main principles governing the exploration and use of outer space.

The cardinal principle on the use of outer space is codified in Article I, para. 2, OST.[63] As mentioned above, this provision pronounces outer space, including the Moon and other celestial bodies, to be '*free for exploration and use by all States without discrimination of any kind, on a basis of equality and in accordance with international law*'. Article II OST is typically interpreted as a corollary provision to this guiding principle, guaranteeing the free use of outer space by prohibiting territorial claims in space.[64] The ancillary nature of this provision thus further supports a narrow interpretation of its scope so as to exclude natural resources. The principle of equality between all states codified in Article I, para. 2, OST is elaborated upon in Article IX OST, which stresses that '*[i]n the exploration and use of outer space, including the Moon and other celestial bodies, states Parties to the Treaty […] shall conduct all their activities […] with due regard to the corresponding interests of all other States Parties to the Treaty*'. To this effect, Article IX OST instructs all states to avoid 'harmful interference' with the activities of other states in the peaceful exploration and use of outer space.

The principles contained in Articles I and IX OST are the main provisions guiding the various uses of outer space in general and thereby also delineate the main tenets of the legal regime of space resources.[65] These tenets largely correspond to the principles guiding the use of shared natural resources in international law in general.[66] The vague nature of these provisions notwithstanding, it is possible to infer from their wording some very concrete criteria that allow us to flexibly differentiate between various types of natural resources in outer space, obviating any need to resort to a discriminative application of Article II OST.

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63 K.U. Pritzsche, *supra* note 9, 32-35.

64 S. Freeland and R. Jakhu, *supra* note 28, nr. 12; S. Hobe, *supra* note 41, 123; P. Delville, *supra* note 18 142.

65 C.W. Jenks, *Space law*, London, Stevens, 1965, 275; I. Csabafi and S. Rani, *supra* note 24, 228. Both determine the legal regime of space resources solely by virtue of the general rules on the use of space, without resorting to Art. II OST.

The main goal of the Outer Space Treaty is to guarantee the undisturbed exploration and use by all states of outer space, including the Moon and other celestial bodies, as the province of mankind. The amenability of natural resources to be freely used by one state without impinging on the equal rights of other states to engage in like activities first and foremost depends on the general availability of the natural resource at hand. This availability is determined both by the physical characteristics of the specific space resource and the strategic value it has for the international community of states. These two criteria constitute the concrete application for the exploitation of natural resources of the OST principle of free use of outer space on the basis of equality with due regard to the corresponding interests of all states. In other words, the legal regime of the exploitation of natural resources of outer space, including the Moon and other celestial bodies, is determined by the *scarcity* of the particular resource, regardless of its astronomical origin.[67] Whether a space resource should be considered scarce depends on a wide variety of factors that should be carefully assessed in each case, which may vary in time and can depend on the particular use envisaged. As such, regard should be had of the physical abundance of the resource, its location and accessibility, the availability of alternative resources for the specific use concerned, whether or not the resource is of particular interest to more than one state and whether it is depleted by human exploitation.[68] Again a parallel can be

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66 It is not argued here that space resources should be equated with shared natural resources. However, the principles guiding the use of both resources show striking similarities: see, for example, Artt. 5 and 7 of the Convention of 21 May 1997 on the law of the non-navigational uses of international watercourses. See further J. Rainne, "The work of the International Law Commission on shared natural resources: The pursuit of competence and relevance", 75 *Nordic Journal of International Law* 2006, 321. See also the general principles on the use of natural resources in international (environmental) law listed in R. Barnes, *Property rights and natural resources*, Oxford, Hart, 2009, 231-248; P. Birnie, A. Boyle and C. Redgwell, *International law and the environment*, Oxford, Oxford UP, 2009, 190-205.

67 See the detailed assessment of a legal regime of space resources based on this criterion in M.S. McDougal, H.D. Lasswell and I.A. Vlasic*, supra* note 55.

68 The exhaustible nature of space resources is frequently mentioned as a relevant consideration for determining their legal regime, without, however, fully contemplating the implications of this criterion. See, for example, C.W. Jenks, *supra* note 65, 275; E. Brooks, *supra* note 36, 345-346; L. Viikari, *From manganese nodules to lunar regolith*, Rovaniemi, University of Lapland, 2002, 25; S.M. Williams, *supra* note 31, 183; R.V. Dekanosov, "Juridical nature and status of the resources of the Moon and other celestial bodies", 23 *IISL Proceedings* 1980, 7; M. Will, *supra* note 37, 59; C.Q. Christol, *supra* note 33, 416-417; P.M. Sterns and L.I. Tennen, "Private enterprises and the resources of outer space", 48 *IISL Proceedings* 2005, 243; K.U. Pritzsche, *supra* note 9, 112 and references; P. Delville, *supra* note 18, 146. The criterion is sometimes taken into account in order to determine the applicability of Art. II OST: see S. Gorove, "Interpreting Article II of the Outer Space Treaty", 11 *IISL Proceedings* 1968, 41. However, it has already been argued that the criterion of scarcity flows from Arts. I and IX OST rather than Art. II OST.

drawn with the criteria that determine the use of shared natural resources in general international law.[69]

The physical characteristics of phenomena in space thus once more infiltrate the natural resource discussion. The particular context in which this occurs, however, is manifestly different from the one previously considered. Rather than rigidly determining the legal status of their physical manifestation, the present consideration of the scarcity of natural resources aims to regulate their concrete exploitation. This allows for a more flexible, dynamic and above all legally correct approach to the regulation of the wide array of space resources so as to contribute to the efficient use of outer space.

The practical application of this approach may well necessitate rendering certain space resources non-appropriable, provided they are in limited supply and have a high strategic value for a large variety of states. This is where the exploitation of the orbit-frequency spectrum enters the discussion. As already mentioned, Article 44 (2) ITU Constitution qualifies radio frequencies and any associated orbits as limited natural resources. This qualification was first introduced with respect to the geostationary satellite orbit in 1971.[70] The prevalent system in force at the time for allocating radio frequencies was an *a posteriori* method solely concerned with protecting registered satellites from harmful interference by later users. Due to the intensive use of the GSO by industrialized nations, the developing countries feared that such a 'first-come, first-served' system would effectively render all economically valuable slots occupied by the time they could access space. The ITU therefore set off on a series of administrative radio conferences in the 1970s and 1980s to revise its allocation methodology so as to mitigate the concerns of the developing countries regarding the consumptive exploitation of the GSO by a mere few industrialized spacefaring nations.[71]

The outcome of these revisions was the introduction of an *a priori* allotment plan that in principle granted all ITU Member States a future possibility to operate geostationary satellites in the so-called planned fixed satellite service (hereinafter: FSS) bands.[72] To this

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69 See Art. 6 of the Convention on international watercourses, *supra* note 66.

70 Resolution 2-1 of 17 July 1971 of the World Administrative Radio Conference for Space Telecommunications, 23 *U.S.T.* 1527, 1686. See also M.A. Rothblatt, "ITU regulation of radio communication", 18 *Stanford Journal of International Law* 1982, 8.

71 For an overview of these evolutions, see F. Lyall and P.B. Larsen, *Space law: A treatise*, Farnham, Ashgate, 2009, 199; J.C. Thompson, *supra* note 38, 290-297.

72 T. Tjelta, A.L. Lillebø and E.O. Evenstad, "ITU-R World Radiocommunication Conference", January 2008, available at http://www.telenor.com/telektronikk/volumes/pdf/1.2008/Page_144-159.pdf (accessed 13 August 2010), 151.

effect, each administration was granted at least one allotment, comprising a nominal orbital position and a bandwidth of 800 MHz.[73] Further, it was specified in current Article 44 (2) ITU Constitution that all countries should be guaranteed equitable access to the orbit-frequency spectrum, '*taking into account the special needs of the developing countries and the geographical situation of particular countries*'. Finally, it had already been stressed in 1971 that registration by a prior user '*should not provide any permanent priority*' over later users and that registrants should take all practicable measures to help non-registrants exploit space systems.[74]

The above changes appear to have been inspired by the need to avoid permanent quasi-property rights being vested in a space resource by a select number of countries. Rather than constituting a selective application of the non-appropriation principle, however, the specific rules installed by the ITU instruments more likely are the concrete implementation of a legal regime of space resources determined by the criterion of scarcity. In other words, the orbit-frequency spectrum has been subjected to a specific legal regime, not because it is considered a limited *natural resource of outer space sensu stricto*, but because it is a *limited* natural resource. To be sure, the exact limits of this resource cannot be determined with any accuracy due to rapidly changing needs and technologies.[75] Nevertheless, the intensive use of the GSO renders the fear for saturation thereof more palpable than the depletion of mineral reserves on celestial bodies, the exploitation of which is still pending and largely speculative. It is therefore not surprising that the concrete implementation of the criterion of scarcity first occurred with respect to the GSO, despite the specific calls for the elaboration of an international regime for the exploitation of the natural resources of celestial bodies in the MA. Conversely, it is clear that the perceived scarcity of a particular mineral reserve with great strategic value, located on an easily accessible celestial body, would spur significant legal efforts in order to guarantee its preservation, notwithstanding the express permissibility of its exploitation and appropriation in the MA.

Article 44 (2) ITU Constitution qualifies *any* orbit associated with the use of the radio-frequency spectrum as a limited natural resource. It follows that a purported *a priori* applicability of the non-appropriation principle to these resources should affect all orbits around Earth that are used for telecommunication purposes, regardless of the particular

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73 See Appendix 30B of the ITU Radio Regulations.

74 Resolution 2-1, *supra* note 70.

75 UN COPUOS study of 29 August 1977 on the physical nature and technical attributes of the geostationary orbit, UN Doc. A/AC.105/203, 1.

service for which they are used. The ITU regime is much more flexible and discriminative than such a rigid application of Article II OST could allow for, however. First, the *a priori* allotment plan devised to appease the developing countries applies only to the expansion bands of the frequency spectrum used for fixed satellites services. This covers only a mere one percent of the total spectrum allocated to space services.[76] The remaining bands are still governed by the first-come, first-served principle. Moreover, the ITU rules on radio communications do not apply to the military uses of radio frequencies, as Article 48 (1) ITU Constitution provides that Member States retain their entire freedom with regard to military radio installations.[77] Thus, it is clear that different rules are in force for different uses of the radio-frequency spectrum and associated orbits. Second, the *a priori* allotment plan distinguishes between the GSO and other orbits. We have seen that it is physically impossible, however, to accurately delineate the GSO, as an orbit is not as much a physical phenomenon as it is a legal fiction created by the path of an artificial Earth satellite. It follows that there are as many GSOs as there are geostationary satellites. Moreover, no single satellite describes a perfect GSO and frequent corrections are needed to compensate the constant oscillations of the satellite. As the GSO is thus a phenomenon that can only be identified by virtue of the use made of it by an artificial satellite, there are no physical grounds for distinguishing between the GSO and other orbits. The sole reason why specific rules regarding the GSO can and should be introduced is because its intensive use for telecommunication purposes has rendered it considerably more scarce than other orbits, such as the low and medium Earth orbits (LEO/MEO). The odds of developing countries pressing for an *a priori* regime with respect to the latter orbits depend on the likelihood that such orbits and the associated spectrum would approach scarcity.[78]

The specificities of the ITU legal regime on radio communications thus reveal that it is not governed by the non-appropriation principle but rather by a flexible application of Articles I and IX OST to the exploitation of natural resources, as guided by the functional criterion of scarcity. The inapplicability of Article II OST does not imply that the entire orbit-frequency spectrum should be considered appropriable. The relative scarcity of the

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[76] J.C. Thompson, *supra* note 38, 295; R. Jakhu, "Developments in the international law of telecommunications: Strategic issues for a global telecommunication market", 83 *American Society of International Law Proceedings* 1989, 391.

[77] R. Jakhu and K. Singh, "Space security and competition for radio frequencies and geostationary slots", 58 *Zeitschrift für Luft- und Weltraumrecht* 2009, 88.

[78] S. Mosteshar, "Development of the regime for the low earth orbit and the geostationary orbit", in G. Lafferranderie and D. Crowther (eds.), *Outlook on space law over the next 30 years*, Dordrecht, Kluwer, 1997, 88 and 102.

GSO in combination with the strategic value of FSS services may very well warrant a specific regime shielding them from national appropriation. However, the free use of outer space by all states is not served by declaring all orbits and services non-appropriable, physically limited though they may be, if their strategic value is limited as well. For example, satellites used for direct broadcasting services typically require only orbital slots that cover the territory of the state receiving the signals. The competition over the orbit-spectrum resource for these services will thus be limited to a specific geographic region, hence arguably allowing for more intrusive rights than when considering fixed satellite services.[79] The reference to 'the geographical situation of particular countries' in Article 44 (2) ITU Constitution could be interpreted in this sense as a criterion concretizing the strategic value of the orbit-frequency resource (see *supra*).

The inapplicability of Article II OST also largely renders void the discussions on how to qualify the rights States can exercise with respect to the orbit-frequency spectrum. Manifold are the objections to the current use of the GSO as purportedly constituting a form of *de facto* appropriation.[80] These objections cannot hold, however, if one accepts that the GSO is a natural resource and in this respect is not subject to the non-appropriation principle.[81] *A contrario*, it might be argued that, as no distinction can be made between outer space *sensu stricto* as a territory and as a natural resource, Article II OST should be deemed applicable to the GSO as an intrinsic part of outer space.[82] However, this would fail to appreciate the full implication of the functional approach to both the definition of space resources and of outer space. The GSO is defined solely by the trajectory of an artificial satellite, which represents a particular use of outer space as a natural resource. As an orbit is thus not a physical phenomenon and its component positions are not fixed at a certain point in outer space, it cannot be equated with the territory of outer space *sensu stricto* and therefore escapes application of Article II OST.

Conversely, it follows that orbital positions allotted to a certain administration must be used by that administration in order to be subjected to the regime of natural resources and elude the non-appropriation principle. The placing of a satellite in orbit around Earth can

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79 M.L. Stern, "Communication satellites and the geostationary orbit: Reconciling equitable access with efficient use", 14 *Law & Policy in International Business* 1982, 868-870.

80 See France's submission to the 1969 UN COPUOS session, referenced in C.Q. Christol, "The geostationary orbital position as a natural resource of the space environment", 26 *Netherlands International Law Review* 1979, 10-11. See also P.A. Salin, *supra* note 38, 190;

81 S. Gorove, *supra* note 21, 449.

82 In this sense, K.U. Pritzsche, *supra* note 9, 89.

in this respect be seen as an act similar to that of removing a natural resource from its place in the (sub)soil of a celestial body as contemplated by the Moon Agreement. This ties in with the interpretation given to the 'in place' criterion in Article 11 (3) MA as not solely applying to tangible resources (see *supra*). Allocating a void part of outer space to a state that has no means or intention of using it is tantamount to a territorial claim to an area of outer space and thus explicitly prohibited by Article II OST. In this light, the measures taken by the ITU to combat the so-called 'paper satellite' problem spurred by the actions of Tonga are not merely a matter of good administration, they are necessary to ensure that the legal regime of the orbit-frequency spectrum is in line with the OST.[83] To be sure, the instruments of the ITU are international conventions through which the States Parties may deviate from previously committed engagements, such as the OST.[84] However, the practice of allotting positions and frequencies to states not in a position of using them might very well run counter to the instruments of the ITU as well, for it negates the qualification of the orbit-frequency spectrum in Article 44 (2) ITU Constitution as a '*limited natural resource, [to] be used rationally, efficiently and economically*'.[85]

5. Concluding Remarks

The article has argued that the different components of the outer space environment can only be defined from a legal point of view with reference to the activities that are allowed in or upon them. It is commonly agreed that the exploitation of natural resources is a legitimate activity that is not expressly regulated by the provisions of the Outer Space Treaty. It follows that whatever provisions are applicable to natural resources in space, they cannot discriminate between different types of resources unless such distinction is implied by the specific activity regulated by a given provision. The Moon Agreement does not affect this finding.

The criterion of scarcity implicit in Articles I and IX OST allows for a flexible regulation of the wide variety of space resources, taking into account their physical abundance and strategic value for the international community of States. In this light, a selective application

[83] Recent ITU actions to combat paper satellites include a reduction of the time limit for bringing into use a registered satellite and a due diligence measure requiring a State to provide evidence of the seriousness of its intention to establish a satellite network.

[84] A.D. Roth, *supra* note 18, 242.

[85] J.C. Thompson, *supra* note 38, 299-302; M. Smith, "Space WARC 1985: The quest for equitable access", 3 *Boston University International Law Journal* 1985, 255.

of Article II OST to the orbit-frequency spectrum is untenable, unwarranted and insufficient for a workable regulation of space resources. First, the phrasing of this provision and the nature of the activity do not allow for a discriminative application to different types of space resources. Further, the rigidity of a distinction between the appropriation of celestial body resources and the orbit-frequency resource is inapt for an efficient exploitation of the entire array of resources in outer space. Finally, the application of the non-appropriation principle to space resources cannot guarantee the free and undisturbed use of outer space by all states. Rendering orbital slots non-appropriable as such does not contribute to the accessibility of the GSO for non-spacefaring nations. Further, practice has shown that categorising the GSO as non-appropriable has not kept states from leasing their allotments and launching satellites into slots pre-registered by other administrations. Conversely, mineral reserves on celestial bodies are commonly regarded as appropriable yet it is clear that such legal designation has little value without the actual act of exploitation. Moreover, the legal regime of these resources is not definitively settled by deciding on the inapplicability of the non-appropriation principle, as it is clear that a scarce mineral reserve with great strategic value should not be susceptible to appropriation by a single state.

The above complexities do not arise when one accepts that natural resources hinge upon their amenability to exploitation for arising as a separate category subject to regulation by space law. The criterion of scarcity is sufficiently versatile to guarantee the efficient management of the wide array of space resources while fully respecting the main principles of space law and furthering the main goal of free and undisturbed use of outer space, including the Moon and other celestial bodies, by all states without discrimination. ■

Potential Uniform International Legal Framework for Regulation of Private Space Activities

Mariam Yuzbashyan

Abstract

Increasingly developing space activities affected by tendencies of globalization, commercialization and privatization have already caused various legal debates and might precondition additional future challenges subject to Space Law regulation.

The aim of this paper is to propose a potential and most importantly adequate and uniform solution for regulation of private space activities in view of the abovementioned tendencies.

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Private International Space Law ("PISL"), defined as a *set of substantive legal rules and rules of conflict of laws governing space-related property and personal non-property relations involving a "foreign element",* could provide such an adequate legal framework for commercial space activities as long as it is most effectively able to take account of both the private nature of the corresponding activities and the specific features of International Space Law and International Law on the whole.

The paper provides an overview of PISL as a new branch of law including its legal sources, principal institutions; evaluates perspectives of its development; as well as includes some *specific conclusions* related to formation of PISL reached by the author in her Ph. D. Thesis. In particular these conclusions concern:

The prevailing character of International Space Law rules and distinctive correlation of public and private legal aspects in commercial space activities regulation;

Interconnection between change of relations subject to PISL regulation and international legal effects for corresponding states;

Formulation of specific rules of conflict of laws applicable within the framework of PISL;

Tendency of parallel and in some cases "overdue" elaboration of national legislation for private space activities regulation.

The author believes that there is a need of a very strong and effective legal framework for turning space for human benefit and exploration, and presumes that formation of PISL could be a step forward on this way.

1. Actuality

Contemporary space activities directly affected by tendencies of globalization, commercialization and privatization[1] have already caused various legal debates and might pre-condition additional future challenges subject to space law regulation.

United Nations (hereinafter "UN") Treaties on outer space were adopted at the time when states were the only actors in this field and space activities were carried out mainly for strategic and scientific purposes. However space activities of non-governmental entities were not excluded from the scope of UN Treaties on outer space. According to Article VI of the Treaty on Principles Governing the Activity of States in the Exploration and Use of

Outer Space, Including the Moon and Other Celestial Bodies, 1967 (hereinafter "the Outer Space Treaty") "the activities of non-governmental entities in outer space, including the Moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty". It is envisaged in the same Article that States Parties shall bear international responsibility for all national activities in space, including the Moon and other celestial bodies (hereinafter "outer space").

The importance of rules and principles of the existing Space Law cannot be denied but it should however be recognized that neither UN Treaties on outer space nor corresponding national legislation do provide (and according to their substance even do not have to provide) comprehensive regulation of increasingly developing commercial space activities in view of the abovementioned tendencies.

Many issues related to private space activities such as property rights, intellectual property rights, liability of non-governmental entities, insurance, legal status of space tourists and others require adequate regulations; and in the future with advances in space technology and emergence of new lines of corresponding activities number of such issues would only increase.

Each of the aforementioned specific issues requires a separate legal analysis and effective solution but not less important is trying to find an appropriate uniform international legal framework for regulation of various aspects of private space activities[2].

Finding of a comprehensive solution to legal problems caused by and related to participation of non-governmental entities and individuals in space activity seems to be a highly topical issue.

2. Private International Space Law

For several years international lawyers specializing in the field of International Space Law (hereinafter "ISL") have been discussing the issue of formation of Private International

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1 See more about it: UN Document A/CONF.184/6. Report of the Third UN Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III) Vienna, 19-30 July 1999, p. 25.

2 For a detailed analysis of legal regulation of commercial use of outer space (I) (licensing and insurance of space activities, property rights and intellectual property rights, liability of states and non-governmental entities in Space Law and export control in the field of space activities); and comprehensive research of the issue of formation of PISL (II) (definition, subject and method of legal regulation, legal sources of PISL, legal status of subjects of PISL and correlation of International Space Law and PISL) please see author's PhD Thesis: Юзбашян М. Р. Международно-правовые основы решения экономических проблем использования космоса. Диссертация на соискание ученой степени кандидата юридических наук: 12.00.10/МГИМО Москва, 2009.

Space Law ("PISL")[3]. This discussion has been also supported by a number of states' official delegations at the UN Committee on the Peaceful Uses of Outer Space ("COPUOS") and its Legal Subcommittee.

2.1. Definition of PISL

PISL could be defined as *a set of substantive legal rules and rules of conflict of laws governing space-related property and personal non-property relations involving a "foreign element".*

As any other branch of law PISL is characterized by its specific *subject of legal regulation* comprising involving a "foreign element" space-related property and personal non-property relations of entities under Private International Law (states and international organizations, individuals and corporations).

"Foreign element" can be distinguished by subject in a relationship, subject-matter or juridical act on grounds of which legal relationship arises, changes or terminates.

To this subject following methods of legal regulations are applicable*:* substantive law method (direct regulation of relations), method of conflict of laws (referral to national law), as well as international and national methods of legal regulation.

Existence of these objective preconditions (specific subject and methods of legal regulation) allows raising the issue of formation of a new branch of law – PISL – that could be able to fill in the legal "vacuum" in regulation of commercial space activities.

2.2. *Legal Sources of PISL*

As any other branch of law PISL shall have its own legal sources. A general brief analysis of the status of potential and existing legal sources both at international and national levels is as follows:

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[3] See.: - Международное космическое право/ Отв. редакторы проф. Жуков Г. П. и проф. Колосов Ю. М.. - «Международные отношения». М.,1999 г., С.133;
- Кунц О. Международное космическое право и международное частное право/Новое в космическом праве (на пути к международному частному космическому праву)// Отв. редактор проф. Верещетин В. С. М., 1990. С.13;
- Ж. Монсеррат Фильо Правовые аспекты коммерческой деятельности в космосе/ Статус, применение и прогрессивное развитие международного и национального космического права. Материалы Симпозиума (Практикума) ООН-Украина по космическому праву. 6-9 ноября 2006 г. Киев, Украина. Актика-Н, 2007. С. 201;

2.2.1 The Cape Town Convention on International Interests in Mobile Equipment and Preliminary Draft Protocol on Matters specific to Space Assets

One of the forms of commercial space activity is *transfer of rights on mobile equipment.* On this issue the Convention on International Interests in Mobile Equipment (hereinafter "Convention") was prepared in frames of the International Institute for the Unification of Private Law ("UNIDROIT") and opened to signature at the diplomatic Conference, held in Cape Town, under the joint auspices of UNIDROIT and International Civil Aviation Organization ("ICAO"), at the invitation of the Government of South Africa, on 16 November 2006. The Convention entered into force on 1 March 2006[4].

The *aim* of the Convention is to increase the efficiency of financing high value mobile equipment (e.g. aircrafts, space objects, railway rolling stock, etc.), because such equipment moves from jurisdiction to jurisdiction, and because not all jurisdictions provide equivalent recognition of creditor's rights, creditors face higher risks and this increases the cost of obtaining credit.

The Convention establishes a sound, internationally-applicable legal regime for security, title-retention and leasing interests. This will reduce the risks faced by creditors and thereby reduce the costs of financing high-value mobile equipment. Financiers will be able to assure themselves that their proprietary interests in a financed asset are superior to all potential competing claims against that asset, and upon default will be able to promptly realize the value of that asset. In particular, the Convention provides for remedies in Contracting State jurisdictions to be capable of expeditious enforcement, and creates a regime for the priority of creditors' interests to be determined by reference to an electronic, notice-based *International Register,* with priority to be established on a "first-in-time" basis.[5]

In course of work on the draft Convention it was decided that the Convention would contain general rules applicable to all categories of high value mobile equipment and separate protocols would contain specific rules applicable to each particular category of mobile equipment and associated rights. In accordance with Article VI of the Convention, the Convention and the corresponding Protocol shall be read and interpreted together as a single

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[4] For the Status of the Cape Town Convention see: *http://www.unidroit.org/english/implement/i-2001-convention.pdf*

[5] International Interests in Mobile Equipment – Study LXXII/ Convention: Objectives and Key Features: *http://www.unidroit.org/english/workprogramme/study072/main.htm*

instrument (1); and, to the extent of any inconsistency between the Convention and the Protocol, the Protocol shall prevail (2).

The first developed protocol that was opened to signature and entered into force on the same date with the Convention is the Protocol to the Convention on International Interests in Mobile Equipment on Matters specific to Aircraft Equipment[6]. The Luxembourg Protocol to the Convention on International Interests in Mobile Equipment on Matters specific to Railway Rolling Stock was opened to signature at the diplomatic Conference held in Luxembourg on 23 February 2007 and has not yet entered into force[7].

Another Protocol dealing with application of the Convention to *space assets* is under development. *The preliminary Draft Protocol on Matters specific to Space Assets* (hereinafter "draft Space Assets Protocol") is under consideration of the UNIDROIT Committee of the governmental experts. Informal working groups meet in the interim, as well as consultations with representatives of the international commercial space, financial and insurance communities are held.

UN COPUOS Legal Subcommittee considered examination of the draft Space Assets Protocol for the first time as item for discussion at its fortieth session in 2001. This work continues and this item still remains on the agenda[8].

Purpose of the Space Assets Protocol would be (1) to establish an international register of secured interests in space assets, giving notice to third parties and thereby establishing priorities, (2) to provide remedies against default and insolvency, (3) to meet the needs of the space industry, (4) to encourage creditors to finance acquisition of space assets, and (5) generally to facilitate financing of space assets[9].

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6 For the Status of the he Protocol to the Convention on International Interests in Mobile Equipment on Matters specific to Aircraft Equipment see: *http://www.unidroit.org/english/implement/i-2001-aircraftprotocol.pdf*

7 For the Status of the Luxembourg Protocol to the Convention on International Interests in Mobile Equipment on Matters specific to Railway Rolling Stock see: *http://www.unidroit.org/english/implement/i-2007-railprotocol.pdf*

8 UN Document : A/AC.105/942 (Page 17).

9 See: Paul B. Larsen, IISL Observer. Brief Summary of the Fourth Meeting of the UNIDROIT Committee of Governmental Experts for the Preparation of the Protocol to the Cape Town Convention on International Interests in Mobile Equipment on Matters specific to Space Assets (Rome, May 3-7, 2010). P. 1.

Existing instruments and principles of Private International Law are applicable to commercial space activities involving a "foreign element", however they do not consider the specificity of this kind of activities, which although are commercial at the core, still are characterized by specific features, determined, in particular, by provisions of Articles VI and VII[10] of the Outer Space Treaty. There is a strong need of specific private international legal instruments for governing space-related private relations involving a "foreign element".

Although there are various opinions on the potential economic impact of the draft Space Assets Protocol, in case of its entry into force, together with the Convention as a single instrument, it may become first specific private international legal source of PISL and could serve as first example of instrument of this kind taking into account both the private nature of regulated activities and specific features of ISL.

As Ms. L. Ravillon noted, it is important to underline the importance of this instrument of substantive law, as the first international private law instrument in the space field[11]. Moreover the system of International Register, envisaged by this instrument, may become *third system of registration* in the field of space activity regulation (taking into account the two existing systems: under Convention on Registration of Objects Launched into Outer Space, 1975 (hereinafter "Registration Convention") and the other one within the frames of the International Telecommunications Union (ITU).

The view was expressed at the forty ninth session of the UN COPUOS Legal Subcommittee that the future Space Assets Protocol was intended not only to regulate the financing of space assets but also to bring space law in line with developing trends in space activities without undermining the current legal regime governing outer space[12].

Adoption of the Convention and continuing work on the draft Space Assets Protocol could be considered as one of the first efforts at the international level to modernize space law to adapt it to increasingly developing commercial space activities, on one hand, and as one of the important preconditions for formation of PISL, on the other hand.

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[10] Article VII of the Outer Space Treaty provides that States are "internationally liable for damage to another State <...> or its natural and juridical persons", if such damage is caused by their space objects.

[11] UNIDROIT Document : UNIDROIT 2010 - C.G.E./Space Pr./4/W.P. 4 rev. (P. 35).

[12] UN Document : A/AC.105/942 (Page 16).

2.2.2. National Space Legislation

National space legislation is considered as currently the most widespread legal source of PISL. As Professor Frans G. Von Der Dunk notes: "International Space Law itself then firstly calls for the establishment of national space legislation; secondly, it provides for the outlines of such legislation as to its scope; and thirdly it provides for a few broad rules as to its contents. In short, a State will have to exercise any available jurisdiction primarily vis-à-vis those particular categories of private activities in respect of which it can be held accountable internationally"[13]. "International accountability" of states is predetermined by Articles VI and VII of the Outer Space Treaty.

States adopted and will continue to adopt national legislation regulating primarily issues of licensing, insurance and export control in this field. Corresponding national regulatory frameworks represent different legal systems with either unified acts (e.g. in Norway) or a combination of national legal instruments (e. g. in the Russian Federation). National space legislation shall be in full conformity with obligations of states under International Space Law (ISL) and International Law on the whole. A state shall provide fulfillment of undertaken international obligations on the whole national territory and by all entities under national jurisdiction[14].

This issue has been profoundly analyzed by honorable specialists in the field of space law. Without getting into details, it seems important to outline the main conclusion: analysis of practical activity of subjects of PISL (individuals and corporations, states and international organizations) on sale and exchange of space-related goods, technologies and services allows stating the tendency of parallel and in some cases "overdue" elaboration of national legislation for private space activities regulation.

It is to be noted that well timed elaboration of adequate legal basis is certainly necessary for stable development, in particular, of this type of activity.

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[13] Prof. Frans G. Von der Dunk. Current and Future Development of National Space Law and Policy//Proceedings of the United Nations/Brazil Workshop on Space Law: Disseminating and Developing International and National Space Law: The Latin America and Caribbean Perspective. – ST/Space/28 – United Nations, 2005. p. 35.

[14] Международное право/ Под ред. проф. Колосова Ю. М., проф. Кривчиковой Э. С. М., «Международные отношения», 2003. С. 9.

2.2.3. Agreement on the International Space Station

The legal framework regulating activity related to the International Space Station ("ISS") is built on the following three levels:

1. *The International Space Station Intergovernmental Agreement* (hereinafter "IGA") signed on 29 January 1998 by the primary nations involved in the ISS project (the United States of America, Canada, Japan, the Russian Federation, and 10 Member States of the European Space Agency (Belgium, Denmark, France, Germany, Italy, The Netherlands, Norway, Spain, Sweden and Switzerland).

In accordance with Article 1 of IGA, this international treaty establishes "a long term international cooperative framework on the basis of genuine partnership, for the detailed design, development, operation, and utilization of a permanently inhabited civil Space Station for peaceful purposes, in accordance with international law".

It is important to note that the IGA regulates issues of diverse legal nature, such as e.g. Registration, Jurisdiction and Control (Article 5), Cross-Waiver of Liability (Article 16), Customs and Immigration (Article 18), Intellectual Property (Article 21), Criminal Jurisdiction (Article 22).

2. *Four Memoranda of Understanding* (MoUs) between the National Aeronautics and Space Administration (NASA) and each co-operating Space Agency: European Space Agency (ESA), Canadian Space Agency (CSA), Russian Federal Space Agency (Roscosmos), and Japan Aerospace Exploration Agency (JAXA). These MOUs regulate principally technical issues and describe in details the roles and responsibilities of the agencies in the design, development, operation, and utilization of the ISS.

3. *Code of Conduct for International Space Station Crews* approved on 15 September 2000 by the Multilateral Coordination Board, the highest-level cooperative body established by the MOUs. This document contains a set of standards (rights and obligations) agreed by all Partners to govern the conduct of ISS crew members, starting with the first expedition crew launched from Baykonur in Kazakhstan on 31 October 2000.

Documents of all of the abovementioned three levels of legal obligations have dual character and could serve as an example of comprehensive solution of legal problems related to regulation of space activities: on one hand – they contain direct reference to provisions of the UN Treaties on outer space, on the other hand – various private law relations involving a "foreign element" are regulated under these documents.

This system shows how within the frames of international space projects are actually regulated, in particular, involving a "foreign element" space-related property and personal non-property relations. Some of the time-proved corresponding provisions may be taken into account in case of future elaboration of necessary international legal framework.

2.2.4. Space Law Cases and Arbitration Practice

With development, relevant court and arbitration practices might become another widespread legal source of PISL. At present, when a relevant case is considered by court, practice on analogous in substance cases is taken into account[15] In due course, as corresponding court and arbitration practices develop, *specific principles and doctrines, applicable for space law cases consideration, might be formulated.*

2.3. Subjects of PISL

Individuals involved in commercial space activities and incorporated persons, as well as states and international organizations are considered as subjects of PISL.

Relations of subjects of PISL are predetermined by provisions of articles VI and VII of the Outer Space Treaty. In their activity these entities are obliged to comply with relevant international and national law provisions.

In view of increase in the number of private actors carrying out space activity, topics of special interest is the issue of application of the concept of the "launching State". The term "launching State" means: *a State which launches or procures the launching of a space object; as well as the State from whose territory or facility a space object is launched (the term "launching" includes attempted launching*). These four categories are mentioned in Article VII of the Outer Space Treaty (although the term "launching State" itself is not mentioned), in Article I of the "Liability Convention", and Article I of the Registration Convention.

Recognition of a State as "launching State" involves certain legal implications. A launching State shall register a space object in accordance with the Registration Convention; and the Liability Convention identifies those States which may be liable for damage caused by a space object and which would have to pay compensation in such a case.

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[15] See, e.g.: Pigott v. Boeing Company (Supreme Court of Mississippi, 1970 Miss. 240 So.2d 63); Smith v. United States (Supreme Court, 1989).

With adoption of the *Resolution 59/115 "Application of the concept of the "launching State"* by the UN General Assembly on 10 December 2004, attention of the international community was turned to the main legal problems resulting from participation of subjects of PISL in space activity, as well as main directions for their solution were proposed.

These recommendations to States include, inter alia: *"enacting and implementing national laws authorizing and providing for continuing supervision of the activities in outer space of non-governmental entities under their jurisdiction"; "conclusion of agreements in accordance with the Liability Convention with respect to joint launches or cooperation programmes"; and submitting of information to the UN COPUOS "on a voluntary basis on their current practices regarding on-orbit transfer of ownership of space objects"*.

It appears that commercialization of space activity has caused to some extent "extension" of the concept of the "launching State".

In view of the subject under consideration, if not analyzed, at least the following issues should be mentioned:

Tendencies of commercialization and privatization have influenced the legal status of major International Satellite Communications Organizations. Most of them were privatized[16].

Development of space tourism determines various legal problems such as applicability of provisions of UN Treaties on outer space to space tourists[17], responsibility, insurance, certification, civil and penal jurisdiction, export of information, reexport of equipment etc.

Legal problems related not directly to tourists but to manned space flights on the whole were already considered by lawyers in the early 90s of the past century[18].

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16 See: Жуков Г.П. 40 лет Договору о принципах деятельности государств по исследованию и использованию космического пространства, включая Луну и другие небесные тела. В кн.: Современные проблемы международного космического права. Под ред. Г.П. Жукова, А.Я. Капустина. М. 2008. С. 87.
Volosov M. E., Kolodkin A. L., Kolosov Y. M. International Maritime Satellite Communication System: History and Principles Governing its Functioning/ Ocean Yearbook. I. Chicago & London. 1978. P. 253.

17 See: Prof. Von der Dunk F. G. Space for Tourism? Legal Aspects of Private Spaceflight for Tourist Purposes/ International Astronautical Congress (IAC) Proceedings 2006, Valencia, Spain. DVD. – p. 2.

18 *See draft Convention on Manned Space Flights at:*
Верещетин В. С. Правовое регулирование полетов человека в космос *(*опыт международного сотрудничества ученых)/ В. С. Верещетин, Э. Г. Жукова, Е. П. Каменецкая// Советский журнал международного права. *1991.* № 1. С.*76-81.*

Till now only the United States have adopted relevant national legislation: Commercial Space Launch Amendments Act, 2004, and Federal Aviation Administration Human Space Flight Requirements for Crew and Space Flight Participants, 2007.

On the whole it is to be noted that development of commercial space activities determined appearance of new subjects. Legal status of these subjects might require regulation within the framework of a new branch of law – PISL. Relevant legal solutions shall be found both at national and international levels.

3. Specific Conclusions

Some brief conclusions on specific issues related to formation of PISL[19] are as follows:

3.1. Prevailing Character of ISL and International Law on the Whole

Both ISL and PISL are aimed at regulation of connected with space activity relations. However corresponding subject and methods of legal regulation, as well as subjects of ISL and PISL, are not identical.

On the basis of analysis of correlation of ISL and PISL a conclusion is made on the prevailing character of ISL and International Law on the whole. Thus, in particular, in accordance with Article XXXIV of the draft Space Assets Protocol[20] (Relationship with the United Nations Outer Space Treaties and instruments of the International Telecommunication Union): "The Convention as applied to space assets does not affect State Party rights and obligations under the existing United Nations Outer Space Treaties or instruments of the International Telecommunication Union".

A potential situation should be considered when a state having become Party to the Convention and the Space Assets Protocol is not participating in any of the UN Treaties on outer space. Although in this case international custom and UN General Assembly Resolutions remain applicable, it is still desirable that compliance with ISL would be assured on a treaty basis. In this respect a recommendation could be given on including in the draft Space

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19 For a detailed analysis of all of the raised issues please see the aforementioned author's PhD thesis.

20 References are made to the text of the revised preliminary draft Space Assets Protocol as it emerged from the fourth session of the UNIDROIT Committee of governmental experts. See: UNIDROIT 2010 – C.G.E./Space Pr./4/Report/Appendix VIII.

Assets Protocol of provision stating that the necessary condition of participation in this Protocol is participation of corresponding State in the Outer Space Treaty of 1967. It appears that *being Party to the Outer Space Treaty is a necessary and sufficient condition for becoming a Party to a PISL instrument.*

3.2. Distinctive Correlation of Public and Private Law Matters

On the basis of overview and analysis of systems of export control as related to space activity at national and international levels the following conclusion is made: commercial space activity, pursuant to the specificity of corresponding relations, requires distinct legal regulation. Although this type of activity is commercial in substance, stricter legal regulation as compared to regulation of other types of commercial activity is unavoidable, as long as long as it affects interests of not merely involved private actors, but also those of the whole international community. *There will always be a distinctive correlation of public and private legal aspects in commercial space activities' regulation*, predetermined, in particular, by Articles VI and VII of the Outer Space Treaty.

3.3. Interconnection between Change of Relations under PISL and International Legal Effects for States

Analysis of legal problems arising in connection with on-orbit transfer of ownership of space objects[21], allows determining a *certain interconnection between change of relations subject to PISL regulation and international legal effects for corresponding states.* Obviously this reflects specific features of space activities, and, correspondingly, testifies to the necessity of distinctive legal regulation.

3.4 Formulation of Specific Rules of Conflict of Laws Applicable within the Framework of PISL

In accordance with Article VIII of the Outer Space Treaty: "Ownership of objects launched into outer space, including objects landed or constructed on a celestial body, and of their component parts, is not affected by their presence in outer space or on a celestial body or by their return to the Earth". This provision is the international legal basis for enforcement of relevant rights by different owners of space objects.

The expression "ownership of objects launched in outer space <…> is not affected" might assist in solution of matters of conflict of laws while determining these rights and

[21] Such as reregistration, jurisdiction, control, liability and other related issues.

their specific content under the law of place of origin (accrual of the right) (e.g., in case of international on-orbit sale of space hardware, when traditional connecting factor rule of the place of settlement of the transaction cannot be applied, and connecting factor rule of the seller's law does not resolve all of the issues). The following conclusion is reached accordingly: *Interpretation of norms of ISL could lead to formulation of specific rules of conflict of laws applicable within the framework of PISL.*

4. General Conclusions

It is an admitted fact that there should be further progressive development of Space Law.

As Professor Kopal notes, "it is evident from international space treaties and judicial decisions, and recognized by specialized writers, that the present International Space Law cannot be viewed as a complete system.[22]"

As it was mentioned, increasingly developing commercial space activities have already caused various legal problems and might pre-condition additional future challenges subject to Space Law regulation.

Therefore there is a need to create a very strong, effective, adequate, comprehensive and uniform legal framework for turning space for human benefit and providing stable development of this type of activities.

Formation of *PISL* could be a step forward on this way as long as it *is most effectively able to take account of both the private nature of commercial space activities and the specific features of ISL and International Law on the whole.* ■

[22] Prof. Vladimir Kopal. Comments and Remarks to "Current and Future Development of the International Space Law" by Prof. Stephan Hobe// Proceedings of the United Nations/Brazil Workshop on Space Law: Disseminating and Developing International and National Space Law: The Latin America and Caribbean Perspective. – ST/Space/28 – United Nations, 2005, p. 25.

You Can Lead an Astronaut to Water…: Prospects for Legal Use and Water Rights on the Moon and Other Celestial Bodies

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Abstract

Life, as we know it, is dependent on water. While several astrobiological theories have posited that water and carbon are not necessarily the universal basis for life forms, all known beings require water to function; even extremeophiles require limited water to exist. More importantly, human life can only be supported with sufficient water for drinking and agriculture. Water is essential to known life because it is an extremely versatile molecule; it has a high specific heat capacity, it is polar, it is a near-universal solvent, and its components readily conform to metabolic processes. Beyond basic life support, water can also be broken into oxygen and hydrogen, key components for the chemical rockets that comprise modern space travel. Whether providing drinking water, breathable oxygen or hydrogen fuel, the

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beneficial use of water in space could drastically reduce the payloads required in leaving Earth or living on a research base.

The use of water found in space has taken two giant strides away from the hypothetical in recent events: the discovery of significant lunar polar water-ice and NASA's decision to support commercial human spaceflight. The practical existence of water deposits on the nearest celestial body to Earth, and the need for ingenuity in for-profit ventures into space offer both opportunity and motive for beneficial water use on the Moon. Before the confluence of these circumstances culminates in unilateral action or an international disagreement, it is imperative to review our existing water law models, and the current space law regime, to come to an understanding of the present regulation for water use in space. Additionally, because there is no explicit international treaty language addressing the beneficial use of water deposits on celestial objects, it would appear necessary to synthesize a solution on how such water use is permitted, managed and adjudicated that is both pragmatic and in accordance with the spirit of extant international agreements on space.

This paper proposes that water in space is non-renewable and must be governed under the same rules as any other harvestable mineral resource. Finding language on resource extraction and use to be lacking in the treaties on outer space, this paper puts forth several analogies for legal exploitation of lunar resources. Ultimately the article advises that to ensure fair use without sacrificing practical advancement, new international agreements and a new regulatory body under the U.N. Office of Outer Space Affairs will be required.

1. Introduction

1.1 The Importance of Water and Fair Use in Space

Water is essential to supporting all known life. Scientists in search of extraterrestrial planets which could sustain life have made the search for water a key indicator of biological possibility. It has even been proposed that the presence of water is necessary for the formation of a number of significant organic compounds. More close to home, water can easily be converted into vital resources for manned space missions. Its usefulness in providing astronauts with breathable oxygen and necessary hydrogen for fuel offer new prospects for space exploration and diminish the often-prohibitive expense of the otherwise required payloads. The discovery of significant water ice on the Moon's southern pole by NASA's LCROSS probe in October 2009 and, more recently, the ISRO's Chandrayaan-I discovery of millions of tons of ice near the north pole of the Moon, sent ripples of excitement through the space

community over the opportunities these findings offer.[1] With the new potential for lunar water use looming, we must look beyond the excitement of space exploration strategists and engineers and weigh the requirements for the use of such water under the existing space law regime. Additionally, much like the American Wild West, we may need to adopt new legal guidelines for the fair use of water as it becomes an issue in humanity's new frontier.

1.2 The Current Problem of Legal Extraterrestrial Water Rights

In February 2010, NASA announced that it was discontinuing the Constellation program and the related plans for manned missions to the Moon in favor of bolstering and utilizing commercial companies.[2] In light of an agency from such an actively spacefaring nation asserting a new commitment to encouraging commercial spaceflight resources, the legal implications and possibilities of extraterrestrial water use by non-governmental space-faring actors has become more than an academic thought-experiment.

While Article Six of the 1967 United Nations Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies ("Outer Space Treaty") implies permissive language regarding the space travel of non-state actors under the oversight of responsible state signatories, the globalization of the aerospace industry has resulted in a significant number of concerns regarding multinational corporations with space launch interests. With specific attention to the use of lunar water ice, this paper will examine the current national and international jurisdictional regimes that would govern the extraction and use of water in outer space. First, it will survey existing terrestrial water and resource law to examine ways in which states have used national laws to regulate the use of water by interested parties. It will then identify the relevant outer space treaty law and how the current and proposed international agreements on space allow for fair use of natural resources. Following this analysis, this article will look to propose solutions for the practical use of water deposits on celestial bodies and new international governance that incorporates the spirit of the existing space law regime. By considering existing water law, space law and the concerns to be addressed in regulating resources in space, this paper seeks to show the need for revision to the 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies

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1 Katherine Trinidad, "NASA Radar Finds Ice Deposits at Moon's North Pole; Additional Evidence of Water Activity on the Moon" *NASA*, (Press Release 10-055) 1 March 2010. Available at: *http://solarsystem.nasa.gov/news/ display.cfm?News_ID=33595*.

2 Jonathan Amos, "Obama Cancels Moon Return Project," *BBC News*, 1 February 2010. Available at: *http://news.bbc.co.uk/2/hi/science/nature/8489097.stm.*

("Moon Treaty") to clarify the framework of the new international regime governing the exploitation of water and other resources in space as provided for in Article 11(5).

2. Resource Use

2.1 Who Has the Right to Water?

It is of note that on July 28th of this year, the UN General Assembly voted that access to water is a universal human right.[3] This declaration was simply a recognition that most civilizations and systems of governance throughout history have acknowledged the importance of access to water to sustain life, to grow food and to support transportation. Modern codified water rights and the various systems of contemporary water laws were primarily established from ideas which came out of the British common law and Roman civil law traditions.

The United Kingdom, many of its former colonies and the Eastern United States traditionally adjudicate water use according to riparian rights, or water rights based on adjoining or surrounding landownership. Water, even when it is flowing, is treated as static property subject to boundary lines. Each adjacent landowner has the right to do with his water as he will, as long as it does not severely impinge on any water use downstream from his property. Under this system, water rights are sold when the property abutting the body of water is sold. Generally in areas that rely on riparian rights, navigable waterways are considered public, with their own set of navigation and access laws. Water may be beneficially used by property owners on the banks as long as it does not significantly impact the flow of the large body of water.

In most of the rest of the world, including the American West, water is governed by use-based rights. These laws take a number of different incarnations, but all have a basis in the recognition of water scarcity and the right of parties sustaining themselves from a given water source to continue to do so. In both ancient Rome and modern Japan, all water was identified as belonging to the public, held in trust by the government, and individual and corporate rights to the water were usufructuary. In terms of Japan's current River Law, this means that disputes are arbitrated by a river administrator whose primary goal is to approve new use proposals to maximize utility from each waterway. No party will be denied historically approved water use, but all new proposals become increasingly competitive.[4] The Western

[3] U.N. General Assembly, 64nd Session, "108th Meeting," 28 July 2010. Available at: *http://www.un.org/News/Press/docs/2010/ga10967.doc.htm.*

[4] Ministry of Land, Infrastructure, Transport and Tourism, "River Administration in Japan." Available at: *http://www.mlit.go.jp/river/basic_info/english/admin.html.*

United States favors prior-appropriation water rights: the first party to use the water for a beneficial use has a right to continue to use that quantity of water for that same purpose.[§] In this system, any following parties may also use the water unless it interferes with the right of the preceding parties to continue to use the water as they had been using it. While water may not technically be property under use-based rights, established water rights can be sold. In the prior-appropriation system, senior appropriators may sell or modify their priority level and share of the water as long as it does not interfere with recognized junior appropriators' water rights. Many states which regulate use according to appropriation have water administration agencies which can declare a water source fully appropriated to the extent that the local environment allows.

Riparian and prior-appropriation rights are primarily applied to flowing watercourses which run through and near multiple properties. Other regulatory systems do exist for stationary bodies of water, however they normally incorporate some form of purchased or use-based allocation of water. While not true in EU, in parts of Scandinavia and several states in the U.S., small, nonnavigable, inland bodies of water can be purchased outright in connection with surrounding land.[5] In Finland, this has led to several fishing rights controversies, complex access ordinances and continued debate. In the U.S. the chief regulation concern of any such nonnavigable body is environmental protection of existing wetland ecosystems. As with rivers, navigable lakes in the U.S. are generally considered public and subject to rules regarding open-access for recreational and other purposes.

Underground water, be it a stream or a reservoir, is often governed differently than moving surface water because of the difficulties in determining and showing the flow of subterranean currents. In the majority of the United States, landowners may draw on groundwater resources with no limitations besides restrictions on malicious or wasteful use; which is difficult to prove by competing neighbors. Alternatively, in California where water law is often concerned with scarcity, subsurface water is to be used on an equal and correlative basis between all users of a shared aquifer.[6] In cases of dispute or draught, this water can be apportioned by a judge to comply with the guidelines for correlative use. Like standing bodies, subterranean water is still governed by ownership and use claims. In both

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5 Pekka Salmi and Riku Varjopuro, "Private Water Ownership and Fisheries Governance in Finland" available at: *http://citeseerx.ist.psu.edu/viewdoc/download;jsessionid =0535633098A743C34AF72E5106A26615?*

6 U.S. Department of Interior Bureau of Land Management, "California: Water Rights Fact Sheet," *Western State Water Laws*, 15 August 2001. Available at: *http://www.blm.gov/nstc/WaterLaws/ california.html.*

instances ownership and access is easier to prove but the uncertainty of renewed supply makes fair use more difficult to assess.

As addressed above, water rights usually and practically fall under national or provincial adjudication. Internationally, water issues are generally arbitrated by bilateral or multilateral agreements between neighboring states and/or specific issue negotiations. One such treaty, the Indus Waters Treaty between India and Pakistan, requires notification and examination of any proposed projects which would significantly affect water flow between the states, and provides for mediation of disputes by a neutral party.[7] Similarly, the International Joint Commission ("IJC") between Canada and U.S. was set up to prevent disputes relating to water quality and use over the border. IJC investigates issues at the behest of both countries, holds biannual status meetings and coordinates open public forums to discuss water management and use impact.[8] Under EU, water administration is governed by directive. In 2000, EU Water Framework Directive required member states to organize and monitor water use by demarcated river basins.[9] Thus proposals for significant use projects would be presented in six-year River Basin Management Plans, for review and oversight by the European Union at large. Most interstate agreements do not directly quantify the flow or share of water each state may extract for beneficial use, but rather outline unacceptable impact and set up a framework for continued discussion on mutually acceptable water management.

On a broader scope, the International Law Association (ILA) and U.N. have both notably weighed in on international water concerns. In an August 1966 meeting in Finland, ILA adopted the Helsinki Rules on the Uses of the Waters of International Rivers ("Helsinki Rules") which offered the first globally applicable, albeit unenforceable, guidelines on the use of transnational waters. The Helsinki Rules declared that each state was entitled to a "reasonable and equitable" share of international freshwater.[10] This reasonable and equitable use was to be determined by a number of factors including geography, climate, contribution of water to the source in question, historical use, need, alternative options and

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7 R.K. Arora, *The Indus Treaty Water Regime* (New Delhi: Mohit Publications, 2007), 5-13.

8 International Joint Commission, "Who We Are." Available at: *http://www.ijc.org/en/background/ijc_cmi_nature.htm.*

9 European Council, *Directive 2000/60/EC,* 23 October 2000**.** Full text available at: *http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=celex:32000L0060:en:html.*

10 International Law Association, *Helsinki Rules on the Uses of the Waters of International Rivers,* 20 August, 1966. Full text available at: *http://webworld.unesco.org/water/wwap/pccp/cd/pdf/educational_tools/course_modules/reference_documents/internationalregionconventions.*

the ability of states to compensate one another to resolve water quarrels. The Helsinki Rules further advised that any states in dispute over the use of water should first seek negotiations, failing that they should set up a joint commission to study the issue and make recommendations, failing that a third party arbiter should be brought in, and failing all else the disagreement should be referred to a separate tribunal or the International Court of Justice.

The U.N. Convention on the Law of Non-Navigational Uses of International Watercourses was adopted in 1997 based on the pioneering guidelines of the Helsinki Rules, but also as a means for addressing several gaps in the ILA's document. The U.N. convention was approved by the General Assembly by an overwhelming majority. Even though it was not ratified unanimously, the adoption of the convention obliged member states to cooperate in a manner that is mindful of the equitable and reasonable use guidelines when managing water resources.[11] The U.N. convention offered no significantly new guidelines for adjudication of disputes, however it did extend the general protocols put forth in the Helsinki Rules beyond drainage basins to independent aquifers and it gave the Rules the weight of broader international agreement.[12] While international law regarding shared water rights remains vague, the repeated themes of notification, cooperation, and the equitable benefit of mankind echo the language found in the Outer Space Treaty and other international agreements on the peaceful use of space.

2.2 The Problems and Potential of Existing Water Rights Regimes as Applied in Space

In articulating new regulation it is often best to seek existing models of analogous and accepted legal governance and modify them to fit the situation at hand. In the survey of conventional solutions to terrestrial water use between private parties and between nations we have been offered several internationally accepted ideas on water management. While the listed water principles, or a combination thereof, are the basis for the exploitation of water as a resource on most of the globe, it is important to critically examine their utility

[11] The United Nations, *Convention on the Law of Non-Navigational Uses of International Watercourses*, 21 May 1997. Full text available at: *http://www.internationalwaterl aw.org/documents/intldocs/watercourse_conv.html.*

[12] It should be noted that the ILA adopted the Berlin Rules on Water Resources at its convention in 2004; however these rules only go beyond the Helsinki rules in adopting the U.N. convention's broadened scope and in requiring states to protect their water resources from environmental damage through local legislation. The Berlin Rules also set out prohibitions for how water is to be used in times of war—both of which are prohibited and at least not yet a concern in Space.

as models for future water extraction and beneficial use in space. At first glance it is clear that both land-based water rights and use-based rights have their drawbacks, which would be exacerbated by the unique problems of space.

Riparian rights are derailed as a model for water use in space from the outset. The principle requires landownership of abutting or encompassing property to hold rights to the water in question. Article Two of the Outer Space Treaty explicitly prohibits, "national appropriation by claim of sovereignty…"[13] No nation can be a riparian owner of extraterrestrial water, because no nation can claim property in outer space, on the Moon or on any other naturally occurring extraterrestrial object.

While it is clear that nations cannot stake claim to lunar real estate, this paper also seeks to investigate the legal use of water deposits in outer space by the imminent nongovernmental and private international corporations currently developing spacefaring capabilities. Would a non-state actor be able to claim riparian rights to the water-ice resources of space? The answer to that question is less overt. The Outer Space Treaty's Article Six declares that states bear international responsibility for national activities in outer space, in full accordance with all of the other treaty provisions, "…whether such activities are carried on by governmental agencies or by non-governmental entities."[14] The article goes on to state that when space activities are carried out by an international organization, both that organization and the participating states are responsible for ensuring the compliance with the treaty. Private ownership of the "province of all mankind" is not explicitly forbid, but national appropriation is prohibited. As state signatories are required by Article Six to authorize space activities of non-governmental entities, it is difficult to posit a scenario where a private actor could own lunar land without the express consent of a state. In such a situation the assenting state, be it the launching state or the state the company is registered in, would be violating the proscription against appropriation through asserting sovereignty in space.

As the preconditions for all riparian rights are expressly or implicitly forbid by the Outer Space Treaty, prior-appropriation rights would seem to become the only alternative for water rights on the Moon. Appropriation rights were developed out of other use-based ideas for the American frontier, where few citizens with recognized legal rights were present and water was scarce. Prior-appropriation was engineered to protect initial parties who were

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13 The United Nations, "Article 2," *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies* ("*OST*"), 10 October 1967.

14 U.N., "Art. 6," *OST.*

already invested in the territory, while allowing for the inevitable influx of additional arrivals. The idea of a manned lunar base operated by one or a group of users lends itself to this kind of first-come, first-served basis as long as later appropriators are allowed to use the lunar water resources as well. In such a scenario, the idea of appropriate beneficial use, which had been hotly contested in the Western United States, should be much clearer for any lunar mission. There is no wildlife or ecological balance to protect, all parties present on the Moon are well known due to international notification requirements, and their arrival and mission activities would be well documented because of the scientific data being collected and the safety procedures being observed. These conditions should make it very clear who is the senior appropriator to any water deposit and how much of the water they use in a given year.

Despite the apparent practicality and historical analogies supporting a prior-appropriation doctrine for water use on the Moon, obvious international objections and treaty stipulations leave many doubts about its applicability. A primary concern in reviewing use-based rights is consideration for developing nations who do not yet posses launch capabilities. The first provision in the Outer Space Treaty advises that space is to be used "in the interests of all countries, irrespective of their degree of economic or scientific development…"[15] While first claimants rights would be easy to adjudicate in space, it would seem that the nations with existing space capabilities have distinct advantage over the rest of the world, expressly counter to the international cooperation encouraged in modern space law.

Beyond general fairness, the legality of use-based entitlements seems to run counter to the Outer Space Treaty. Article Two not only prohibits national appropriation by sovereignty claims, but also forbids ownership "by means of use or occupation, or by any other means."[16] Prior-appropriation rights rely on claims staked by use. If no part of the Moon or other natural objects in the solar system can be allocated by ownership or use claims, than neither riparian rights nor the prior-appropriation model can be made to suit the existing legal framework. The Outer Space Treaty essentially disallows any ownership in space, except for manmade objects.

While water deposits cannot be made the property of any nation or entity, it should be remembered that under most use-based rights, water itself is not owned; only the right to beneficial use is owned. In such systems water is often a public good, accessed by users under limitations placed by government regulations. The Outer Space Treaty prohibits any

[15] U.N., "Art. 1," *OST.*

[16] U.N., "Art. 2," *OST.*

one nation jurisdiction over water allocation and therefore use-based rights would need to be adjudicated and apportioned at an international level.

Both riparian and prior-appropriation rights, as they are practiced terrestrially, are invalid models under the Outer Space Treaty. There can be no property on the Moon, owned by a country or by any private entity authorized to act in space by a nation, which is not explicitly sent there from Earth; but use is not itself prohibited. The specific circumstances of existing and accepted space law prohibit traditional water rights, but lunar water use is still viable and practical. Just as both U.N. and ILA's international frameworks prohibit harmful water projects and facilitate discussion rather than bestow privileges, water in space cannot be looked at in terms of traditional rights, but must be examined in terms of limitations and obligations.

2.3 Where Water is Not a Right

The legal hurdles of existing space law are not the only thing preventing water-ice deposits on the Moon and other extraterrestrial bodies from being regulated by existing terrestrial water rights models. The practical difficulties and differences of using water on the moon also indicate that new models must be sought. It should be abundantly clear that water on the Moon is not a renewable resource as it is on Earth. There is no water cycle on known celestial bodies, even for repurposed waste water. Water in space will be used, not as part of the seasonal cycle that defines terrestrial water rights, but as a mineral resource. Like oil on Earth, water on the Moon and asteroids will be mined from deposits to be used up as fuel or to generate power. Even as a supplement to life support systems, extraterrestrial water cannot be a requirement for sustaining life in space because conscientious safety precautions require enough oxygen and water to be maintained in a space vehicle's payload for a return to Earth. Rather, water will be a convenience extending the reach and staying power of spacecraft. Water in space will also be a commodity requiring significant processing and special storage. Much like terrestrial gasoline, water extracted from celestial bodies will have to be dispensed for use by multiple parties, or each party will have to harvest and refine it themselves to make the water usable.

Water rights on Earth are distinct from mineral rights because the water cycle approximately replenishes the resource being used each year, and because clean drinking water is a basic necessity of life. In space, water-ice deposits will be harvested, with no promise of remainder for subsequent access. Furthermore, as identified previously, lunar water being non-renewable cannot conscionably be relied upon to sustain the life of any space mission, only to supplement it. Reasonable safety procedures necessitate any spacefaring

party to carry sufficient water, air and fuel supplies for emergency returns. As extraterrestrial water cannot be considered an essential element for survival, and as it will not be a renewable resource, it is most fitting to consider it a mineral for the purpose of use.

Historically, mineral interests are usually severed from landownership. In this way mineral estate avoids the initial problems of riparian water rights. Mineral extraction rights are also historically compatible with prior appropriation principles. In the 1849 gold rush in the United States, mines and panning streams were open to prospectors on a first-in-time, first-in-rights basis.[17] Despite the fact that no lunar real estate is required to purchase mineral rights, and that mineral rights can also be successfully administered on a use claim basis, property declared under national appropriation is still not permitted under international space law. While more pragmatically correct, thinking of water in space as a mineral does not resolve the existing prohibitions on ownership and appropriation.

The benefit of recognizing that water in space is indistinct from other minerals, in conditions for use, is that it condenses the scope of the fix that is needed in space law, while also broadening the analogies that can be drawn on as a basis for new regulation. Standard national water and mineral resource regulation models cannot be made to fit in existing space law. In looking for practical legal solutions, one must turn to the existing treaty parameters to identify the spirit of the accords and the corresponding resource regulation regimes that bar property rights but allow beneficial use.

3. Space Law

3.1 The Sky is Not the Limit, the Law is

It has clearly been identified that standard terrestrial water and mineral rights are proscribed by the provisions of the Outer Space Treaty. As states and their nationals cannot claim sole oversight of specific water deposits, it is necessary to examine the possibilities for use, without ownership, allowed for in the body of existing space law.

The Outer Space Treaty is the primary guide and foundation for all legal space operations. Having been signed and ratified by a majority of the U.N. members, as well as by all major spacefaring nations, this treaty sets up the framework for peaceful uses of outer space and must be the first source in examining the current permissibility of the use of water on the Moon.

[17] Douglas R. Littlefield, "Water Rights During the California Gold Rush: Conflicts over Economic Points of View," The Western Historical Quarterly. Vol. 14, No. 4 (October, 1983), 415-434.

The treaty at its outset recognizes the common interest of mankind in the peaceful use of space and asserts that it is to be used for the benefit of all people.[18] In terms of resource use, this is the spirit of the treaty which should govern all non-explicit conditions for exploitation of celestial bodies. The first article of the treaty reminds all signatory states that free access shall not be restricted in space and asserts the need to encourage overall cooperation, echoed in many other articles. As previously elucidated, Article Two prohibits all national appropriation, and Article Six extends state responsibility to all non-governmental national parties. The treaty obligates signatory states to require private entities to seek state authorization for space activities and states must subsequently monitor the proposed actions.[19] The treaty goes on to clarify, in Article Eight that personnel and objects launched into space are subject to the jurisdiction of the state on whose launch registry they are listed. Any craft or facility constructed in space remains under the jurisdictional rules of state that launched the constructing elements, but Article Twelve makes any equipment subject to visit by other signatory parties to the treaty. The treaty also requires that states report any planned activity in outer space, directly to another state if it might harmfully interfere with that country's operations, or otherwise to the Secretary-General of the United Nations and international scientific community. These reports should, if feasible detail "the nature, conduct, locations and results of such activities."[20] Numerous articles in the treaty speak to how space operations and use should be conducted, and in so doing lay out a vision of how practical resource exploitation should be carried out.

The Outer Space Treaty makes private and state launch vehicles and astronauts subject to the national laws of their launching state. Therefore, any such entities looking to use the natural resources on the Moon or other celestial bodies must be authorized to do so by their launching state, and that state is obligated by the treaty to notify the other signatory states and the Secretary General of U.N. In extracting resources, they cannot block other national entities from free access to the site and all the equipment and facilities involved are subject to visitation by representatives from other parties to the treaty. Any water resources being mined, and the land that facilities would be built on would not belong to the state or parties using them. These are the only binding and widely accepted specific limitations in place for resource use in space. With state authorization, U.N. notification, possible subsequent consultations, and open access to all interested parties, the extraction of water-ice deposits on the Moon and beyond can easily be a legal reality.

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[18] U.N., "Preamble," *OST.*

[19] U.N., "Art. 6," *OST.*

[20] U.N., "Art. 9 & 11," *OST.*

While the Outer Space Treaty implicitly allows resource use within set boundaries, the Moon Treaty sought to address issues relating to activities on or around celestial bodies more directly. This article has not significantly referenced this agreement in its earlier discussions because no country with launch capabilities has yet ratified the Moon Treaty. Its status as international law exists only in the framework it proposes, and only inasmuch as countries are willing to honor it. Many of the major launch-capable countries rejected the Treaty because of the constraints it put forward on resource use in space, however lacking any further guidance, the Moon Treaty is often looked to by scholars as the existing soft legal regime, *pro tem*.

Like the Outer Space Treaty, the primary purpose of the Moon Treaty was to avoid international conflict in space, but the latter also was conceived clearly bearing in mind the "benefits which may be derived from the exploitation of the natural resources of the Moon..."[21] Despite this distinction, many of the provisions of the earlier treaty are echoed in the Moon agreement. Like the Outer Space Treaty, Article Five of the Moon Treaty requires notification of U.N. Secretary-General and the scientific community at large of any proposed activities in space. Similarly, Article Nine reasserts free access to all lunar areas and Article Fifteen affirms the right of states to visit any equipment or installation on the Moon. Article Fourteen simply reiterates that states must ensure that non-governmental parties act in accordance with the treaties and international law, and Article Twelve restates that the jurisdiction of national laws applies to launched vehicles and constructed bases.

The agreement starts to expand on the previous treaty in that it asserts space activities should only be undertaken with due regard for future generations and in the interest of all countries.[22] Explicitly in regarding use, the Moon Treaty states that scientific investigations, "shall have the right to collect on and remove from the moon samples of its mineral and other substances," and those resources will remain at the disposal of the removing state. Furthermore, the treaty also agrees that states may, "in the course of scientific investigations also use mineral and other substances of the moon in quantities appropriate for the support of their missions."[23] Under the treaty's expanded guidelines for resource use, to support scientific missions, acting parties are to take measures to protect the "existing balance of [the Moon's] environment."[24] In protecting the Moon's environment, the agreement allows

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21 The United Nations, "Preamble," *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies* ("*MT*"), 5 December 1979.

22 U.N., "Art. 4," *MT.*

23 U.N., "Art. 6," *MT.*

24 U.N., "Art. 7," *MT.*

states to propose preserves on the moon for areas of special scientific interest.[25] However, the most significant update regarding the use of water, minerals or any other celestial resource is the Moon Treaty's proposal of a new governing body.

Article Eleven of the Moon Treaty seeks to set up an international committee to review and authorize the use of space resources. This agency would ensure: 1) the orderly and safe development of resources, 2) rational management thereof, 3) the expansion of use opportunities, and, 4) the equitable sharing of resource benefits.[26] The fourth charge of this new regime requires the equitable sharing of resources while both remembering the needs of the developing countries and the efforts of countries which contributed to the exploration of the moon. It was apparently decided by the drafters of the treaty that resource use was too complex an issue for the treaty to outline or for signatory nations to agree to directly. In order to allow this organization to be the gatekeeper of resource use, all parties to the treaty are obliged to notify U.N. Secretary-General and the public of any natural resources they may discover on the moon. As the whole Moon is potentially a resource, including the orbits around it, it is conceivable that parties would only report resources they intend to use; however in reporting resources for intended use, states and their non-governmental actors are inviting the committee to possibly decide that the resource may be exploited, but that the product must be distributed and shared.

Beyond concerns about a new committee's ideas of equitable sharing, a major sticking point against signing the Moon Treaty for current spacefaring nations was Article Eleven's declaration that the Moon and its natural resources are "the common heritage of mankind." Both applicable treaties identify outer space and the celestial bodies as the "province of all mankind."[27] Indeed, they are the province of all nations, in that all states party to the Outer Space Treaty have agreed that space is to be governed by all nations and is subject to no national claims of sovereignty. In fact this was a major impetus behind the Outer Space Treaty and the term was originally included in the 1966 Soviet draft of the treaty.[28] In agreeing that space was a province of all states, all major spacefaring nations agreed that space was not *res nullius* to be annexed by the first claimant to court or the first to occupy.

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25 *Ibid.*

26 U.N., "Art. 11," *MT.*

27 U.N., "Art. 1," *OST* and "Art. 4," *MT.*

28 J.I. Gabrynowicz, "The 'Province' and 'Heritage' of Mankind Reconsidered: A New Beginning," *The Second Conference on Lunar Bases and Space Activities of the 21st Century (Proceedings from a conference in Houston, TX, April 5-7, 1988),* ed. W.W. Mendell. (Houston: NASA Conference Publication 3166, 1992), 691.

The concern in signing the Moon Treaty lies in the leap between *res comunis* and the common heritage principle. While some may not see a significant jump between common property and "common heritage," the implications are striking. In accepting space as *res comunis*, the international community agrees that access to it cannot be blocked and that no one state or entity can make claims to property in space. Much like public domain creative works, or more aptly the common grazing areas of many 17th century villages, celestial bodies are open to all use, but not to be restricted by any. The idea of common heritage, as presented in the Moon Treaty, identifies the Moon and its resources as a birthright for all people and for future generations. As many of the natural resources on celestial objects are non-renewable, declaring them a common heritage of posterity is tantamount to barring the use of resources on the Moon. The Moon Treaty goes beyond explicitly prohibiting property ownership, and declares that no natural resources can be owned by the parties who extract them.[29] While the distinction between the "province of all mankind" and the "common heritage of mankind" is unarticulated in international law, the prevailing interpretations identify the Moon agreement's phrase as a disincentive for private or commercial operations in space and a significant constraint on state exploration.

The Outer Space Treaty puts significant boundaries on the use and right to natural resources in space, including water, without directly addressing consumption by states or private parties under national oversight. The Moon Treaty was proposed as a means for addressing the vagaries and gaps of the earlier agreement, in large part regarding the exploitation of resources; but in so doing it deters any party from making the expenditure to pursue space water deposits and discourages further exploration to that end. With open questions as to how international law would claim and allocate the products of any mission's labor, a few states which could actually use lunar resources in this century are willing to subject their nationals to the restraints of the Moon Treaty, but none are willing to reject it outright. In failing to adopt clear rules of resource use, but also failing to offer alternative regimes, the Moon Treaty's provisions have a tenuous status as de facto law. That is, the treaty is for now implicitly accepted as non-binding policy guidance until someone actually begins operations to utilize lunar resources.

3.2 Analogies and Interpretations

As the Outer Space Treaty and Moon Treaty were conceived in an effort to prevent space and space resources form becoming the stage or impetus for conflict, it would seem

[29] U.N., "Art. 11(3) (5)," *MT.*

important to offer practical solutions for regulation before the issue is decided in dispute. Many of the provisions of both treaties have terrestrial or existing analogies that offer ideas for practical implementation or legal work-arounds in regards to resource management.

The most discussed comparison to the Moon Treaty is the UN Convention on the Law of the Seas ("Law of the Seas"). In designating another "common heritage of mankind," the Law of the Seas sets out similar environmental considerations, equal access provisions and a regime to control the use of undersea resources.[30] The actual practice of the clauses concerning natural resource use in the treaty has manifested as the International Seabed Authority ("ISA"), a two-organ body composed of a general assembly of all signatory states and an elected 36 member council which is designed to represent competing interests.[31] Together, these organs set policies on seabed use, and authorize specific requests to prospect for mineral resources in international waters.

Procedurally, ISA contracts private and public entities to explore seabed areas of interest for exploitable natural resources. These contractors are given geographic regions in which to exclusively conduct their exploration. The contractors are required to submit annual resource and environmental reports and samples, in preparation for transitioning from an exploration contract to an exploitation contract. Applying contractors are required to submit $250,000(USD) in application fees and their prospecting must be approved by Council and its advisory committees. The contractors are required to remit portions of their prospected territory to the Authority on a designated schedule, totaling half of their contracted exploration area after eight years.[32] While ISA is recognized and the Law of the Seas has been ratified by all major spacefaring nations, except the United States, it remains a cautionary model for the bureaucracy proposed under the Moon Treaty. ISA has, under its oversight, authorized numerous entities to investigate resources in a designated "common heritage" area; however none of the operations have had the opportunity to move into the exploitation stage. Under the ISA's Mining Code, contractors who conduct exploration are to be given preference in designating exploitation contracts, however no such contract has been made, and exploration appears lackluster.[33] It can easily be

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30 The United Nations, "Section 2, Article 136 & Section 6," *Convention on the Law of the Sea* ("*UNCLOS*"), 16 November 1994.

31 International Seabed Authority, "About Us." Available at: *http://www.isa.org.jm/en/about*

32 International Seabed Authority, "Regulations for Prospecting and Exploration of Polymetallic Nodules," *Mining Code*. Full text available at: *http://www.isa.org. jm/files/documents/EN/Regs/MiningCode.pdf*

33 ISA, "Regulation 24(2) of the Regulations for Prospecting and Exploration of Polymetallic Nodules," *Mining Code*.

argued that the numerous restrictions on use and the uncertain claim to the return on investment have dissuaded commercial exploration and the use of the seabed for the benefit of mankind. While ILA has effectively delayed any mining operations in international waters, it has effectively preserved the common heritage of mankind charged to them for future generations.

Space exploration and the development of space resources are recognized as benefitting all mankind, so it is essential to seek effective international regulation which does not conserve by merely impeding progress. The other example often cited as analogous to the existing international space law is the Antarctic Treaty and its protocols. Unfortunately for our purposes, the original treaty does not discuss mineral resource use or identify the southern continent as the common heritage of mankind in an effort to tread lightly around pre-existing territorial claims.[34] While a 1988 protocol sought to set up an ISA style regulatory body on mining, it was rejected by most parties and a later protocol to the treaty imposed an outright moratorium on resource exploitation until binding regulations could be agreed upon.[35] As such, this second most similar international legal regime offers no solutions as to how water can be beneficially used on the Moon, as a mineral resource, in accordance with international law and multinational interests.

As common analogies to space law offer only models where resource use is unnecessarily bogged by unwieldy committee bureaucracy or banned outright until a better solution can be found, it is necessary to look to less conventional guidance. The Moon Treaty as it stands allows for the removal and use of minerals "in carrying out scientific investigations".[36] State parties are allowed to retain these collected minerals as long as some quantity is made available to the scientific community. State parties may even use the minerals and other substances to support scientific missions. The Outer Space Treaty and the Moon agreement are not the only international treaties that allow otherwise prohibited activities in the furtherance of scientific research. While not an ideal model for practical resource use when seeking to avoid provocation and diplomatic conflict, the whaling expeditions of Japan and Iceland conducted under scientific permits take advantage of similar provisions in allowing the harvesting of resources for scientific purposes. In 1982 the International Whaling Commission voted to halt commercial whaling beginning in 1986, subject to review at

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[34] *The Antarctic Treaty*, 23 June 1961. Full text available at: *http://www.nsf.gov/od/opp/antarct/anttrty.jsp*

[35] *Convention on the Regulation of Antarctic Mineral Resource Activities*, 1988 (never in force) and "Article 7 and Article 25(5)," *Protocol on Environmental Protection to the Antarctic Treaty*, 14 January 1998.

[36] U.N., "Art. 6(2)," *MT.*

prescribed time periods.[37] Despite this moratorium, several nations continued to conduct whaling operations under the Convention's provisions for scientific research.[38] The primary requirement in the Convention for issuing scientific whaling permits is notification of the International Whaling Commission of the details and possible effect of the operation, allowing enough time for comment by advisory committees and interested state parties. Similar notification provisions are required by the Moon Treaty in Articles 5(1), 9(1) and 11(6).

While the notification provisions involved in scientific whaling seem too weak to offer successful regulation, many international treaties effectively govern by simply requiring the presentation of detailed proposals and opportunities for consultation. As discussed earlier in this article, U.N. Convention on the Law of the Non-navigational Uses of International Watercourses urges nations to work in a spirit of general cooperation as facilitated through mutual notification of planned projects. Notable multinational accords regarding specific water resources have been drafted under these same principles and interested nations have cordially conducted themselves accordingly. Given the opportunity to not simply file and objection, but to consult on workable solutions after reviewing proposals, states find they can better plan their own strategic interests.

Still, the most apt model for resource use in space is the only existing regulation of a specific natural resource in space: geostationary Earth orbits and frequency bands. Many countries and committees have urged recognition that geosynchronous orbits ("GEO") are a limited and natural resource. To avoid possible collision and signal interference, orbit allocation and radio frequency must be governed judiciously; with both an eye towards present capabilities and future needs. The International Telecommunications Union, specifically the Radiotelecommunication Sector (ITU-R) is responsible for encouraging growth, maintaining technological momentum and planning for equitable access by developing nations, but more importantly ITU-R is a space resource regulatory body that works. While the very real concern posed by space junk and overcrowding often overshadow the broader workings of the ITU-R, the agency is one of a few examples where international agreement has led to both pragmatic resource use and ethical consideration of future needs.

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[37] International Whaling Commission, "Paragraph 10(e)," *International Convention for the Regulation of Whaling*, 2 December 1946 (here amended 23 July 1982). Full text available at: *http://iwcoffice.org/commission/schedule.htm.*

[38] IWC, "Paragraph 30," *International Convention for the Regulation of Whaling*, 1946 (amended 1982).

ITU-R confronts its space resources with a two pronged approach, designated to ensure both timely, efficient utilization and equal access. Equitable allotment of resources is achieved by *a priori* planning and allocation of both broadcasting and fixed satellite service frequencies designated for each state for a predetermined orbital arc.[39] Countries can then apply to take up their reserved allocations and use them when it is within their capabilities. In an effort to encourage widespread communications networks and improved technology, ITU-R also coordinates with launching parties prepared for actual pending usage. Parties planning to launch a satellite must publish general details and the likely effect the system will have on other existing or planned satellites.[40] If the satellite to be launched is intended for GEO (or other designated special orbits), the launching party must request coordination of frequency from ITU-R. If the planned orbit is not a designated coordination orbit, than due notification for recording in the ITU-R register is sufficient.[41] While these are simplified descriptions of the complex space resource management that ITU undertakes, the guiding principles of maintaining incentive for technical development and safeguarding resources for all nations are germane to the issue of legal water use in space.

The use of lunar resources should not be intentionally squelched by bureaucracy, halted in anticipation of future solutions or conducted through a legal loophole in the treaties. Scientific advancement, exploration, commercial interests and equal access should be harmonized in international law which requires notification, offers discussion and ensures that progress and fairness are both protected from one another.

5. Proposals

4.1 The New Moon Agreement

The Moon Treaty disincentivizes lunar exploration through ambiguity and encourages would-be beneficial users of resources to sidestep regulation by justifying their operations as scientific investigation. As this is the situation at hand, a new Moon agreement must be drafted. The existing Moon Treaty should be aborted because it has not and will not be accepted by spacefaring nations with the current language in place. Yet space law scholars

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39 Ed. B.G. Evans, *Satellite Communication Systems, 3rd Ed.* (London: Institution of Engineering and Technology, 2008), 73.

40 "Spectrum-orbit Coordination Procedures," presented at International Telecommunications Union Radiocommunication Regional Seminar in Abu Dhabi (22 – 26 April 2007). Full text available at: *http://www. ituarabic.org/2007/Radiocommunication-UAE/DOCS/04_ Spectrum% 20Orbit% 20Coordination_MS.pdf.*

41 International Telecommunications Union, "Article 9(1)(2)," *Radio Regulations*, 2008.

continue to debate the merits of the Moon Treaty and incorporate its principles into their legal reckonings. The treaty doubly fails in regulating the peaceful use of celestial bodies because it is not pragmatic international law but, because it remains a focal point for discussion, no new agreement has been put forward. Without a new agreement, or a significant amendment of the existing treaty, space resource law will be made by the precedent of some interested party's practice and not by the legal considerations necessary to prevent conflict and promote cooperative regulation.

A new Moon agreement should avoid the diplomatic hazard of referring to our natural satellite and activities conducted on it as anything besides the "province of all mankind." This language is already accepted and ratified in international law by all major players in space. By reasserting that all nations have province over the exploration and use of the Moon, the new agreement should set up an international body to govern resource use, rather than recommend that one be implemented at a later date.

Such an agency could be put under the oversight of a larger body to build on existing space regulations and give legitimacy to regulation framework and decisions. Just as ITU-R is connected to broader industry issues by its parent organization, so a space resource branch would be a fitting expansion of U.N. Office of Outer Space Affairs ("OOSA").

4.2 The Office for the Peaceful Use of Outer Space

The Committee on the Peaceful Use of Outer Space ("COPUOS") serves an advisory role to the U.N. General Assembly by collecting information and deliberating over the technical and legal aspects of operating in space. In turn, OOSA is charged with implementing resolutions and overseeing initiatives proposed by COPUOS. The launch registry, legally maintained by COPUOS, is housed in the Secretariat at Outer Space Affairs. By adding a Section for the Peaceful Use of Outer Space Resources to OOSA as a new regulatory body, it would benefit from the annual counsel of both the legal and technical subcommittees on emerging capabilities and parameters.

The new resource regime, as set up by a new Moon agreement, should be an operational office concerned with receiving notifications and disseminating them to state parties to the new treaty for review. Resources on the Moon and asteroids would have to be identified and managed in such a way that some resources would be preserved in trust for all nations, and others would be used to encourage the profitability of increased space transportation capabilities and scientific exploration.

5. Conclusion

While water remains an important substance with unique molecular properties, traditional terrestrial water rights cannot apply in outer space. Water rights on earth are based on property ownership and historical claims, predicated on the idea that water is a replenishable resource necessary for the preservation of life. Water-ice deposits on the Moon and all known extraterrestrial bodies are non-renewable and have not been discovered in a form that would readily support life without processing. In space, water rights lose their distinction from mineral estate. Furthermore, as outer space is not subject to national appropriation by treaty law, neither property-based nor usage claims support ownership rights to water deposits.

Current space law neither expressly nor implicitly bars the use of water-ice found in space, as long as equitable access is preserved and U.N. and interested parties are given due notification. While unsigned by all states with launch capabilities, the Moon Treaty more directly permits the use lunar mineral resources in the furtherance of scientific missions. The Moon agreement both expressly permits the utilization of valuable deposits and subjects the utilization of those resources to a legal limbo where their beneficial use may be redistributed to all signatory states in the name of equal access.

Analogous examples of international law show that suitable management of resource use faces many pitfalls and threats of irrelevance. The impetus to develop new technologies and the general pursuit of resources can be dampened by bureaucracy, deferred in perpetuity by legal considerations, or a driving force to circumvent international agreements. Successful international regulation of resources makes equitable considerations for parties who cannot yet utilize resources that should be open to all, while not unduly impeding the progress of those who would use them to advance human capabilities. Overall, peaceful resource use should be facilitated by notification, communication and coordination between interested parties.

With these principles in mind, this article suggests that the failed Moon Treaty be amended or usurped by a new agreement outlining the practicable use of lunar resources, including water deposits, with equitable reservations for countries to utilize after developing spacefaring capabilities. The use of the Moon should serve as an example and an incentive to go to the celestial bodies beyond. ■

Current Status and Recent Developments of the Non-Discriminatory Principle in the 1986 UN Principles on Remote Sensing

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Abstract

The theme of this paper is to explore international law as applicable to remote sensing activities. Considering the rules and principles of remote sensing activities, the so-called Non-Discriminatory Principle is essential. The sensed States shall have access to the primary data, the processed data and the available analysed information "on a non-discriminatory basis and on reasonable cost terms."[1] Obviously the major objective of the Non-Discriminatory Principle is to protect and to promote the rights and interests of the sensed States. The latter was stipulated in the 1986 UN Principles on Remote Sensing and it has influenced laws and policies worldwide. In this paper, recent remote sensing laws and policies are identified and the current status and recent developments of the Non-Discriminatory Principle are pointed out. In conclusion, the applications of the term "non-discriminatory" are now generally broader than the original Non-Discriminatory Principle. It also points out that the term "non-discriminatory" may no longer be used in a context of sensed States, but in a context of "needs and interests of the developing countries."

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[1] Principles relating to Remote Sensing of the Earth from Outer Space [hereinafter the 1986 Principles] princ. XII, G.A. Res. 41/65, 115, U.N. GAOR, 41st Sess., Supp. No. 53 (December 3, 1986).

1. Introduction

Remote sensing plays an important role, since the data help users achieve their goals in various fields: natural resource management, environmental protection, confidence building, etc. The legal implications of remote sensing were discussed as early as the 1970's in the United Nations Committee on the Peaceful Uses of Outer Space [hereinafter COPUOS].[2] Through arduous discussions, the Resolution "Principles relating to remote sensing of the Earth from outer space"[3] [hereinafter the 1986 Principles] was eventually adopted by the United Nations General Assembly.

Although the Resolution included imprecise expressions and omitted several issues, the 1986 Principles provided a definition for the key issue "access." Principle XII (Non-Discriminatory Principle) stipulates that

> "As soon as the primary data and the processed data concerning the territory under its jurisdiction are produced, the sensed State shall have access to them on a non-discriminatory basis and on reasonable cost terms. The sensed State shall also have access to the available analysed information concerning the territory under its jurisdiction in the possession of any State participating in remote sensing activities on the same basis and terms, taking particularly into account the needs and interests of the developing countries."[4]

The sensed State has a right of access to the data concerning its territory "in as much as they relate to natural resource management, land use and environmental protection."[5] Even today, this principle is deemed important (and controversial) as distinguished scholars center their attention thereon during the space law sessions in the International Law Association.[6]

In this paper, the current status and recent developments of the Non-Discriminatory Principle are examined. How do nations approach this principle today? Were there any endorsement or challenges? The author touches these questions, analyzing today's remote

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2 The Remote Sensing Working Group was established by the Legal Sub-Committee in 1975. *See* COPUOS, *Report of the Legal Sub-Committee on the Work of its Fourteenth Session*, ¶ 7(b), U.N. Doc. A/AC.105/147 (March 11, 1975).

3 The 1986 Principles, *supra* note 1.

4 *Id.* princ. XII.

5 P.P.C. Haanappel, The Law and Policy of Air Space and Outer Space 160 (Kluwer Law International 2003).

6 *E.g.*, International Law Association [ILA], Report of the Seventy First Conference, Tront 706 (International Law Association 2006) (comments by the committee chair).

sensing laws and policies. In Part II, the drafting work and professional opinions on the Non-Discriminatory Principle are mentioned to clarify the original thoughts. In Part III, in contrast, recent remote sensing laws and policies are described. Finally, Part IV concludes the discussion.

2. The Original Thoughts

2.1. The Drafting Process in the COPUOS

It was in 1977 that the Non-Discriminatory Principle first appeared on the international scene. The Chairman of Working Group stated that "[i]t was [thereby] able to ascertain a common element, namely that sensed States should have access to data obtained by remote sensing from outer space pertaining to their territories on reasonable terms."[7] Then, the draft principle XI provided

> "A sensed State [shall] [should] have timely and non-discriminatory access to data obtained by remote sensing [of the natural resources of the earth] [and its environment] from outer space, pertaining to its territory on reasonable terms [to be mutually agreed upon with the sensing State] and to the extent feasible and practicable, [shall] [should] be provided with such data on such terms [on a continuous and priority basis] [and in any case no later than any third State]."[8]

The concept of non-discriminatory access had already been expressed, although it was still under consideration. Furthermore, a relative problem of 'dissemination to third States' was discussed together, i.e., whether the timely access by sensed States before any third States would be appropriate or not.

In 1980, the drafting work had evolved and the classification of data was introduced.[9] Opinions were divided as to the necessity of reasonable terms being agreed upon between the sensing and the sensed States and as to the time element involved.[10]

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7 COPUOS, *Report of the Legal Sub-Committee on the Work of Its Sixteenth Session (14 March – 8 April 1977)*, ¶ 12, U.N. Doc. A/AC.105/196/AnnexIII.

8 *Id.* at 6.

9 COPUOS, *Report of the Legal Sub-Committee on the Work of its Nineteenth Session (10 March – 3 April 1980)*, at 10, U.N. Doc. A/AC.105/271/AnnexII.

10 COPUOS, *Report of the Legal Sub-Committee on the Work of its Twentieth Session (16 March – 10 April 1981)*, ¶ 11, U.N. Doc. A/AC.105/288/AnnexI.

In 1985, based on the French working paper, the working group prepared the draft principle XII, which closely resembled the final text. The draft principle XII provided

> "As soon as the primary data and the processed data concerning the territory under its jurisdiction are produced, the sensed State shall have access to them on a non-discriminatory basis and on reasonable cost terms. The sensed State shall also have access to the available analysed information on the same basis and terms."[11]

It is remarkable that the issue "dissemination to third States" was deliberately removed. In 1986, the second sentence was rectified into the current wording finally leading the Working Group to a consensus.

2.2. Opinions of International Lawyers

In this section, the opinions of four international lawyers are briefly introduced.

Professor Bin Cheng incisively differentiated the data concerning areas outside the territorial jurisdiction of any state from the data concerning sensed State.[12] According to him, "[p]erhaps all that Principle XII amounts to now is that a State taking part in the remote sensing of the territory under the jurisdiction of another State should not withhold from that State any of the primary or processed data, or any of the available analysed information that is in its possession, concerning that State."[13]

Professor Carl Christol mentioned that "Principle XII effected an accommodation between the sovereign rights of a sensed State and the sovereign rights of a sensing State. . . . This provision acknowledges the sovereign right of the sensed State to such data."[14]

Professor Diederiks-Verschoor pointed out, with regard to "non-discriminatory basis" and "reasonable cost terms," that "this is an important shift in favour of the developing states."[15]

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11 COPUOS, *Report of the Legal Sub-Committee on the Work of its Twenty-Fourth Session (18 March-4 April 1985)*, at 23, U.N. Doc. A/AC.105/352.

12 Bin Cheng, Studies in International Space Law 593 (Clarendon Press 1997).

13 *Id.* at 593-594.

14 Carl Q. Christol, Space Law 76-77 (Kluwer Law and Taxation Publishers 1991).

15 I.H.Ph. Diederiks-Verschoor, An Introduction to Space Law 82 (2nd ed., 1999).

Professor Goldman noted that "Principles XII and XIV answered the debate over the availability of data to sensed states. Simply, the Third World lost on prior consent, but won on access to data. . . . Many developing countries had jettisoned their demands for prior consent remote sensing in return for a regime that emphasized international cooperation and consultation and a contractual agreement based on "equitable and mutually acceptable terms." "[16]

It was incontrovertible that Non-Discriminatory Principle was made for sensed States, and it was derived from the consideration of territorial sovereignty. Moreover, it should be noted that the issue "dissemination to third States" and the issue concerning data outside the territorial jurisdiction were abandoned, in a spirit of compromise.

3. Recent Laws and Policies

In this chapter, remote sensing laws and policies are examined. It consists of two sections; the first relates to national space laws and policies, and the latter on the rules and principles adopted in international organizations and entities.

3.1. States

United States

The main concern of U.S. remote sensing laws and policies was the commercialization of the Landsat system. The Congress passed the Land Remote-Sensing Commercialization Act of 1984[17] (Commercialization Act) and Land Remote Sensing Policy Act of 1992[18] (Policy Act). In addition, the President issued many Presidential Directives which dealt with remote sensing activities.[19]

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16 Nathan C. Goldman, American Space Law 104-105 (Iowa State University Press 1988).

17 Land Remote-Sensing Commercialization Act of 1984, Pub. L. No. 98-365, 98 Stat. 451 (1984).

18 Land Remote Sensing Policy Act of 1992, Pub. L. No. 102-555, 106 Stat. 4163 (1992).

19 *See* U.S. National Space Policy, NSPD-49 (Aug. 31, 2006), *http://www.fas.org/irp/offdocs/nspd/space.pdf* (George W. Bush Administration); National Space Policy, PDD/NSTC-8 (September 19, 1996), *http://www.fas.org/spp/military/docops/national/nstc-8.htm* (Clinton Admi-nistration); National Space Policy, NSPD-1 (November 2, 1989), *http://www.fas.org/spp/military/docops/national/nspd1.htm* (Bush Administration); National Space Policy, NSDD-293 (January 5, 1988), *http://www.fas.org/spp/military/docops/national/policy88.htm* (second Reagan Ad-ministration space policy); National Space Policy, NSDD-42 (July 4, 1982), *http://www.fas.org/irp/offdocs/nsdd/nsdd-42.pdf* (first Reagan Administration space policy); Civil Operat-ional Remote Sensing, PD/NSC-54 (November 16, 1979), *http://www.fas.org/irp/offdocs/pd/pd54.pdf* (Carter Administration).

These U.S. remote sensing laws and policies have consistently endorsed Non-Discriminatory Principle,[20] and Commercialization Act supported even broader application. It stipulated that

> "It shall be the policy of the United States that civilian unenhanced remote sensing data be made available to all potential users on a nondiscriminatory basis and in a manner consistent with applicable antitrust laws."[21]

EOSAT (Earth Observations Satellite Corporation), the ex-Landsat contractor, was bound by this broad non-discriminatory access policy, which required making the data available to all who requested it.[22] On the contrary, it is interesting that in the Policy Act private companies are only required to make unenhanced data available to the governments of sensed States.[23]

It was also notable that the U.S. prepared an exception to the Non-Discriminatory Principle on the basis of national security, foreign policy or international obligations (the so-called "shutter control").[24]

India

India has launched the most remote sensing satellites among spacefaring nations. Through Antrix Corporation Limited, which is owned by the Government of India, the data of Indian Remote Sensing (IRS) satellites system are sold in the world market. There is no legislation concerning remote sensing but a data policy was made for the Indian Space Research Organization (ISRO) in 2001. This data policy stipulated that

> "All data of resolution up to 5.8 m shall be distributed on a non-discriminatory basis and on "as requested basis" . . . With a view to protect national security interests, all data of 5.8 m and better than 5.8 m resolution images will be screened

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20 *E.g., supra* note 18 § 202(b)(2).

21 *See supra* note 17 § 103(b).

22 Joanne Irene Gabrynowicz, *The Perils of Landsat from Grassroots to Globalization: A Comprehensive Review of US Remote Sensing Law with a Few Thoughts for the Future*, 6 Chi. J. Int'l L. 45, 54 (2005) (This policy leaded to the stagnancy of the commercialization of Landsat).

23 Joanne Irene Gabrynowicz, *The promise and problems of the Land Remote Sensing Policy Act of 1992*, 9 Space Policy 319, 321 (1993).

24 15 C.F.R. § 960.11(10) (2009); 15 C.F.R. § 960.12 (2009); U.S. Commercial Remote Sensing Space Policy, NSPD-27, art. IV (Apr. 25, 2003), *http://www.fas.org/irp/offdocs/nspd/remsens.html*. (George W. Bush Administration).

> by the appropriate agency before distribution so that images of sensitive areas are excluded."[25]

It is distinctive to articulate a specific resolution 5.8 m as a criterion, and to decide whether its "non-discriminatory basis" and "requested basis" should be applied. Its "non-discriminatory basis" may not only apply to sensed States but also third States. In this sense, India has adopted a broader application of the access policy rather than the original Non-Discriminatory Principle.

Canada

Canada issued the "Canadian Access Control Policy"[26] in 1999, the "Operation of Commercial Remote Sensing Satellite Systems"[27] (a treaty with U.S.) in 2000, the "Remote Sensing Systems Act"[28] in 2005, and the "Remote Sensing Systems Regulations"[29] in 2007. Article 8 (4) (c) of Remote Sensing Systems Act stipulated

> "[R]aw data and remote sensing products from the system about the territory of any country — but not including data or products that have been enhanced or to which some value has been added — be made available to the government of that country within a reasonable time, on reasonable terms and for so long as the data or products have not been disposed of [. . .]."[30]

Thus Canada may exactly abide by the Non-Discriminatory Principle, although the laws and policies include exceptions of national security and foreign affairs interests.[31]

Germany

Germany enacted its legislation on the distribution of remote sensing satellite data in 2007, as a way of responding to the launch of TerraSAR-X.[32] This Act aimed to safeguard

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25 Remote Sensing Data Policy, ISRO:EOS:POLICY-01:2001, art. 4 (2001), *http://www.nrsc.gov.in/Policy.Pdf.*

26 Canadian Access Control Policy (June 9, 1999), *as reprinted in* Operation of Commercial Remote Sensing Satellite Systems, U.S. – Can., Annex I, June 16, 2000, 2000 U.S.T. LEXIS 43.

27 Operation of Commercial Remote Sensing Satellite Systems, U.S. – Can., June 16, 2000, 2000 U.S.T. LEXIS 43.

28 Remote Sensing Space Systems Act, 2005 S.C., c. 45 (Can.).

29 Remote Sensing Space Systems Regulations, SOR/2007-66 (Can.).

30 *See supra* note 28, art. 8(4)(c).

31 *E.g., supra* note 26, art. 12.

Germany's national security or foreign policy interests, which could be endangered by the distribution of high resolution data. Dr. Gerhard from the German Aerospace Center DLR stated then that, "[t]his Act restricts the distribution of some sort of data, i.e. high resolution data. . . . Therefore it is not evident to call for an additional right of access for the sensed State within such legislation."[33] He also explained that this restriction follows generally accepted rules of international law in analogy to export control.[34]

France

France has operated the SPOT satellites, and Spot Image Corporation has distributed the data. The 2008 Act, concerning space activities, deals with data in its Article 23 to 25.[35] Under the Act, remote sensing activities which ought to harm fundamental interests, national security, foreign policy and international obligations are restricted.[36]

3.2. International Organizations/Regimes

The issue "access" appears not only in domestic legislation and policies, but also in rules and principles of international organizations and entities. In this section, five such entities are identified for further consideration.

CEOS

There are 29 Members and 20 Associate Members in the CEOS (Committee on Earth Observation Satellites). Taking a "best efforts" approach, CEOS coordinates civil space-borne observations of the Earth. Two resolutions were adopted at the Plenaries of 1991 and 1994.[37] The Preamble of the 1994 Resolution states the following:

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[32] Gesetz zum Schutz vor Gefährdung der Sicherheit der Bundesrepublik Deutschland durch das Verbreiten von hochwertigen Erdfernerkundungsdaten [Satellitendatensicherheitsgesetz], November 28, 2007, BGBl. I at 2590 (F.R.G.).

[33] Michael Gerhard & Bernhard Schmidt-Tedd, *Germany Enacts Legislation on the Distribution of Remote Sensing Satellite Data*, 50 Proc. Coll. L. Outer Space 411, 417 (2008).

[34] *Id.*

[35] Law No. 2008-518 of June 3, 2008, Journal Officiel de la République Française [J.O.] [Official Journal of France], June 4, 2008, at 1.

[36] *Id.* art. 24.

[37] CEOS, Resolution on Principles of Satellite Data Provision in Support of Operational Environmental Use for the Public Benefit (September 1994); CEOS, Resolution on Satellite Data Exchange Principles in Support of Global Change Research (December 1991) (revised December 1992), *both available at http://www.ceos.org/images/wgiss/ceosdataxchangerinciples1994.pdf*).

> "REAFFIRMING the commitment of CEOS Members to the general principle of non-discriminatory access to data; . . ."[38]

There is no mention of sensed States, and the "non-discriminatory access" may be broader than the Non-Discriminatory Principle.

World Meteorological Organization

WMO, a specialized agency of the UN, has a membership of 189 Member States and Territories. All Members shall do their utmost to implement the decisions of the Congress, the supreme body of the organization.[39] In 1995, the Congress adopted the following commitment:

> ". . . *WMO commits itself to broadening and enhancing the free and unrestricted international exchange of meteorological and related data and products*; . . ."[40]

The "free and unrestricted" was defined as "non-discriminatory and without charge" by the Congress itself.[41] The data policy may be broader than Non-Discriminatory Principle.

EUMETSAT

EUMETSAT (European Organization for the Exploitation of Meteorological Satellites) currently operates five meteorological satellites and has 26 Member States and 6 Cooperating States. "EUMETSAT Principles on Data Policy" was adopted in 1998. Its Article IV stipulates that

> "A set of data, products and services to be determined by Council will be available on a free and unrestricted basis as "Essential" data and products in accordance with WMO Resolution 40 (Cg-XII)."[42]

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38 CEOS, Resolution on Principles of Satellite Data Provision in Support of Operational Environmental Use for the Public Benefit, Preamble, Preamble, para. 12 (September 1994).

39 Convention of the World Meteorological Organization, art. 6, 8, October 11, 1947, 1 U.S.T. 281, 77 U.N.T.S. 142.

40 WMO, WMO Policy and Practice for the Exchange of Meteorological and Related Data and Products including Guidelines on Relations in Commercial Meteorological Activities, Res. 40 (Cg-XII), *compiled in* Abridged Final Report or Twelfth Congress 126 (1995), *ftp://ftp.wmo.int/Documents/PublicWeb/mainweb/meetings/cbodies/governance/congress_reports/english/pdf/827_E.pdf.*

41 *Id.*

42 EUMETSAT, Council Resolution, Resolution on EUMETSAT Principles on Data Polic-y, art. IV, EUM/C/98/Res.IV (July 1998), *http://www.eumetsat.int/idcplg?IdcService=GET_FILE&dDocName=PDF_LEG_DATA_POLICY&RevisionSelectionMethod=LatestReleased* (Principle II was amended in 2005).

EUMETSAT endorsed the WMO data exchange policy above, but there was no mention to sensed States.

European Space Agency (ESA)

ESA, with 19 Member States, is involved with many Earth observation missions. In 2000, the ESA Council adopted the ENVISAT Data Policy. It referred to the 1986 Principles as follows:

> "ENVISAT data shall be available in an open and non-discriminatory way, and distribution of the data shall be consistent with United Nations Resolution 41/65 dated 3 December 1986 on Principles relating to Remote Sensing of the Earth from Space."[43]

ESA accordingly applies in a very strict sense the Non-Discriminatory Principle.

Group on Earth Observations (GEO)

GEO was established to carry out the Global Earth Observation System of Systems (GEOSS) 10-Year Implementation Plan. GEO currently has 81 Members, 58 Participating Organizations and 6 observers. GEO calls itself an intergovernmental group, however it is virtually an intergovernmental organization.[44] The plan prescribes its data sharing as follows:

> "There will be full and open exchange of data, metadata, and products shared within GEOSS, recognizing relevant international instruments and national policies and legislation."[45]

This data-sharing principle does not mention sensed States either. It is quite certain that the range of "full and open exchange" is larger than that of the Non-Discriminatory Principle.

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43 ESA, The Envisat Data Policy, *http://eopi.esa.int/doc/download/envisat_data.pdf* (last visited August 27, 2010).

44 Setsuko Aoki, Nihon no Uchuu Senryaku [Japan Space Strategy] 309 (Keio University Press 2006) (Japan).

45 GEO, The Global Earth Observation System of Systems (GEOSS) 10-Year Implementation Plan, art. 5.4 (February 16, 2005), *http://www.earthobservations.org/documents/10-Year%20Implementation%20Plan.pdf.*

4. Conclusion

The Non-Discriminatory Principle still lives on. There are no States or international organizations or international entities acting in a voluntary manner against the Principle, although spacefaring nations have started to introduce the exceptions on the basis of national security, foreign policy or international obligations.

However, the lack of opposition does not mean that remote sensing activities are always operated in consideration of sensed States and, most importantly, of their territorial sovereignty.[46] Actually, in recent laws and policies, the applications of the term "non-discriminatory" are generally broader than the original Non-Discriminatory Principle.[47] The differences between them may be the third States and the data outside the territorial jurisdiction, which were removed from the originally drafted Principle. Even though the 1986 Principles do not address these issues at all, the Non-Discriminatory Principle might have influenced them, as a relative and authoritative text.

Furthermore, in the Author's view, the term "non-discriminatory" is no longer used in a context of sensed States. Rather, it is used in a context of "needs and interests of the developing countries," which was hastily added to the last sentence of Principle XII in 1986. In other words, it seems that the major objective of the Non-Discriminatory Principle has changed from the protection of rights and interests of sensed States to the protection of common interests. This idea may well illulstrate the current situation of international cooperation.

International space law has promoted common interests. For instance, there are well-known concepts of "province of mankind"[48] and of "common heritage of mankind."[49] The 1986 Principles also repeatedly mentions the relevant issues of common interests.[50] Indeed, international cooperation on remote sensing activities is blooming. The change of the context in which the term 'non-discriminatory' is used might merely reflect the development of international law. ■

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46 *See supra* note 6, at 700 ("The Principles per se, might not always be considered by some states when embarking on activities of the kind." (Dr. Williams)).

47 The Indian data policy, the CEOS data exchange principles and the GEOSS data sharing principles are good examples.

48 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies art. 1, January 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205.

49 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies art. 11(2), December 18, 1979, 1363 U.N.T.S. 3.

50 *E.g., supra* note 1, Principle II, IV, V, VI, VII, VIII, IX, X, XI, XII, XIII.

Legal Pluralism in Outer Space

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This paper contains a critical assessment of the existing legal framework in outer space in light of future participation of private actors in outer space activities. With the aid of the theory of Legal Pluralism, a systems theory worked out by Gunther Teubner, light will be cast on current and future complications in the legal area pertaining to private actors entering the realm of outer space. The results presented in this paper might provide for some new insights and tools for future regulatory approaches.

1. Introduction

This article is based on the presumption that there will be a moment when private actors actually start settling in outer space, with commercial space activities acting as the first and prime catalyst. This development might lead in due course to the construction of outer space communities or permanently manned facilities orbiting earth or located on a celestial body.[1] Such working and living communities may consist of persons of a varied number of nationalities which have left earth, meaning that these persons have entered the legal realm of outer space.

When hypothesizing about the future expansion of the presence of private actors in outer space, out of the challenges that present itself, it is noticeable that the current spatial legal framework is not designed for private participators because, from its starting point, the framework is focused on states and inter-state relationships, as states were the initiators of activities in space during the early second half of the twentieth century.

Another challenge to regulating private activity in outer space is the fact that the current treaties relating to outer space significantly limit the possible effects of the territoriality principle as applied on earth, leading to an absence of sovereignty-based jurisdiction.[2] What is more, a legal framework in outer space modelled on the legal framework as on earth, with scattered jurisdictions based on territoriality and nationality, might not be fit for the conditions in outer space. First of all this might be the case because of the magnitude of space, and the problems relating to controlling potential territories and nationalities. Second, should the

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1 Sterns, Patricia M., Tennen, Leslie I., *Jurisprudential Philosophies of the Art of Living in Space: The Transnational Imperative,* IISL Proceedings 1982, p. 187-202, p. 188.

2 Art. 2, 8 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other Celestial Bodies (Outer Space Treaty) 1967, Art. 2 (1) Registration Convention 1975.

same scattering of territorial jurisdictions as we see on earth occur in outer space it will again lead to a serious constraint on jurisdictional efficiency. In short, "new areas of human activity will create problems."[3] The combination of these observations culminates in the main question: *What should the future legal regulation of private actors in outer space look like?*

The solution to the above mentioned question suggested in this article is the following: *As a starting point for developing answers to the question regarding how to regulate private parties in outer space, legal pluralism could provide a suitable alternative theoretical framework and analytical tools for the normative development required for the regulation of the conduct of private persons in outer space, in comparison to state-created law.*

The complications discussed in this article will mainly concern the jurisdiction applied to private actors operating in outer space. Therefore further elaboration on the three key aspects of this article, (1) *Private Actors*, (2) *Space Activities,* and (3) *Jurisdiction,* is necessary.

Private Actors are mainly natural persons and legal persons and entities, for instance companies. Also included in the definition will be non-governmental organizations.[4]

Space Activities for the remainder of this article will be considered space activities *stricto sensu*. Space activities *stricto sensu* can be described as activities "comprehensively taking place in outer space"[5] or as activities, outside the territorial jurisdiction of states.[6] This negative link with territorial jurisdiction is important as it should lead to alternative necessary forms of jurisdiction which should be applied to such *stricto sensu* activities.

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[3] Brownlie, Ian, *Principles of International Law,* Seventh Edition, Oxford University Press, New York, 2008. p. 255.

[4] Klabbers, Jan, *An Introduction to International Institutional Law,* Cambridge University Press United Kingdom, 2007, p. 7-15; A positive definition of a NGO follows: "A non-governmental organization (NGO) is any non-profit, voluntary citizens' group which is organized on a local, national or international level. www.ngo.org/ngoinfo/define.html.

[5] Dunk, von der Frans G., *Private Enterprise and Public Interest in the European Spacescape,* International Institute of Air and Space Law, Faculty of Law, Leiden University, 1998, p. 15.

[6] Even though it can be argued that article VIII Outer Space Treaty provides for a form of territorial jurisdiction.

Jurisdiction in the remainder of this article, when concerned with states, is defined as:

[T]he power of the state under international law to regulate or otherwise impact upon people, property and circumstances and reflects the basic principles of state sovereignty, equality of states and non-interference in domestic affairs.[7]

To be clear, jurisdiction based on sovereignty implicates intrinsically a "monopoly of law creation on its [state] territory."[8] A further distinction can be made regarding jurisdiction:

"territorial" jurisdiction: the type of jurisdiction a state exercises within its own territory;

"quasi-territorial" jurisdiction: the jurisdiction a state exercises over its space objects, aircrafts and ships;

"personal" or "national" jurisdiction: the jurisdiction over a state's nationals.[9]

Finally a form of functional jurisdiction, a consent to prescriptive jurisdiction, will be introduced herein where the authority to regulate derives from the will of legal subjects to adhere to the legal authority, on the basis of a pragmatic trade-off, leading to the granting of authority to the entity that provides the most "practical benefits".[10]

From here on, a rather blunt approach is taken to tackle the legal complications states encounter currently in order to regulate private actors in outer space. The situation aboard the International Space Station (ISS) will be used as a vivid example of the legal complexities involving private actors. What then will follow is a concise explanation of the theory of legal pluralism. A brief analysis of the legal complications found against the background of the theory of legal pluralism will be presented in the final part of this article.

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7 Shaw, Malcolm N., *International Law,* Sixth Edition, Cambridge University Press, Cambridge UK, 2008. p. 645.

8 Robé, Jean-Philippe, *Multinational Enterprises: The Constitution of a Pluralistic Legal Order,* in Global Law without a State, edited by Gunther Teubner, Darthmouth Publishers, Aldershot, UK, 1997, p. 45-79, p. 49.

9 Cheng, Bin, *The Commercial Development of Space: The Need for New Treaties,* Journal of Space Law, vol. 19, 1991, p 17-41, p. 37-41; Von der Dunk n. 5, p. 13-22.

10 Mertens, Hans-Joachim, *A Self Applying System Beyond National Law?* in Global Law Without a State, Gunther Teubner, 1997, Darthmouth Publishing, Hants, England, p. 31-44., p. 35-40; Shaw n. 7, p. 58, footnote 47.

2. Legal Structure of ISS Regulation

Since its construction in the 1980's, the ISS has proved to be a successful cooperative effort of several contributing countries and space agencies. The components of the ISS have been constructed and registered by the United States, Russia, Canada, Japan and the European Space Agency (ESA). The finalization of construction is planned to take place in 2010; after completion it is expected that the ISS will operate for ten years thereafter.[11]

The legal structure and jurisdiction that applies to the ISS and its inhabitants has three aspects. First, the general international principles and treaties applying to outer space, which form the basis of law at the international level; second, the multilateral and bilateral agreements applying solely to the ISS; and third, the national or regional laws of the participating states which apply to their nationals aboard the ISS.[12]

2.1. Outer Space Treaty and other relevant treaties

2.1.1. Articles I&II OST

Articles I and II of the Outer Space Treaty (OST) are very closely related in that they guarantee the freedom of the "exploration and use" of outer space in combination with the prohibition of "national appropriation by claim of sovereignty, by means of use or occupation, or by any other means." Therefore, the ISS, and other space objects reaching the realm of outer space, are located in a sovereignty-free area.[13]

As described in the following paragraphs, Articles VI, VII and VIII OST are exemplary in this case, as they provide for exceptions to the freedom of use of outer space in order to

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[11] Rosmalen, S., *The International Space Station Past, Present and Future – An Overview*, in The International Space Station, Commercial Utilisation from a European Legal Perspective, edited by F.G. von der Dunk AND m.m.t.a Brus, Martinus Nijhoff Publishers, Leiden, 2006, p. 9-14, p. 11-14.

[12] Von der Dunk, F.G., *The International Legal Framework for European Activities on Board the ISS,* in The International Space Station, Commercial Utilisation from a European Legal Perspective, edited by F.G. von der Dunk and M.M.T.A Brus, Martinus Nijhoff Publishers, Leiden, 2006, p. 15-32., p. 15. ESA is the regional exception to the remaining individual state participants. Recognition of the commercial possibilities of the ISS is growing stronger, which could lead to a larger influence of national laws, Veldhuyzen, R.P., Masson-Zwaan T.L., *ESA Policy and Impending Legal Framework for Commercial Utilisation of the European Columbus Laboratory Module of the ISS,* in The International Space Station, Commercial Utilisation from a European Legal Perspective, edited by F.G. von der Dunk AND m.m.t.a Brus, Martinus Nijhoff Publishers, Leiden, 2006, p. 47-62., p. 49.

[13] Art. I and II OST; Von der Dunk n. 12, p. 16.

make sure that some form of legal controls is in place when activities in outer space are undertaken, whether by states or by their nationals.[14]

2.1.2. Article VI OST

Article VI OST is concerned with the general international responsibility of states for activities undertaken in outer space. The relevant part of the article reads as follows:

> "States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the Moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty."

Briefly stated, a state can be held responsible for any activity carried out by the state and its nationals. Article VI OST shifts all possible obligations under international law to the state.[15]

2.1.3. Article VII of the OST and the Liability Convention

Article VII of the OST is concerned with liability of states for damage deriving from activities in outer space. The relevant part of the article reads as follows:

> "Each State Party to the Treaty that launches or procures the launching of an object into outer space, including the Moon and other celestial bodies, and each State Party from whose territory or facility an object is launched, is internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons by such object or its component parts on the Earth, in air space or in outer space, including the Moon and other celestial bodies."

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14 Id., p. 16,17.

15 Von der Dunk n. 5, p. 53.

16 Article 1 of the *Convention on International Liability for Damage Caused by Space Objects,* 29th of March 1972, entered into force 1st of September 1972. The launching state either being the state that launches, procures the launch, or the state from whose territory of facility an object is launched.

In the outer space environment the liability will fall upon the launching state of a space object.[16] Liability will be the consequence of any damage occurring.[17]

Article VII OST has been elaborated and extended in the 1972 Liability Convention.[18] Article VI and VII together with the Liability Convention implicate that for the activities of private actors that have caused damage, the national's state and/or launching state will be responsible and/or liable.[19] In the outer space environment the liability will mostly fall upon the launching state of a space object. The jurisdiction flowing from Art. VI and VII and the Liability Convention, the latter two components more in an indirect way, therefore can be described as based on nationality.

2.1.4 Article VIII OST and the Registration Convention

Article VIII of the OST is concerned with the registration of space objects and the creation of jurisdiction over the space object due to registry, elaborated and extended in the 1975 Registration Convention.[20] The relevant part of article VIII OST reads as following:

> "A State Party to the Treaty on whose Registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body."

The Registration Convention, in combination with article VIII OST, links the entitled jurisdiction of a state with the space object on its registry. The jurisdiction therefore applies directly to the space object as a physically demarcated area. Such jurisdiction therefore can be described as based on territoriality.[21] Yet, only a quasi-territoriality, as appropriation

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17 Damage is defined in art. 1(a) 1972 Liability Convention as "*loss of life, personal injury or other impairment of health; or loss of or damage to property of States or of persons, natural or juridical, or property of international intergovernmental organizations*."

18 *Convention on International Liability for Damage Caused by Space Objects,* 29th of March 1972, entered into force 1st of September 1972. As of 1st of January 2009, 87 Ratifications and 22 Signatories, including almost all major space-faring nations.

19 Wollersheim, Michael, *Considerations Towards the Legal Framework of Space Tourism,* 2nd International Symposium on Space Tourism, Bremen, 1999, *http://www.spacefuture.com/archive/considerations_towards_the_legal_framework_of_space_tourism.shtml,* p. 2.

20 *Convention on Registration of Objects Launched into Outer Space*, 14th of January 1975, entered into force 15th of September 1976. As of 1st of January 2009, 51 Ratifications and 4 signatories, including most of the major space-faring nations.

21 Though it could also be argued this jurisdiction is based on nationality.

under the legal framework is forbidden in outer space. As a consequence, this would lead to a situation where any private actor aboard a space object will fall under the direct jurisdiction of the state that has registered this same object.

2.1.5 The role of Articles VI, VII and VIII in the light of alternative forms of jurisdiction

Articles VI and VIII OST give a more direct and complete rationale for legal control by states over space activities through clear denomination of responsibility-, jurisdictional- and controlling issues of private actors. Article VII OST provides for a more indirect approach to this same legal control, as a state's eventual liability will result in precautionary (regulatory) measures to prevent any damage occurring.[22]

The possibilities of derogation provided by articles VI, VII and VIII OST from current international law could be important, as it demonstrates the current legal framework is not completely indisputable and absolute, but might leave room for alteration. This flexibility could provide for points of support in the light of alternative forms of law making. In the same light, the Registration Convention provides for the possibility of intergovernmental organizations to take over the role of states, accepting the rights and obligations which befall them under the Registration Convention.[23]

2.2. Multilateral and Bilateral Agreements

On January 29, 1998 the participating countries signed the International Space Station (ISS) Inter-governmental Agreement (IGA), which acts as the constitution of the ISS and entails the fundamental obligations with which the participating states must comply.[24]

The multilateral and bilateral agreements applying to the ISS are several, with the IGA as the main and most important instrument, complemented by four Memoranda of Understanding (MoU) between the various states' agencies. One of the MoU's contains a specially created instrument, the Crew Code of Conduct for the ISS Crew

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22 Lyall, Francis, Larsen, Paul, *Space Law: A Treatise,* Farnham Ashgate, 2009, p. 83.

23 Von der Dunk n. 12, p. 19,20.

24 Fukushima, Masahiko, *Legal Analysis of the International Space Station (ISS) Programme Using the Concept of "Legislation",* Space Policy vol. 24 2008, p. 33-41, p. 34; Rosmalen n. 11, p. 9,10: Signatories being the United States, Canada, Japan, The Russian Federation and the ESA, consisting of eleven Member States; Belgium, Denmark, France, Germany, Italy, The Netherlands, Norway, Spain, Sweden, Switzerland, and the United Kingdom.

(CCOC), a soft law instrument dealing with the regulation of human behaviour aboard the ISS.[25] With regard to jurisdiction aboard the ISS, the substantive issues are dealt with in the IGA.[26]

Article 17 IGA shows with regard to liability that no derogation has been made from the international legal framework in outer space when it concerns the launch and construction of the several ISS elements and damage towards external third parties, whether or not inflicted by private actors. Article 16 IGA is a special liability regime applicable to the ISS partners internally.[27]

Article 5 IGA, in accordance with article VIII OST and article 2 Registration Convention, attributes jurisdiction to the state which has registered the object. Next to this, article 5(2) IGA also grants a state jurisdiction over a states' personnel in or on the Space Station who are its nationals, which comes down to a form of jurisdiction based on nationality. Articles 21 and 22 IGA repeat the jurisdiction attribution with respect to intellectual property issues and criminal law.

Within the ISS quasi-territorial jurisdiction is granted a higher legal status than personal (national) jurisdiction, except for issues concerning criminal law.[28] This hierarchical distinction

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[25] Article 11(6) MoU, it states: "The Space Station Code of Conduct will, inter alia, establish a clear chain of command on-orbit: clear relationship between ground and on-orbit management; and management hierarchy; set forth standards for work and activities in space, and, as appropriate, on the ground: establish responsibilities with respect to elements and equipment; set forth disciplinary regulations; establish physical and information security guidelines; and provide the Space Station Commander appropriate authority and responsibility, on behalf of all the partners, to enforce safety procedures and physical and information security procedures and crew rescue procedures for the Space Station," Roos, de T.A., *Disciplinary and Criminal Law in Space,* in The International Space Station, Commercial Utilisation from a European Legal Perspective, edited by F.G. von der Dunk AND m.m.t.a Brus, Martinus Nijhoff Publishers, Leiden, 2006, p. 115-124, p.115-123; Farand has heralded the CCOC as "*an autonomous and unique piece of programme documentation developed by the ISS Cooperating Agencies.*.", and of the same legal status as the IGA and MoU's. Farand, A., *Astronauts' behaviour onboard the International Space Station: Regulatory Framework*, *http://portal.unesco.org/shs/en/files/8480/11224719601Farand.pdf/Farand.pdf*., 2005., p. 1.

[26] The MoUs and Implementing Agreements are more concerned with the practical side of these jurisdiction issues, Veldhuyzen, Masson-Zwaan n. 12, p. 49.

[27] Von der Dunk n. 12, p. 23,24.

[28] Ibid., p. 22.

means that within each individual registered compartment of the ISS, in first instance the jurisdiction of the state of registry prevails.

Articles 3(b) and 4(1) IGA lift the status of the ESA from an intergovernmental organization to a fully recognized "European Partner."[29] In combination with article 5(1) IGA the members of the ESA will all have jurisdiction within the ESA registered elements on the ISS. Here, a 'legal fiction' is created to circumvent the restriction of article VIII OST which allows only one state to register and apply quasi-territorial jurisdiction over a space object and the private actors therein.[30]

What the IGA, the MoU's and the CCOC make clear, is the way in which states deal with jurisdictional issues aboard an international space object. States use both hard law instruments, treaties and multilateral agreements, as well as soft law instruments such as the CCOC, to come to agreement and compromise on solutions to legal problems with regard to private actors, as a consequence of cooperation in activities concerning the ISS.

2.3. National Laws and Regulations

States and their respective legislations are at this moment the only means to properly bind private parties to international space law, which makes national laws currently very important in regulating private actors. National laws are also used to cover lacunae in space legislation which are not covered by international law. Several national laws related to space activities have already been developed.[31] As Lyall recognizes, "Commercial activity in outer space, in particular any involving human beings in outer space, would require extensive national supervision."[32]

The first type of national law is concerned with four operational legal fields: "status, security, safety and liability."[33] Such national laws are mainly aimed at licensing requirements, insurance issues, and technical aspects relating to space objects. These national

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29 Hobe, S., Reuter, T., *The Eu Constitutional Teaty and Space: Towards EU Jurisdiction on Board a Space Station,* in The International Space Station, Commercial Utilisation from a European Legal Perspective, edited by F.G. von der Dunk AND m.m.t.a Brus, Martinus Nijhoff Publishers, Leiden, 2006, p. 125-136, p. 128; Von der Dunk n. 12, p. 22.; Art 5(1) IGA.

30 Veldhuyzen, Masson-Zwaan n. 12, p. 48; Hobe, Reuter n. 29, p. 128,129.

31 Von der Dunk n. 5, p. 107.

32 Lyall n. 22, p. 496.

33 Von der Dunk n. 5, p. 107.

laws can be produced and enforced with the aid of space agencies and other administrative entities.[34]

The second type of national law is comprised of the general laws applicable within a state and produced in order to regulate private actors and their activities.[35] An example of such laws are to be found in the sphere of intellectual property, where the laws are not specifically produced for use in outer space, but still can be applied to this area.[36]

The text of Article VIII OST, Article 2 Registration Convention and Article 5 IGA all show a preference of the drafting states for an extension of their jurisdiction beyond the limits of state territory.[37] What this preference has led to, is a legal framework in outer space that has paved the road for national laws to be applied substantively to private actors.[38] National legislation has an operating area initially confined to the boundaries of the nation's territory.[39] However, a state can declare the extension of its jurisdiction to outer space, a policy already common with respect to artificial islands at sea, where jurisdiction for example is extended to oil drilling rigs in the high seas.[40]

An example of such a declaration extending jurisdiction can be found in the United States' Patent Act 35 U.S.C. §105 (2003), which states that a space object in outer space should be considered an extension of US territory in relation to inventions made, used or sold on a space object registered by the United States.[41]

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34 Von der Dunk n. 12, p. 26.

35 Meaning laws not specifically construed for outer space.

36 Von der Dunk n. 5, p. 287-290.

37 Farand, A., *Jurisdiction and Liability Issues in Carrying out Commercial Activities in the International Space Station (ISS) Programme,* in The International Space Station, Commercial Utilisation from a European Legal Perspective, edited by F.G. von der Dunk AND m.m.t.a Brus, Martinus Nijhoff Publishers, Leiden, 2006, p. 87-96, p. 89.

38 Von der Dunk n. 5, p. 107.

39 Balsano, A.M., Wheeler, J., *The IGA and ESA: Protecting Intellectual Property Rights in the Context of ISS Activities,* in The International Space Station, Commercial Utilisation from a European Legal Perspective, edited by F.G. von der Dunk AND m.m.t.a Brus, Martinus Nijhoff Publishers, Leiden, 2006, p. 63-86, p. 66; Farand n. 26, p. ; Von der Dunk n. 5, p. 286-289.

40 Haanappel, Peter, *A Proposal for a Protocol to the Intergovernmental Agreement on the ISS: Private Law Matters,* in The International Space Station, Commercial Utilisation from a European Legal Perspective, edited by F.G. von der Dunk AND m.m.t.a Brus, Martinus Nijhoff Publishers, Leiden, 2006, p. 107-114, p. 111.

41 Balsano, Wheeler n. 39, p. 66; Art. 21(2) of the IGA confirms this legal stance.

All of the above leads to the conclusion that, with the ISS as a current example and a possible model for future human settlements in outer space, on three different levels between states jurisdiction has been construed to deal with the regulation of private actors in the same realm; the general international level; the multi- or bilateral level; and the national level. As one can imagine, this might lead to difficulties.

3. Legal Complications

3.1. Absence of Sovereignty

The first complication arising from the present legal framework is the absence of sovereignty, due to the provisions in articles I and II OST which denominate outer space as a *res communis*. "The general regime is, like that of the High Seas, based upon free use and a prohibition of claims to sovereignty by individual states."[42] The consequence of this absence of sovereignty is that one of the ways in which jurisdiction is primarily organized on earth, on the basis of territoriality, is not possible in outer space.[43]

In practice the absence of sovereignty in outer space has been challenged. The clearest example is the failed *Bogota Declaration*, in which some equatorial states claimed unlimited sovereignty over the air space above their territories up to the geostationary orbit.[44] Another example of a claim to a form of sovereignty which was rejected was the initial article 22 IGA, where full criminal jurisdiction regarding the ISS was given to the USA, but later withdrawn with the participation of Russia to the project.[45]

Thus, national laws generally cannot be applied on the basis of territorial jurisdiction, causing problems for private actors as well as for states.

3.2. Inefficiency of Jurisdiction

The second complication is connected to the first complication in that it addresses the lack of jurisdictional power in the current alternative forms of jurisdiction. As showed above, national jurisdiction and quasi-territorial jurisdiction have been used to compensate

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42 Brownlie n. 3, p. 257.

43 Lowe, Vaughan, *Jurisdiction,* in International Law, M. Evans, OUP, 2006, p. 344; Though many authors, among them Brownlie, see potential problems once human activity on for example the moon will start occurring on a regular basis, and settlements on celestial bodies will create some sort of possessory rights, see Brownlie n. 3, p. 255; Takaya, Yuri, Lee, Ricky J., *Space Tourism and Permanent Human Settlement: The Legal and Regulatory Issues,* IISL Proceedings 2000, p. 142-147, p. 146.

the lack of ordinary territorial jurisdiction. But the question is whether these substitute jurisdictions will prove to be sufficient.

The three types of jurisdiction, *territorial*, *quasi-territorial* and *personal/national* jurisdiction can each respectively be divided in two elements. First, the prescriptive jurisdiction or "*jurisfaction*"; the capability of a state to create legislation, territorial or not. Second, the ability to enforce or "*jurisaction*"; the capability to physically enforce and apply legislation and court decisions. Though the theory of Legal Pluralism as well as this article is mainly concerned with "jurisfaction", the discussion cannot be seen as separate from the "jurisaction", as the two forms of jurisdiction, especially in practice, cannot be seen as detached from each other. The issues concerning "jurisaction" therefore will be dealt with in the next paragraph.

As already mentioned, territorial sovereignty is missing in outer space, leaving room only for "quasi-territorial" and "national" jurisdiction. As most laws of a country are mainly founded on the territoriality principle, the jurisfaction initially does not extend to extra-territorial spheres, leaving large lacunae within regulations to be applied.[46]

Yet, the nationality principle is still available for states to control activities undertaken by its nationals and a partial 'quasi-territorial' jurisdiction is available for space objects registered within a certain state. First and foremost, a national law could clash with other national laws;[47] second problem is national laws could also clash with international laws, being the legal framework in outer space.[48]

Furthermore, it could be questioned whether a permanent resident of a future outer space settlement could still be considered a national of a terrestrial state, as the *Nottebohm Case* has shown and tried to define what it is that makes one a national:

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[44] Pop, V, *Appropriation in outer space: the relationship between land ownership and sovereignty on the celestial bodies*, Space Policy 16 2000, p. 275-282, p. 280; Harris Harris, Alexandra, Harris, Ray, *The Need for Air Space and Outer Space Demarcation,* Space Policy Vol. 22 2006, p. 3-7, p. 5; Bogota Declaration: Declaration of the First Meeting of Equatorial Countries, adopted December 3rd 1976; countries that signed are Brasil, Colombia, Congo, Ecuador, Indonesia, Kenya, Uganda, Zaire.

[45] Sgrosso, *Legal Status of the Crew in the International Space Station,* IISL Proceedings 1999, p. 35-49., p. 45

[46] Cheng n. 9, p. 37-41; Shaw n. 7, p. 645-651.

[47] This problem will be elaborated in section 2.3.4.

[48] Diederiks-Verschoor, L. H. Ph., *An Introduction to Space Law Third Revised Edition,* Kluwer Law International Dordrecht, 2008, p. 93.

> [A] legal bond having as its basis a social fact of attachment, a genuine connection of existence, interests and sentiments, together with the existence of reciprocal rights and duties.[49]

3.3. Enforcement Problems

The main limitation placed on enforcement or the earlier discussed *jurisaction* by a state is that it cannot take place in the territory of another state. This limitation does not mean that a state is strictly bound to its own territory if it wants to enforce, for areas without a territorial claim, such as the high seas or outer space, can be included to the reach of a state's enforcement power.[50]

Perhaps enforcement can be argued to be more of a practical problem rather than a theoretical or legal one. The difference between territorial and nationality based jurisdiction is the former's more effective ability to enforce legislation as a state has coercive power in its own territory. In the latter's case enforcement is possible in theory, yet in practice it might turn out to be very difficult, conceivably this is even more so in outer space as compared to the high seas or Antarctica.[51]

The appropriate state will have to deal with physical inabilities concerning the enforcement of laws over nationals which reside in outer space. The state is of course capable of enforcing laws once the national has reappeared within the state territory, yet the question remains how a state can truly enforce outside its own territory.[52] What is more, a problem of enforceability of jurisdiction in relation to floating objects (ships) is occurring on the high seas, similar to the situation of objects in outer space, with the emergence of "flags of convenience".[53] It is very possible this same problem will occur in outer space.[54]

3.4. A Variety of National Laws Applying to One Space Object or in Outer Space

Problems which could arise aboard the ISS or any future cooperation of states that applies the same legal infrastructure to a space object, is that multiple jurisdictions with

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49 ICJ Reports 1955, p. 4, 23.

50 Lowe n. 43, p. 356; Evans, Malcolm D., *The law of the Sea*, in International Law, Edited by Malcolm D. Evans, Oxford University Press, New York, 2006, p. 623-652, p. 636.

51 Evans n. 50, p. 636; Von der Dunk n. 5, p. 16.

52 Lee 2005, p. 219.

53 Evans n. 50, p. 637; Art. 94(1) Law of the Sea Convention.

54 Wollersheim n. 19, p. 3.

multiple regulations will exist next to each other without clear demarcations and in close distance to one another. As Balsano states:

The complexity of the legal regime […] for the ISS lies in the fact that the ISS consists of a jigsaw of nationally owned space elements rather than an 'international' space station per se."[55] Another author describes the situation on the ISS as a "juxtaposition of jurisdictions, launching states and registration states.[56]

Different national laws might apply to the same individual legal issue but might result in completely different outcomes. It will be hard to locate legal acts, such as for example the place of performance of a contract, next to the way in which such effects as the performance of a contract are determined by the various applicable national laws.[57] Next to this, and partially as a result of this, the difficulty of overlapping jurisdictions could arise, leading to further solutions based on "balancing of interests" between states, unilateral restraint tactics, or harmonization efforts.[58] These complexities could become so complicated that constant legal support will be needed when a private actor will undertake activities in outer space.[59]

Of course, not every space object will be the result of an intensive cooperation of states. Even so, space objects could be registered by only one state. In this case, complexities will be of lesser substance, although still the feasibility of space objects with different jurisdictions can be questioned if the possibility of harmonization is realistic as well.

With regard to the ESA and (elements of) space objects registered by the agency, there is the question which private law will apply to ESA elements, as the ESA does not have its

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55 Balsano, Wheeler n. 39, p. 66.

56 Smith, Lesley Jane, *Legal Aspects of Commercial Utilisation of the International Space Station – A German Perspective,* in The International Space Station, Commercial Utilisation from a European Legal Perspective, edited by F.G. von der Dunk AND m.m.t.a Brus, Martinus Nijhoff Publishers, Leiden, 2006, p. 153-180, p. 178.

57 Lowe n. 43, p. 353, Lowe discusses for example the difference in 'conduct' crimes and 'result' crimes.

58 Ibid., p. 354-356.

59 As de Roos states, already space travellers have to abide to a variety of rules: the ISS Flight rules, the Disciplinary Policy, regulations of the cooperating space agency, the regulations of the earth-orbit vehicle, the rules of the institution hosting the training, the requirements of the Multilateral Crew Operations Panel, Multilateral Space Medicine Board and the Multilateral Medical operations Panel, de Roos n. 26, p. 117.

own private law, but is dependent on the private laws of its members to be applied aboard ESA registered space objects.[60] As von der Dunk points out:

> The ESA is an "international intergovernmental organization" not having any jurisdiction of its own which could be retained and exercised in outer space. Therefore, at this point any agreement relating to jurisdiction over a space object launched under ESA registration could only lead in practice to a member state applying and exercising its jurisdiction, not to any (exercise) of ESA jurisdiction.[61]

This situation will quite possibly also lead to complications and confusion. Thus, in short, even though a variety in regulations can provide for alternative ways of dealing with the same legal issue, it can be assessed that a more unifying, harmonized, approach to the application of national laws might be preferable before "different jurisdictions go galloping off in different directions."[62]

3.5. Applicability of Substantive National Laws

When looking at the substantive national laws applying to outer space, rather than jurisdictional issues, the direct application of national laws might not always serve the purpose of proper regulation. The physiological uniqueness of outer space might frustrate the application of terrestrial domestic laws.[63] This situation is mainly due to the general nature of national laws which "will not address unique features of space objects or space activities, no matter which law is chosen."[64]

The CCOC as applied aboard the ISS can be seen as a sign that special circumstances, as exist aboard the ISS, will require special regulation. The CCOC was argued as being the most efficient manner in creating broad consensus over the regulation of conduct aboard the ISS, providing for a set of tools to take action and sanction offenders of the CCOC.[65]

Areas of concern for the ISS in specific and for manned space objects in general can be found in issues relating to harassment on board of the ISS, the authority of the commander

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60 Haanappel n. 40, p. 110-114.

61 Von der Dunk n. 5, p. 237.

62 Lyall, *Space Law- What Law or Which Law?,* IISL Proceedings 1991, p. 240-243, p. 242,243.

63 Kozuka, p. 301.

64 Kozuka, p. 301.

65 Farand n. 26, p. 2,3.

of the ISS and the use of force aboard the ISS as part of the disciplinary policy.[66] Other areas of concern aboard a space object or within a space settlement can be found in areas such as confinement to close spaces; stress; fatigue; performance limitation; lack of gravity; solar radiation; lack of resources; complete dependence and encirclement by technology, all having possible detrimental effects on private actors.[67] Therefore these areas should specifically be covered or in the future be tackled by any national laws. These issues lead to the (currently) unanswerable question recognized and posed by Sloup:

> [H]ow will physiological and psychological changes in humans living in space for long periods affect their needs and perceptions and, in turn, their own ideas as to what the "rules" should be that they live under.[68]

3.6. Private Interests

It seems private actors hardly have possibilities to pursue their own interests and ideas, where private actors are confronted with a legal framework mainly produced by public entities, as aboard the ISS. As von der Dunk states, "They [private actors] are simply confronted with a legal system, largely give or take, if they are interested in being part of the overall ISS activities."[69] Such an unbalanced situation might lead to constraints on the development of human activity in outer space, as private actors might feel that they are not being supported. Van Traa-Engelman points this out in the following way:

> Since private enterprise in countries with a private economy will automatically become the driving force behind space commercialization, securing of their legal interests in both national and international law will be a precondition for their increased participation and determine the pace of the commercialization process, which progress will be necessary to justify continuation.[70]

To summarize, the complications set out above demand a legal system that more efficiently deals with the regulation and enforcement of the conduct of private actors in a

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66 Farand n. 26, p. 4-6.

67 March, p. 223; IAA Report, *Psychology and Culture During Long-Duration Space Missions*, 2009, p. 16, 26.

68 Sloup, George Paul, *Legal Aspects of Large Space Structures: Factors Leading to the Development of the Jurisprudence of "Astrolaw",* IISL Proceedings 1984, p. 270-272, p. 270-272.

69 Von der Dunk n. 12, p. 32.

70 Traa-Engelman van, Hanneke Louise, *Commercial Utilization of Outer Space: Law and Practice,* Hotei Publishing, 1989, p. 221.

res communis environment. Perhaps a small leap over to an alternative view on lawmaking such as the theory of legal pluralism provides promising insights.

4. Legal Pluralism

Many comparable definitions have been used to describe the theory of legal pluralism. Subject to one's perspective, in general legal pluralism can be defined as "[t]he condition in which a population observes more than one body of law"[71] as well as "the theory that there is a plurality of legal orders, both by states and by other, non-state communities."[72] The theory describes the existence of several "functional", "heterarchical", "self-validating", "decentralized" forms of "social law-making" operating simultaneously and next to each other.[73] The theory of legal pluralism provides an alternative view to the perspective of the state as an "all-encompassing entity" in relation to law-production.[74]

The theory of legal pluralism offers a perspective on law-making that is quite different from the approach taken by the "traditional doctrine" which has been supported over the last four centuries, where states are at the centre of law production.[75] In the latter doctrine a hierarchization of legal norms is inherent to the system, where the higher norms determine the legitimacy and validity of the lower norms. The hierarchization of norms can be derived from the *rule of law doctrine*, the root of the unity of state and law and the key concept in Western liberal legalism and which consists of three elements. The first element comes down to the notion that law is solely law created by the state. Second, state law is the most efficient way to create systematic structure and order. Finally, it is state law which is the most proper form of social engineering.[76]

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71 Woodman, Gordon R., *The Idea of Legal Pluralism*, Chapter 1in the Legal Pluralism in the Arab World, edited by Baudouin Dupret, Maurits Berger, Laila al Zwaini, Kluwer Law International, Dordrecht, 1999, p. 3-20., p. 3.

72 Michaels, Ralph, *The Re-State-ment of Non-State Law: The State, Choice of Law, and the Challenge from Global Legal Pluralism*, Duke Law School Working Paper Series, 2005, paper 21, p. 2.

73 Next to political and legal law making, Teubner, Gunther, *Global Law without a State*, edited by Teubner, Dartmouth Publishing Company, Hants, England, 1997, p. xiii, xiv, 3-22.

74 Michaels, Ralph, Jansen, Nils, *Private Law Beyond the State? Europeanization, Globalization, Privatization,* American Journal of Comparative Law, vol. 54 2006, p. 843-890, p. 890.

75 Teubner n. 73, p. xiii, xiv.

76 This is only one among many views on the rule of law doctrine, Anderson, 2005, p. 8-13; The highest norm from a traditionalist view then is a state's constitution, Teubner n. 73, p. xiii.; Michaels, 2005, p. 20.

In contrast, the theory of legal pluralism however describes how new "sources" of law production come to existence as a consequence of the formation of "specialized, organizational and functional networks".[77] According to the theory of legal pluralism:

> The new living law of the world is nourished not from stores of tradition but from the ongoing self-reproduction of highly technical, highly specialized, often formally organized and rather narrowly defined, global networks of an economic, cultural, academic or technological nature.[78]

These networks do not have the formal authority to create and apply legal rules, yet through "jurispersuasion", the persuasion of others of their right to jurisdiction, networks can apply their legal rules.[79] Therefore those have authority, whose authority is being perceived as relevant or binding in practice.[80]

Legal pluralism has been spurred on by the globalization processes of the last decades, which according to Gunther Teubner, has shown the rise and complexities of "[t]he difference between a highly globalized economy and a weakly globalized politics."[81] What globalization and the current high level of transnational relations mainly have shown is that it is becoming harder to uphold that legal norms derive solely from the state.[82] The theory in general shows a broadening scope of the rule of law in such a way that "[t]he rule of law encompasses all the morals, and values incorporated in norms created and adopted by people living in a society."[83] Such societies, or "societal subsystems", are not strictly limited to state boundaries or territorial demarcations in general but could be of a local, regional or transnational extent or even based on functional characteristics. By "decoupling the unity of law and state" the theory tries to show the possibility of alternative forms of law making.

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77 Teubner n. 73, p. 7.

78 Teubner n. 73, p. 7.

79 Berman, Paul, *Towards a Cosmopolitan Vision of Conflict of Laws: Redefining Governmental Interests in a Global Era,* University of Connecticut School of Law Articles and Working Papers, 2005, p 1-67 (3);. Lando, *The Rules of European Contract Law*, Working Paper, Legal Affairs Series, JURI 103 EN, Chapter III, 127-136, June 1999. *http://www.cisg.law.pace.edu/cisg/biblio/lando2.html,p. 136.*

80 Berman, p. 1178.

81 Teubner n. 73, p. xiv.

82 Robé n. 8, p. 49-55.

83 Zekos, Georgios, *The role of Courts and ADR in the Rule of Law,* The ICFAI Journal of Alternative Dispute Resolution, vol. 7 issue 3 2008, p. 11-36. *http://ssrn.com/abstract=1157114, p. 19.*

Through this decoupling, a shift is made from a law producing body solely based on territoriality to recognition of law producing bodies based on functionality as well.[84] Legal pluralism tries to divert from the classic presumption that law evolves around "rule, sanction and social control".[85]

Teubner's assumption is that several "autonomous", "heterarchical", "non-legalistic", "non-institutional" law making processes can appear at the same time in societal subsystems.[86] Teubner's theory of legal pluralism bases itself on two axioms. First, it argues that the definition of what law is, is not dependent on "legal theory", but on "legal practice". Second, it presumes equality in several forms of lawmaking, whether it is lawmaking through national political systems, through processes via courts or nation states or through social process, on a global or regional scale.[87]

The best example of a legal pluralistic system is the commercial network with the *lex mercatoria* as its self produced law. It is these "networks" that are taking care of law production and maintenance through their "self-reproductive" (autopoietic) abilities, by private actors and away from state authority and intervention, on the national and international level.[88]

Teubner defines legal pluralism as a "multiplicity of diverse communicative processes in a given social field that observe social action under the binary code of legal/illegal."[89]

The communicative processes can be described as the communicative events between the members of a societal subsystem to which a binary code is applied. "Legal acts", as these communicative events can be denominated, determine what law is, instead of "legal rules". These legal acts filter the social control from potentially non-legal content.[90]

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84 Bartelson, Jens, *The Concept of Sovereignty Revisited,* The European Journal of International Law, Vol. 17, issue 2, 2006, p 463-473, p. 466-474; Fischer- Lescano, Teubner, Gunther*, Regime-Collisions: The Vain Search for Legal Unity in the Fragmentation of Global Law*, 25 Michigan Journal of International Law 999, 2004.

85 Teubner n. 73, p. 12.

86 Teubner, Gunther, *The Two Faces of Legal Pluralism*, Cardozo Law Review, Vol. 13, 1992, p. 1443, p. 1448, 1451.

87 Teubner n. 73, p. 8.

88 Ramsay, I, *The Politics of Commercial Law*;. Wisconsin Law Review; 2001, p. 565-575, p. 565; Teubner n. 73, p. 5-9;, Teubner n. 86, p. 555.

89 Teubner, n. 73, p. 14.

90 Ibid., p. 13; A legal act is basically an act with a legal consequence: this for instance could be a court dealing or a contract.

The binary code, legal/illegal is "the discriminating factor" which determines the legal validity of social action by the communicative processes.[91] The binary code, legal/illegal stands for the observation of a second order; in this order law reviews the law. Secondary observation entails, with regard to this article, the following: "How does space community law observe itself in its environment of national and international legal orders and the social system which is the space community"?

Societal subsystems, such as a space community, are continuously producing social expectations, whether moral norms or social conventions. Yet, it is the binary code legal/illegal which decides if any legal validity should be given to such expectations.[92] To state it simply, the binary code legal/illegal is a repeating sorting tool, constantly questioning whether a notion of social control is legally right or wrong.[93] It is up to the system itself to determine what "legal" entails.[94] Melissaris formulates the concept of the binary code legal/illegal in such a way that:

> "This understanding of the legal is essentially positivistic to the extent that it focuses on demarcation of the law from its environment but, at the same time, it differs from ordinary positivism in that it leaves it up to legal discourse itself to delineate its boundaries in relation to its environment."[95]

Tamanaha considers this perspective on law as a non-essentialist one.[96] Or as Dupret puts it: "Law is what people consider as law, nothing more nothing less."[97] As a result, such an approach can solve conflicts between multiple jurisdictions applying to one area.

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91 Dupret, Baudoin, *Legal Pluralism, Plurality of Laws, and Legal Practices: Theories, Critiques, and Praxiological Re-Specification,* European Journal of Legal Studies: Vol. 1 Issue 1, 2007 *http://www.ejls.eu/index.php?id=1.,* p. 10/26.

92 Teubner n. 86, p. 1451.

93 Luhmann, Niklas, *Operational Closure and Structural Coupling: The Differentiation of the Legal System*, Cardozo Law Review, Vol. 13 1991-1992, p. 1419-1441, p. 1427-1435.

94 Teubner, Gunther, *Autopoietic Law: A New Approach to Law and Society*, edited by Gunther Teubner, Berlin, New York, de Gruyter, 1988, p. 4; Luhmann n. 93, p. 1421-1425.

95 Melissaris, Emmanuel, *The More the Merrier? A New Take on Legal Pluralism,* Social Legal Studies, Vol. 13 2004, p. 57-79, p. 62; a legal discourse is the equivalent of a societal subsystem in its recognition of similar elements within a given field, either processes or demographic or professional groups of people.

96 Tamanaha, Brian Z., *A Non-Essentialist Version of Legal Pluralism*, Journal of law and Society, vol. 27 Issue 2 2000, p. 296.

97 Dupret n. 91, p. 1.

Teubner's conception of legal pluralism has three important consequences. First, law is capable of creating its own social reality, due to its autonomy and self-reproduction. Second, as law is the result of communicative events, it is the private actors' communicating which indirectly produce law. Third, the operational closure of a societal subsystem leads to and requires a cognitive openness.[98] The latter consequence leads to the autonomy of a sub-systems' law identification and production capabilities, making the system independent of its environment. This environment could for instance be partially made up of a national legal system. Furthermore, such a system should also be capable of operating in the "absence of a […] political system and the absence of […] legal institutions.[99]

The theory of legal pluralism has shown how societal subsystems can independently identify legal phenomena. The next question is how such a system legally validates its laws? How can a social structure construct its own legal centre grasp, or validate the legality of its own actions?

Teubner takes the contract as an example. Is it possible to have contracts without law? Despite the fair amount of autonomy in the drafting of contracts, it always maintains a link with a national legal order. But is this truly necessary? Is a contract capable of validating its own legality? Presuming this is possible, what mechanism(s) would a contract have, to ascertain its own validity? There are, depending on the actual contents of a contract, three different mechanisms which cumulatively can determine self-validity, being "*hierarchy*," "*time*" and "*externalization*":[100] Briefly, *hierarchy* refers to the bipolarisation of rules applying to a contract, the first being rules focused on the obligations of the parties, and the second being rules with which the legal validation of these obligations can be recognized. *Time* refers to the subsequential timeframes over which a contractual performance stretches and as a result the repeated testing of the contract within a social structure. *Externalization* refers to the shifting of the validation process to an external entity.[101]

The theory of legal pluralism shows a way in which legal systems with "territorial" and "functional" roots can both be viable within the same area.[102] Legal pluralism then does not

98 Ibid., p. 9/26.
99 Teubner n. 73, p. 15.
100 Ibid., p. 15,16.
101 Teubner n. 73, p. 11-16.
102 Robe n. 8, p. 49; Berman, p. 1203.

deny the existence of state law, but explains the possibility that several legal systems are capable of existing side by side and these alternative legal systems are not dependent on state law. The use of the theory of legal pluralism can be effective in areas where the law of states have trouble penetrating and different forms of legal ordering have potentiality.[103] Even though the theory does not directly participate in the creation of substantive norms, the theory is capable of laying down an "infrastructure" upon which a legal system can be built. Such an infrastructure can provide advantages in the convergence of legal traditions, cultures and issues multiple private actors could bring into a community.[104] Which brings us to the culmination of this work, where the earlier described legal complications will be reflected upon through a legal-pluralistic lens.

5. Future Normative Development

5.1. Absence of Sovereignty

Legal pluralism can be used as a conceptualization to find alternative forms of law in areas where it is hard for sovereign states to fully employ their national laws, if states can employ their laws at all. Outer space is such an area. If alternative forms of lawmaking will arise in outer space, legal pluralism might prove helpful in identifying and fortifying such legal developments.[105] With its regard for jurisdiction based on functionality, which does not require a sovereign claim over a certain geographical area, the theory of legal pluralism might provide for an alternative form of jurisdiction. Legal pluralism recognizes that ties connecting people to a certain legal system can be different from merely the territorial (or national) ties which states employ. This recognition could lead to ties based on, for example, transnationality where a private actor becomes a member of a spatial trading network or an environmental body monitoring the human cultivation of celestial bodies. The production of laws then will not be dependent on a central body specifically concerned with legislation, but much more follow the eventually organized systems in outer space.[106]

Legal pluralism is capable of detaching the political aspect from law making, circumventing the absence of sovereignty and capable of providing the pragmatism and

[103] Berman, p. 1177.
[104] Ibid., p. 1166.
[105] Ibid, p. 1161.
[106] Teubner n. 73, p. 8.

functionality which should advance the regulation of private actors in outer space.[107] From such a perspective private actors should not be seen initially as representatives of states but as individually operating actors.

5.2. Inefficiency of Jurisdiction

From a more economic, pragmatic view on law, inherent to legal pluralistic theory, a form of jurisdiction has to be found which is most suitable for regulating private actors in outer space.[108] The consequence of such a perspective on jurisdiction leads to an acknowledgement wherein the source of the law is not so much important, as is the law's ability to do what it has been created for.[109]

Whether the law producing entity be a state structure creating 'official law' or a social periphery creating "soft law", does not matter from a legal pluralistic perspective, not even in a hierarchical sense or from a perspective of legal validity.[110] "Soft law" does not necessarily mean "weak law".[111] As the ISS has shown, if international projects emerge, it requires effort, time and determination to regulate jurisdiction.[112] Though consensus has been reached in the case of the ISS, it is debatable whether the eventual solution is the most suitable and feasible in jurisdictional matters. The IGA is a good example of international cooperation. Yet, in the sphere of private law it falls a bit short.[113]

In order to reach societal legal structure, voluntary assent to authority by the members of the structure is what is needed for a legal pluralistically legal system to work. It is this same authoritative power that is needed in outer space for civil society to produce their independent laws.[114] A wide share of values is of highest priority within a legal system based

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107 Schutz, Anton, *The Twilight of the Global Polis: On Losing Paradigms, Environing Systems and Observing World Society,* in Global Law Without a State, Gunther Teubner, 1997, Darthmouth Publishing, Hants, England, p. 257-294, p. 277.

108 Chow, Daniel C.K., *A Pragmatic Model of Law,*Washington Law Review, Vol. 67 1992, p. 755-825., p. 823-825.

109 Michaels, Ralf, Jansen, Nils, *Beyond The State: Rethinking Private Law,* The American Journal of Comparative Law, Vol. 56 2008, p. 527-539, p. 452.

110 Teubner n. 73, p. 10.

111 Ibid., p. 21.

112 Weidaw III, Kenneth M., *A General Convention on Space Law: Legal Issues Encountered in Establishing Lunar and Martian Bases,* IISL Proceedings 2004, p. 272-283..

113 Ibid., p. 274.

114 Robe n. 8, p. 61.

on voluntary assent, in addition to the preference of private choice over coercion when it comes to the applicable law.[115] The law should reflect the dominant influence of technology and be susceptible to adaptation as a consequence of a rapid pace of innovation. As Gorove has said "[l]egal developments are greatly influenced by scientific innovations and discoveries."[116] Therefore law created at the periphery, where law meets science and innovation, might be most suitable.

The main question in this section is how members of an outer space society should feel bound to a legal pluralistic legal system? There are two theories which can provide an answer to this question: First the contractual theory, where a citizen individually agrees to be bound by the regulations of a certain social subsystem when becoming part of it, as evidenced by the CCOC. Second, the institutionalist theory, which holds that private groupings feel the necessity to create intrinsic legal norms which determine their own conduct.[117] Both theories result in a form of enforcement of legal rules which is not based on coercion, but on voluntary submission and self preservation.

Three different elements of a legal system then have to be worked out, which together, if combined correctly, are capable of forming a legitimate private legal system under the legal pluralistic theory. These elements would be *law creation*, *adjudication* and *legislation*.[118]

5.3. Enforcement Problems

The theory of legal pluralism is not so much concerned with enforcement procedures, as it does not attach great value to the sanctioning aspect of law. To create valid law, legal pluralism tends to look at the intrinsic value of the law itself, meaning the validity of the rules per se that have authoritative power on its subjects. As Teubner says, "[t]he symbolic reality of legal validity is not defined by sanctions"[119] Perhaps legal pluralism is more concerned with substance than with procedure.[120]

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115 McDougal, Myres S., Lasswell, Harold D., *The Identification and Appraisal of Diverse Systems of Public Order,* The American Journal of International Law, Vol. 53 Issue 1, p. 1-29, p. 11.

116 Gorove, S., *On the Threshold of Space: Toward a Cosmic Law, Problems of the Upward Extent of Sovereignty,* IISL Proceedings 1959, p. 69-77, p. 71.

117 Robe n. 8, p. 63.

118 Teubner n. 73, p. 17.

119 Teubner n. 73, p. 13.

120 Sterns n. 1, p. 190.

Still, dispute resolution through an arbitration court leads to awards which have to be enforced. Yet, where states already cope with a diminishing of enforcement powers within the celestial realm, a worse scenario will probably apply to a legal pluralistic conception of a legal system in outer space. As an alternative to enforcement powers one can think of solutions in the area of reputation mechanisms.[121]

In light of the latter, as the closed private legal system is effectuated on the basis of voluntary assent and a more personal tie to the jurisdiction, it is likely that the enforcement of certain dispute outcomes might not be that necessary. We should keep in mind that the membership to a certain community can be conditional on consent with dispute resolution through a mandatory court. On the other hand, the mandatory aspect of this consent might diminish the benevolence of a private actor to cooperate.[122]

5.4. Variety of Laws Applying Aboard One Space Object

The ISS is a perfect example of a concentration of several national legal orders being applied to an area as big as a football field.[123] Imagine several of such objects located in outer space and perhaps private actors act on rotation between such objects. A private actor will then be confronted with a substantial amount of different jurisdictions.

A pluralistic framework recognizes that normative conflict is unavoidable and so, instead of trying to erase conflict, seeks to manage conflict through procedural mechanisms, institutions, and practices that might at least draw the participants to the conflict into a shared social space.[124] The legal pluralistic view on the source of law leads to the conclusion that law is whatever is used by a functional network to reproduce itself. This leads to a focus on the practical characteristics of law rather than the theoretical. What is used as law will then be law, irrelevant what its source is.[125] This can be seen very clearly in the case of the terrestrial *lex mercatoria* which uses a large variety of sources, national, international and self-regulatory, to construct its legal system.[126]

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121 Bernstein, Lisa, *Private Commercial Law in the Cotton Industry: Creating Cooperation Throuh Rules, Norms, and Institutions,* Michigan Law Review, Vol. 99 Issue 7, 2001. p. 1724-1790, p. 1787.

122 Mertens n. 10, p. 38.

123 *http://esamultimedia.esa.int/docs/issedukit/en/html/t01r1.html*

124 Berman, p. 1167, 1168.

125 Teubner n. 73, p. 7-12.

126 Ly, Filip de, *International Business Law and Lex Mercatoria*, T.M.C. Asser, Amsterdam, 1992. p. 271; Maniruzzaman, Abul F., *The Lex Mercatoria and International Contracts: A Challenge for International Commercial Arbitration?* American University international Law Review, Vol. 14 1999, p. 657-734.

The strength of a legal pluralistic system is that it can function as a supplement jurisdiction to areas not fully covered by an official legal system.[127] The system thus is very suitable for newly developed and innovative areas of law.

Weaknesses of a legal pluralistic system might lie in the continuous evolution of legal rules parallel to the evolution of the binary code, legal/illegal. This evolution could occur in such a way and at such pace that clarity will not be served. Furthermore, the theory of Legal Pluralism provides only a limited answer to the enforcement problems described above.

5.5. Substantive Laws Other than National Laws

A privately initiated space law could derive from actors in outer space, a space law which is perfectly capable of combining socio-economic or socio-environmental and socio-physiological uses of space. This leads to an optimal exploitation of the know-how and experience of these private space travellers.[128] If developments will start drifting in this direction, not only private interests will be served better, but in some instances even the interests of the space community as a whole, as the legal pluralistic systems can have an exemplary function. "A law should be applied to a particular set of facts only where a legitimate policy underlying the law would be furthered by such application."[129] This view underscores the rationale of legal pluralism. Laws will be created based on the experiences of space crew and space settlers.[130] Such law production should eventually lead to the creation of jurisprudence which uniqueness resembles the uniqueness of space itself.[131]

5.6. Multiple Interests

The relation between the interests of the subjects of a certain legal system and the interests of the authority holding legislative power is such that these interests may differ from time to time. The question is: "what is the objective and, more importantly in this paragraph, *who* decides what the objective is"?[132]

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127 Berman, p. 1192; Sterns n. 1, p. 190.

128 Lebeau, André, *Space: The Routes of the Future,* Space Policy, Vol. 24 2008, p. 42-47, p. 45.

129 Sterns n. 1, p. 191.

130 Weidaw n. 112, p. 279.

131 Sterns n. 1, p. 197.

132 Chow n. 108, p. 757.

As activities in outer space by states as well as private entities increase, as a consequence this development leads to an intense interplay between different actors in outer space. Once private actors have settled in outer space, whether in an orbital space object such as the ISS or in a multinational settlement or colony on a celestial body, the main question is whether, in case conflicts arise:

> [T]erritorially-based state community's norms should govern a dispute that, by definition, is not easily situated territorially and necessarily involves affiliations with multiple communities?[133]

This question touches upon the hierarchy of interests, between states, private actors and perhaps the spatial community and international law in general.

The larger part of the interest struggle comes down to the interrelationships of the different actors in outer space. The relationships concerning *stricto sensu* activities in or on a space object, or in a settlement are the following:[134]

(1) the settlement itself with the launching or founding entity, whether governmental or nongovernmental; How does the settlement cope with the jurisdiction of a distant entity?;

(2) the individual with the launching or founding entity; Does the individual still feel ties with the registrant or launching state? Is this entity capable of handling the interests of the individual in a suitable way?;

(3) the individual with the local settlement systems of organization and economics; How does the individual operate within the community or the network? Should the private actor still be bound by his nationality, which leads to strange effects if the settlement is of a multinational origin with inhabitants of multiple nationalities?;

(4) the individual with the individual, both the interaction of the individual settlers and the individual with his or her own being; Would they still be referring to the

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133 Berman, p. 1192.

134 All derived from Sterns, Patricia M., Tennen, Leslie I., *International Recognition of "The Art of Living in Space": the Emergence of Settlement Competence,* IISL Proceedings 1979, p. 221-231, p. 222.

> jurisdiction and laws of their domicile, or would a tailor made law for the community be more effective?[135]

The interplay of relations will lead to different answers in regard to the question as to the evolution of a national into a member of a space community and the extent in which a coloniser will grant the autonomously operating space community freedom of movement.[136] The circumventing of the cultural identity of the coloniser might become a hot issue; "a question of profound political, social and moral importance."[137] As Alexandre Dumas once remarked about the island Corse, the 86th department of the French Republic: "La Corse est un département français ; mais la Corse est encore bien loin d'être la France."[138]

6. Conclusion

Before the actual private participation in outer space will commence on a large scale, it is good to think about different regulatory forms in relation to the conduct of private actors, even if these forms sometimes prove to be a bit out of the box. The results of the analysis in this article might provide for some tools for reconsideration and contemplation about alternative ways of law creation in outer space. As Brownlie states, "[a]t any rate the existing rules need development to cope with the practical problems of peaceful but competing uses and matters of jurisdiction."[139]

Yet, what this article has tried to show is that an alternative view on law production might provide for different insights to certain legal complications which might arise in outer space. The answers derived from this concise analysis may not always be of substantial value, nor applicable in practice. Nevertheless, the answers show some modestly original ways of dealing with issues of jurisdiction and law production. ■

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135 *Ibid.,* p. 222.

136 Muchlinsky, *Global Bukowina Examined: Viewing the Multinational Enterprise as a Transnational Law-Making Community,* in Global Law without a State, edited by Gunther Teubner, Darthmouth Publishers, UK, p. 79-109, p. 102.

137 *Ibid,* p. 102.

138 Dumas, Alexandre, Les freres Corses, Paris, Hippolyte Souverain, 1845, "Corsica, it is true, is a French department, but Corsica is yet very far from being France."

139 Brownlie n. 3, p. 257.

Space and Lisbon. A New Type of Competence to Shape the Regulatory Framework for Commercial Space Activities

Matxalen Sánchez Aranzamendi

Abstract

The event with perhaps one of the major repercussions for space law of the last year has precisely occurred outside the boundaries of space law. That is the entry into force of the Lisbon Treaty and with it the recognition of the competence of the European Union to potentially regulate space activities. It is well known that space legislations do not only have the capacity to shape the space market while strengthening the international position of national commercial operators but also to shape the business culture of such operators. Perhaps a more neglected regulatory area is the one composed by the set of other regulations which are not specific to space but which are applicable and often indispensable to space activities such as data regulations, standards or insurance regulations. The reach of such regulations goes far beyond space activities as covered by national legislations (launch services and satellite operations), it actually stretches to space applications and services which have a high market component and affect the daily live of citizens. All in all, those

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regulations have the capacity to enhance the role of space in the economy and in our societies. This paper selects a set of most representative regulatory fields which apply to space activities, identifies for which stages of space activities they are relevant and determines their impact on the development of space activities, space based applications or space based services. The paper will finally draw recommendations on how to elaborate a balanced regulatory framework, which facilitates the development of space activities, applications and services while discussing how the new European competence can play a role towards such aim.

1. Introduction

The development of space activities has experienced a strong change of paradigm in the last decades extending the scope of space activities from launching and exploration to the wider area of space applications, satellite communications together with satellite navigation and Earth observation. Satellite applications have gained attention for their capacity to support public policies and, most importantly, for their potential to provide consumer services and generate innovation and economic growth.

The introduction of space technologies in consumer markets through downstream services and products has subjected space to non-space specialized legal regimes. Regulations on telecommunications or environment are directly applicable to the delivery of downstream services. Yet it is not for the space authorities to decide on those regulations while the specifics of the space sector may require certain adaptations and consideration.

This shift of paradigm towards the regulation of space activities under other policy areas has played an essential role in the development of space activities in the EU where space activities have been developed under competences such as transport or telecommunications. Galileo is taking shape in the context of transport policy while satellite communications have been regulated under the telecommunications competence supported by the principles of the Common Market and the competition rules.

A practical commercial approach towards developing space based services backed by regulatory powers in the field of transport or telecommunications has earned the EU an increasing role in space activities despite the absence of explicit competences in space activities. This increasing role under the new paradigm has led to the introduction by the Lisbon Treaty of an explicit EU space competence endowing the Union with the capacity to adopt measures in the context of a space policy and a space programme. However, this competence explicitly precludes the adoption of binding measures to harmonise space legislation.

Given the express prohibition of harmonisation of national laws, the effective development of this competence in the EU will still depend on the management of space affairs according to the changed paradigm which relies on the development of space based services and their relevance for other policy areas. This competence is an example and test case of the change of paradigm in space law.

2. Some Regulatory Areas Relevant for Space

Although it is difficult to talk about a radical shift of paradigm in space law, space lawyers have been looking into other regulations that are not specific to space for a long time. Regulations related to exports and technology transfers have for a long time attracted the attention of space lawyers as they directly determine access to space technologies. In this vein, other regulations such as those on radiofrequency allocation or data affect directly the delivery of space-based services. The common feature of all those regulations is that they are adopted in the context of other policies such as telecommunications or environmental policies.

The higher the focus of space authorities in the development of space based services, the higher the impact of such non-space specialized regulations in the space sector and the higher the need to take them into the realm of space law.

Those regulations that most attention has received until now are export control regulations, data regulations applicable to remote sensing data and radio-frequency regulations. A brief analysis of the issues arising out of those regulatory fields reflects the impact and importance of taking them into consideration for favouring the development of space activities.

2.1 Conflicting interests in the patchwork of regulation relevant to Remote Sensing data

The nature of regulations applicable to data is as wide as the number of uses of this type of data. Remote Sensing (RS) applications serve public policies such as environmental policies, meteorological services, crisis management and civil protection actions. Equally, remote sensing data is the source of imagery that can be utilised by private users in forestry exploitation, agriculture or cadastral uses. Remote sensing data is most often used in the form of satellite imagery and the production and delivery of this data is subject to different principles, laws and regulations depending on the stage of elaboration and destination.

The difference in destination of the imagery, support of public policies or private utilisation, already posses the first regulatory issue. While certain public uses such as

environmental surveillance or disaster management are governed by principles of open access to satellite imagery data, access to satellite imagery by users (whether public or private) is often subject to intellectual property protection as commercial satellite operators foresee reaping the benefits of the investment in operating (RS) satellites. In this sense, principles such as the UN Resolution on open access to RS data establishes the right of sensed countries to obtain access to data on open and non-discriminatory basis[1]. In addition to this space specific norm, rights of environmental nature may apply to RS data, the Aarhus Convention on Access to Information[2], Public Participation in Decision-making and Access to Justice in Environmental Matters (the Aarhus Convention) also establishes the obligation for public authorities to ensure adequate and transparent flow of information about activities that may significantly affect the environment. According to the Aarhus Convention such environmental information must be made available free of charge to the public by public authorities. Given the value of RS imagery for environmental purposes, commercial images made available against cost to public authorities may also need to be made available freely to the public.

The right to information and, most importantly, the concepts of free access to information and open access to information are usually not clearly defined, attenuated by commercial or Intellectual Property (IP) considerations or are even exempted by public security considerations. In fact, intellectual property rights are an important area of regulation applicable to satellite imagery as they allow generators of RS information to reap benefits for their investment. However, there is no space-specific Intellectual Property Right (IPR). On the contrary, general copyright laws and adjacent rights are applied to satellite data and imagery. In addition to the conflict between the undetermined concept of open access to space data and IPRs there is a second point of lack of definition related to IPRs. Also the final image be protected or also the raw data? It is argued that raw data cannot be protected for lack of any creative input. On the other hand, it is also argued that in the European Union (EU) the existing data directive could effectively apply to raw RS data. The adoption of the one or the other approach or even the application of the principles on open access determines the shape of the market as non onerous access to raw data could increase competition by image developers who are not satellite operators with satellite operators.

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1 A/RES/41/65 Principles relating to remote sensing of the Earth from space.

2 Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters Aarhus Convention, Aarhus, done on 25 June 1998 Art. 4 and 5; Doldirina, Catherine, "INSPIRE: A Real Step Forward in Building an Interoperable and Unified Spatial Information Structure for Europe?" ESPI Perspective 20, Vienna: European Space Policy Institute, 2009.

In parallel to regulations on environment, open access or IPR, considerations on privacy rights are also applicable to satellite imagery.

Another level of regulation relating to RS data is linked to the standardisation of RS data. This gains particular relevance in the environmental field where the integration of satellite-originated data with ground based data may provide for higher accuracy. The European INSPIRE directive is an example of the effort to generate standards, which can facilitate the integration of environmental data, collected by satellite technologies and ground-based technologies[3].

Due to this vague regulatory landscape pertaining to RS data, space agencies and commercial operators have been free to develop their own data policies, regulating delivery to customers and pricing policies[4]. Those data policies already work on the assumption that operators enjoy ownership rights, and therefore, certain Intellectual Property over the data they generate. This assumption is based on the right to reap the benefits of the investment for developing RS technologies and the launch and operation of such technologies in space.

The discussion is relevant for the development of Earth Observation imagery and meteorological services. Open access to RS data can facilitate the development of a wider range of services by imagery developers who are not satellite operators but who do rely on RS satellite operators to develop their services. Open access to such data would lower the costs of generation of this type of imagery while allowing new entrants to the market.[5]

2.2 Radio-frequency regulations v liberalisation of telecommunications

Radio-frequency regulations provide for the perhaps most traditional example of non-space specialised regulatory field which determines the operation of telecommunication satellites and delivery of satellite communication services.

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[3] Directive of the European Parliament and of the Council (EC) 2007/2 of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE). OJ L108, 25 April 2007.

[4] Von der Dunk, Frans. "European Satellite Earth Observation: Law, Regulations, Policies, Projects and Programmes", Creighton Law Review, April 2009, Vol. 42, No. 3.

[5] Catherine Doldirina. "Are Intellectual Property laws an impediment to the development of collaborative Earth observation missions?" IAC – 2009.

Satellite telecommunications strongly rely on secure radio transmission to the point that design and operation of satellites depends on the frequency band they will transmit their signal on. Satellites are designed to operate in a certain frequency band and once in orbit they must operate in such band for the entire lifetime of the satellite, which can reach up to twenty years.

On the other hand, radio spectrum is a limited natural resource shared by all telecommunications systems, terrestrial as well as space based. The efficient and equitable use of radio spectrum are ensured by the provisions of the Convention and Constitution of the International Telecommunications Union (ITU)[6] and are implemented through the Radio Regulations adopted through its Radio communication sector which plays a vital role in the global management of radio spectrum. Radio-regulations are revised every three to four years during the World Radio Communication Conferences (WRC). Frequency bands are allocated to the different types of telecommunication services also per geographical region.

International Radio Regulations are further implemented at national level through the corresponding national telecommunications legislations whereby telecommunications operators are allowed to operate services and radio-frequency spectrum is allocated. Licensing of frequency use may follow different models. For instance, mobile communication networks have mostly been subject to technical standards without any licence requirement. Meanwhile the more traditional TV broadcasts have been subject to licensing requirements. In some cases frequencies are limited to given uses that have been established on purely regulatory criteria *(command and control)*. In other cases a licensee owns an exclusive transferable right for a specific spectrum and geographic area with flexible use rights which are limited by technical rules to protect spectrum users against interference *(exclusive licence)*.[7]

Given the scarce nature of frequency spectrum, the telecommunications market has been a highly regulated market where satellite communications have been secured through strict licensing frameworks. However, telecommunications are rapidly evolving to offer higher data rates, mobility and availability any time, anywhere. Terrestrial mobile technologies have strongly entered the telecommunications markets with high demands

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6 *http://www.itu.int/en/pages/default.aspx*

7 Thomas W. Hazlett, "Market allocation of radio spectrum", ITU Workshop Geneva January 22-23, 2007.

of spectrum causing severe competition to satellite operators. While the very dynamic terrestrial mobile technologies require flexible access to radio spectrum, satellite technologies lack any flexibility and fear interferences from terrestrial mobile technologies.[8]

The response from regulators to higher demands of radio spectrum has been in the lines of liberalisation and deregulation as reflected by the European case in the area of telecommunications.

In 2007 the European Commission launched a reform of its telecommunications policy amending the existing regulations (the telecommunications package). The amendments[9] proposed where based on the principles of non-discrimination and fair competition and applied the principles of technology neutrality and service neutrality. According to those principles all types of radio network or wireless access would be allowed to access the radio spectrum open to electronic communication services.

The existing system based on individual authorisations was to be substituted by a system of general authorisations only to be waived by reasons of public interest. In addition, primary right holders would be allowed to transfer or lease their rights to secondary service providers. The proposal contained no reference to ITU Radio-regulations and national authorities and regulations were referred as the means to implement the directives. This highly liberalised scenario was widely contested by satellite operators who argued in favour of respecting ITU radio regulations and the authority of national telecommunications authorities on the grounds of potential interference and services of public interest. The package as amended[10] still contains the general authorisation scheme and keeps the wording

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8 Frédéric Pujol, "Regulatory and Policy Implications of Emerging Technologies to Spectrum Management.", ITU Workshop Geneva January 22-23, 2007.

9 Proposal for a Directive of the European Parliament and of the Council amending Directives 2002/21/EC on a common regulatory framework for electronic communications networks and services, 2002/19/EC on access to and interconnection of, electronic communications networks and associated facilities, and 2002/20/EC on the authorisation of electronic communications networks and services.

10 Directive of the European Parliament and of the Council (EC) 2009/140 of 25 November 2009 amending Directives 2002/21/EC on a common regulatory framework for electronic communications networks and services, 2002/19/EC on access to and interconnection of, electronic communications networks and associated facilities, and 2002/20/EC on the authorisation of electronic communications networks and services.

on non-discriminatory access but has incorporated heavily references to ITU radio-regulations and national regulations.[11]

2.3. Export Control regulations and their impact on space industry

Export control regulations are an essential piece of national regimes regulating the export and import of goods into national territory. Like import rules, export regimes have the aim of preserving national supply as well as national security interests.

In principle, export activities are by nature trading activities and are subject to trade rules and economic considerations. However, the strategic character of certain goods may involve security considerations that subject such goods to the competence of authorities in charge of national security. This is the case of armament and dual use items such as space technologies (goods and technologies meant for civilian use which may also be used for military applications). The export of dual use items requires additional supervision by security authorities as well as special export licences. Under the export control rules trade authorities must cooperate with other authorities or even refrain from acting. This division of competences has had special impact in space activities due to the dual nature of space goods.

Far from being specific to space, national export control regulations are the consequence of a compendium of overarching policies. International commitments, national security considerations and trade policy are combined in these rules.

To begin with, to a large extent space technologies are being subject to export control regimes due to the fact that they are incorporated in international agreements for the prevention of proliferation of weapons of mass destruction. National export control regimes mirror their international commitments in the context of non-proliferation of ballistic missiles. Several international instruments have been dedicated to the non- proliferation of this type of weapons and all of them incorporate space technologies. The Wassenaar Arrangement[12] as well as the MTCR[13] elaborate soft law and provide for a fora for exchange of good practices aimed at

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[11] Codecision procedure 2007/0247/COD *http://ec.europa.eu/prelex/detail_dossier_real.cfm?CL=en&DosId=196418*

[12] Category 9 "Aerospace and Propulsion", The Wassenaar Arrangement on Export Controls for Conventional Arms and dual-use goods and technologies dual-use goods and technologies and munition list.

[13] Missile Technology Control Regime (M.T.C.R.) Equipment, Software and Technology Annex.

avoiding the proliferation of dual-use technologies that are listed in their respective texts. All propulsion technologies, materials and even test equipment and technologies are listed. Although not binding upon national authorities, international confidence building measures are authoritative reference for national export control regulations.

In addition to the international commitments national strategic interests are crucial for shaping export control regimes. A clear example is given by the International Traffic in Arms Regulations (ITAR) in the U.S., which has been claimed to exert excessive burden on the U.S. space industry. The export control process in the US involves two sets of regulation: the International Traffic in Arms Regulations (ITAR) and the Export Administration Regulations (EAR) administered by the Directorate of Defence Trade Controls (DDTC) and the Bureau of Industry and Security (BIS) respectively. Both regulations aim at reducing the possibility of missile-related technology spreading to foreign entities that could use it to threaten U.S. interests. Both sets of regulations work on the basis of lists of items. While ITAR only lists items that could be used for military purposes, EAR lists dual use items. While application for a licence under EAR works on the basis of which is the destination country, ITAR requires the exporter to prove that their item does not pose any threat to national security.

Space items are dual use items and should fall under the scope of the EAR regulations. However, space goods and technologies have been subject to ITAR and need to be licensed by the DDTC. Not only goods covered by the international non-proliferation agreements are subject to the ITAR regulations but also satellite technologies and distribution services and intermediate services require specific licences under ITAR. Some exports may even require interservice consultation and even Congressional Notification.[14]

Such stringent exports control has been said to damage relations with international counterparts as the latter fear to be caught up in burdensome lengthy procedures or of being found to infringe the law and be involved in legal procedures. As a way to avoid getting entangled in administrative procedures, other international industries have opted for substituting U.S. technologies for developing their own technologies. In this sense they have not only avoided cooperation with the U.S. but have also developed competing technologies and gained market by marketing such technologies with the "ITAR-free" label. An additional consequence of such market losses is that space depends fully on public demand.

[14] Introduction to U.S. Export Controls for the Commercial Space Industry. U.S. Department of Commerce and U.S. Federal Aviation Administration. October 2008.

The case of the U.S. export control regulations has been one of the most discussed and commented cases of red-tape in space and provides for one of the most clear examples of non-space specialized regulations having an impact on space activities.

3. The Lisbon Competence A Limited Competence or a Visionary Pioneer?

The three regulatory areas that have been analysed above provide for examples of non-space specialised regulatory areas that are essential to space activities. Attention granted to them by space law experts and doctrine also show the shift in the legal paradigm that accompanies the increasing relevance of space applications and space based services in national space policies.

This focus on space applications and space-based services has driven the EU action in the field of space. Without any specific legal basis for space, the EU's role in space has grown on the legal basis of other sectors. The space capacity of the EU is aimed in essence at the development of space applications in support of its other policies and the creation of market activity. The three main fields of activity have been SatNav, EO and Satcoms. Each of them have been developed under different competences and shaped by the regulations of those competences.

On 1 December 2009 the European Union adopted the Lisbon Treaty (LT),[15] which reforms the constitutional law of the EU and introduces institutional and constitutional changes. Among those changes the LT introduces the "space competence" anew as a shared competence of the EU and the Member States. The adoption of space competence may be seen as the consequence of the increasing role of the EU in space matters and the consolidation of its scattered space relevant activities in one centralised competence.

The adoption of space competence is an important step from the point of view of the change of paradigm as the EU has never acted as space power and does not conduct launch or in-orbit operations by itself. The EU is not party to the Space Treaties and does not own legislation on space activities. However, it conducts space programmes such as Galileo and Global Monitoring for Environment and Security (GMES) with all their relevant legislation and has already regulated since the first adoption of the already defunct 1994 Satellite Direction satellite communications, through legislation on communications.

[15] Treaty of Lisbon amending the Treaty on European Union and the Treaty establishing the European Community, signed at Lisbon, 13 December 2007.

3.1. A short overview on the legal basis for space activities before the space competence

The adoption of Art 189 of the Treaty of the Functioning of the European Union (TFEU) is the explicit expression of the implicit powers exercised by the EU in support of other specific policies.

Satellite Navigation is a cornerstone of the Transport Policy, which underwent an overall review in 2001 with the adoption of the Transport White Paper. Intelligent Transport Systems were streamlined across all transport sectors relying heavily on electronic communications and satellite navigation. Galileo was developed on the legal basis of the Transeuropean Networks and hosted by the European Commission Service in charge of Transeuropean Networks (DG-TREN) and most precisely under its section of transport.[16]

Equally, satellite communications have not been developed as such but they have been subject to regulations on telecommunications. Starting with the 1994 Satellite Directive, the subsequent telecommunications packages have regulated liberalisation of telecommunications services.[17] Satellite communications have been embedded in such legislation.

The third area of action has been dedicated to Earth Observation and its flagship programme GMES. GMES has managed with soft law. Up to September 2010, GMES had been mainly set up through Commission Communications and accompanying reports. The first piece of hard law came in May and September 2010 in the form of a Commission Decision setting up the GMES Partners Board and a Regulation on GMES and its initial operations both already on the basis of the TFEU. However, the decision does not refer to any concrete article as legal basis while the regulation does state Art. 189 TFEU. Nonetheless, important legislation on GMES derived data has been adopted under the environment competence.

The fact that these activities have been developed in the context of other policy areas does not only show a lack of specific competence for space but also the narrow relation between space and other policy and regulatory initiatives. Space was basically born as part of such policies and the general objectives of the EU, not in a rather instrumental way.

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16 Regulation (EU) No 911/2010 of the European Parliament and of the Council of 22 September 2010 on the Global Monitoring for Environment and Security (GMES) and its initial operations (2011 to 2013).

17 Supra 11.

3.2. The European Space competence in the TFEU

The legal basis for the space competence is provided for in Art. 189 of TEFU on and is catalogued by Art. 7 TFEU as a shared competence without pre-emption (both the EU and Member States on their own can act in parallel). This is a first peculiarity of the EU space competence as commonly once the EU rules on a specific issue MS are not allowed to overrule the EU measure. The second peculiarity of the competence is that it precludes "any harmonisation of the laws and regulations of the Member States (MS)". Commonly, the EU is empowered to adopt binding measures approximating the laws of the MS in order to attain a level playing field between MS within the objectives of certain competence (or the general objectives of the EU). Once the EU adopts such binding measures, MS are not allowed to amend those measures. This is the general rule unless the contrary is expressly stated as in the case of Art. 189. TFEU. Both characteristics, no pre-emption and non-harmonisation, may be seen as two versions of the same question that MS maintain their competence to rule.[18]

It has been held that the combination of these two characteristics killed the space competence, as the EU would not be able to rule with binding rules on space legislation.[19] However, this might not be completely accurate. What is more, it even confirms a vanguardist approach to space affairs and space legislation, which is not based in the traditional conception of space, as space activities are accompanied by legislation on the licensing and safety of such activities.

The wording of Art. 189 TFEU contains elements to support this approach. The EU space competence is built on two major elements: the implementation of other policy areas by means of the Space Policy and the adoption of the Space Programme. To that aim the Union may use the following tools: soft law such as joint initiatives and coordination and it may also use binding rules ("in accordance with the ordinary legislative procedure"). In this respect Art. 189 (2) TFEU mentions the adoption of a space programme as the instrumental means to implement the space policy.

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[18] Lenaerts, Koen, Van Nuffel, Piet and Bray Robert (ed.). Constitutional Law of the European Union. Suffolk: Thomson, Sweet and Maxwell, 2005. 267-278.

[19] Marboe, Irmgard "National Space Legislation: The European Perspective." Nationales Weltraumrecht National space Law. Development in Europe-Challenges for Small Countries. Eds. Christian Brünner and Edith Walter. Vienna-Cologne-Graz: Böhlau, 2008. 31-46; Marchisio, Sergio. "Potential European Space Policy and its Impact on National Legislation." Stephan Hobe, Bernhard Schmidt-Tedd, Kai-Uwe Schrogl (eds.), Toward a Harmonised Approach for National Space Legilation in Europe. Köln: 2004 p 145, 150.

Support the implementation of other policies: The practical nature of the Space Competence is already clear in the first sentence of Art. 189 TFEU. The European space competence is not an aim by itself but the instrument to support other policies and the general aims of the Union to achieve a competitive economy. In this regard, regulations adopted for the implementation of the space policy are very likely to be intertwined with other policy and regulatory areas. For example, decisions taken regarding the technical standards for Galileo devices will have an impact on the characteristics of the European Rail Traffic Management Systems. In addition, it is highly unlikely that MS may use the non-harmonisation clause in this case as such regulations may be part of other national policies subject to EU harmonisation.

The space programme as the means to implement the Space Policy: On the other hand, the space programme would provide for the factual means to realise the main programmes constituting the flesh and bones of the space policy. Those are the two flagship programmes, Galileo and GMES, together with satellite communications and potentially SSA and exploration. The realisation of all this programmes is based on cooperation between MS and could possibly not be run by individual MS. Thus they can be labelled as intrinsically European. Assumably, the purpose of the European Space Programme would be to provide for the organisational means to implement the main flagship programmes. That is, the provision of financial as well as regulatory tools. These being the nature of these programmes intrinsically, there is little to think that regulations adopted for the implementation of Galileo, GMES or Satcoms (read also SSA and exploration if adopted) could be vetoed by MS.

The flagship programmes, Galileo and GMES already provide a hint of the regulatory load attached to their development. In this sense, some of the most obvious regulatory issues for Galileo include a liability regime, radio spectrum allocation, certification issues, standardisation and data policies. None of such issues are by themselves space specific. Yet the functionality of Galileo depends on an appropriate regulatory framework as much as on the operation of its satellites. Regarding GMES, despite its incipient status, GMES counts already with regulation on environmental data. GMES relies strongly on the creation of a reliable data network, issues of standardisation, interoperability, certification and intellectual property will need to be addressed in the context of the space programme. The space programme is most likely to provide for essential basis for the development of an infrastructure for space services and applications.

Support to the Internal Market: Although the objective of the completion of the Internal Market has ceased to be listed as the main aim of the Union, it is among the full fledged competences of the EU and it may be specially important in the area of space

services as well as space components. The Internal Market is based on the free provision of services and goods across borders within the EU. The creation of common licences for signal access would also fall within the competence of the EU. An important aspect here would concern the opening of the internal market for dual use items. The current regime in the EU counts with Regulation 428/2009[21] on the export of dual use items that allows for the free movement of such goods within the Union. However, national authorities may require authorization for the export of certain goods listed in the regulation even for intracommunity trade. Although there is a directive regulating the intracommunity trade of military goods[22] that could facilitate trade of those items between MS, problems have been reported in the launcher sector due to the requirements for authorisation to export space technologies.

3.3 The Space Competence as the basis for creating Space Legislation?

The European space competence is a good example of the change of paradigm. It not only shows that the relevance of space applications and space based services may be substantial enough as to base a constitutional competence but it also shows the importance of non-space specialised regulation.

What is therefore left outside of the reach of the Union in Space? The answer is space activities *stricto sensu* if we were to understand that the fact that five states out of a total of 27 Member States have adopted space legislation. The European space competence does not exclude space activities and, therefore, space legislation in strict sense. In fact, the European Space Policy at its current stage also mentions launch and in orbit operations. If need be for the achievement of the general goals of the Union or the implementation of other policies, any action on the side of the EU would need to be through non-binding measures.

4. Conclusions

What the foregoing analysis shows is that space ceased consisting only of manufacturing industries and launching activities. The meaning of commercial space activities expands now to large downstream markets that are affected by the stark competition from other

[21] Council Regulation (EC) No 428/2009 of 5 May 2009 setting up a Community regime for the control of exports, transfer, brokering and transit of dual-use items.

[22] Directive 2009/43/EC of the European Parliament and of the Council of 6 May 2009 simplifying terms and conditions of transfers of defence-related products within the Community.

terrestrial technologies. All kinds of regulations may be applicable to space activities and affect the competitiveness of the space sector.

Fostering a healthy development of space applications markets does not only ensure continuity of space activities and a new niche of commercial activity but also creation of wealth and economic growth. It is already a long time that space authorities have realised and elevated space applications and services to the higher ranks among space programmes. However, the commercial potential of those services has not been realised yet through regulation.

By creating a space competence the European legislator has realised the need to foster the creation of downstream space markets as a way to create economic growth. By excluding any legislative and regulatory harmonisation of space legislation but yet keeping with a space policy, the European legislator has made clear that there is a wider field of action of space in other policy areas. What is more, it shows that regulation of such areas can be monitored and guided from the space sector in order to ensure that the regulation of other space activities under other policies is not detrimental to the development of commercial space activities. ■

Forum-Selection Clauses in Suborbital Space Tourism Contracts and EU Law

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Suborbital space tourism flights open space to the wide public. Such flights will involve operators operating from different countries and carrying spaceflight participants (SFPs) of various nationalities. To minimize the cost and risk of litigation, operators will probably use forum-selection clauses in their contracts with SFPs. These clauses designate the courts of a particular state, mostly the state of the operator's main place of business, as competent to resolve any disputes arising from or in relation to the contract. This paper examines the European Union (EU) law on such clauses. The topics under examination include the scope, the validity requirements and the effects of jurisdictional clauses on operators and SFPs. The

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policies behind the relevant provisions, with special regard to the particularities of consumer protection are also considered. It is concluded that mandatory provisions of EU law on consumer protection could undermine the advantages that forum-selection clauses can have in determining the competent court. National courts will decide on the validity of forum-selection clauses. *De lege ferenda* it would be useful to introduce international uniform rules, which will also regulate jurisdictional issues, yet such a possibility appears remote at present. Therefore, national courts will have to strike an appropriate balance between the interests of SFPs and the interests of the nascent suborbital industry. The final word on the interpretation of EU rules on forum-selection clauses will come from the ECJ. In the meantime, the effect of such clauses on space tourism contracts cannot be accurately foreseen.

1. Forum-selection clauses and suborbital space tourism contracts

Forum-selection clauses or jurisdiction agreements are contractual provisions stipulating that claims arising from a contract or in relation thereto can be presented before a particular court.[1] They may provide that the courts of a particular place are the only competent courts to hear the case excluding all other courts that would have jurisdiction under the applicable law (agreements on exclusive jurisdiction) or that they are also competent to hear the case beside the other courts (agreements on concurrent jurisdiction). Forum-selection clauses are widely used in business practice. In many cases they are pre-formulated and have the form of an adhesion contract, which means that the other party to the contract can either accept them as they are or reject the whole contract.

Companies use forum-selection clauses for two major reasons: first, to limit the risk – and the associated cost – of litigating before multiple courts, which may also be in different states; second, to secure litigation in a legal environment favourable to their interests, e.g. where the material law applicable to the case will probably satisfy their legal positions in case of a contractual dispute. Therefore, and given that the suborbital space tourism industry is young and uses largely experimental technology, it is expected that operators of suborbital space tourism vehicles will use such clauses in their contracts with spaceflight participants (SFPs).

[1] E.g. “any action for a dispute in relation to the present contract can only be brought before the courts of Paris, France”.

The purpose of this paper is to examine legal aspects of forum-selection clauses according to the law of the European Union (EU). The paper attempts to answer the following questions: first, what is the scope of the relevant rules; second, what are the requirements for their validity; third, what is their exact effect on litigating disputes arising out of space tourism contracts; and fourth, what is the role of the special rules on consumer protection.

Provisions on forum-selection clauses under EU-law are generally permitted and can be found in the Regulation (EC) No 44/2001 (*Brussels I*).[2] They are referred to as contractual 'prorogation of jurisdiction'. *Brussels I* was laid down to modernize the 1968 Brussels Convention on jurisdiction and the enforcement of judgments in civil and commercial matters.[3] As many provisions of the Brussels Convention have been maintained, the case law and the commentaries developed under the Convention remain valid.

2. Scope of the provisions on forum-selection clauses of the Brussels regulation

1. Territorial and material scope

The relevant provisions of the Regulation apply only if jurisdiction is conferred to the courts of an EU Member State,[4] since the EU has no competence to regulate the competence of courts outside its boundaries.[5]

The Regulation does not apply to arbitration [Art. 1(2)(d)], which means that a forum-selection clause conferring jurisdiction to an arbitral tribunal will not be judged according to the Regulation.

2. Personal scope

As to the Regulation's personal scope, the criterion of internationality must be fulfilled. It is necessary that the parties have their domicile in different EU Member States or that one party is domiciled in an EU Member State and the other party in a third state.[6] If both parties

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3 Official Journal L 299, 31 Dec. 1972, p. 0032-0042.

4 ECJ Case C-387/98 *Coreck Maritime v. Handelsveem BV and Others*, [2000] ECR 9337, para 19.

5 Magnus/Mankowski, Brussels I Regulation (2007), Article 23, para. 36.

6 Jenard, P., *Report on the Convention on jurisdiction and the enforcement of judgments in civil and commercial matters*, OJ C 59/1, 5 March 1979, p. 37-38; Schlosser, Peter, *Report on the Convention on the Association of the Kingdom of Denmark, Ireland and the United Kingdom of Great Britain and Northern Ireland to the Convention on jurisdiction and the enforcement of judgments in civil and commercial matters and to the Protocol on its interpretation by the Court of Justice*, OJ C 59, 5 March 1979, pp. 71-151, para. 174; Magnus (*supra* note 5), paras 23-24, where he cites the various views regarding the exact requirements of internationality.

are domiciled outside the EU, the Regulation is generally inapplicable.[7] If a party was domiciled in the EU at the time of the conclusion of the contract, but was no longer domicile therein when the legal proceedings are instituted, or vice versa, then *Brussels I* should remain applicable, in order to respect the will of the parties to choose the forum of their litigation in accordance with the Regulation,[8] e.g. a SFP was resident of the UK at the time the contract was signed, but then moved to Australia. In no case is the nationality of the parties significant (Art. 2), which means that the Regulation would be applicable if a SFP, who is a Mexican national but resides in Spain, sued a US operator.

The domicile of physical persons is determined by the law of the forum [Art. 59 (1)]. But if a party is not domiciled in the member state whose courts are seized of the matter, then, in order to determine whether that party is domiciled in another member state, the court shall apply the law of that member state [Art. 59 (2)]. For example, if a French court needs to determine whether the defendant is domiciled in Germany, it will apply German law.

In order to enhance legal certainty, the Regulation has adopted an autonomous definition of the domicile of a legal entity. This is the place where the legal entity has its (a) its statutory seat, or (b) its central administration, or (c) its principal place of business [Art. 60 (1)]. For the UK and Ireland statutory seat means the registered office or, where there is no such office anywhere, the place of incorporation or, where there is no such place anywhere, the place under the law of which the formation took place [Art. 60 (2)].

3. Validity requirements

A forum-selection clause will be useless for an operator, if it is invalid. Therefore, the requirements for the validity of such clause need to be examined. These are the agreement of the parties to establish the competence of a particular court and the form of such agreement.

1. Agreement

Prorogation of jurisdiction must have been agreed upon by the parties [Art. 23(1), 1st sentence]. The forum-selection clause must have been in fact the subject of consensus between the parties, which has to be clearly and precisely demonstrated.[9] This means

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7 Schlosser (*supra* note 6), para. 176

8 The issue is disputed. See on the opposing views Magnus (*supra* note 5), paras 61-63, with further citations, who also supports the view adopted in this paper.

9 ECJ Case C-24/76, *Estasis Salotti v RÜWA* [1976] ECR 1831, para. 7, Case C-25/76 *Segoura v Bonakdarian* [1976] ECR 1851, para. 6; Case C-106/95 *MSG v Gravières Rhénanes* [1997] ECR 1-911, para. 15.

that the operator must prove that a forum-selection clause has been included in the contract and the SFP has accepted it. In practice, it would suffice that the SFP has signed at the end of the suborbital flight contract, which will include a forum-selection clause. It would also help, if the clause can be easily distinguished from the rest of the text, e.g. it is written with bold or underwritten characters, and the SFP has initialed the end of the relevant page.

A forum-selection clause need not be formulated in such a way that the competent court can be determined on its wording alone. It is sufficient that the clause states the objective factors on the basis of which the parties have agreed to submit their dispute to a particular court. However, these factors must be sufficiently precise to enable the court seized to ascertain whether it has jurisdiction.[10] For example, a forum-selection clause could provide that all disputes arising from the contract shall be brought before the courts of the place where the operator of the suborbital vehicle has its central administration.

The validity of the jurisdiction agreement is independent of the validity of the contract. A forum-selection clause serves a procedural purpose, which is distinct from the substantive provisions of the main contract. Furthermore, one of the Regulation's objectives is to provide legal certainty by unifying the rules on jurisdiction. This objective would be jeopardized if one party to the contract could simply claim that the whole contract is void on grounds derived from the applicable substantive law.[11] To illustrate, clause excluding the operator's liability for any injuries sustained by the SFP might be invalid, but its invalidity could not affect the agreement that only certain courts are competent to hear the case.

2. Form

The agreement must be in writing, or evidenced in writing, or in a form that accords with commercial practices that the parties have established between themselves [Art. 23(1), 2nd sentence]. An agreement in writing has the meaning that the will of each party to establish jurisdiction of a particular court must be incorporated in a paper, whose author must be recognisable.[12] An agreement evidenced in writing is an agreement concluded orally and confirmed in writing.[13] The form that accords with commercial practices of the parties

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10 ECJ C-387/98 (*supra* note 4), para. 15.

11 ECJ C-269/95 *Francesco Benincasa v Dentalkit Srl.* [1997] ECR I-03767, paras 25-29.

12 See the decision of the German Supreme Court (BGH) of 22.02.2001, NJW 2001, p. 1730.

13 This becomes obvious from the text of the Regulation in other languanges, e.g. '*verbalement avec confirmation écrite*' in French, and '*mündlich mit schriftlicher Bestätigung'* in German – see Magnus (*supra* note 5), para. 102.

depends on the circumstances of the particular case; yet such form will have no practical importance in commercial suborbital tourism contracts with SFPs, in which there is no continuous commercial relationship between the operator of the vehicle and the SFP.

Moreover, to take into account the needs of modern electronic transaction the Regulation stipulates that any communication by electronic means providing a durable record of the agreement is equivalent to "writing" [Art. 23(2)]. This would be the case of electronic files saved in hard disc drives or portable storage systems (USB sticks, DVDs etc.) or even in online servers (cloud). Also an exchange of e-mails between the parties, in which they agree on the competent court amounts to "writing".

If the forum-selection clause is included in the general terms and conditions of one party, the requirement of a 'writing' is fulfilled under two conditions. First, there must be an express reference to those general conditions in the contract signed by both parties.[14] Second, the general terms must have been communicated to the other party prior to the conclusion of the contract.[15] These conditions serve to ensure that the other party has indeed consented to the clause waiving the normal rules of jurisdiction. In general, the validity of a pre-formulated forum-selection clause is assessed only according to the Regulation; any other considerations not referred therein, such as the link between the chosen court and the dispute in question, the intention of the party that inserted the clause or the substantive liability rules applicable in the chosen court, are not to be considered.[16]

The form requirements must be met when the legal proceedings are initiated. Only at that time does a jurisdiction agreement produce legal effects.[17] This is underlined by Art. 66 of the Regulation, which stipulates that the Regulation shall apply only to legal proceedings instituted and to documents formally drawn up or registered as authentic instruments after its entry into force.[18] Hence, an agreement on the competent court can be also concluded after the signing of the contract on the suborbital flight, even after the accident that caused the SFP's injury has occurred, as long as the SFP has not sued yet.

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14 ECJ C-24/76, (*supra* note 9), paras 9-10.

15 ECJ C-24/76, (*supra* note 9), para. 12.

16 ECJ C-159/97 *Transporti Castelletti Spedizioni Internazionali SpA v Hugo Trumpy SpA*, [1999] ECR I-01597, paras 48-52.

17 ECJ C-25/79, *Sanicentral GmbH v René Collin*, [1979] ECR 03423, para. 6.

18 Magnus (*supra* note 5), para. 60.

4. Effects

A valid forum-selection clause confers exclusive jurisdiction to the designated court, which cannot decline its jurisdiction; however, it exercises no influence on issues of provisional measures.

1. Exclusive jurisdiction

The effects of a forum-selection clause depend on the place where the parties to the contract are domiciled. If at least one of the parties is domiciled in an EU Member State, then the designated court has exclusive jurisdiction, unless the parties have otherwise agreed [Art. 23(1), 1st sentence]. For example, if a forum-selection clause in a contract between Virgin Galactic and a SFP designates the courts of London as competent mentioning nothing else, then only these courts are competent to resolve disputes arising out of the contract.

If none of the parties is domiciled in an EU Member State, the Regulation's provisions are generally inapplicable and the courts of the member states decide on the validity of the forum-selection clause and their jurisdiction according to their national law.[19] Nevertheless, to ensure respect of the forum-selection clause throughout the EU,[20] the Regulation prohibits courts of other member states from accepting jurisdiction over the case, unless the court chosen has declined jurisdiction [Art. 23(3)]. This provision regards cases in which courts of other EU Member States would normally have jurisdiction. For example, suppose that Blue Origin, which has its headquarters in Washington and has no branches or other commercial establishments in the EU, offers flights from Kiruna, Sweden. In its contracts, English courts are designated as competent to hear any claims arising from the contract. If a SFP who is resident in Japan brings an action before Swedish courts, then these may not accept jurisdiction, unless English courts have declined jurisdiction according to English law.

2. Mandatory acceptance of jurisdiction

The designated court must accept jurisdiction, even if it would otherwise lack jurisdiction.[21] Furthermore, the court chosen may not decline jurisdiction on the basis of *forum non conveniens*, which is inapplicable under the Regulation.[22] Nonetheless, if the

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19 Magnus (*supra* note 5), paras 53-54.

20 Schlosser (*supra* note 6), para. 177.

21 Magnus (*supra* note 5), para. 45.

22 ECJ Case C-281/02 *Andrew Owusu v N.B. Jackson, trading as 'Villa Holidays Bal-Inn Villas' and Others* [2005] ECR I-1383, paras 37-46.

court of another member state has been seized first, the designated court must stay proceedings (Art. 27), until the former decides on its jurisdiction according to the Regulation.[23]

3. Provisional Measures

Pursuant to Art. 31 of the Regulation, an application for provisional measures may be brought before the courts of any member state, even when those courts lack jurisdiction under the Regulation as to the substance of the matter. Consequently, a valid forum-selection clause does not influence the competence of other courts falling in the territorial scope of the Regulation to order, suspend, revoke or modify provisional measures according to their national law. This does not prevent the court seized for provisional measures to deny jurisdiction based on its national law. For example, the German Code of Civil Procedure foresees that German courts are competent to hear cases brought against alien defendants, if they have assets in Germany.[24] The Regulation foresees no such rule. Nevertheless, a SFP resident in France suing a US operator in France, which has a bank account in a German bank, could apply before German courts for the temporary freezing of the operator's bank account.

5. Special rules on forum-selection clauses in consumer contracts

The Regulation foresees special rules on forum-selection clauses in consumer contracts. As these rules are designed to provide additional protection to "consumers", which are deemed the weaker contractual party, they set more stringent standards for the acceptance of a forum-selection clause as valid. Consequently, their application could have significant repercussions on the operator's litigation risk.

1. Scope of the special rules

The special rules apply to 'consumer contracts'; yet, not all consumer contracts are subject to the special rules.

a. Notion of "consumer contract"

Consumer contracts are concluded between two persons, only one of whom is acting outside his/her trade or profession [Art. 15(1)]. Thus, a contract between a suborbital

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22 ECJ Case C-281/02 *Andrew Owusu v N.B. Jackson, trading as 'Villa Holidays Bal-Inn Villas' and Others* [2005] ECR I-1383, paras 37-46.

23 ECJ Case C-116/02 *Erich Gasser GmbH v MISAT Srl*, [2003] ECR I-14693, paras 47-49.

24 § 23 of the German Civil Procedure Code.

operator, which is a commercial company, and a SFP who flies for recreational purposes is a consumer contract. However, a scientist who takes a suborbital flight to conduct experiments for the company or organization he/she works for is not a "consumer" under the Regulation.

The consumer's contractual partner must pursue commercial or professional activities in the member state of the consumer's domicile or direct by any means such activities to that member state, and the contract must fall within the scope of such activities [Art. 15(1)(c)]. Where a consumer enters into a contract with a party not domiciled in a member state but has a branch, agency or other establishment in one of the member states, the latter is deemed to be domiciled in that state regarding disputes arising out of the operations of the branch, agency or establishment [Art. 15(2)]. For example, XCOR is not resident in any EU Member State, because it has its statutory seat and principal place of business in California. However, if a SFP has concluded a space tourism contract with XCOR through an agent in the Netherlands, then XCOR would be deemed to reside in the Netherlands – which could establish jurisdiction of the Dutch courts to hear a claim brought against it.

In sum, the special rules on consumer contracts may apply if the operator is commercially active in the state where the SFP has its domicile.

b. Exceptions

The Regulation provides that the special rules on consumer contracts do not apply to contracts of transport, with the exception of contracts that, for an inclusive price, provide for a combination of travel and accommodation [Art. 15(3)].[25] Thus, a travel seller or a tour operator who offers a holiday package, which includes e.g. transport to the spaceport, a three-day training course and hotel accommodations, falls in the ambit of the special rules.

To protect their clients from the application of the special rules, legal councils of operators of suborbital vehicles would argue that contracts for suborbital flights as such are contracts of transport. Therefore, the forum-selection clauses included by operators in the respective contracts are not covered by the Regulation's special provisions on consumers.

[25] See Council Directive 90/314/EC of 13 June 1990 on package travel, package holidays and package tours, Official Journal L 158, 23 June 1990.

Nevertheless, lawyers representing SFPs could respond that the reason for the exception of transport contracts is that jurisdiction over disputes arising therefrom is determined by international conventions[26], and the Regulation does not affect any conventions to which the member states are parties and which determine jurisdiction in relation to particular matters (Art. 71).[27] Hence, transport contracts have been excepted from the Regulation's scope because they are governed by international conventions, which contain special provisions on jurisdiction and supersede the Regulation. Therefore, the Regulation aims only at the exclusion of transport contracts that are governed by international conventions. Suborbital flights are not covered by international conventions at present. First, under current plans, they will not be international, as they will begin and end in the same atate. Second, it is doubtful whether the international conventions on air transport cover suborbital flights, because it is highly uncertain if suborbital vehicles can be considered 'aircraft'.[28] For these reasons, the Regulation's wording is broader than its purpose. Therefore, one could apply a teleological reduction of the Regulation's wording, so that the scope of the Regulation encompasses transport contracts not regulated by an international convention. As a result, jurisdiction over disputes arising from suborbital flights not covered by international conventions could be determined by the Regulation and the special rules on consumer contracts would be applicable.

The counter-argument of operators to such teleological interpretation would be that the special rules on consumer contracts are meant to apply to everyday contracts, which are concluded on a massive scale and in which consumers with a weak bargaining power often contract with powerful well-established companies. However, the suborbital industry is currently in an infant, very fragile state. Suborbital flights are not conducted on a massive, everyday basis, like e.g. air travel. Furthermore, the high cost of such contracts entails that SFPs will be able to afford experienced legal support before entering into an agreement to fly. Hence, the reasons underlying the establishment of consumer-protection rules are not

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[26] Schlosser (*supra* note 6), para. 160. Examples of such conventions are the *International Convention for the unification of certain rules relating to international carriage by air*, signed at Warsaw on 12 October 1929; the *Convention concerning International Carriage by Rail*, signed at Berne on 9 May 1980; the *Convention relating to the Carriage of Passengers and their Luggage by Sea*, signed at Athens on 13 December 1974.

[27] See also Schlosser (*supra* note 6), paras 239-240, who clarifies that provisions on jurisdiction contained in special conventions are to be regarded as if they were provisions of the 1968 Convention itself; if a special convention contains no provisions directly governing jurisdiction, the jurisdiction provisions of the Brussels Convention apply.

[28] See on this question Hobe, Stephan, *Legal aspects of space tourism*, Neb.L.Rev. 2007, p. 439 (442-444).

present in the case of manned commercial suborbital flights and the special rules of the Regulation on consumer contracts are inapplicable.

Therefore, it is possible that a court will decide in favour of the applicability of the special rules on consumer contracts.

2. Requirements for the validity of forum-selection clauses in consumer contracts

If the special rules on consumer contracts are found applicable, then the Regulation sets three alternative criteria for the validity of forum-selection clauses, in addition to the general requirements laid down in Art. 23. Moreover, the Court of Justice of the European Union (ECJ) has ruled that an additional condition must be fulfilled in any case.

a. Rise of the dispute or concurrent jurisdiction or jurisdiction of the common residence

A deviation from the special rules on consumer contracts by an agreement between the parties is allowed only after the dispute has arisen [Art. 17 (1)], which means that the initial contract between operators and SFPs cannot contain any stipulations on the competent courts. In practice, this entails that operators will have to negotiate with SFPs on the possible place of litigation, which in turn could be part of a wider bargain on the issues of the dispute to be litigated.

For future disputes, a forum-selection clause is permitted if it allows the consumer to initiate proceedings before courts other than those indicated in the Regulation [Art. 17 (3)]. Combining the wording of this provision ("allow" as opposed to "oblige") with the Regulation's purpose to protect consumers[29], the meaning of the provision is that such agreements are permitted if they allow consumers to bring proceedings before courts in addition to those indicated by the Regulation. A different interpretation would deprive consumers of the Regulation's protection.

In the alternative, agreements on jurisdiction before the conflict arises are permitted, if both the consumer and the other party to the contract are domiciled or habitually resident in the same Member State at the time of the conclusion of the contract, and the agreement confers jurisdiction to the courts of that Member State, provided that such agreement is not contrary to its law [Art. 17(3)]. In such cases, the Regulation is applicable despite the lack of internationality.

[29] Indent 13 of the Regulation's preamble.

To understand better the Regulation's provisions on choice-of-jurisdiction agreements for future disputes, suppose that Virgin Galactic contracts with a UK resident to fly from Kiruna, Sweden. The parties can agree that future contractual disputes can be resolved, apart from the courts of Sweden and UK, also by French courts. They can also agree that UK courts will be competent in all cases, because both parties are domiciled in the UK. Yet, they cannot agree that future disputes will be resolved exclusively by French courts.

b. Clause not abusive

Furthermore, the ECJ has ruled[30] that a forum-selection clause in an adhesion contract is subject to abuse control according to the Directive 93/13[31]. This means that a forum-selection clause will produce no effects, if it is judged abusive.

Pursuant to the above Directive, the court must refer to all the circumstances attending the conclusion of the contract and to all the other terms of the contract, and assess whether there is a significant imbalance in the parties' contractual rights and obligations to the detriment of the consumer, contrary to the requirement of good faith.[32] The Directive provides that a forum-selection clause that has not been individually negotiated may be abusive, as long as it excludes or hinders the consumer's right to take legal action.[33] Hereto belongs also a clause that confers exclusive jurisdiction to the courts of the place where the consumer's contractual partner has its principal place of business.[34] Such clause is abusive if it obliges the consumer to appear only before the court of the place of the other party's principal place of business, because such appearance may be associated with high costs while the amount of the dispute could be relatively small.[35] Furthermore, the ECJ has clarified that the court has to determine of its own motion whether such clause is unfair.[36]

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30 See ECJ Joined cases C-240/98 to C-244/98 *Océano Grupo Editorial SA v Roció Murciano Quintero* (C-240/98) *Salvat Editores SA v José M. Sánchez Alcón Prades* (C-241/98), *José Luis Copano Badillo* (C-242/98), *Mohammed Berroane* (C-243/98) and *Emilio Viñas Feliú* (C-244/98), [2000] ECR p. I-04941.

31 Council Directive 93/13/EEC of 5 April 1993 on unfair terms in consumer contracts, OJ L095, 21 April 993, p. 0029 – 0034.

32 See Arts 3(1) and 4 of the Directive.

33 Annex I, para. 1(q) of the Directive.

34 ECJ, Joined cases C-240/98 to C-244/98 (*supra* note 30), para. 22.

35 ECJ *ibid*, para. 24.

36 ECJ, *ibid*, para. 29.

It should also be noted that Directive 93/13 lays down minimum standards for the protection of consumers[37] and member states may introduce more strict rules. In fact, many member states consider as always abusive pre-formulated jurisdiction clauses that confer exclusive jurisdiction to the courts of the place where the consumer's contractual partner has its principal place of business.[38]

Thus, under application of the special rules on consumer protection there are increased possibilities that forum-selection clauses will be judged as abusive.

c. Consequences of an invalid forum-selection clause

If the court finds that a forum-selection clause is invalid, then the validity of the rest of the contract remains unaffected[39] and the Regulation's provisions on jurisdiction for consumer contracts apply. The Regulation stipulates that the courts of the place where the consumers are domiciled have concurrent jurisdiction to hear claims of the consumers against their contractual partners [Art. 16(1)], whereas they have exclusive jurisdiction to hear claims brought against the consumers [Art. 16(2)]. Consequently, SFPs could sue an operator of a suborbital vehicle also at the place of their domicile.

6. Conclusion

In conclusion, forum-selection clauses are going to play an important role in space tourism contracts. They will apply to litigation related with contracts of suborbital flights, if the defendant is resident in an EU Member State. Such clauses must have been agreed to by the parties and must be at least evidenced in writing. Their effect is that they confer exclusive jurisdiction to the designated court, which cannot decline its jurisdiction on the case, yet it does not affect national jurisdictional rules on provisional measures. Thus, under the general jurisdictional rules of EU law, such clauses may help operators of suborbital vehicles reduce the risk and cost of litigation by conferring exclusive jurisdiction to the designated court.

Application of the special rules on consumer contracts confers SFPs a series of advantages, because the validity requirements of forum-selection clauses is more strict and SFPs can have them easier declared null and void. Nonetheless, it is doubtful whether the

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37 See Art. 8 of the Directive.

38 See Schulte-Nölke, Hans (ed.), *EC Consumer Law Compendium – Comparative Analysis*, Bielefeld 2007, p. 386.

39 Art. 6(1) of Directive 93/13.

special rules apply to contracts on suborbital flights, if these are not part of an organized package travel. In case of an accident, lawyers will try to convince the court on the applicability or not of the special rules, depending on the respective interests of their clients. Should the court find the special rules on consumer contracts applicable, the effect of jurisdiction agreements for operators will be limited and SFPs will take advantage of the consumer-friendly EU rules.

In any case, national courts will determine the exact repercussion of jurisdiction agreements on suborbital flights, according to the circumstances of the particular case.

De lege ferenda it would be useful to introduce uniform international rules on manned commercial suborbital flights, which would include rules on the competent courts to strike a balance between the interests of SFPs and the interests of the nascent suborbital industry. However, the possibility of enacting such rules seems remote at present, given also that for the time being suborbital flights will not be international. It should be also noted that EU law supersedes national law,[40] which means that, even if special rules on suborbital flights were enacted at national level, they would not be able to set aside current EU rules. Therefore, the task of striking a balance of interests between SFPs and industry falls on national courts. However, the final word on the application of consumer-protection rules to suborbital flights will be left to the ECJ, which interprets authoritatively EU law.[41] In the meantime, under application of EU law, operators of suborbital vehicles should not be too confident about the effect of their forum-selection clauses on eventual litigation with SFPs. ■

[40] ECJ Case 6-64, *Flaminio Costa v E.N.E.L.*, [1964] ECR English special edition, p. 00585.

[41] Art. 267 of the Treaty on the Functioning of the EU.

Rethinking Responsibility in the Law of Outer Space

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Abstract

International Law, as many other branches of social sciences, is essentially dynamic. Just as the realities it intends to govern, it is constantly changing. New areas are appearing and, in general – with very few exceptions such as the law of outer space- law is following, rather than preceding, technological developments.

This paper discusses the need of rethinking international responsibility and liability in the field of space law on the basis of the project on "Responsibility of International Organisations" presently being developed in the framework of the United Nations International Law Commission (ILC).

Having in mind that the above-mentioned rules of the ILC are not quite as advanced as those embodied in the 1972 Convention on International Liability for Damage caused by Space Objects, it may be wise to analyse whether the incorporation of these rules and their future application should be reviewed.

In brief, is it necessary to update the rules on responsibility and liability in the field of Space Law?

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International Law, as many other branches of social sciences, is essentially dynamic. Just as the realities it intends to govern, it is changing constantly. To a large extent, foreseeing social problems and finding solutions or, at least, realistic proposals, is today a great concern to lawyers and politicians. In this sense, Space law is an exception as it frequently preempts technological developments and therefore provides legal answers to potentially future problems[2]. It should be noted that, by the time man landed on the moon, the international community had already developed a number of general principles currently embodied in the basic structure of Space Law. Therefore, it would be possible nowadays for that situation to become a stumbling block likely to affect the dialogue between Space Law and traditional international law.

This paper intends to confirm the above hypothesis when discussing the international responsibility of international organisations and the legal standing of its member states. The United Nations International Law Commission (hereinafter the ILC) is, in fact, currently working on a project concerning the Responsibility of International Organisations and internationally wrongful acts. And so is the International Law Association (ILA) within a Study Group on the matter which reported recently to the 74th Conference of the institution (The Hague 2010). These ILC Draft Articles lay down a regime for the responsibility of international organisations which overlaps, in some ways, with the laws applicable to international responsibility for space activities. For these reasons, and with a view to reaching some degree of harmonisation between both regimes, the first step should be to verify whether this possibility is realistic enough. That is to say, if these two systems are subject to comparison or assimilation.

This appears opportune since the ILC Articles, as well as those on state responsibility adopted by UNGA Resolution 56/83, deal with responsibility for wrongful acts whereas, in the field of space activities, the issue refers to acts prohibited by international law. In fact, as the object of this analysis is the relationship between international organisations (hereinafter "IOs") and their member states, the constituent act originating responsibility (wrongful in itself or derived from a wrongful act) does not seem to be a factor precluding comparisons. Consequently, the overlapping of the two regimes should be looked into, namely the ILC Articles and the Liability Convention together with the 1967 Space Treaty. Do they differ sharply from one other? Does the Liability Convention and/or the Space

[2] Scholars tend to agree on this point. See B. Cheng "Studies in International Space Law". Clarendon Press, Oxford, 1997.

Treaty need to be adapted to the ILC Draft? Which of them should prevail? Should it not be worthwhile to revisit the space rules on responsibility? To this end, the regime of IOs shall be addressed first in the framework of the ILC Draft. Then, a discussion will follow on the current legislation in the field of the space activities and, finally, some conclusions will be drawn on these issues.

1. The ILC Articles on International Responsibility of IO

During its 52nd Session, the ILC included on its agenda the drafting of a set of articles on the Responsibility of International Organisations" as a long-term working issue. The General Assembly, by means of Resolution 56/82 of 12 December 2001, requested the Commission to start working on the subject. During its 54th Session the Commission included the topic on its programme and appointed Giorgio Gaja as Special Rapporteur. The Special Rapporteur devoted the last part of his fourth report to the 58th Session of the ILC (2006) to analysing the subject in question, namely the responsibility of states members of an IO. In the Gaja Report, special attention was given to Article 29 which provides the following:

"*Responsibility of a State member of an international organization for the internationally wrongful act of that organization.*

1. Without prejudice to articles 25 to 28, a State member of an international organization is responsible for an internationally wrongful act of that organization if:

(a) It has accepted responsibility for that act; or

(b) It has led the injured party to rely on its responsibility.

2. The international responsibility of a State which is entailed in accordance with paragraph 1 is presumed to be subsidiary".[3]

In accordance with this Article the general principle would not cover the international responsibility of the member states, except for cases where the State had previously accepted the responsibility for an internationally wrongful act or when this had led the injured party to rely on the existence of a responsibility of the kind. Even in this assumption the responsibility of member states would be subsidiary in nature.

[3] Gaja, Giorgio. Fourth Report on the Responsibility of International Organizations. ILC, 58th session. Doc. A/CN.4/564/Add.2. 20/04/06.

The ILC also took into account two relevant legal precedents, the *Westland Helicopters*[4] and the *Tin Council Association* cases.[5] The former had its origins in a request for arbitration made by Westland Helicopters Ltd, against the Arab Organization for Industrialization (AOI) and the four States members of that organization were Saudi Arabia, Egypt, Qatar and the United Arab Emirates. The competence of the arbitral tribunal, according to the International Chamber of Commerce (ICC), was grounded on a contract between Westland Helicopters and the Arab Organization for Industrialization. The arbitral tribunal examined, in an interim award, the issue of its own competence and the degree of liability of the four States concerning acts of that organisation. In this interim award, the arbitral tribunal stressed the following points*:* "*…A widespread theory, deriving moreover from Roman law… excludes cumulative liability of a legal person and of the individuals which constitute it, these latter being party to none of the legal relations of the legal person. This notion, which could be deemed "strict", cannot however be applied in the present case*".[6] However, given the particular features of the organisation, and due to the absolute interdependence of the state members' decisions, the tribunal concluded that:

In default by the four States of formal exclusion of their liability, third parties which have contracted with the AOI could legitimately count on their liability. This rule flows from general principles of law and from good faith.[7]

One could equally compare the AOI to a cooperative which, in the absence of contrary provisions in existing legislation or within the articles, would leave subsisting the liability of the members.[8]

Even though the tribunal declared itself competent to hear in the case against the Organization and the member States, the tribunal award was later to be set aside by the Court of Justice of Geneva at the request of Egypt.[9]

The second case causing an in-depth discussion of the responsibility of States members of an organisation followed the failure of the International Tin Council (ITC) to perform its obligations under several contracts.

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4 Interim award regarding jurisdiction in the arbitration between *Westland Helicopters LTD and The Arab Organization for industrialization, United Arab Emirates, Saudi Arabia, Qatar, Egypt, Arab British Helicopter Company*. ICC. Case 3879, 5th March, 1984.

5 *JH Rayner (Mincing Lane) LTD v. Department of Trade and Industry and others.*

6 op cit 2. page 23.

7 *Ibid,* page 26.

8 *Ibid,* page 27.

9 Judgment of 27 October 1987, International Law Reports, vol. 80, page 622.

In one of the cases before the High Court, the plaintiffs sued the United Kingdom Department of Trade and Industry (DTI), twenty-two foreign States and the then European Economic Community (EEC). In connection with the above mentioned case, Justice Staughton observed the following: "*It seems to me that the view of Parliament [...] was that in international law legal personality necessarily meant that the members of an organization were not liable for its obligations*".[10] Regarding the same legal precedent, Lord Kerr also held the view that State members should not be bound by the obligations entered into by the IO. He observed that: "*he could not find any basis for concluding that it has been shown that there is any rule of international law, binding upon the member States of the ITC, whereby they can be held liable – let alone jointly and severally*".[11] Lord Gibson concurred and remarked: "*where the contract has been made by an organization as a separate legal personality, then, in his view, international law would not impose such liability upon the members, simply by reason of their membership, unless upon a proper construction of the constituent document, by reference to terms express or implied, that direct secondary liability has been assumed by the members*".[12]

In addition to the above mentioned cases, the same conclusion was reached by the European Court of Human Rights in the case *Behrami and Behrami against France and Saramati against France, Germany, and Norway*[13], concerning the international responsibility incurred by the United Nations as a consequence of peacekeeping operations. In this case, the tribunal concluded that the member States (as suppliers of military forces) were not liable because the acts performed by them were under the control of an IO.

It is interesting to note that the London courts have indeed accepted the liability of a state for damage arising from trespass and negligence incurred by UK forces at the service of the United Nations. *In Bici and another v. Ministry of Defence (Queen's Bench Division*) the local courts not only declared themselves competent but, moreover, decided to compensate the victims of killings and other physical injuries caused during the 1999 UN peacekeeping operations in Kosovo.

In a case closer to space law, the Court of Strasbourg rejected an application against the Federal Republic of Germany where the European Space Agency (ESA) had

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10 Judgment of 24 June 1987, International Law Reports, Vol. 77, page 88.

11 *Ibid,* page 109.

12 *Ibid,* page 172.

13 *Agim Behrami and Bekir Behrami vs France, Ruzhdi Saramati vs France, Germany and Norway.* Judgment of 2 May, 2007. European Court of Human Rights, Grand Chamber.

been involved. In *Waite and Kennedy vs. Germany*[14] the plaintiff – who worked for ESA – filed a complaint against Germany on the basis of denial of access to jurisdiction. For acting in such a manner, the local labour court considered that ESA had immunity of jurisdiction which was hindering court proceedings. The tribunal concluded that: "…*in giving effect to the immunity from jurisdiction of ESA on the basis of section 20(2) of the Courts Act, the German courts did not exceed their margin of appreciation"*.[15]

2. Solutions in the Field of Space Law

In the field of Space Law, international responsibility was defined by the 1967 Space Treaty, in Articles VI and VII, and in the 1972 Liability Convention, in Article XXII.

The legal standing of State members of an IO according to Article VI of the Space Treaty is as follows: "…*When activities are carried on in outer space, including the Moon and other celestial bodies, by an international organization, responsibility for compliance with this Treaty shall be borne both by the international organization and by the States Parties to the Treaty participating in such organization*."

Likewise, Article XXII of the Liability Convention establishes the following: "…*3. If an international intergovernmental organization is liable for damage by virtue of the provisions of this Convention, that organization and those of its members which are States Parties to this Convention shall be jointly and severally liable; provided, however, that:*

(a) Any claim for compensation in respect of such damage shall be first presented to the organization;

(b) Only where the organization has not paid, within a period of six months, any sum agreed or determined to be due as compensation for such damage, may the claimant State invoke the liability of the members which are States Parties to this Convention for the payment of that sum.

4. Any claim, pursuant to the provisions of this Convention, for compensation in respect of damage caused to an organization which has made a declaration in accordance with paragraph 1 of this article shall be presented by a State member of the organization which is a State Party to this Convention."

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[14] *Waite and Kennedy vs. Germany.* Judgment of 18 February, 1999, European Court of Human Rights.

[15] *Ibid,* page 16.

The most interesting feature of Article XXII of the Liability Convention is that it explains the principle addressed in Article VI of the Space Treaty and stresses the fact that States members of an IO shall be jointly and severally liable for the damages for which the international organisation was responsible. Paragraph 3 of that Article provides that the IO shall be liable for damage in the first place. And only when the IO fails to compensate the victim, the liability of the member states of the IO and the provisions of the Liability Convention may be invoked. As a consequence, it would follow that the responsibility of the States members of an IO engaged in space activities is subsidiary.

It should be borne in mind, however, that Article XXII of the Liability Convention has been harshly criticised by a number of specialists of renown. Among others, Williams quotes Cheng, who holds the opinion that to treat an IO party to a treaty in equal terms as if it were a State member when some of its members were not a party to that treaty would be the same as to allow a group of people to travel with the ticket of only one person.[16]

The International Law Association at its New Delhi Conference in 2002[17] reached the conclusion that no amendments should be introduced to the current text of the Liability Convention and that concrete suggestions consisted in encouraging States to accept the binding nature of the Claims Commission decisions and awards, in accordance with Article XIX, paragraph 2 of the Convention and following the proposal made by the Austrian delegation to the Legal Subcommittee of COPUOS in 1998.

3. Conclusions and Final Questions

According to the foregoing comments, two solutions would, in fact, be coexisting in connection with the international responsibility of IOs. The peculiarities regarding this topic seem to be that traditional international law and international space law are leading to opposite solutions. On the one hand, space legislation establishes a subsidiary regime for liability in cases where the state members of an IO – that are also members to the Liability Convention – are held liable against third parties when the IO fails to compensate that third party. On the other hand, traditional international law does not accept the liability of states members of an international organisation except in the infrequent case where those

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16 Williams, S.M. *Derecho Internacional Contemporáneo.* Abeledo-Perrot. Buenos Aires. 1990, page 37.

17 Williams, S.M. *Final report on the review of space law treaties in view of commercial space activities – concrete proposals*. ILA Space Law Committee, 70th Conference (New Delhi, 2002).

States accept this responsibility or if this understanding could be presumed as a consequence of their behaviour. As a result of the foregoing thoughts it seems valid to ask oneself whether the regime of international responsibility established by the Liability Convention should not be revised.

The legal standing of states members of an IO raises a conflict between general international law and space law. This, in turn, opens the door for a rather topical debate. It is important to reflect upon this issue as cases of the kind are likely to arise in the near future. For example, when an IO, such as the European Space Agency, becomes involved in a wrongful act, both regimes may be considered for finding solutions. Yet, at the same time, answers may differ, and even be in conflict. In the ILC project, states members are not held responsible. Section 29 of the project is very clear on this point based on the precedents of the *International Tin Council Association and Westland Helicopters*. In both cases, the claimants filed a complaint against the IOs and members, and it was decided that the latter were not responsible for failing to comply with the IOs obligations. Article 29 is sufficiently clear on this matter (see above). Conversely, Space Law establishes a system of subsidiary responsibility for States members of the IO. This system is derived from Articles VI and VII of the Space Treaty (authorisation and duty of supervision) and, in particular, from Article XXII of the Liability Convention.

In the context of this dilemma, there are arguments against and in favour of an amendment of the regime applicable to the responsibility of States members of an international organisation in the field of space law, as follows:

Against the amendment:

a) Space law applies to a specific area, namely, outer space beyond national jurisdiction. Therefore, when applied, it would be setting aside any legislation of a general nature. For this reason a clash between the two legislations would have no relevant legal consequences.

b) Space law regulates a specific field in clear departure from regulations applicable to activities on Earth. This is why it calls for a special regime, different from the general rules applicable to international responsibility in traditional international law.

c) Since space activities entail risk, it is recommended that State members of an international organization be held liable if and when IO fails to compensate. In this manner, the rights of the victims to an integral compensation remain protected.

d) Given the complexities surrounding revision of international treaties, such as the Liability Convention – which has a good number of ratifications – such course of action would not seem advisable.

In favour of the amendment:

a) Space Law, in the field of responsibility, should be adapted to the ILC Project in order to maintain certain coherence within the current international regime.

b) The regime established by Space Law does not respect the objective personality of the IO.

c) Article XXII of the Liability Convention leaves a gap regarding the State members of an international organisation which are not parties to the Liability Convention.

4. Final Remark

The central aim of this paper was to underline the absence of dialogue and the legal contradiction introduced by the ILC rules on international responsibility of international organisations. Hopefully, these lines may be seen as a modest invitation to reflection. ■

Reflections on the Concepts of 'Liability' and 'Responsibility' in a Privatised Atmosphere

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1. Introduction

The 1967 Outer Space Treaty provides for liability of the state for any of its national activities in outer space whether such activities are performed by itself or by any other non-governmental agency. Article VI intentionally imposes a strict liability regime, rather than subjective responsibility, on the launching states since the treaty prohibits any space activity by a non-governmental entity unless it is authorised and continually supervised by that state. This paper focusses on the requirement for a revised notion and distinct demarcation between the traditional concepts of 'responsibility' and 'liability' in order to effectively redress the legally entangled issues arising out of the rapid developments in the commercialised and privatised sector of space activities. Following a detailed analytical study of the existing literature on the point, it is asserted that the attribution of state responsibility for commercial acts done by non-governmental entities should be reconsidered. To that end, there must be an attempt to explicitly confine the contours of the term 'national activities' and re-assess the scope of the concepts of 'launching state, 'appropriate state' and the 'state of registry'. Further, issues such as change of ownership of satellites in orbit and multi-state launching operations and the liability arising therefrom are addressed. It is concluded that in the light

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of recent State practice, a functional approach on a case by case basis to determine the 'launching State(s)', 'appropriate State(s)' and the 'State of Registry' for the purpose of attribution of international responsibility and attendant liability is suitable to cater to the contemporary commercialised and privatised scenario of activities in outer space.

At the outset of the space age, outer space was treated as a confrontational platform by the two superpowers to enhance their prestige and to achieve military supremacy.[1] As opposed to military objectives or other related agenda in the past, an influential driving factor behind current space activities primarily is the return of investments and maximisation of profits in this sector.[2] Although commercialisation of space activities was expected since the very commencement of space ventures,[3] such a colossal private stake-holding in the industry was not anticipated. A striking feature of the commercialisation of the space sector is the rapidly growing role played by private entities in various branches of space activities.[4]

The possible involvement of private enterprises in outer space and the attribution of responsibility for such private activities to the states was one of the controversial ideological issues between the U.S.A. and the then U.S.S.R. The Soviet view was that only states were entitled to the principle of free use and access to outer space in order to avert any possible disarray arising from private participation.[5] It asserted that only states should participate in space activity and that "to give private companies a free hand in outer space could lead to chaos and anarchy."[6] On the other hand the U.S.A. urged for private participation in space ventures by arguing that outer space should be used as freely as the high seas and not limited to use by sovereign State actors.[7] The compromise offered by the Soviet Union was to allow private participation in space activity subject to the control of the "appropriate State" and

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1 J. M. Filho, 'On Private States and International Public Interests in Space Law" (1991) Proceedings at the 38th Colloquium on Law of Outer Space at 238.

2 H. L. van Traa-Engelman, *Commercial Utilization of Outer Space* (Dordecht: Martinus Nijhoff Publishers, 1993) at 18.

3 See for example, M. S. McDougal, H. O. Laswell and I. A. Vlasic. *Law and Public Order in Space* (Yale University Press, 1963) at 9.

4 Private Enterprise and the Exploration of Outer Space, UN Information Note, Doc. A/AC.105/L. 131, 2 May 1983 quoted in van Traa-Engelman, supra note 2 at 277.

5 A. S. Piradov, *International Space Law* (Progress. 1976) at 97.

6 U.N. Doc. A/AC.105/C.2/SR.28, p. 13, 9 July 1963.

7 K. Tatsuzawa, "The Regulation of Commercial Space Activities by the Non-Governmental Entities in Space Law" (1988) Proceedings at the 31st Colloquium on Law of Outer Space at 342.

the State would bear international responsibility for it.[8] It was set forth in Principle 5 of the United Nations General Assembly Resolution 1962 (XVIII), and later was incorporated in Article VI of the 1967 Outer Space Treaty.

Thus the acceptance of private actors on the space stage results from a compromise between the then U.S.S.R. and the U.S.A. So a clear prerequisite for private space activities remains in the duty to obtain the authorisation of a state otherwise no private activity may be legally undertaken in outer space. In short, the regime for private space activities can be summed up as giving freedom to private entities, and international responsibility to the states.[9] Hence, the necessity of keeping a close link between an enterprise and its state of nationality (or registry) is obvious.

2. Private Participation in Outer Space Activities

'Non-governmental entities' would, today, refer in particular to private companies operating launches, spaceports, satellite communications.[10] Private companies are a contributory, if not dominant, player in space ventures today. In the past, private companies were not excluded from the launch business, but they were not the direct participants in these activities either.[11] Professor Böckstiegel[12] categorises such industrial involvement in space activities in the capacity of a supplier of goods and services under the common denominator '*indirect participation of private enterprise in space activities*'.

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8 Carl Q. Christol, *The Modern International Law of Outer Space*, (New York: Pergamon Press, 1982) at 65.

9 M.G. Bourély, "La commercialisation des activités spatiales: aspects juridiques", (1989) XXXVII, *Annales de l'Université des sciences sociales de Toulouse* 43, at 56.

10 Valérie Kayser, *Launching Space Objects: Issues of Liability And Future Prospects*, (Springer, 2001) at 31.

11 K.H. Böckstiegel, "Legal Implications of Commercial Space Activities (1981) Proceedings at the 24th Colloquium on Law of Outer Space at 4: *"Until recently, it was only the indirect participation which would be found in practice: States and State institutions had a monopoly of space activities and private industry was only linked to these activities as subcontractors or sometimes as customers for the result. The exclusion of private industry from direct participation even in private economy countries, where normally private industry is the motor for technical progress and then transferring such progress into practical use for the community, was due to the enormous size of the technical means involved."*

12 K.H. Böckstiegel, 'Present and Future Regulation of Space Activities by Private Industry', paper presented during the International Conference on Doing Business in Space: Legal Issues and Practical Problems, 12-14 November 1988, Washington D.C.; American Law Institute-American Bar Association Conference Materials 1981, The American law Institute.

In parallel with the above form of indirect involvement, wide-scale private involvement in direct space activity located in the sectors of space transportation, space communication (including direct television broadcasting and other forms of specialised telecommunication services), as well as various other space application services such as remote sensing and materials processing taking place onboard orbiting space facilities is characterised by a number of different ways and degrees of involvement stretching from full ownership to more restricted titles of right or relationships.[13]

3. International Responsibility and Liability

At this juncture, it is imperative to discuss the existing international responsibility and liability regimes under general international law and space law since they are of paramount significance for the States due to the consequences which they entail both at the international and national planes. The States bear significant burdens on the international arena which in turn dictate the necessity to administer and deal with all their consequences at the national level.[14] The provisions for liability were mostly sought by non-space faring nations to assure themselves that they would be compensated for any injury.[15]

It is evident from Salmond's definition that liability or responsibility is the bond of necessity that exists between the wrongdoer and the remedy of the wrong.[16] Thus although in the municipal legal sphere, there seems to be no distinction between the two terms, yet they convey specifically different meanings in the field of international law.[17] The distinction between State responsibility and liability lies in the fact that the prerequisite to the former is an act breaching international law and to the latter the harmful effects of an activity, which is not *per se* a violation of international law.[18]

While clarifying the seemingly twin concepts of responsibility and liability under general international law, Professor Bin Cheng provided the following definition:

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13 van Traa-Engelman, supra note 2 at p.279.

14 J. Hermida, Legal Basis for a National Space Legislation, (DCL, Thesis, McGill University, 2003) [unpublished], at 23.

15 W. B. Wirin, "Practical Implications of Launching State – Appropriate State Definitions", (1994) Proceedings of the 37th Colloquium on the Law of Outer Space at 111.

16 P.J. Fitzgerald, *Salmond on Jurisprudence*, (12th ed. 1999) at p. 349.

17 Dr. Sandeepa Bhat B. and Dr. P. Ishwara Bhat, "Legal Framework of State Responsibility and Liability for Private Space Activities" in Sandeepa Bhat B. (ed.), *Space Law in the Era of Commercialisation* (Eastern Book Company, 2010).

18 Rebecca M. M. Wallace, *International Law*, (Sweet & Maxwell, 2003) at 203.

> "Responsibility[19] means essentially answerability, answerability for one's acts and omissions, for their being in conformity with whichever system of norms, whether moral, legal, religious, political or any other, which may be applicable, as well as answerability for their consequences, whether beneficial or injurious. In law, it applies in particular to a person's answerability for compliance with his or her legal duties, and for any breaches thereof.
>
> The term liability is often used specifically to denote the obligation to bear the consequences of a breach of a legal duty, in particular the obligation to make reparation for any damage caused, especially in the form of monetary payment. The term is often used more generally to denote a legal obligation to repair a loss irrespective of any culpability, especially in cases of assumed or imposed liability. However, both terms responsibility and liability have derivative meanings, where they can assume slightly different connotations. Although responsibility is a broader concept than liability, the two terms are sometimes used interchangeably."[20]

As has been further elucidated by Professor Cheng, international state responsibility in the outer space field arises the moment a breach of an international obligation is produced and not when the State is seen to have failed in its duty to prevent or repress such breach, for the State is immediately accountable for the breach on the international plane as if it itself had breached the international obligation.[21]

While responsibility applies to a "State's obligation to regulate and control space activity both in the present, and in the future, to assure compliance with not only the letter but the spirit of the Outer Space Treaty principles", liability on the other hand refers to an "obligation of a State to compensate for damages".[22]

4. Establishing Links to Attribute Responsibility and Liability

With this backdrop, the following discussion would throw some light on the parameters for attribution of responsibility to State actors for private enterprises venturing into space activities.

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19 On the concept of responsibility, see Bin Cheng, *General Principles Of Law As Applied By International Courts And Tribunals*, Part III: General Principles of Law in the Concept of Responsibility, at pp. 163-253 (Cambridge University Press, 1987); Ian Brownlie*, State Responsibility* (Clarendon Press, 1983); International Law Commission's Draft Articles on State Responsibility, in U.N., *Report of the International Law Commission on the work of its forty-eighth session,* 6 May-26 July 1996, GAOR, 51st Sess. Supp. No. 10, U.N. Doc. N5111O, at 125-170 (1996).

20 Bin Cheng, "Article VI of the 1967 Space Treaty Revisited: 'International Responsibility', 'National Activities' and 'The Appropriate State'" (1998) 26:1 *J. Sp. L.*, 7, at 9.

21 *Ibid.*, at 15.

22 Wirin, supra note 15 at 109.

1. National Activities by Non-governmental Entities

In order to determine the most effective strategy for attribution of such responsibility to the States for private participation, the applicable criterion for the qualification of 'national activities' must be examined because Article VI of the Outer Space Treaty stipulates that States should be held responsible for 'national activities' carried on by non-governmental entities.

In this context, there are two conflicting views with respect to the actual notion of national activities among authors and commentators.[23] While one perspective holds that the concept of national activities is remitted to domestic law, the other one perceives that the Outer Space Treaty provides the content of this notion.

Pursuant to the jurisprudence espoused by the International Court of Justice in the Barcelona Traction case, the key to determining the 'nationality' of an activity can be, for instance, the place where the enterprise has been incorporated i.e., by or under the laws of a certain State and/or the principal place of business or permanent residence of the enterprise, i.e., in fact the place (from) where the space activity takes place or the State of original licensing of the private entity.[24] This view is submitted by Henri Wassenbergh who further emphasises nationality to illustrate other 'genuine links' such as ownership of the private entity, nationality of the persons active in outer space and registration of the space object(s).[25]

Wassenbergh also proposes the construction of the concept of national activities based on the ambit of national legislation whereby he argues that it is the prerogative of each State to define their 'nationals' for purposes of exercising jurisdiction.[26] Julian Hermida equates this logic to a situation where a State could not consider as its nationals those individual foreign nationals that reside in its territory or those legal entities which are wholly owned by foreign shareholders but that conduct business in its territory on a permanent basis. He

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[23] van Traa-Engelman, supra note 23 at 140; F. von der Dunk, "Public Space Law and Private Enterprise. The Fitness of International Space Law Instruments for Private Space Activities", (1998) Proceedings of the 40th Colloquium on the Law of Outer Space at 4; R Quizi, "Certain Legal Aspects of Commercialization of Space Activities", (1990) XXII *Ann. Air & Sp. L* at 337; H. Wassenbergh, *Principles of Outer Space Law in Hindsight* (Martinus Nijhoff Publishers, 1991) at 23; Bin Cheng "The Commercial Development of Space: the Need for New Treaties (1991) 19 *J. Sp. L.* at 36-40; van Traa-Engelman, supra note 2 at p. 281.

[24] Barcelona Traction, Light and Power Company Ltd, Case concerning (New Application, 1962) (Belgium v. Spain) (Second Phase), I.C.J. Reports, 1970, p. 3, para 70.

[25] Wassenbergh, supra note 23 at 23–25.

[26] H. Wassenbergh, "International Space Law: A Turn of the Tide", (1997) XXII *Ann. Air & Sp. L.* at p. 335.

concludes that such a line of reasoning is inconsistent with the intention of the drafters of the Outer Space Treaty, for they intended that states bear international responsibility for the activities of their nationals in a very broad sense.[27] Hence, it is submitted that the notion of national activities may not be interpreted to be at the entire discretion of each state.[28]

The second view is enunciated by Professor von der Dunk who postulates that the most effective interpretation of 'national activities' may be made in light of the interrelation of the doctrines of jurisdiction and international responsibility.[29] He holds that 'national activities' are those activities over which a State has jurisdiction or more specifically those activities over which it has the possibility to exercise legal control.[30]

In order to further clarify the above reasoning, it must be kept in mind that the two elements of state jurisdiction are *jurisfaction* and *jurisaction*.[31] On the one hand, *jurisfaction* represents the normative element of state jurisdiction which entitles a state to make laws or take decisions, including judicial decisions, with legally binding effect within its own territory or world-wide extra-territorially. *Jurisaction*, on the other hand, represents the concrete element of state jurisdiction which enables a state physically to carry out the functions of a state by setting up machinery to take laws and to take decisions, or actually to implement and to enforce its laws and decisions. The system of hierarchy among jurisactions means that normally at any given time and place, although jurisfactions can be concurrent, there can be only one state that is entitled to exercise jurisaction, thus obviating any conflict at least in the actual and physical exercise of state powers.[32]

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27 *AC.105/C.2/SR.94* at 51.

28 "As the considerations to employ a certain criterion and to apply it to a specific case often involve rules of international conflicts law, it needs little imagination to realize the complexity and variety of cases, as well as their outcome according to the different law systems and regulations. If any expectations might be forthcoming from such a national approach to serve the aims of international law, and those of space law in particular only an intensified research in the field of comparative law, and a progressive development in the unification of international conflicts law, on a worldwide basis, or at least among space faring nations would have a fair chance of success in establishing international legal security in this respect." H.L. van Traa-Engelman, "Problems of State Responsibility in International Space Law", *(1983)* Proceedings of the 25th Colloquium on the Law of Outer Space at 140 quoted in Hermida, supra note 14.

29 F. Von der Dunk, supra note 23 at 4.

30 *Ibid.*

31 On this system of classification of State jurisdiction, including the distinction between jurisfaction and jurisaction, see Bin Cheng, "The Extraterrestrial Application of International law", 18 *Current Legal problems* (1965), at 132-152.

32 Bin Cheng, "Nationality for Spacecraft?" in Tanja L. Masson-Zwaan and P.M.J. Mendes de Leon (eds.), *Air and Space Law: De Lege Ferenda*, (Martinus Nijhoff Publishers, 1992) at 203-217.

Hence, it can be inferred from the above discussion that the opportunity to exercise legal control is encompassed in the concept of jurisdiction[33] and more precisely in the jurisaction of states. Therefore, it is submitted that a state is responsible for the activities over which it has the opportunity to exercise legal control, i.e., activities which are within the state's jurisaction, whether territorial, quasi territorial or personal.[34]

The above proposition concerning 'national activities', especially those by 'non-governmental activities' is in conformity with the view of Professor Bin Cheng who has reflected on the conceptualisation of this notion on numerous occasions and in rather intricate detail.[35] After a review of the voluminous literature on the point, in my opinion, the following description of 'national activities' by Professor Cheng can be said to be, by far, the most comprehensive and progressive interpretation of space law.

> *In fact, to be totally comprehensive, national activities should include all activities within the jurisdiction of a State, including its territorial jurisdiction,*

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33 "Jurisdiction is a legal concept used to describe a state's right to take action; e.g. to prescribe and enforce rules of law with respect to a particular person, thing, or event. In its inception, the principle of jurisdiction was primarily territorial, deriving from the belief that the power of a nation to act within its own borders was necessarily exclusive and absolute [...] susceptible of no limitation not imposed by itself. Although there are many jurisdictional rationales, all require that there be some genuine link between the state and the person, property, or event over which jurisdiction is claimed". Office of Technology Assessment, "Space Stations and the Law: Selected Legal Issues" in G.H. Reynolds and R.P. Merges, *Outer Space: Problems of Law and Policy,* (1989) at 248 quoted in Hermida, supra note 14, at 30.

34 The United States Commercial Space Launch Act and the Swedish Space Activities Act of 1982 are more prudent in submitting within their ambit space activities not only within their territory, but also those of their nationals outside their country. The United Kingdom, however, in its Outer Space Act 1986, seems to believe that it means only activities of United Kingdom nationals, individual or corporate, but there are good reasons for believing that the term covers a much wider circle of persons and situations. In fact it covers potentially all persons, physical or legal, and occurrences under its territorial, quasi-territorial and personal jurisdictions, and definitely all under its effective jurisaction. Bin Cheng, "Whose Parking Space Is It Anyway", *The Time Higher Educational Supplement* (30 May 1986), p. 14, cols. 3-5.

35 Bin Cheng, "Space Objects and their Various Connecting Factors", in Gabriel Lafferranderie, Daphné Crowther (eds.), *Outlook on space law over the next 30 years: essays published for the 30th anniversary of the Outer Space Treaty*, (Martinus Nijhoff Publishers, 1997); Bin Cheng, "Space Activities, Responsibility and Liability For" in R. Bernhardt (ed.), *Encyclopedia of Public International Law*, Instalment 11 (North-Holland, 1989) 299-303; Bin Cheng, "The Commercial Development of Space: The Need for New Treaties", 19 *J. Sp. L.*(1991) at 14-44; Bin Cheng, "Convention on International Liability for Damage Caused by Space Objects", in N. Jasentuliyana and R.S.K. Lee (eds.), 1 *Manual on Space Law* (New York: Oceana, 1979) at 83-172.

quasi-territorial jurisdiction and personal jurisdiction, by whomsoever carried on. Thus, in addition to activities carried on by a state's nationals wherever they may be, and those by any person within a state's territory, one should include within the notion of 'national activities' also those by, or on board, ships and aircraft of a state's nationality, wherever these ships or aircraft may be and irrespective of the nationality of the persons involved. To these one may add, in any event, as among parties to the 1967 Outer Space Treaty, also activities by, or by personnel, of space objects under a state's registry. Since Article VIII of the Outer Space Treaty speaks of the State of Registry 'retaining' its jurisdiction and control over such objects and their personnel, "while in outer space or on a celestial body", it implies that such jurisdiction exists before such objects and their personnel enter outer space, and is not restricted to the period when they are in it. Consequently, its responsibility covers their activities wherever carried on.[36]

2. Launching State

The definition of the term 'launching state', enshrined in the Liability Convention in conjunction with article VII of the Outer Space Treaty and the standards set in the Registration Convention, is the leading source for the determination of the State which bears international liability.

Apart from the conceptual obscurity, the term 'launching' also requires several other clarifications. Bockstiegel, however, suggested that not all suborbital launches can be eliminated since the ambit of the definition of 'launch' includes attempted launches. To differentiate attempted launching from pre-launch arrangements, Stephen Gorove put forth the following guidelines in conformity with criminal jurisprudence: attempted acts must be intended; they cannot be absolutely impossible of commission; they must involve "perpetration" or "execution"; they have to come close to success; the means used must be adequate.[37]

There is considerable academic and scholarly discourse on the definition of the concept of 'launching state' and its implications primarily directed towards clarifying the concept of

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[36] Bin Cheng, "International Responsibility and Liability of States for National Activities in Outer Space, Especially by Non-Governmental Entities" in Tieya Wang, Ronald St. J. Macdonald (eds.), *Essays in honour of Wang Tieya,* (Martinus Nijhoff Publishers, 1993) pp. 145-163 at p. 158.

[37] Stephen Gorove, Space Transportation Systems: Some International Legal Considerations, (1981) Proceedings of the 24th Colloquium on the Law of Outer Space at 118 quoted in K. H. Böckstiegel, "The Term 'Launching State' in International Space Law", (1994) Proceedings of the 37th Colloquium on the Law of Outer Space.

procuring state.[38] On the question of what degree of activity qualifies a procuring state as such, Professor Christol concluded that it has been left open in the Convention.[39] The US Senate Committee on Aeronautical and Space Sciences has also dwelt on the issue whether a State would fall within the category of procuring state if its only connection with a space activity is a minor experiment aboard the spacecraft, or if it supplied only a small component in the spacecraft booster or if it just sent a technical observer.[40] Böckstiegel proposed a substantial threshold test relying on which, provision of small minor components to the payload or the launching of another State, and even the sale of a satellite to another State would not qualify as procurement.[41]

It is evident from an analysis of the views of the above-mentioned publicists that the strictly narrow interpretative approach adopted by Böckstiegel is impractical as opposed to the broader construction followed by Wirin to accommodate the current commercial trends and to give effect to the objects and purposes of the Outer Space Treaty. Wirin, however, also advises that an unreasonably wide ambit of interpretation accorded to the term 'launching state' could act as a deterrent in space activities for some states that would become more hesitant to approve private participation because they are not willing to shoulder the potential liability to which they would subject themselves, even for "tangential connections" to a launch thereby hindering the purposes of the Outer Space Treaty.[42]

Böckstiegel[43] and Cheng[44] hold that the liability provisions are applicable both for launchings by states and by non-governmental institutions because invariably at least one of

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38 J. Hermida, *Space Law: International, National and Contractual Aspects* (Buenos Aires: Ediciones Depalma, 1997) at 70.

39 Christol, supra note 8 at 115.

40 Committee on Aeronautical and Space Sciences United States Senate, Convention on International Liability for Damage Caused by Space Objects. Analysis and Background Data, 92d Congress 2d. Session, US. Government Printing Office, Washington, 1972 at p. 29.

41 K. H. Böckstiegel, "The Terms Appropriate State and Launching State in the Space Treaties – Indicators of State Responsibility and Liability for State and Private Space Activities", (1991) Proceedings of the 34th Colloquium on the Law of Outer Space at 15.

42 Wirin, supra note 15.

43 K. H. Böckstiegel, "The Term Launching State in International Law" (1994) Proceedings of the 37th Colloquium on the Law of Outer Spaceat 81; Böckstiegel, supra note 42 at p.15.

44 Bin Cheng, "Convention on International Liability for Damage Caused by Space Objects" in N. Jasentuliyana & R.S.K. Lee eds., *Manual on Space Law* (New York: Oceana, 1979) Vol. 1 at 103.

the four criteria for the launching state will be fulfilled in the case of launchings by private entities.[45] This argument has been found to be fallacious firstly, because it ignores the clear provisions of the Outer Space Treaty and the norms of customary international law and secondly, because there may be cases where a private company may launch a payload without the active involvement of any state, such as the case of a launch from a private launch facility located outside the territory of a state where a state neither procures nor launches a space object.[46] Peter Nesgos in also in agreement that a private enterprise providing a space object for launch by a foreign State would cause the state of nationality of that enterprise to be considered a launching State.[47]

A major controversy with respect to the application of the definition to the multinational nature of the space industry today is illustrated by the Sea Launch project, which involves a private joint venture of companies from Russia, the U.S.A., Ukraine and Norway with the rockets launched from a converted oil drilling platform in the high seas.[48] Some scholars have referred to this as a lacuna in the application of the Liability Convention.[49] Dr. Lee rebuts this argument as the launch operator in the case of a launch from the high seas or in airspace above the high seas and the satellite operator who procured the launch would nevertheless be easily identifiable, and all the launching states are jointly and severally

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43 K. H. Böckstiegel, "The Term Launching State in International Law" (1994) Proceedings of the 37th Colloquium on the Law of Outer Spaceat 81; Böckstiegel, supra note 42 at p.15.

44 Bin Cheng, "Convention on International Liability for Damage Caused by Space Objects" in N. Jasentuliyana & R.S.K. Lee eds., *Manual on Space Law* (New York: Oceana, 1979) Vol. 1 at 103.

45 P. Malanczuk, "Die völkerrechtliche Haftung für Raumfahrtschäden" [Liability in International Law for Damage Caused by Space Objects], in K.H. Böckstiegel (ed.), *Handbuch des Weltraumrechts*. Köln et. al.:(Carl Heymanns Verlag, 1991), 755-804 at 783.

46 Von der Dunk's interpretation is analogous to those of Bin Cheng and Böckstiegel but it differs in the fact that he articulates his thesis in a potential mode, thus leaving room for cases where there may be no involvement of states in the launching operations. F. G. von der Dunk, "Launching from Down Under: The New Australian Space Activities Act of 1998" (2000) Proceedings of the 43rd Colloquium on the Law of Outer Space at 134 quoted in Hermida, supra note 14, at 35.

47 Peter Nesgos, "National and Domestic Law Applicable to Commercial Launch Vehicle Transporation", (1984) Proceedings of the 27th Colloquium on the Law of Outer Space at 102.

48 A. Kerrest, "Launching Spacecraft from the Sea and the Outer Space Treaty: The Sea Launch Project", (1997) Proceedings of the 40th Colloquium on the Law of Outer Spaceat 264.

49 Kai-Uwe Schrogl and Charles Davies, "A New Look at the 'Launching State': The Results of the UNCOPUOS Legal Subcommittee Working Group "Review of the Concept of the 'Launching State' 2000-2002," (2002) Proceedings of the 45th Colloquium on the Law of Outer Space.

liable.[50] He further elaborates that in order to avoid imposition of liability on the 'launching states' who have relinquished their control over the operation of the satellite to another state post-launching procedure, the states concerned can enter into private bilateral agreements concerning indemnification to the 'launching states' for any damage caused after orbital insertion.

As opposed to this line of reasoning, Wirin dismisses the criterion of 'launching state' as an indicator of state responsibility on the ground that the terms 'procurement of launching' makes it difficult to identify the supporting or secondary state. He adopts an inclusive approach by holding any state which assists a launch, either by providing technological or infrastructural support or offering any political or economic benefits as a 'procuring state'.[51]

Van Traa-Engelman considers the 'launching state' as elaborated in the Liability and Registration Convention as the best chance of securing the practical fulfilment of the responsibilities of states in the execution of space activities, in particular by private enterprise. Moreover, she also offered a second criterion based on the nationality and/or seat of the person or organisation launching a space object in the event of private enterprise space activity, which would address situations where a private entity launches a space object from high seas, and no launching state can be allocated.[52]

Thus, it is advanced that each decision as to whether a state falls within the category of procuring state is a question of fact, which should be made on a case by case basis in light of the parameters contained in the definition of launching state. In this respect, Christol's assertion that the Convention has purposefully been left open supports the conclusion that the qualification of a state as a launching state can only be decided in each specific case of damage arising from a space endeavour.

3. Appropriate State

After a careful scrutiny of the liability entailed by a launching state for activities of private enterprises, we must now focus our attention on the term 'appropriate state'[53] (Outer

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50 Dr. Ricky J. Lee, "The Convention on International Liability for Damage Caused by Space Objects and the Domestic Regulatory Reponses to its Implications", paper presented at United Nations/ Republic of Korea Workshop on Space Law: "United Nations treaties on outer space: actions at the national level" Daejeon, Republic of Korea, 3-6 November 2003.

51 Wirin, supra note 15 at 111-112.

52 van Traa-Engelman, supra note 2.

53 On the notion of the 'appropriate state', see Bin Cheng, "International Responsibility and Liability for Launch Activities", 20 *Air and Space Law* (1995), at 297-310, s. IV. 5, 304-5.

Space Treaty, Art. VI). As far as non-governmental activities are concerned, the *Declaration of Principles* places them logically under the responsibility of their national state, as far as international responsibility is concerned which is in conformity with classical international law principles that a state is responsible for taking measures necessary for its nationals to exercise their activities in a way which does not create harm. However, in the *Outer Space Treaty*, the notion of state which was uncertainly used in Principle 5 has been replaced by that of "appropriate state", which did not adduce any explanation. In the absence of any precise definition, this term has been subject to various divergent interpretations based on the diverse opinions and perspectives of various authors and commentators. A survey of the literature would help us to identify the major constructive methods implemented by scholars to resolve the ambiguity associated with the 'appropriate state' as elaborated in the following discourse.

There has also been a lot of deliberation on the feasibility of the concept of multiplicity of appropriate states. With respect to this, there seems to be a general consensus that even if the text of the Outer Space Treaty refers to this term in the singular, there may be several "appropriate states" with respect to a particular activity in outer space.[54] Otherwise these states could be held responsible for an activity which they were deprived to exercise the authorization and supervision functions,[55] since there are a number of states which may be potentially responsible for a certain space activity.

Exploring the possibility of multiple 'appropriate states', Dr. Herczeg in his 1967 report hypothesised a situation where the private entity was incorporated or had its headquarters in one state, the payload was produced in a second state and the launching took place in a third state. His conception of the term "appropriate state" is based on an analogy of his understanding of the meaning of 'launching state'. Extrapolating the concept of essential role played by a state in a space activity to the notion of 'appropriate state', Herczeg concludes that all three states in the above instance were "appropriate states".[56] Herczeg's view has been upheld by Barton, who also advocates that "the appropriate state could be any state which played an important role in the launching of the spacecraft".[57]

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54 K. B. Böckstiegel, "The Term 'Appropriate State' in International Space Law", (1994) Proceedings of the 37th Colloquium on the Law of Outer Space at 79; Wirin, supra note 15 at 109.

55 Bin Cheng, *Studies in International Space Law* (Oxford: Oxford University Press, 1997) at 609.

56 Istvan Herczeg, "Problems of Interpretation of the Space Treaty of 27 January 1967", (1967) Proceedings of the 10th Colloquium on the Law of Outer Space at 107.

57 Barton, "Summary of Discussions", (1967) Proceedings of the 10th Colloquium on the Law of Outer Space at 116.

As concerns the scope of the notion of appropriate state, Professor Stephen Gorove emphasises on the term 'national activities' and deduces nationality as the decisive criterion for an "appropriate state" based on the inter-relation between the authorisation and the nationality principle.[58] He reasons that article VI of the Outer Space Treaty places responsibility on states for their national activities and since the authorization and the responsibility principles are strongly interconnected, the appropriate state must be construed as the state of nationality. He has also suggested that the degree of participation is a critical question in resolving who is an "appropriate state".[59] Professor Vereshchetin supports these views.[60]

Van Traa Engelman holds that the appropriate state should be assimilated with the concept of launching state as has been discussed before,[61] since this is compatible with the practice of effective control by a state over its own territory.[62]

Approving the terminology used in Resolution 1962 as more adequate than the one adopted in the Outer Space Treaty, Professor Bin Cheng holds that since for each activity in Outer Space there may be several states which are concerned – especially because they may bear international responsibility – it is legitimate for all these states to subject those activities to their authorisation and continuing supervision thereby concluding that all those states may be considered the appropriate state.[63]

Wirin also elaborates on the essential role standard, but he refers to it as substantial participation and understands that the concept of appropriate state requires substantial participation on the part of the states in the sense that states that manage, control or are the principal investors in a space project must be deemed appropriate states.[64] In the event there are multiple "appropriate states" such States should be responsible for only the function or participation which cause them to be an "appropriate state". Professor Kerrest is in agreement

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58 Stephen Gorove, "Liability in Space Law: An Overview" (1983) VIII *Ann. Air & Sp. L.* at 377

59 Stephen Gorove, Space Transportation Systems: Some International Legal Considerations, (1981) Proceedings of the 24th Colloquium on the Law of Outer Space at 117.

60 Vladlen Vereshchetin, Space Activities of 'Nongovernmental Entities': Issues of International and Domestic Law, (1983) Proceedings of the 26th Colloquium on the Law of Outer Space at 261.

61 van Traa-Engelman, supra note 2.

62 van Traa-Engelman, supra note 28 at 140.

63 Cheng, supra note 20, at 14.

64 Wirin, supra note 15 at 113.

with this view that the concept of a responsible state is identical to that of an 'appropriate State'.[65]

In the light of the vagueness of its formulation, Dr. Bourély suggests a flexible approach for construing "appropriate states" by exemplifying his position through enumeration of the states which could qualify as "appropriate States". These include the state which exercises jurisdiction and control over the private enterprise, the "launching state", the state of registry, the state where the head office is located or the production plant is located, the state which owns the payload or the state from which the payload is controlled.[66]

Professor Böckstiegel compared Articles VI and IX of the Outer Space Treaty and while pointing out the coterminous nature of the provisions, he cautioned that it may lead to different States being "appropriate states" versus launching states, which would be unsatisfactory. He is in favour of a functional definition based on a case to case approach.[67]

Dr. Silvestrov warns us against the conclusion that all "launching states" are *ipso facto* "appropriate states" would potentially lead to conflicting requirements for authorisation and mind boggling conflicting supervision by the "appropriate states".[68]

From the foregoing discussion, it is emphatically established that the notion of appropriate state leaves ample room for employing varying methods of construction. Thus, it is submitted that the possibility of multiple appropriate states is a feasible approach to attribute responsibility to states for the activities of the private entities based on the doctrines of effective control, essential role and substantial participation as described above. In summary, therefore, the recommended approach to be undertaken to determine the appropriate state should be on a case by case basis in light of the specific characteristics surrounding each activity that takes place in outer space on account of the reasons and criteria expounded above.

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65 A. Kerrest, "Remarks on the Responsibility and Liability for Damage Caused by Private Activity in Outer Space" (1997) Proceedings of the 42nd Colloquium on the Law of Outer Space at 139.

66 Michel Bourély, "Rules of International Law Governing the Commercialisation of Space Activities", (1986) Proceedings of the 29th Colloquium on the Law of Outer Space at 157.

67 Böckstiegel, supra note 42 at 13.

68 G. Silvestrov, "On the Notion of the 'Appropriate State' in Article VI of the Outer Space Treaty", (1991) Proceedings of the 34th Colloquium on the Law of Outer Space at 326.

4. State of Registry

The "state of registry" has been defined in the Registration Convention as "a launching state on whose registry a space object is carried in accordance with article II". From this definition, it follows that there may be only one state of registry and that the state of registry has to be one of the launching states.[69] In the event that there are several launching States these have to determine which one of them will register the object in its national registry. These states may further agree on the application of certain aspects of the legislation of the State which will not act as state of registry.[70]

In general, the most plausible direct legal link between state and space activities, at least as far as the responsibility for the activities is concerned, is the "state of registry" of the space object(s) owned, operated or used by private entities, as the "appropriate state".[71]

The transfer of satellites in orbit, especially sale of satellites have given rise to serious concerns in the legal literature. There are two sets of possible scenarios in this context: the transfer of satellites between launching states and that to a non-launching state.[72] As far as state practice is concerned, we can refer to the transfer of satellites registered in the United Kingdom to China as a consequence of the handover of Hong Kong or the sale of Canada's Anik CI and CII satellites to Argentina,[73] among some other ones. Hermida comments that

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69 A. A. Cocca, "Registration of Space Objects", in N. Jasentuliyana & R.S.K. Lee eds., *Manual on Space Law* (New York: Oceana, 1979) Vol. 1 at 180.

70 J. Hermida, *Commercial Space Law: International, National and Contractual Aspects* (Buenos Aires: Ediciones Depalma, 1997) at 63. It must be highlighted that in the International Governmental Agreement on the Space Station, States opted for the registration in a separate way of each element contributed by the States. European States delegated this responsibility to the European Space Agency. In effect, pursuant to Art. 5 of the Agreement each partner will register as space objects the flight elements which it provides, which are all listed in an annex to the Agreement. IGA, Art. 5.

71 Wassenbergh, supra note 23 at 26.

72 Hermida, supra note 14, at 65.

73 In order to establish a temporary satellite system to comply with ITU timelines, Telesat Canada sold the Anik CI and Anik CII satellites to the Argentine corporation Paracom S.A. Both companies – Paracom and Telesat – formed the Paracomsat joint venture, which was in charge of the operation of the Anik satellites. Both Canadian satellites had to be moved approximately 30º to the East from their original position, to be situated at 76º West (Anik CI) and 72º West (Anik CII). Paracomsat leased transponder capacity not only to Argentine corporations – ATC Cable, Crónica TV, Canal 8 de Mar del Plata, but also to Uruguayan television channels 4, 10, and 12 of Montevideo, which sets the basis for a potential regional system. The satellites remained registered in Canada. J. Hermida, "Argentine Space Law and Policy" (1996) XXI-II *Ann. Air & Sp. L.* at 177.

these isolated cases may not be considered to amount to a general and consistent practice of states followed from a sense of legal obligation, and thus infers that there is no rule of customary international law governing the transfer of satellite ownership in orbit.

As is evidenced by the Hong Kong precedent, the transfers of satellites in orbit among launching states would be permitted under the Registration Convention and would not offer major difficulties.[74] Dr. Ricky Lee has thrown further light on the issue by enunciating the current status of the law on liability for damage caused by satellites. He proposes a truly fault-based system where the life of a satellite would be divided into liability phases: launch, functional operation and retirement thereby affirming that such liability should no longer be dependent on the "launching states."[75]

Although the Registration Convention allows the possibility of launching states to conclude agreements on jurisdiction and control over the space object and over any personnel thereof,[76] yet it has been opined that the Registration Convention does not permit any modification in respect of the transfer of ownership in orbit to a non-launching state[77] thereby ignoring the full array of possibilities permitted both by the Convention and general international law. As asserted by Aldo Cocca, this reflects the principle that special agreements override general ones and the unitary criteria of Art. II(1) of the Convention.[78]

Hermida and Hörl have put forth that it is legally possible for a state to register a space object and to enter into an agreement with another launching state to transfer part or all of

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74 A. Kerrest, "Remarks on the Notion of Launching State" (1999) Proceedings of the 41st Colloquium on the Law of Outer Space at 309.

75 R. J. Lee, "Effects of Satellite Ownership Transfers on the Liability of the Launching States" (2000) Proceedings of the 43rd Colloquium on the Law of Outer Space at 148. *"During launch, it is the "launching states", defined as the nationality of the launch territory and the launch operator, which should be liable. During the functional operation phase, it should be the state that has the operation and control of the satellite that should be liable for any damage incurred in space or on its unexpected re-entry. On retirement, the liability should fall squarely on the entity (or country) that had the ability to return the satellite to Earth (so that it would be destroyed in the atmosphere during re-entry) and failed to do so. Liability in this phase should not be based on fault, as that would merely encourage the proliferation of space debris, especially along the geostationary orbit."*

76 Registration Convention, Art. II.

77 Kerrest, supra note 74 at 309.

78 A. A. Cocca, "Registration of Space Objects", in N. Jasentuliyana and R.S.K. Lee eds., *Manual on Space Law* (New York: Oceana, 1979) Vol. 1 at 180.

the rights and obligations arising from the registration of a space object.[79] The underlying rationale for this premise is that nothing in Art. II of the Registration Convention prohibits the transfer of all the jurisdictional and control rights. They have provided examples in support of their position that launching states can decide to transfer certain jurisdictional rights to others, such as in the case of criminal law under the Intergovernmental Agreement on the International Space Station.[80] With regard to the issue involving transfer of rights to a non-launching state, it has been clarified that a launching state which intends to transfer rights to a non-launching state will have to conclude with all the other launching states the transfer of jurisdiction and control rights and obligations to a third non-launching state pursuant to Article II (2) of the Registration Convention.[81]

Therefore, it is understood from the preceding discussion that the transfer of satellite ownership in orbit is legally possible under international law. However, this would necessitate an agreement among the launching states to transfer all of the jurisdiction and control rights and obligations in favour of a third non-launching state.

5. Concluding Remarks

The present framework for liability regime in the case of damage caused by space activities is evidently not adequate to address the numerous legally entangled multi-jurisdictional issues in the space industry. Further, the unprecedented growth of commercialised privatisation of the space industry at a pace unforeseen by the framers of the Conventions has urged the international community to pause for a moment and re-assess the legal structure in order to accommodate the interests of the technological, commercial and political stakeholders in a harmonised manner. In order to do so, many States have recognised the need for a domestic legislation to shift its unlimited liability under the Liability Convention to private operators, through requirements of compulsory third party insurance and indemnification.

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79 Kay-Uwe Hörl and Julian Hermida, "Change of Ownership, Change of Registry? Which Objects to Register, What Data to be Furnished, When, and Until When?," (2003) Proceedings of the 46th Colloquium on the Law of Outer Space at 454.

80 Agreement among the Government of Canada, the Governments of Member States of the European Space Agency, the Government of Japan, the Government of the Russian Federation, and the Government of the United States of America concerning Cooperation on the Civil International Space Station, signed January 29, 1998, Art. 22.

81 Hörl and Hermida, supra note 79, at 454.

In regard to both liability and international responsibility, Professor Cheng proposes that whilst it may be possible to conclude liability-apportioning, hold-harmless and similar agreements in the case of joint launching, such arrangements may often be difficult to make in the case of responsibility for national space activities by non-governmental entities, because in such cases the identity of all the states involved may not initially be certain or known, and there is consequently less opportunity for coordination.[82]

To reduce the emphasis being placed on states to be liable for the activities of private operators, the liability frameworks incorporating governmental indemnification can be relied upon to amend and update the existing liability regime for space activities. ■

[82] Bin Cheng, "Space Objects and their Various Connecting Factors", in Gabriel Lafferranderie, Daphné Crowther (eds.), *Outlook on space law over the next 30 years: essays published for the 30th anniversary of the Outer Space Treaty*, (Martinus Nijhoff Publishers, 1997) at 213.

One Man's Space Junk is Another Man's Archaelogical Treasure: The Potential for Conflict and Compromise in the Emerging Fields of Environmental and Historic Preservation Law in Outer Space

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This paper will begin with an introduction to the concept of space archaeology and background information on the continuing development of this field. This will lead into a discussion of the future value of what is today considered "space junk," and which laws, international or domestic, could be drawn from in order to set up a system for historic preservation of space artefacts. The thesis introduced in this paper is that a delicate balance must be struck between space archaeology/historic preservation and space environmentalism, because great potential for conflict exists between these two emerging areas of space law. The goals of establishing a regime for historic preservation law applicable to outer space are to preserve various human-made items found in space for future study and to maintain them as physical reminders of mankind's cultural heritage. With the possibility of private space

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travel and space tourism looming, proposals have already been made to protect the Apollo 11 landing site, launch complexes on earth, orbital debris, human waste, satellites, and objects on Mars. This paper will explore which objects, if any, should be the proper subjects of historic preservation in space. The existing space law provisions that may be applicable to space archaeology include Article 7(3) of the 1979 Moon Agreement and the Outer Space Treaty of 1967. U.S. (federal and state), as well as foreign historic preservation laws, may also be relevant. This paper will explore these and other existing sources of law and will propose that an entirely new international law regime may need to be developed. Finally, this paper will discuss the problem of separating the archaeological space treasures from the space junk targeted by environmental space law and various clean-up efforts. Space junk poses threats of collision with space shuttles and other useful space apparatus, occupies useful and increasingly scarce space real estate, and pollutes the otherwise pristine natural space environment. NASA, the European Space Agency, and some private organizations have already begun developing plans to remove space junk by using ground-based lasers to speed the rate of decay and burn-up, by sending out 'space tugs' as roving garbage collectors, or by using tethers to rope and haul in bits of space debris. This paper proposes the proper definitions for space junk and space treasures, and a legal mechanism for protecting only the latter.

1. Introduction

When man first began exploring our solar system, the outer space he encountered was pristine. Every object floating in space was naturally occurring; every surface on which he or his instruments landed was previously untouched by humankind. Today, fifty-three years after the launch of *Sputnik I,* the areas of outer space accessible to man with our current technology are quite different. Countless manmade objects, some whole, some in pieces, are orbiting Earth and can be found on the surfaces of the Moon and Mars.[1] These objects, treasured by some and despised by others, have become so numerous in recent years, especially in the wake of the Iridium Satellite collision, that the time is ripe for an international discussion regarding their fate.[2]

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[1] *See*, *e.g.*, NASA Earth Observatory, Image of the Day, Space Debris, *http://earthobservatory.nasa.gov/IOTD/view.php?id=40173* (mapping the approximately 19,000 manmade objects larger than 10 centimetres in Earth orbit as of July 2009) (last visited June 20, 2010).

[2] *See* NASA, *supra* note 1.

Part I of this paper will focus on those who want to legally protect and preserve manmade objects in space through the developing field of space archaeology.[3] The utility behind preserving such space objects for future use and study will be explored, and the legal means to do so will be analyzed.[4] Recent developments in the application of terrestrial notions of historic preservation law to outer space will also be discussed.[5]

Part II of this paper focuses on those who would like to see the number of manmade items in space reduced or eliminated completely.[6] The notion of environmental protection in outer space is introduced, the dangers of "space junk" are explored, and the application of currently existing environmental law regimes to outer space is contemplated.[7] Recent trends and developments in the area of space environmentalism are also discussed.[8]

Part III of this paper explores the potential for conflict and compromise between historic preservation and environmentalism in outer space and concludes by suggesting an international legal framework for resolving disputes over the future of manmade items in space.[9]

2. Archeology and Historic Preservation in Outer Space

Terrestrial archaeology includes among its many goals: to study human evolution, to study cultural evolution, and to better understand culture history.[10] To do so, archaeologists recover and analyze materials and environmental data found on Earth that earlier societies have left behind.[11] These materials may include artefacts, architecture, biofacts and cultural landscapes.[12] The fewer of these materials that archaeologists are able to

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3 *See infra* Part I.

4 *See infra* Part I, Sections A and B.

5 *See infra* Part I, Section C.

6 *See infra* Part II.

7 *See infra* Part II, Sections A and B.

8 *See infra* Part II, Section C.

9 *See infra* Parts III and IV.

10 Alison Wylie, Thinking From Things: Essays in the Philosophy of Archaeology 31 (Berkeley: University of California Press, 2002).

11 *See generally* Herbert D. G. Maschner & Christopher Chippindale, Handbook of Archaeological Methods, Volume 1 (AltaMira Press, 2005).

12 *See* F. Abiola Irele & Biodun Jeyifo, The Oxford Encyclopedia of African Thought 44 (Oxford University Press, 2010) ("Archaeology…studies human cultures through the recovery, documentation, and analysis of material remains and environmental data, including architecture, artifacts, biofacts, human remains, and landscapes").

recover, the less they are able to understand and appreciate the societies that created them.[13] The goal of historic preservation is to preserve, conserve, and protect buildings, objects, landscapes or other artefacts of historic significance for future archaeological study, research, or enjoyment.[14] Presumably, the more significant objects that we preserve from our own time, the better understood and appreciated our society will be by future generations.[15]

These same terrestrial concepts of archaeology and historic preservation could easily be applied to mankind's history in and lasting imprint on outer space.[16] When mankind first began exploring space, it marked a significant achievement and an historic moment in our shared history.[17] Many events led up to man's physical exploration of space, from the launching of the first satellite, to the first manned space flight; all of these events can and should be remembered and studied by future generations.[18] The objects and sites left behind by man's presence in space represent historically and archaeologically significant sites which

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13 *The loss of archaeological information is mourned for this very reason.* See, e.g., *William Harms,* Archaeologists Review Loss of Valuable Artifacts One Year After Looting, *Univ. of Chicago Chronicle (Vol. 23, No. 14, April 15, 2004) (describing the loss of archaeological information about the Mesopotamian culture after the almost complete looting of the Iraqi National Museum),* available at *http://chronicle.uchicago.edu/040415/oi.shtml.*

14 *See generally* Norman Tyler, Ted J. Ligibel & Ilene R. Tyler, Historic Preservation: An Introduction to Its History, Principles, and Practice, Second Edition (W.W. Norton & Company, 2009).

15 *See Historic Preservation*, *http://spacegrant.nmsu.edu/lunarlegacies/historic_preservation.htm* (last visited June 27, 2010) ("Only preservation and documentation of the objects and events allows humans to accurately reconstruct and remember the past").

16 For an excellent article on this topic, *see generally* Beth Laura O'Leary, Ralph Gibson, John Versluis & Leslie Brown, *Lunar Archaeology: A View of Federal US Historic Preservation Law on the Moon*. World Archaeological Congress 5.

17 *See*, *e.g.*, Daniel Hohler, *Top 5 Reasons why Space Exploration is Important for the World* (July 26, 2009) *available at http://planetsave.com/blog/2009/07/26/top-5-reasons-why-space-exploration-is-important-for-the-world/* (citing the worldwide promotion of science education, NASA's environmental research, the future elimination of Earth's over population, exploration for natural resources, and "putting ourselves into perspective").

18 The first satellite, *Sputnik I,* was launched on October 4, 1957, by the Soviet Union. *See* Michael Shinabery, New Mexico Museum of Space History, *This Week in Space History,* Alamogordo Daily News, April 11, 2010, *available at http://www.alamogordonews.com/ci_14861740*. The first manned space flight was undertaken on April 12, 1961, when cosmonaut Yuri Gagarin made one orbit around the Earth aboard the *Vostok 1* spacecraft. *See* Marcia Dunn, *13 Astronauts Celebrate 2 Big Space Anniversaries*, Associated Press, April 12, 2010, *available at http://www.google.com/hostednews/ap/article/ALeqM5g8gpZRl3t8mV2RxsVjIuPU75dJeAD9F1M5D80*.

will undoubtedly help the citizens of the Earth in the future to understand our history and to predict our future in space.[19]

2.1 Why Preserve? The Future Value of Today's "Space Junk"

One compelling reason to preserve manmade objects in space is the possibility of performing scientific experiments on them in the future. For example, organic matter such as human waste in orbit might be of interest to scientific researchers.[20] According to Alice Gorman, an archaeologist at Flinders University in Australia and a leading advocate of space archaeology, the Mir space station has been described as "surrounded by a halo of yellow icy particles of human waste" which are exposed to lots of radiation.[21] Because no human has stayed out in space as long as this "astronaut poop," samples of the solid material could reveal a lot about how cosmic radiation affects organic molecules and therefore impact researchers' views on the long-term health risks of human exposure to cosmic radiation.[22]

But the potential for future scientific research is not the only concern that lends value to today's "space junk." By doing nothing other than remaining in their current locations or orbits, manmade space objects could also provide an opportunity for mankind in the future to understand the history of human space flight and early space technology.[23] Some of the most culturally significant objects found in space today include *Vanguard 1,* the Hubble telescope, and the objects scattered on the face of the Moon at the Apollo 11 Landing Site. These objects tell a tale of the cultural history of man in space, and, because of that, are worth preserving.

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19 *See* O'Leary *supra* note 16 at abstract (discussing the value of the first lunar landing site as "a significant historical archaeological site for the citizens of the earth in the future" and an "exceptionally significant site to the people of the world").

20 *See Conversation: Saving Space Junk: Alice Gorman Wants to Take Archaeology Into Orbit,* Archaeology (Volume 60 Number 6, November/December 2007), *available at* http://www.archaeology.org/0711/etc/conversation.html

21 *See* Gorman, *supra* note 20.

22 *See* Gorman, *supra* note 20.

23 Judy Skatssoon, *Cleaning Up Space Junk May Erase History*, ABC Science Online (May 23, 2006) ("Preserving [space items] could provide evidence of a nation's presence in space or help reconstruct a history of space exploration"), *available at http://www.abc.net.au/science/news/stories/s1644380.htm.*

Vanguard 1 was the United State's fourth artificial satellite, launched in March 1958.[24] It is still in orbit, and, being no longer operational, has been referred to from time to time as the "oldest piece of space junk."[25] But it is culturally significant that *Vanguard 1* holds the record for being in space longer than any other human-made object. It continues to capture human imagination not for its current scientific contributions, but for its cultural and historical significance. On March 17, 2008, it logged its 50th year in Earth orbit.[26] And as it did so, the Naval Research Laboratory commemorated the event with a day-long meeting that concluded with a simulation of the satellite's track as it passed into the orbital area visible from Washington, D.C.[27]

The Hubble Telescope may, like *Vanguard 1,* lose its scientific functionality by 2015.[28] But it, too, should be preserved for its cultural significance. More scientific research papers have been published using Hubble's data than with any other scientific instrument in any discipline.[29] Among Hubble's many achievements is helping to settle the decades-old debate about the age of the universe.[30] The Hubble has, without a doubt, succeeded in capturing the public's imagination. In 2004, a year after the Columbia tragedy, NASA announced that Hubble would not receive its last servicing mission.[31] Famed scientist and Hubble enthusiast Neil deGrasse Tyson has noted that, "curiously, the loudest voices of dissent were not from the scientists but from the general public. Akin to a modern version of a torch-wielding mob, angry editorials, snippy letters to the editor, and no end of radio

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24 *See generally* Lambert M. Surhone, Miriam T. Timpledon & Susan F. Marseken, Editors, Timeline of Earth Science Satellites: Satellite, Earth Science, Sputnik 1, Explorer 1, Van Allen Radiation Belt, Explorer 2, Vanguard 1, Explorer 3 (Betascript Publishers, 2010).

25 *See*, *e.g.*, Jim Lebans & Bob McDonald, The Quirks & Quarks Guide to Space: 42 Questions (and Answers) about Life, the Universe, and Everything 36-37 (McClelland & Stewart, February 19, 2008) ("The oldest piece of space junk would be a museum piece if we could ever get it back to Earth. It's one of the earliest scientific probes, the *Vanguard 1*...").

26 Donna McKinney, *Vanguard I Celebrates 50 Years in Space*, Naval Research Laboratory Press Release (March 13, 2008), *available at http://www.eurekalert.org/pub_releases/2008-03/nrl-vic031308.php*.

27 Keith Cowing, *Vanguard Approaches Half A Century In Space*, *SpaceRef.com* (Nov. 3, 2007), *http://www.spaceref.com/news/viewnews.html?id=1241*.

28 Neil deGrasse Tyson, *For the Love of Hubble,* Parade Magazine (June 22, 2008) (predicting an additional seven years of life for the Hubbell Telescope after the final 2008 servicing mission), *available at http://www.parade.com/articles/editions/2008/edition_06-22-2008/1New_View_of_Space*.

29 *See* Tyson, *supra* note 28.

30 *See* Tyson, *supra* note 28.

31 *See* Tyson, *supra* note 28.

and television talk shows all urged NASA to restore the funding and keep Hubble alive."[32] Congress ultimately reversed the decision, partially because of Hubble's enormous cultural significance.[33]

A third and final group of manmade space objects that are especially significant in detailing the history of mankind in space are the objects left on the surface of the moon by U.S. astronauts Neil Armstrong and Buzz Aldrin at the Apollo 11 landing site.[34] During their 1969 moon walk, the lunar explorers left behind tons of trash, including empty food bags, electrical equipment and several receptacles meant for bodily waste.[35] Also left were Mr. Armstrong's footprint, an American flag, a mission patch from Apollo 1 in which three astronauts died in a fire, and a message from world leaders.[36] All told, more than 106 culturally significant artefacts totalling an estimated 100 metric tons have been identified and catalogued by the Lunar Legacy Project.[37] Space Archaeologist Beth O'Leary has argued that Mr. Armstrong's footprints on the moon rival the archaeological importance "of the 3.6-million-year-old footprint tracks of our hominid ancestor preserved in geological sediments in Laetoli, Tanzania."[38]

Given the significant scientific, cultural, and historical importance of these manmade space objects, it seems apparent that they should be protected and preserved for future generations. However, it is not so obvious *how* the objects should be protected. There is no legal framework explicitly designed and implemented for such a purpose, and for jurisdictional reasons, the existing international and domestic U.S. preservation laws are an awkward fit, at best.

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32 Tyson, *supra* note 28.

33 *See Scientists Cheer Renewed Hope for Hubble: Telescope's Backers Seek Revival of Servicing Mission,* Msnbc.com (Jan. 30, 2004, 9:21 PM), *available at* http://www.msnbc.msn.com/id/4111360.

34 Grant Heiken & Eric Jones, On the Moon: The Apollo Journals 456 (Springer; 1st ed., April 13, 2007) ("And, other than the rock boxes and some items brought back as personal souvenirs, virtually all of the lunar surface gear was left behind to save room and weight on the return trip").

35 For a comprehensive list of all items left on the moon by U.S. astronauts, *see* The Handbook for Space Engineering, Archaeology, and Heritage 764-65 (Ann Garrison Darrin & Beth L. O'Leary eds., CRC Press, 2009).

36 *See* Handbook, *supra* note 35.

37 *See* Handbook, *supra* note 35 at 760, 763. *See also* Lunar Legacy Project Website, http://spacegrant.nmsu.edu/lunarlegacies/ (last visited June 20, 2010).

38 Handbook, *supra* note 35 at 766.

2.2 Preservation Laws That Could Apply to Outer Space

National assertions of jurisdiction over objects in outer space cannot be thoroughly discussed without first examining the current international treaty regime governing objects and bodies in outer space. The 1967 Outer Space Treaty prohibits states from establishing territorial sovereignty in outer space, but authorizes and, in some cases even requires, that states exercise jurisdiction over space objects and personnel.[39] Article II of the Outer Space Treaty states, "Outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim or sovereignty, by means of use or occupation, or by any other means."[40] This prohibition against assertions of national "appropriation" or claims of sovereignty is consistent with the Outer Space Treaty's aim of establishing outer space as a form of global commons, the "province of all mankind," and seems patently inconsistent with the notion of any one nation unilaterally asserting jurisdiction over a space object.[41] However, Article VIII provides,

> "A State Party to the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body. Ownership of objects launched into outer space, including objects landed or constructed on a celestial body, and of their component parts, is not affected by their presence in outer space or on a celestial body or by their return to earth . . . ."[42]

Therefore, a nation may, and sometimes must, assert jurisdiction over manmade, as opposed to non-manmade objects, in space. Because *Vanguard 1*, the Hubble Telescope, and the Apollo 11 objects were all launched into outer space by the United States, under the Treaty, the United States maintains ownership, jurisdiction, and control over them.

Given that the United States maintains jurisdiction over *Vanguard 1,* the Hubble telescope, and the Apollo 11 objects, could U.S. federal preservation laws and regulations be applied to them? The main U.S. federal historic preservation statute is the National Historic

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39 *See* Treaty on the Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies [herein after "Outer Space Treaty"], art. II, VIII, opened for signature Jan. 27, 1967, 18 U.S.T. 2410, 1363 U.N.T.S. 3.

40 Outer Space Treaty, *supra* note 39 at art. II.

41 Outer Space Treaty, *supra* note 39 at art. I ("The exploration and use of outer space, including the moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind.").

42 Outer Space Treaty, *supra* note 39 at art. VIII.

Preservation Act and its implementing regulation.[43] This law recognizes that, "historic properties significant to the Nation's heritage are being lost or substantially altered," and that, "the historical and cultural foundations of the Nation should be preserved as a living part of our community life and development in order to give a sense of orientation to the American people."[44] The Act authorizes the Secretary of the Interior to "expand and maintain a National Register of Historic Places," which is to be composed of "districts, sites, buildings, structures, and objects" which are significant to "American history, architecture, archaeology, engineering, and culture."[45] Once objects or sites have been added to the National Register, they receive a certain degree of "protection," because Article 106 of the Act requires that,

> "[A]ny Federal department or independent agency having authority to license any undertaking shall, prior to the approval of the expenditure of any Federal funds on the undertaking or prior to the issuance of a license, as the case may be, take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register".[46]

While being listed on or eligible for listing on the National Register qualifies these approved objects or sites for grants, loans, and tax incentives, it does not automatically prevent their damage or destruction.[47]

American made space objects such as *Vanguard 1,* Hubble, and the Apollo 11 items would seem to qualify for protection under the U.S. National Historic Preservation Act as "objects" and "sites" due to their unquestionable historical and cultural significance, as discussed in detail in Part I Section A of this paper. The objects are also worthy of protection under the Act because they are in danger of being disturbed by astronauts from other space faring nations or non-state actors.[48] However, the Act never explicitly references its own

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43 *See* National Historic Preservation Act of 1966, 16 U.S.C. § 470 et seq. (West 2010); 36 CFR Part 800.

44 National Historic Preservation Act § 1(b)(2-3).

45 National Historic Preservation Act § 101(a)(1)(A).

46 National Historic Preservation Act § 106.

47 *See* Charles E. Fisher, *Promoting the Preservation of Historic Buildings: Historic Preservation Policy in the United States*, Vol. 29 No. ¾ APT Bulletin 7, 8 (1998).

48 For Example, Google is currently sponsoring the "Lunar X Prize," which will award $30 million to the first individual or team to land a privately funded robotic rover on the Moon that is capable of completing several mission objectives, including roaming the lunar surface for at least 500 meters and sending video, images and data back to the Earth. *See* Google Lunar X Prize Website, *http://www.googlelunarxprize.org/lunar/press-release/google-sponsors-lunar-x-prize-to-create-a-space-race-for-a-new-generation* (last visited June 22, 2010).

applicability to extraterrestrial objects, making its application to them uncomfortable. If Congress intended the Act to apply to space objects, presumably they would have at least been mentioned in the text of the Act, especially given the fact that the Act was passed in 1966 at the peak of the "Space Race" between the United States and Soviet Union when awareness of the importance of outer space was especially high.[49] Additionally, even if manmade space objects are entered onto the Registry, or are designated as National Historic Landmarks, the Article 106 benefits this status affords wouldn't be able to protect them from destruction by other countries or non-state actors, which is the ultimate goal of space archaeologists.[50] Finally, if the U.S. were to add these objects to the Registry, other nations may interpret this as an assertion of sovereignty by the United States over, for example, the surface of the moon in which Neil Armstrong's footprint can be found.[51] Such an assertion of sovereignty would violate the Outer Space Treaty and may offend the other signatories.

Although there have been some setbacks, the legal obstacles associated with applying U.S. Federal historic preservation laws to manmade space objects have not proven to be completely insurmountable. In fact, in the past year alone, space archaeologists have made several large strides in their efforts to preserve the Apollo 11 items.

2.3 Recent Trends and Developments

Strangely enough, it seems to be the States, rather than the U.S. Federal Government, that are leading the charge to preserve the space objects associated with the United States' history in outer space. On January 29, 2010, the Historical Commission of California put the objects and structures at the first lunar landing at Tranquility Base on their State Historic Register.[52] The State sited the dual goals of raising public awareness regarding California's contribution to the historic Apollo 11 moon mission, and the importance of protecting the

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[49] *See Space Race Exhibition*, National Air and Space Museum, http://www.nasm.si.edu/exhibitions/gal114/gal114.htm (last visited June 27, 2010) (quoting President John F. Kennedy discussing the "Space Race" as early as 1962, saying, *"We have a long way to go in the space race. We started late. But this is the new ocean, and I believe the United States must sail on it and be in a position second to none.").*

[50] Jill Thomas & Justin St. P. Walsh, *Space Archaeology*, LosAngelesTimes (June 1, 2009), *available at http://articles.latimes.com/2009/jun/01/opinion/oe-walsh1/2* ("The final frontier already has some historic sites — such as Tranquility Base on the moon — that deserve protection from well-meaning but potentially destructive private projects in outer space.").

[51] In fact, this is exactly the position taken by NASA's Deputy Counsel in a 2000 letter to Professor Beth O'Leary stating, "The listing of lunar areas as NHL's is likely to be perceived by the international community as a claim over the Moon." *See* Handbook, *supra* note 35 at 775.

[52] *See generally* Jesse McKinley, *To California, Moon Junk is State Treasure*, N.Y. Times, Jan. 30, 2010, at A12, *available at http://www.nytimes.com/2010/01/30/science/space/30moon.html.*

objects from "lunar interlopers."[53] California's state historic preservation officer, Mr. Donaldson, acknowledged that there are no "space cops" available to enforce any U.S. protective measures to safeguard the historical resource.[54] Current U.S. preservation laws are not the perfect solution to the preservation problem, but, California seems to be hopeful that the move to add the objects to the State's Historic Register might "lead to bigger and better things."[55]

Following in California's footsteps, on April 9, 2010, New Mexico placed the same items on the New Mexico Register of Cultural Properties.[56] Similar moves are expected to be made in Texas, Georgia and Florida – the other states highly involved in the Apollo program.[57] Meanwhile, Beth O'Leary and other Apollo 11 Preservation Task Force Members are still hopeful that they will someday be successful in having these lunar artefacts objects designated as a National Historic Landmark under U.S. federal preservation law.[58] But space archaeologists face a looming challenge from those who would like to see their beloved cultural objects moved, or in some cases, destroyed.

3. Environmental protection in Outer Space

Environmentalism in the United States developed mainly as a reaction against the massive pollution that resulted from the industrial revolution.[59] As forests were cleared,

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53 *See* McKinley, *supra* note 52.

54 *See* McKinley, *supra* note 52.

55 *See* McKinley, *supra* note 52.

56 *See* Associated Press, *New Mexico Has Designated the Artifacts Left Behind at Tranquility Base on the Moon in its Official Registry of Historic Properties,* (April 13, 2010), *available at http://www.publicbroadcasting.net/krwg/news.newsmain/article/0/1/1635854/Regional/Apollo.11-New.Mexico*.

57 *See* One India News, *1969 Apollo 11 Moon Landing Site Given Heritage Status,* (January 30, 2010) ("State Historic Preservation Officer Milford Wayne Donaldson said that similar moves will be made in Texas, New Mexico, Georgia and Florida - the other states highly involved in the Apollo programme."), *available at http://news.oneindia.in/2010/01/30/1969apollo-11-moon-landing-site-given heritagestatus.html?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+oneindia-all-news+%28Oneindia+-+News%29*

58 *See* Handbook, *supra* note 35 at 775-76.

59 *See* Andy Reynolds, *A Brief History of Environmentalism*, *available at* http://*www.public.iastate.edu/~sws/.../HistoryofEnvironmentalism.doc* ("Between 1730 and 1850, the Industrial Revolution sparked an unparalleled wave of mining, forest clearance, and land drainage. It was also a period of the building of great factories. Jobs and economic development ruled. The oceans and rivers seemed unlimited in size and were the sewers of the world. Reacting to this onslaught, a few scattered individuals began to speak out.").

landfills were packed with waste, and factory smokestacks pumped exhaust out into the atmosphere at an alarming rate, some individuals advocated the development of a legal regime to protect the planet.[60] The goals of environmentalists were, and still are, diverse. For some, protecting the environment is for the future benefit of humans; for others it is "because nature, like a work of art, has its own value."[61] For some, environmentalism means actively cleaning up old pollutants, while for others it means regulating the production of new or future pollutants.[62] As environmental protectionism gained momentum, the United Nations held a Conference on the Human Environment, which resulted in a declaration of 26 environmental principles, as well as an Action Plan for the Human Environment and the establishment of an Environment Fund.[63] The United Nations Environment Programme was established, with the goal of promoting environmental practices across the globe and coordinating Earth Summits to continue a periodic global environmental dialog.[64]

These same terrestrial concepts of environmentalism could easily be applied to develop a legal regime for managing the trash and clutter left in outer space by mankind. Just as the industrial revolution led to the realization that our earthly land, air, and sea resources were not boundless and impervious to contamination, the halo of space clutter resulting from the space age has led to the current realization that the remnants of our society's past exploits in outer space now threaten our future scientific endeavors as well as our safety.

3.1 The Problem with Space Junk: Clutter and Pollution in Outer Space

Clutter in outer space is one problem that poses a threat to mankind's future scientific endeavours. Although outer space is undeniably vast, perhaps even endless, conflicts still develop over valuable "real estate" in outer space.[65] Geostationary orbits, located in a

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60 *See* Reynolds, *supra* note 59.

61 *See* Reynolds, *supra* note 59.

62 *See*, *e.g.*, Janice Nolen, *5 Steps to Clean Up Air Pollution*, Sci. Am. (June 2009, sp. ed.)(discussing importance of cleaning up old pollution); Susan Kraemer, *News Sources Ignore EPA's 1 in 100 Odds of Livable Future Without the American Power Act*, Sci. Am. (June 19, 2010) (discussing the importance of preventing future pollution).

63 *See* Reynolds, *supra* note 59. *See also* Rep. of the U.N. Conf. on the Human Env't, June 5-16, 1972, U.N. Doc. A/CONF.48/14/REV.1 (Jan. 1, 1973) [hereinafter U.N. Env't Report], *available at http://www.unep.org/Documents.Multilingual/Default.asp?documentid=97*.

64 *See* U.N. Env't Report, *supra* note 63.

65 For a discussion of the "infinite universe," *see* Joseph Silk, The Infinite Cosmos: Questions from the Frontiers of Cosmology 1 (Oxford University Press, March 23, 2006) ("Indeed, modern astronomy tells us tells us that the infinite universe may be more than just a metaphysical concept. Physics may even require an infinite universe.").

small, defined band of outer space 35,786 km from the Earth's surface and only 30 km wide, are perhaps the most important space real estate because of their desirability for communications satellites, which, when placed in geostationary orbit, will continually hover over the same place on the globe's surface.[66] The first NASA satellite was placed in geostationary orbit in 1964, and today there are over 1,000.[67] Scientists estimate that the geostationary orbit may only have the physical capacity to hold a total of approximately 1,500 satellites; therefore this already scarce resource is growing ever scarcer year by year.[68] Every "slot" in this orbit that is taken up by one satellite means one less slot for another satellite, or other scientific instrument. Therefore, it is essential that this orbit be kept as "clean," or free of clutter and space junk, as possible.[69] But currently there are more than 200 dead satellites littering the orbit.[70] The International Association for the Advancement of Space Safety has warned that this number could increase fivefold in ten years.[71] If this prediction comes true, this clutter from dead satellites will threaten to derail future scientific uses of this valuable portion of space.

Space junk does not merely inconvenience future scientific endeavours; it also threatens the safety and security of current space projects. As one writer has eloquently observed, space junk, "once discarded, has a nasty habit of turning into potentially lethal hyper-velocity projectiles – perfect for smashing into spacecraft and posing a serious threat to astronauts."[72]

This possibility nearly became a reality in early 2010, when Mission Control Centre at the Johnson Space Center discovered a floating piece of space junk, which they believed was on course to collide with the International Space Station.[73] A complicated plan to change

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66 *See generally* Christy Collis, The Geostationary Orbit: A Critical Legal Geography of Space's Most Valuable Real Estate, in: Space Travel and Culture, From Apollo to Space Tourism (Martin Parker & David Bell, eds., Wiley-Blackwell, 2009).

67 *See* Collis, *supra* note 66.

68 *See* Collis, *supra* note 66.

69 *See* Collis, *supra* note 66.

70 *Robots to Push Dead Satellites off Earth's Orbit*, The Times of India (October 12, 2009), *available at http://timesofindia.indiatimes.com/home/science/Robots-to-push-dead-satellites-off-Earths-orbit/articleshow/5113573.cms*.

71 *See* Times of India, *supra* note 70.

72 Lebans, s*upra* note 25 at 36.

73 *See* Gina Sunseri, *Space Station Safe From Space Junk: NASA Had Feared Debris Was in the Path of the Space Station*, ABC News, March 16, 2009, *http://abcnews.go.com/Technology/story?id=7092319&page=1*.

not only the Station's orbit, but also the path of the Space Shuttle Discovery, had to be developed quickly; luckily, the plan never needed to be implemented when the junk passed by the Station with a sufficient margin of clearance.[74] But this recent threat to the Space Station is just one event in what is shaping up to be the realization of a nightmare scenario described by Donald Kessler in his seminal paper, "Collision Frequency of Artificial Satellites: The Creation of a Debris Belt."[75] In this paper, Kessler hypothesized that a time would come when dead satellites and other space debris would accumulate until crashes in outer space became frequent and inevitable.[76] Colliding objects would shatter into countless smaller, equally dangerous pieces, setting off a cascading effect — a chain reaction of additional crashes.[77] Kessler predicted that, "the result would be an exponential increase in the number of objects with time," which would eventually create a "belt of debris" around the Earth.[78]

Currently the U.S. military actively monitors at least 19,000 objects in space, including many pieces of space junk, but many more go unmonitored.[79] One incident resulting from a lack of such monitoring was the February 10, 2009 surprise collision of a commercial communications (Irridium) satellite with a defunct Russian satellite.[80] In an instant, two space objects became more than 2,100 space projectiles, threatening military and communications satellites, the Space Station, shuttles, astronauts, and otherwise littering the cosmos.[81] Space environmentalists believe that if the creation of space junk is not reduced or completely halted, it is possible that at some point in the future outer space may become, at best, defiled, at worst, unusable.[82] This underlines the importance of developing a legal regime for cleaning and regulating the outer space environment.

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74 *See* Sunseri, *supra* note 73.

75 *See* Evan Schwartz, *The Looming Space Junk Crisis: It's Time to Take Out the Trash*, Wired Magazine, March 24, 2010 (noting the prescience of Donald Kessler's paper).

76 *See generally* Donald J. Kessler & Burton G. Cour-Palais, *Collision Frequency of Artificial Satellites: The Creation of a Debris Belt*, Vol. 83, No. A6 J. of Geophysical Res. 2637 (June 1, 1978), *available at http://webpages.charter.net/dkessler/files/Collision%20Frequency.pdf.*

77 Kessler, *supra* note 76.

78 Kessler, *supra* note 76.

79 *See* Michael Barkoviak, *Space Nations Unsure How to Handle Space Junk*, DailyTech, February 18, 2009, *available at* http://www.dailytech.com Space+Nations+Unsure+How+to+Handle+Space+Junk/article14304.htm.

80 *See* Bill Harwood, *U.S. And Russian Satellites Collide*, CBS News, Feb. 11, 2009.

81 *See* Schwartz, *supra* note 75.

82 *See*, *e.g.*, Howard A. Baker, *Protection of the Outer Space Environment: History and Analysis of Article IX of the Outer Space Treaty*, 12 *Annals Air & Space*, (1987) ("With an environmental approach, protection of the outer space environment and its sub-systems is the priority, [not] ensuring that outer space can be used for [human] space activities."); Robert N. Wells, Jr., *Law,*

3.2 Environmental Law That Could Apply to Outer Space

Although there is no "International Convention on Space Environmentalism," portions of many existing laws, both international and domestic, could arguably be applied to achieve the goals of space environmentalists.

It is a principle of customary international law that no State has the right to use or permit the use of its territory, or to use the territory of another State to pollute the global commons.[83] This principle was first proclaimed by an arbitral tribunal in *The Trail Smelter Case* (U.S. v. Can.), which involved the pollution of the air with noxious fumes.[84] The principle was reinforced by a 1996 advisory opinion of the International Court of Justice regarding the legality of the threat or use of nuclear weapons.[85] The Court held that States were under an international legal obligation to respect the environment of states beyond their territory and control.[86]

Although these cases and the principle they announced did not specifically reference any application to outer space, outer space, like the high seas and the Antarctic, has traditionally been viewed as a global commons, and the principle should therefore arguably apply. Nations who pollute outer space with orbital debris would therefore be in violation of customary international law. Unfortunately, enforcement of customary international law is almost non-existent, and therefore, even if this principle of customary international law

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Values, and the Environment, (The Scarecrow Press, Inc., 1996) ("Outer space, a source of wonder and inspiration for centuries, deserves to be preserved in its original pristine state, for its own sake and for future generations to enjoy."); April Greene Apking, *The Rush to Develop Space: The Role of Spacefaring Nations in Forging Environmental Standards for the Use of Celestial Bodies for Governmental and Private Interests*, 16 Colo. J. Int'l Envtl L. & Pol'y (2005) ("[W]e must ensure that our presence [in space] does not defile what remains one of the few accessible pristine areas."); *But see* J.H. Huebert & Walter Block, Space Environmentalism, Property Rights, and the Law, *37* U. Mem. L. Rev. 281 (2007) (criticizing space environmentalism and concern about the space environment as "absurd").

83 *See* Trail Smelter Case (U.S. v. Can.) 3 R. Int'l. Arb. Awards 1905 (1938 & 1941) (dealing with damage to farmland in the state of Washington from the emission of fumes from a Canadian smelter).

84 *Id.*

85 *See* Legality of Threat or Use of Nuclear Weapons, Advisory Opinion, 1996 I.C.J. 226 (July 8).

86 *Id.*

were widely accepted as applicable to space, it most likely would do little to force space-faring nations to alter their environmental behaviour.[87]

Another source of international law, in this case a multilateral treaty, applicable to the environmental regulation of space is the Outer Space Treaty.[88] Article I of the Treaty requires that activities in outer space, "be carried out for the benefit and in the interests of all countries . . . ."[89] Article IX requires that States Party to the Treaty to ". . . pursue studies of outer space . . . and conduct exploration of them so as to avoid their harmful contamination and also adverse changes in the environment of the Earth resulting from the introduction of extraterrestrial matter. . . ."[90]

Because the proliferation of space junk by space-faring nations is not in all States' interests, space pollution is arguably a violation of Article I of the Treaty.[91] Additionally, space junk, whether on the moon or in orbit, constitutes "harmful contamination" which can and has caused effects on the surface of the Earth, although the effects have primarily been disruptions in satellite communications, rather than adverse environmental changes, and therefore arguably do not fall within the language of Article IX. As with customary international law, the enforcement of multilateral and bilateral treaties is also challenging. In the case of the Outer Space Treaty, there is no international military to enforce its provisions, and diplomatic pressures alone have not proven sufficient to encourage States to adhere to the environmental applications of the Treaty's principles. Additionally, the treaty lacks sufficient specificity to serve as grounds for legal claims, and does not provide for causes of actions by non-governmental parties.

Partially because of the shortcomings of international customary and treaty law in establishing an effective environmental law regime for outer space, some scholars have

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87 See *Elena Katselli,* The Problem of Enforcement in International Law: Countermeasures, the Non-Injured State and the Idea of International Community*, Int'l. L. Observer (May 18, 2010) ("The problem of enforcement in international law is one that has undermined not only the effectiveness of the international normative system but also its credibility. For many international law skeptics there is only so much that international law can do. To expect the international system to offer true justice to the states comprising it is perhaps a utopian idea that cannot be fulfilled simply because the system does not have the required mechanisms in place and the ability to achieve this.").*

88 *See* Outer Space Treaty, *supra* note 39.

89 Outer Space Treaty, *supra* note 39 at Article I.

90 Outer Space Treaty, *supra* note 39 at Article IX.

91 Space junk is especially against the interests of States such as Saudi Arabia, one of the countries that has experienced a large piece of space junk falling out of the sky and striking the Earth's surface within its sovereign territory. *See* Schwartz, *supra* note 70.

argued for the extraterritorial application of U.S. domestic laws to space.[92] Jennifer Purvis, an advocate of applying domestic U.S. environmental law to outer space, has examined the potential applicability of the National Environmental Policy Act (NEPA), Resource Conservation and Recovery Act (RCRA), and Clean Air Act (CAA) (among other statutes) to clean up and regulate the further pollution of outer space.[93] After close examination, Purvis concludes that, "it appears that none of the statutes considered will apply to outer space . . ." primarily because of a lack of Congressional intent for them to do so.[94] However, she goes on to argue that the U.S. Congress could, and should craft environmental statutes to apply to space, "because U.S. legislation aimed at preventing the discard of debris would put a significant and urgently needed check on the growing debris problem."[95] Despite Purvin's persuasive argument, Congress has yet to follow her legislative suggestions. But the lack of an existing international or domestic legal environmental regime which applies to outer space has not prevented space environmentalists from proposing various ideas and methods for tackling the space debris problem.

3.3 Recent Trends and Developments

After two events created previously unheard of amounts of orbital debris (the downing of a satellite by China in 2007 and the Iridium/Cosmos satellite collision of 2009) NASA's Orbital Debris Program Office developed some guidelines to slow down the accumulation of space junk. The rules limited what could be abandoned, and they required satellite operators to help clean up the crowded geosynchronous belt 22,400 miles above Earth by manoeuvring retired spacecraft into slightly higher "graveyard orbits."[96] But such relatively modest steps, aimed primarily at halting the chain reaction of collisions, were not enough for some.

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6 *See*, *e.g.*, Jennifer A. Purvis, *The Long Arm of the Law? Extraterritorial Application of U.S. Environmental Legislation to Human Activity in Outer Space*, 6 Geo. Int'l Envtl. L. Rev. 455 (Spring 1994) ("The conclusion that international law is unable to cope with the accumulation of debris compels a different approach to the problem, namely, the application of U.S. environmental law to outer space. Considering the substantial amount of U.S. activity in outer space and the consequently large U.S. contribution to the problem, such an approach could significantly reduce debris accumulation.").

93 *See* Purvis, *supra* note 92.

94 *See* Purvis, *supra* note 92 at 498.

95 *See* Purvis, *supra* note 92 at 498.

96 *See* Schwartz, *supra* note 75.

More extreme space environmentalists advocate cleaning up outer space by removing or destroying all manmade objects not currently serving their original scientific purpose, and they have proposed vaporizing the debris with lasers, knocking it off course so that it will burn up in the Earth's atmosphere, capturing it with nets, or towing it with an electromagnetic tether.[97] Proposals to recycle space junk have also been suggested, where orbital debris could be repurposed to serve as a radiation shield for new satellites and space stations, among other things.[98] As bizarre as many of these proposals sound, influential people, including the Pentagon's Darpa, are listening.[99] But most of the proposals are estimated to be both expensive and difficult, costing from tens of millions to $240 million.[100]

Despite the high cost of many of today's proposals to clean up the cosmos, space environmentalism is continuing to gain popularity, and the discussions regarding the future of space junk are only just beginning to take shape. And as they do, space environmentalists may have their eyes on cleaning up *Vanguard 1,* the Hubble, and the Apollo 11 objects, all objects which are no longer, or soon will no longer be, serving their original scientific purposes. Additionally, they can be seen as contaminating the once pristine space environment and unnecessarily cluttering space real estate.

4. Potential for Conflict and Compromise between Historic Preservation and Environmentalism

Because space environmentalists are interested in developing a legal regime which could require the clean up (by moving or destroying) of the very same objects which space preservationists would like to see legally protected, there is tremendous potential for conflict between these two emerging areas of outer space law. This does not, however, mean that these two areas of the law cannot be reconciled and perhaps even developed in tandem, each making accommodations for the other. In the context of domestic U.S. law, conflicts between historic preservation law and environmental law have largely been overcome; and in fact the two areas of law are often integrated. For example, the Federal Emergency

97 *See* Schwartz, *supra* note 75. *See also* Skatssoon *supra* note 23.

98 *See Recylcing Space Junk*, Island One Society, http://www.islandone.org/LEOBiblio/SPBI1RE.HTM.

99 *See* Schwartz, *supra* note 75.

100 *See* Schwartz, *supra* note 75 ("Last December, at a Marriott not far from Darpa's headquarters in Arlington, Virginia, about 175 people filed into a meeting hall to take part in the first-ever International Conference on Orbital Debris Removal, sponsored by Darpa and NASA.").

Management Agency (FEMA) has an Environmental Planning and Historic Preservation (EHP) program that,

> "[I]ntegrates the protection and enhancement of environmental, historic, and cultural resources into FEMA's mission, programs and activities; ensures that FEMA's activities and programs related to disaster response and recovery, hazard mitigation, and emergency preparedness comply with federal environmental and historic preservation laws and executive orders; and provides environmental and historic preservation technical assistance to FEMA staff, local, State and Federal partners, and grantees and subgrantees".[101]

Additionally, in 1998 Congress passed the Environmental Policy and Conflict Resolution Act, which created the U.S. Institute for Environmental Conflict Resolution.[102] This institute helps to resolve environmental disputes that involve the federal government, including conflicts between environmental law and historic preservation law under the Historic Preservation Act, by providing mediation, training, and related services.[103]

The international development and integration of historic preservation and environmental laws in outer space can and should follow the model of integration between these two areas of law in the United States' domestic system. The two areas of law should be explicitly integrated in an international, multilateral treaty, and an international system for arbitration of any future disputes should be developed. An international convention including representatives and experts from both fields would be the ideal means of beginning the process. Delegates to the convention could begin drafting the provisions of an International Treaty for Environmentalism and Historic Preservation in Outer Space, and perhaps also domestic implementing legislation, which would be adopted by interested member states. An international treaty that develops both fields of law at once stands the best chance of addressing conflicts over specific space objects before they arise, and would avoid the jurisdictional debacle encountered by space preservationists and space environmentalists who have previously sought the extraterritorial application of domestic U.S. laws to achieve these ends. Criteria for nominating and designating certain objects as historic space landmarks could be developed in the treaty, and a legal regime for ensuring

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101 *See FEMA's Environmental Planning and Historic Preservation (EHP) Program*, Fed. Emergency Mgmt. Agency, *http://www.fema.gov/plan/ehp/ (last visited June 28, 2010)*.

102 *See* U.S. Inst. for Envt'l Conflict Resolution, http://www.ecr.gov/Default.aspx (last visited June 28, 2010) [hereinafter USIECR website].

103 *See* USIECR website, *supra* note 102.

and enforcing the protection of these items could be explicitly established. The criteria for designation as a UNESCO World Heritage Site could perhaps serve as a useful model.[104] The treaty could then allow for, and perhaps even require, the clean up of all space junk that does not meet the criteria for historic preservation contained in the treaty's text. The treaty could also provide for the creation of an international arbitral panel to resolve disputes over the fate of individual space objects, in case the application of the treaty to certain objects is unclear. The creation and adoption of such an international treaty would make clear that the goals of preserving culturally significant items *and* significantly reducing the growth of space pollution do not have to be mutually exclusive if they are well coordinated.

5. Conclusion

It has been over 53 years since the first manmade object, *Sputnik,* was launched into orbit in outer space. In the following decades the number of manmade objects in space grew exponentially, but the development of international laws to regulate, protect, or prohibit such manmade items in space did not. This dearth of applicable international laws has prompted space enthusiasts, both preservationists and environmentalists alike, to advocate for the extraterritorial application of U.S. domestic laws to outer space. The problem with this approach is that outer space is and always has been viewed as a global commons, and the application of one sovereign jurisdiction's laws to all of outer space is uncomfortable and risks upsetting the peace. Space can and should be governed by international law.

Today, with an estimated half million manmade objects in orbit, the time is ripe for an international discussion regarding their fate. The negotiation of an international treaty on historic preservation and environmental protection in outer space is overdue. A treaty of this kind promises the best solutions to ensure that the most historically and culturally significant items associated with man's *history* in space are appropriately preserved, while the true "space junk" is reduced before man's *future* in space is threatened. ■

[104] *See* Convention Concerning the Protection of the World Cultural and Natural Heritage, arts. 1-2, Nov. 16, 1972, 27 U.S.T. 37, 1037 U.N.T.S. 151, available *at http://whc.unesco.org/en/conventiontext*.

Recalibrating the Moon Treaty to the Domain of Development

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Abstract

The Agreement Governing the Activities of States on the Moon and Other Celestial Bodies ("the Moon Treaty"), 1979 was in part, brought in to address a question left open by the 1967 Outer Space Treaty: the status of private property rights. However, all it generated was a furore of extremely heated discussions which resulted in no major space faring nation signing up for the legislation, which took about 5 years to even acquire the sufficient signatories to come into force. It is generally considered a failure, even by its supporters. And by its own terms, it comes up for periodic review by the United Nations General Assembly. The first such review was scheduled to take place ten years after its entry into force. Although there was then no great interest among UN members in revisiting the

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Moon Treaty, a strong proposal for substantial reform might pique it now. This article aims to fulfil this need of the hour in a two-fold process. Firstly, this article highlights and then critically analyses the four principal points of controversy regarding the Moon Treaty, that it:

1. Allegedly, imposes a moratorium on exploitation of the resources of the moon and other celestial bodies until the establishment of a governing regime.
2. Requires establishment of a governing regime.
3. Allegedly prohibits private resource property rights.
4. Proposes to allow a governing regime to tax private enterprises**.**

While the Moon Treaty would no doubt be bad for space development if it were in force against the major space powers, its absence is not a sufficient condition for space development. The mere absence of regulation is not enough to encourage investment: there must be positive legal protection for property rights. Such protection is difficult to achieve in the absence of some sort of legal regime. And although it is conceivable that an appropriate regime might be provided via a unilateral approach employing only the municipal (domestic) law of individual nations, that is very much plagued with its own set of drawbacks. Therefore, the second section of the paper concentrates on redrawing the structure of the Moon Treaty, so as to incorporate the essential needs of fortification of property rights while maintaining the pillar of "common heritage of mankind" followed in space law, to ensure a common uniform legal regime across all space-faring nations with regard to the lunar resources.

1. Introduction

On July 20, 1969 at 4:17:40 p.m. the world changed. Neil Armstrong became the first person to land on the moon. With this landing the world entered into a whole new age, the space age. Upon entering in to any age there are always people who want to exploit this new situation and others who want to preserve the existing situation which was true in this case too. The parties directly involved in this controversy are private business and the United Nations.

On December 19, 1966 the "Outer Space Treaty" was adopted by the UN General Assembly and was open for signature in London, Moscow and Washington in on 27 January

1967. The Outer Space Treaty is sometimes referred to as the Magna Carte for all space law and treaties. The first multilateral space convention, the 1967 Outer Space Treaty,[1] establishes a basic framework for the international legal regime in outer space. The treaty declares that the exploration and use of outer space should be carried out for the benefit and in the interest of all countries and "shall be the province of mankind." It provides that outer space, including the moon and other celestial bodies, should be free for exploration and use by all states. Outer space is not subject to national appropriation. The treaty prohibits the placement of nuclear weapons or any other kinds of weapons of mass destruction in outer space, and declares that the moon and other celestial bodies shall be used "exclusively for peaceful purposes." The treaty contains provisions on the rescue and return of astronauts. States to bear international responsibility for national activities in outer space, as well as international liability for damage.

From the Outer Space Treaty four other treaties were spawned. (1) the Agreement on the Rescue and Return of Astronauts, and the Return of Objects Launched into Outer Space, opened for signature in 1968; (2) the Convention on International Liability for Damage Caused by Space Objects (Liability Convention), opened for signature in 1972; (3) the Convention on Registration of Objects Launched into Outer Space, opened for signature in 1975; and (4) the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (Moon Treaty), opened for signature in 1980.

The Moon Treaty[2] represents the only one of the four agreements which became deeply imbedded in controversy immediately upon its resolution of approval by the General Assembly. The Treaty was finally formulated and propagated by the UN General Assembly in 1979. Its basic purpose was to insure that any wealth obtained from the Moon by any space faring nation was to be distributed to all the people of the world. This treaty was the culmination of the time when the world's underdeveloped nations were attempting to use international forums to assert their rights as sovereign nations and seeking to obtain their shares of the world's and space's resources.

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[1] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, 1967.

[2] Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1979.

However, the Moon Treaty has been largely rejected by the international community[3] mostly due to its provisions that would make outer space resources the "common heritage of mankind." "Although the Moon Treaty is valid law, it is in effect only against its signatories and is therefore not considered a part of space law by American commentators."[4] Only thirteen nations have ratified the treaty, none of them space-faring,[5] so this treaty can hardly be considered representing any form of international legal consensus. Indeed none of the signatories of the Moon Treaty (except France) has space access capability, suggesting that it does not reflect any practical concerns in space exploration and development.

In the Moon Treaty Article 11.1 states that the Moon and its natural resources are the "common heritage of all mankind." The Outer Space Treaty has a provision which sounded similar – "the common Province of all mankind", but actually meant that no single country could claim outer space or other celestial bodies as colonies, but it permits the use of the resources. "The common heritage of all mankind" is a phrase which means all the resources of space belong to all nations and the use or extraction by one nation is against the principle of this treaty. There should also an international organization established to redistribute the wealth returned from the moon and outer space. This interpretation of the treaty is disputed and has resulted in no major space-faring nation including the U.S. and Russia not signing the treaty.

Since its entry into force thirty years ago, the Moon Treaty has certainly been languishing, the principal reason obviously being the fact that the enthusiasm for exploiting the natural resources of the Moon, which had been so marked at the time of its adoption had soon begun to wane. On the positive side it is to be noted that at present efforts are being undertaken attempting to strengthen the legal regime enshrined in the Moon Treaty by encouraging wider participation. To this end, in spring 2008 a group of States Parties to the Agreement issued a joint statement on the benefits of adhering to it, pointing out that in conjunction with the Outer Space Treaty it was helpful to States Parties in rejecting the "idle claims to property rights" that had surfaced in recent years.

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[3] *U.N. Committee on the Peaceful Uses of Outer Space, Report of the Legal Subcommittee on its Forty-eighth Session, art. 31(a), U.N. Doc.A/AC.105/935 (August. 20, 2010), available at http://www.oosa.unvienna.org/pdf/reports/ac105/AC105_935E.pdf.*

[4] Glenn Harlan Reynolds, *Key Objections to the Moon Treaty*, *http://www.nsschapters.org/hub/pdf/Moon Treaty Objections.pdf.*

[5] Adam G. Quinn, Note, *The New Age of Space Law: The Outer Space Treaty and the Weaponization of Space*, 17 MINN. J. INT'L L. 475, 482 (2008).

The Agreement had adopted an "intelligent approach" regarding the exploitation of natural resources, leaving to the States involved the responsibility for the establishment of an international regime in accordance with the principle of common heritage of mankind and other principles of outer space law at the time when the exploitation of the natural resources becomes feasible. Such a regime should be established and implemented by taking into account simultaneously the relevant political, legal and technical facts, possibilities and requirements existing at that time. The statement also clarifies that the Moon Agreement does not preclude any modality of exploration, by public or private entities or prohibit the commercialization of such resources, provided that such exploitation is compatible with the principle of a common heritage of mankind. It is further noted that to date no other solution allowing the possible exploitation of the natural resources of celestial bodies has been proposed under the provisions of the United Nations treaties on outer space.

1.1 Problems with the existing Moon Treaty

"Common Heritage of Mankind" Language

The core provision of the Moon Agreement, is Article 11, paragraph 1, based on the informal Austrian compromise text, providing that "the Moon and its natural resources are the common heritage of mankind", which finds its expression in the provisions in paragraph 5 of that article. According to that paragraph, States Parties undertake to establish an international regime, including appropriate procedures, to govern the exploitation of the natural resources of the Moon as such exploitation is about to become feasible. This provision is to be implemented in accordance with article 18 which provides for a review conference ten years after the entry into force of the Agreement on the basis of the common heritage principle and taking into account in particular any relevant technological developments. Article 11, paragraph 7, sets forth the main purposes of the future international regime which is to include an equitable sharing by all States Parties in the benefits derived from the resources, whereby the interests and needs of the developing countries as well as the efforts of those countries which have contributed either directly or indirectly to the exploration of the Moon shall be given special consideration. This provision thus contains a balanced definition of the notion of equitable sharing of benefits as it proceeds from the assumption that equity is impossible without special consideration of the efforts of States which have contributed to resource exploitation activity on the Moon. Like the identical language contained in the Law of the Sea Convention, the "common heritage" language of the Moon

Treaty constitutes a finding that all nations of the world – whether or not they expend any effort or risk any capital – have rights to Lunar resources. This means that any effort to develop resources would require the consent of all nations, a process that would be slow, cumbersome and prone to blackmail.

1.2 Ban on Property Rights

That this goal is made clear by Paragraph 3 of Article 11, which provides that: "neither the surface nor the subsurface of the Moon, nor any part thereof or natural resources in place, shall become the property of any state, international intergovernmental or non-governmental organization, national organization or non-governmental entity or of any natural person."

Without property rights, economic development of the Moon would be frustrated - unless it were conducted by the special monopolistic regime that the treaty contemplates in Article 11, Paragraphs 5 & 7.

1.3 The International Regime

According to Paragraph 5 of the Treaty, there will be established "an international regime, including appropriate procedures, to govern the exploitation of the natural resources of the Moon as such exploitation is about to become feasible."

Paragraph 7 provides (among other things) that the regime shall promote "orderly and safe development of lunar resources, rational management of them and the equitable sharing by all states parties in the benefits derived from those resources."

Although the Moon Treaty itself provides little guidance on what these terms mean, the very similar Law of the Sea Convention interprets them to involve the creation of an international authority to govern or conduct all resource extraction, with a hefty share of the proceeds going to less-developed countries regardless of whether they have any investment in the activity or not. That would discourage – if not outrightly prevent – the development of lunar resources any time soon.

1.4 Other Problems

Although styled as "Moon Treaty," this agreement by its terms also extends to other celestial bodies, including Near-Earth asteroids and Mars (Article I). The Moon Treaty is

silent on the question of human rights in space, except to deny them in the case of property rights (see above) and privacy rights (Article 15). And it limits use of the Moon only to "scientific purposes" until an international regime is established pursuant to Article 11.5. This might even prohibit space tourism or space power systems, or other beneficial but non-scientific uses of the Moon and other celestial bodies.

Since the world has shown little interest in the Moon Treaty and there have been no attempts since to address this issue by treaty, a big question remains: since national appropriation is forbidden, what about private appropriation? Even if private appropriation is not prohibited, would a private company get to reap the benefits of its labour? Does "the province of all mankind" have the same or similar meaning to the "common heritage of mankind" calling for an equitable distribution?

In short, the Moon Treaty could pose a serious barrier to space development. It's up to us to keep that from happening.

2. Why Real Property Rights are Necessary?

The 1979 Moon Treaty contains a non-appropriation clause which is more inclusive than Article 2. Although Article 11, paragraph 2 of the Moon Treaty reiterates the language of Article 2 of the Outer Space Treaty, Article 11, paragraph 3 further provides that "neither the surface nor the subsurface of the moon... shall become property of any state, international inter- governmental or non-governmental organization, national organization or non-governmental entity or of any natural person" (references to "the moon" in the Moon Treaty refer to all celestial bodies and areas of outer space other than Earth and Earth orbits).

The treaty also says, in Article 11, paragraph 1, that "the moon and its natural resources are the "common heritage of mankind." Opponents of the treaty note that the developing nations often interpret "common heritage" to mean "common property" of mankind. As a result, the Moon Treaty has encountered resistance from many countries with free market economies.

A development regime which provides some form of property rights will become increasingly necessary as space develops. Professionals foresee an integrated system of solar power generation, lunar and asteroidal mining, orbital industrialization, and habitation in outer space. In the midst of this complexity, the right to maintain a facility in a given location relative to another space object may create conflict. Such conflicts may arise sooner

than we expect, if private companies begin building subsidiary facilities around space stations. Eventually large public facilities will become the hub of private space development, and owners will want to protect the proximity value of their facility location.

It also seems likely that at some point, national governments and/or private companies will clash over the right to exploit a given mineral deposit. Finally, the geosynchronous orbit is already crowded with satellites, and other orbits with unique characteristics may become scarce in the future.

The institution of real property is the most efficient method of allocating the scarce resource of location value. Space habitats, for example, will be very expensive and will probably require financing from private as well as public sources. Selling property rights for living or business space on the habitat would be one way of obtaining private financing. Private law condominiums would seem to be a particularly apt financing model – inhabitants could hold title to their living space and pay a monthly fee for life-support services and maintenance of common areas.

Even those countries which do not have launch capability would benefit from a property regime. Private entities from the developing nations could obtain property rights by purchasing obsolete facilities from foreign entities that are more technologically advanced.

A regime of real property rights would provide legal and political certainty. Investors and settlers could predict the outcome of a conflict with greater certainty by analogizing to terrestrial property law. Settlers and developers would also be reassured, knowing that other nations would respect their right to remain at a given location.

Many developing nations might favor an equitable distribution of benefits reaped from outer space resources regardless of contribution, but have so far never considered this to mean the nations that do go to space are obligated to give up their technology so that nations without this technology can go themselves. Further, no nation can be blocked from using space for peaceful, scientific purposes. Perhaps an example of how the space-faring nations practice the concept of the province of all mankind with each other is in order.

The International Space Station (ISS) Agreement,[6] which recognizes all space treaties (with the notable exception of the Moon Treaty), does NOT state that the benefits

[6] Agreement Among the Government of Canada, Governments of Member States of the European Space Agency, the Government of Japan, the Government of the Russian Federation, and the Government of the United States of America Concerning Cooperation on the Civil International Space Station, Jan. 29, 1998.

belong to all nations equally, but that the knowledge gained in experiments on the station are the intellectual property of the nation whose module the research was conducted in, maintaining intellectual property rights. So although the ISS Agreement recognizes the Outer Space Treaty, discoveries aboard the International Space Station are not strictly the Common Heritage of Mankind, giving us some insight into what the major space-faring nations conceptualize as the "province of all mankind."[7]

No corporation (or other private business entity) would make a large investment knowing that, not only would there be little or no profit, but most likely the undertaking would lose the bulk of its investment to non-contributors. So, for private appropriation to work, first we must assume that like technology and knowledge, the benefits will be peacefully obtained and shared with humanity in a less direct, more commercial form. Just like certain benefits that have been gained from other forms of technological innovation, the human race benefits from space exploration by having products that have been properly licensed and then marketed to the public.

"In sum, the 'Common Heritage' to be enjoyed by all mankind may be seen modernly as a hybrid of: equitable access for all, some equitable benefits for all (excluding non-peaceful purpose technology), and equitable rights to peace in space."[8]

If the space-faring nations of the world use He^3 in fusion reactions instead of burning fossil fuels such as coal or natural gas for energy, doesn't this benefit the world? It would vastly reduce greenhouse gases. It would also greatly decrease the demand for finite fossil fuels, making them more available for all the various plastics and polymers used in our technologies besides help in freeing many developed nations from dependence on resources in other countries.

"While the private enterprise receives the possible financial benefit from the risky undertaking, people throughout the world stand to benefit because space resources will conserve the Earth's scarce natural resources, further scientific discovery, and boost the world economy."[9]

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7 Id Moon Treaty

8 Daniel A. Porras, Comment, *The "Common Heritage" of Outer Space: Equal Benefits For Most of Mankind*. 37 CAL. W. INT'L L.J. 143, 172–73 (2006).

9 Kelly M. Zullo, Note, *The Need to Clarify the Status of Property Rights in International Space Law*, 90 GEO. L.J. 2413, 2434 (2002)

3. Real Property Rights

In general, real property law would seem to provide more appropriate analogies when addressing the problems associated with permanently located space facilities and mining sites. Maritime analogies should only be applied in connection with space vehicles and satellites in unstable orbits. There has been little discussion of property rights in the literature of space law. C. Wilfred Jenks provides one of the few treatments of the subject in his book, Space Law[10]: If property transactions should take place in space it would seem appropriate to regard them as governed by the law with which it has the most substantial connection. If anything in the nature of real property rights at a space station on a celestial body were to be recognized, the law applicable there would presumably govern them. Any recognition of real property rights beyond the limits of such a station would raise a major question of policy concerning the basis of authority to confer or recognize such rights.[11] Jenks does not explain the distinction between property rights within a facility and property rights outside a facility. Why would recognition of property rights outside a facility "raise a major question of policy" while property rights within a facility would not?

4. Property Rights without a Sovereign

Assuming that "the province of all mankind" does not mean "the common heritage of mankind" and corporations could mine the Moon and keep their profits or, alternatively, then the province of all mankind includes a less direct benefit to all.

U.N. Charter protects a nation's property from expropriation by another nation.[12] However, if one domestic corporation tries to seize the land or resources of another domestic corporation, it is not an issue for the U.N., but of the sovereign nation of whose territory in which the action took place. The World Trade Organization protects the activity of corporations but only as citizens of a sovereign nation that is a signatory of the treaty.[13] Corporations acting in space could not ask these supranational organizations to enforce their claim since that would require a nation to extend its sovereignty "by any other means."[14]

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10 (New York: Frederick A. Praeger, 1966.

11 *Ibid*

12 U.N. Charter art. 2, para. 4.

13 Agreement Establishing the World Trade Organization, Apr. 15, 1994, 1867 U.N.T.S. 154, art. 3, para. 2.

14 Outer Space Treaty, *supra* note 19, art. XI.

So the question remains, can one secure property rights without a sovereignty. Many scholars believe that property rights can be secured without sovereignty. These scholars assert that the Outer Space Treaty does not ban private property and that private corporations could establish a legal claim to property on the Moon and other bodies in outer space.[15] Several legal scholars agree with this perspective by using the legal doctrine of *expressio unius est exclusion alterius*, that is, if something is not expressly forbidden, it cannot be inferred that it is forbidden.[16] Because the Outer Space Treaty does not expressly forbid nongovernmental appropriation, these scholars point to the world's rejection of the Moon Treaty, which attempts to forbid private appropriation, as evidence that many nations have no intent to eliminate the possibility of private claims.[17]

5. Real Property Rights beyond a Facility

The relationship between property and sovereignty differs under common law and civil law systems. The common law theory of title has its roots in feudal law. Under this theory the Crown holds the ultimate title to all lands, and the proprietary rights of the subject are explained in terms of vassalage. Civil law, on the other hand, is derived from Roman law, which distinguishes between property and sovereignty. Under this theory it is possible for property to exist in the absence of sovereignty.

Article II of the Outer Space Treaty prohibits territorial sovereignty but does not prohibit private appropriation. Hence, private entities may appropriate area in outer space or on a celestial body, although states may not. Under the common law theory of property rights, however, states (lacking sovereignty), would not have any rights to confer on private entities. Conversely, under the civil law view, property rights would exist independent of sovereignty, and therefore could be recognized.

This is why "in the discussions leading to the conclusion of the Outer Space Treaty, France a civil law country indicated more than once that she was not altogether satisfied

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15 David Kopel & Glenn Reynold, The New Frontier: Preparing the Law for Settling on Mars, NAT'L REV. ONLINE, June 4, 2002, http://www.nationalreview.com/kopel/kopel060402.asp.

16 Alan Wasser & Douglas Jobes, *Space Settlements, Property Rights, and International Law: Could a Lunar Settlement Claim the Lunar Real Estate It Needs to Survive?*, 73 J. AIR L. & COM. 37, 44–45 (2008).

17 Joanne Irene Gabrynowicz, *The International Space Treaty regime in the Globalization Era*, AD ASTRA, Fall 2005, at 30, *available at* http://www .space-settlement-institute.org/Articles/IntlSpaceTreatyGabryno.pdf.

with the wording of Article II....." France's representative was "thinking in particular of the risks of ambiguity between the principle of non-sovereignty – which falls under public law – and that of non-appropriation, flowing from private law."[18]

It follows that any recognition of real property rights beyond the confines of a facility would, as Jenks observed, "raise a major question of policy." Because a private entity could conceivably (assuming it overcomes the high establishment and operational cost and management issues) establish control over an area of the same magnitude that a country might control, recognition of real property rights beyond facilities would raise issues similar to those raised by territorial sovereignty.

Although proponents of space development would undoubtedly welcome the economic incentive of unlimited appropriation, such claims should not be recognized. This form of property rights could potentially preclude free access to outer space in the same manner as territorial sovereignty would preclude free access. Finally, as a point of law, recognition of real property rights beyond the confines of space facilities would be inconsistent with the common law theory of property.

6. Real Property Rights within a Facility

Jenks stated that property rights within a facility would be permissible under international law. Nevertheless, in light of the maxim that entities cannot transfer a greater right than they have, these property rights would be, in common law jurisdictions, necessarily more limited than traditional property rights. The common law sovereign could only confer title to the extent of its own sovereignty; thus, under the functional sovereignty conferred by Article VIII of the Outer Space Treaty, property rights would befunctionally defined and limited in time.

7. Spitzbergen

Can nations, confer property rights which are limited, to the extent of the sovereignty conferred under Article VIII of the Outer Space Treaty? Terrestrial governments have never actually conferred or recognized property rights predicated on functional rather than territorial sovereignty. Nevertheless, the idea is not without precedent. Functional property rights have been considered in connection with the Spitzbergen Islands, which are located off the Norwegian coast.

At the turn of the century, coal deposits were discovered on these islands. Simultaneously companies of several different nationalities began mining operations. Because the arctic

climate discouraged permanent occupation, the nations which had previously used the islands never considered it worthwhile to claim them. So these islands were generally recognized as terra nullius – a "no-man's land." Suddenly, when coal was discovered, the concerned nations found it necessary to settle conflicting claims and to protect the rights of their nationals, in the absence of territorial sovereignty.

Consequently, Robert Lansing, in his article "A Unique International Problem"[19], proposed that the islands be jointly governed by the various nations, on the basis of functional sovereignty, within the framework of an international agreement. Central to Lansing's proposal was the concept of limited property rights predicated on functional sovereignty. In 1912 the parties prepared a draft convention to implement the idea. World War I intervened, however, and in the changed circumstances following the war, the parties signed a treaty granting sovereignty to Norway.

8. A Proposal

Under a regime of functional property rights, title would arise on the basis of a principle entirely different from traditional property rights. Conferral of title would not depend upon a government's control over a specific area, but rather upon its control over the space objects and personnel at that location. Once conferred, these rights would, nevertheless, be almost identical to terrestrial property rights.

On Earth the exclusion of others from the use and enjoyment of a given area is the principal right associated with real property ownership. In space first-come, first-served occupation, and the prohibition against harmful interference with other states' activities provides states with a similar, albeit less clearly defined, right of exclusion. Property rights legislation would extend this right to a state's citizens. Functional property rights would be subject to the limitations of Article VIII jurisdiction. These rights would terminate if activity were halted, as for example, if a space object was abandoned or returned to Earth. Finally, rights would be limited to the area occupied by the space object, and to a reasonable safety area around the facility. Hence, orbital property rights would extend only to the moving "envelope" occupied by a facility, and not to its entire orbital path.

In other respects a real property regime could be structured at a state's discretion. States would determine the conditions necessary to establish and maintain property rights. They

[19] Available at *www.jstor.org/stable/2188203*.

could follow the example of the United States' Canada's, Australia's or New Zealand's Homesteading Acts, and require owners to maintain a facility (and/or conduct certain activities) in a fixed location, for a specified period of time (e.g. one to five years), to establish a property right. The regime would have to specify the period of inactivity or abandonment necessary to extinguish a property right, and the permissible deviation of an orbital facility from its proper location.

In outer space, requiring facility owners to maintain a fixed orbit offers several advantages. First, it will reduce the probability of collision. It seems likely that some sort of "space traffic control" will evolve to track and direct space objects; plotting titled orbital locations as constants would permit controllers to concentrate on space vehicles and satellites in less stable orbits. Facility owners would benefit from this arrangement if non-titled space objects (or space objects exceeding their parameters) were held presumptively liable in a collision. Secondly, fixed orbits discourage indiscriminate dumping of debris, because debris can be more easily tracked to plotted, fixed points of origin. Hence, courts would sometimes be able to assess liability for debris-caused damage.

Functional property rights permit free access to all areas of outer space and celestial bodies because they do not necessitate territorial sovereignty and its consequent appropriation of large areas of space. Safety zones may extend to a reasonable distance around a facility, and exist only for the security of the facility and to promote safe navigation in its vicinity.

The regime is attractive because it is so easy to implement. Nations can unilaterally enact legislation, and they can tailor that legislation to conform to their existing property laws. The regime will cost states virtually nothing to implement, yet it will encourage citizens to enter what promises to be a very lucrative field.

Participating states should additionally provide for reciprocity and/or negotiate some form of limited "mini-treaty" to coordinate national property legislation. Such a treaty would elaborate on the elements in Article VIII of Outer Space Treat, it would define the property rights and provide for their recordation; it would define the term "space object," with particular emphasis on the distinction between space vehicles and permanently situated space facilities; it would define the term "personnel"; and it would delineate the extent of jurisdiction and control, with particular emphasis on the physical extent of safety zones, and upon the temporal duration of jurisdiction, i.e. upon the period of abandonment necessary to extinguish jurisdiction. ■

The Legal Framework of Satellite Positioning with Particular Reference to Privacy

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The present paper discusses the problems of and legal framework applicable to satellite positioning with particular reference to the protection of privacy. Technological applications based on positioning technology are widely used and their number is constantly increasing. The rapidly developing technology in the field makes it possible to position people and goods easily and accurately. These developments give rice to privacy issues, however, as positioning can violate the privacy of the person who is the object of the positioning activities. In the case of navigation, in which users determine the utilisation of the services, privacy protection is usually not a complex issue. In contrast, where an individual is located without his or her request, privacy protection can be compromised. Especially problematic cases are positioning in employment and the positioning of minors. Drawing on a case study of Finland, the paper discusses these questions and takes a broad look at the legal framework regarding privacy protection in positioning activities. The paper concludes that although specific laws covering positioning in the context of privacy are rare or lacking in international space law, European Union law and national legislation, there are many regulations that become applicable and restrict positioning and the utilisation of location data.

1. Introduction

Rapid developments in positioning technology have made it possible to position and track people and goods with ease and accuracy. Such location data can be generated by several methods, the two main ones being network-based and satellite-based positioning. In the former, the information about the location of a mobile station is in the mobile communication system and users of the mobile stations do not usually ask for positioning themselves.[1] In the latter, satellite receivers are used to calculate a location and it is usually users who wish to know their location.

The two positioning methods are based on diverse technologies, yet, as the paper will show, positioning and the use of location data are largely covered by the same regulations. An important term in this context is 'location data', which in this paper is understood as location information that can be generated by satellite-based positioning, network-based positioning or any other positioning method. The main focus here is on satellite-based positioning, but as the regulation is largely identical for both forms, they are mostly discussed without differentiation.

[1] Matkaviestinsanasto (TSK 29, 2001), available on the Finnish Terminology Centre TSK term bank at <http://www.tsk.fi/cgi-bin/netmot.exe?UI=figr&height=158&qfind=verkkopaikannus> (4.1.2011).

Privacy issues arise because a receiver unit can be located and tracked accurately; in the worst case, this can violate the privacy of the person who is the object of the positioning. With the current technology and small equipment, positioning is possible even without the object noticing it. Furthermore, positioning is very accurate and an individual's location can be determined within meters or even centimetres, particularly in the case of satellite-based positioning.[2]

As positioning equipment is relatively small and inexpensive, its potential is unlimited. A strong increase in the number of applications is expected: according to a 2006 estimate, the number of receiver units in 2020 will be as high as three billion.[3]

A great number of applications based on positioning are already in use, in particular in navigation. Direct tracing of goods is possible, and can be utilised in transportation for instance. Applications are also found in fields such as land survey, agriculture, scientific research and tourism.[4] Other examples are health care and services designed to enhance safety for elderly people. Applications have great potential, and many other services, such as the advertising of services near individual's location, can be delivered by means of positioning.[5]

2. Two Particular Areas of Concern: The Tracking of Employees and Minors

It is essential to discuss privacy in connection with positioning. In the case of navigation, in which users determine utilisation of the services, privacy is usually not a complex issue. In contrast, where an individual is located without his or her request, privacy can be compromised. As already mentioned, advanced technology allows positioning to be conducted even without the awareness of the object of the activity. Especially problematic cases in this regard are positioning in employment and the positioning of minors.

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2 For further technical information about satellite-based positioning, see e.g. Airos, Esa; Korhonen, Risto & Pulkkinen, Timo: Satelliittipaikannusjärjestelmät, Puolustusvoimien teknillinen tutkimuslaitos – Defence Forces Technical Research Centre, Julkaisuja 12 (Edita Prima Oy, Helsinki 2007), p. 12 – 13.

3 Commission of the European Communities: Green Paper on Satellite Navigation Applications, COM(2006) 769 final, 8/12.2006, p. 3.

4 Commission of the European Communities: Green Paper on Satellite Navigation Applications, COM(2006) 769 final, 8/12.2006, p. 3.

5 Helopuro, Sanna; Perttula, Juha & Ristola, Juhapekka: Sähköisen viestinnän tietosuoja, 2. edition (Talentum, Helsinki 2009), p. 167.

2.1 Positioning in Employment

A central question in an employment relationship is whether the employer has the right to use positioning as a means of control and surveillance.[6] Positioning can be argued to, among other things, increase the security of employees and to enhance effectiveness in operations. On the other hand, this kind of monitoring interferes with the employee's privacy in an unprecedented way.

Positioning in employment can be carried out either directly or indirectly. Positioning is direct if it is the intention of the employer to locate or track a certain employee, e.g., by equipping the employee with a receiver unit. If the employer's intention is to locate an object other than the employee, for instance a vehicle, in a way that the employee can simultaneously be identified, positioning is indirect.[7] It is worth noting, however, that if the object of positioning is merely goods, with no person being identifiable, privacy is not compromised.

It is the opinion of the author that indirect positioning can be considered to be substantially the same as direct positioning in this context, as the employer can identify the employee in both cases. The employee's privacy can be violated either way. In both instances, privacy is particularly at risk if an employer utilises positioning without the awareness of the employee who is the object of the positioning activities.

2.2 Positioning of Minors

The positioning of minors has recently been a topical issue.[8] Not only can minors utilise positioning for their own purposes but parents can also monitor and track their children through positioning applications. Products and services specifically tailored for tracking children are readily available.[9]

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6 Positioning in employment has been discussed e.g. in Helopuro, Sanna; Perttula, Juha & Ristola, Juhapekka: Sähköisen viestinnän tietosuoja, 2. edition (Talentum, Helsinki 2009), p. 182 – 184; Innanen, Antti & Saarimäki, Jarkko: Internet-oikeus (Edita Publishing Oy, Helsinki 2009), p. 344 – 347.

7 Publication of the Office of the Data Protection Ombudsman in Finland: Työelämän tietosuoja – käsikirja, toimintaohjeita yksityisyydensuojan tarkastamiseksi työpaikalla, Asiaa tietosuojasta 2/2009, 29.5.2009; available in Finnish at <*http://www.tietosuoja.fi/uploads/2rg3ed0lzorr1.pdf*> (4.1.2011), p. 83 – 85; The Office of the Data Protection Ombudsman is an independent authority in Finland operating in connection with the Ministry of Justice.

8 See e.g. Helopuro, Sanna; Perttula, Juha & Ristola, Juhapekka: Sähköisen viestinnän tietosuoja, 2. edition (Talentum, Helsinki 2009), p. 170 – 172; Innanen, Antti & Saarimäki, Jarkko: Internet-oikeus (Edita Publishing Oy, Helsinki 2009), p. 348 – 350.

9 Applications have been available for several years; see e.g. BBC News: Baby-sitting via satellite, published on 12 August 2002, available at <*http://news.bbc.co.uk/2/hi/technology/2181469.stm*> (4.1.2011).

There is no doubt that positioning improves the safety of minors, especially those of young age, by allowing parents to monitor where their children go. Naturally, the other side of the coin is that such monitoring can be seen as violating the minors' privacy. Balancing the benefits and disadvantages of positioning minors is challenging.

This paper examines the legal framework relating to both this issue and positioning in employment through a case study of Finland.

3. The Legal Framework Pertaining to Privacy Protection in Satellite Positioning

The following sections provide a brief description of privacy protection in satellite positioning under international space law, European Union law and national legislation.

3.1 International Space Law

The main agreements of international space law were made at a time when the current extensive use of satellite positioning applications could not have been predicted. Nonetheless, many general obligations of the agreements, e.g. those concerning co-operation, are applicable in all space activities and in principle apply to satellite positioning activities as well.

States have also concluded many bilateral and multilateral agreements related to the utilisation of satellites.[10] Privacy issues have not been the centre of attention, but states may well seek to further clarify legal considerations in this area as well. In any case, international co-operation regarding the use of satellites, in particular satellite-based navigation, apparently continues to be of interest.[11]

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[10] An example of the most recent agreements is the Cooperation Agreement on Satellite Navigation between the European Union and its Member States and the Kingdom of Norway; Official Journal of the European Union L 283, 29/10/2010, p. 12 – 20.

[11] For instance, the representatives of the United States of America and the European Union and its Member States issued a joint statement on 29.7.2010 on co-operation between the U.S. Global Positioning System (GPS) and Europe's planned Galileo space-based navigation system; Joint Statement: U.S. and EU Announce Improved Performance from Receivers Using both GPS and Galileo Combined Performance, 29.7.2010; available at <*http://ec.europa.eu/enterprise/policies/satnav/galileo/files/2010_08_02_joint_statement_en.pdf*> (4.1.2011); Another example of the international co-operation is the tripartite Space Dialogue set up in 2006 between the European Commission, the European Space Agency and Roscosmos; the forum identified satellite navigation as one of the main fields of co-operation; European Space Agency: Annual Report 2006, (Netherlands, 2007), p. 77 – 78.

3.2 European Union Law

There is no specific regulation covering positioning activities in the context of privacy protection in the European Union. Nevertheless, the current EU law, especially that related to privacy protection, applies to data collected by satellite-based positioning.

Privacy protection in positioning has been addressed in the Green Paper on Satellite Navigation Applications, which states that most privacy issues related to satellite navigation are covered by the current legislative framework.[12] The Green Paper refers in particular to the Directive on the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communications)[13] and to the Directive on the protection of individuals with regard to the processing of personal data and on the free movement of such data.[14]

The Directive on privacy and electronic communications applies in particular to the processing of personal data in electronic communications. Among other things, it includes provisions on the user's prior consent, which is important in the case of positioning.

The Directive on the protection of individuals with regard to the processing of personal data and on the free movement of such data lays down guidelines on how personal data – defined in Article 2 as any information relating to an identified or identifiable natural person – can be processed. The Directive is significant for positioning since location data collected using positioning can clearly fulfil this definition where such data can be associated with a natural person.

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12 Commission of the European Communities: Green Paper on Satellite Navigation Applications, COM(2006) 769 final, 8/12.2006, p. 11. Note, however, that the Committee of the Regions has called for further study on privacy issues in its opinion on the Green Paper on Satellite Navigation Applications: "New technologies increase the need to responsibly resolve privacy issues and examine them in more detail… The limits between potential commercial exploitation of each application and protection of personal data (tracking goods, customers, employees, etc.) must be defined…"; Committee of the Regions: Opinion of the Committee of the Regions on the Green Paper on Satellite Navigation Applications, 72nd plenary session 28 – 29 November 2007; Official Journal of the European Union C 53, 26/2/2008, p. 3.

13 Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 concerning the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communications); Official Journal of the European Union L 201, 31/07/2002, p. 37 – 47.

14 Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data. Official Journal of the European Union L 281, 23/11/1995, p. 31 – 50.

The directives have harmonised regulation among the EU member states, since the member states are obligated to implement directives at the national level.[15] In addition, it is worth noting that privacy is one of the fundamental freedoms in the European Union. The Charter of Fundamental Rights of the European Union protects individual's right to a private life and to the protection of personal data concerning him or her.[16]

3.3 National Legislation

Few states have enacted laws directly related to satellite positioning.[17] Laws concerning positioning in the context of privacy are even fewer, or non-existent. Despite the lack of specific privacy-oriented satellite positioning regulation, many national laws related to privacy protection limit the use of positioning. In this paper, the issue is examined through a case study of Finland.

4. National Case Study: Positioning and Privacy Regulation in Finland

The following case study first discusses the overall legal framework related to positioning and privacy protection. It then takes up the problems related to positioning in employment and the positioning of minors.

4.1 The Legal Framework

In Finland, no specific laws have been enacted to protect privacy in positioning activities. Nonetheless, several laws are relevant to the protection of privacy in positioning, in particular

[15] EU regulations and directives take precedence over national law and are binding on national authorities. Regulations are binding as soon as they are passed, while directives are addressed to national authorities, who implement them in their national laws; European Commission website: Application of EU law, at <*http://ec.europa.eu/community_law/introduction/treaty_en.htm*> *updated 9.12.2010* and <*http://ec.europa.eu/community_law/introduction/what_regulation_en.htm*> *updated 9.12.2010* (4.1.2011).

[16] According to Article 7 of the Charter of Fundamental Rights of the European Union "Everyone has the right to respect for his or her private and family life, home and communications."; According to Article 8, "Everyone has the right to the protection of personal data concerning him or her…"; Official Journal of the European Union C 83, 30/3/2010, p. 389 – 403.

[17] An example of a state addressing the issue in its regulation is Russia, which enacted a law on satellite navigation in 2009; available in Russian at <*http://document.kremlin.ru/doc.asp?ID=050810*> (4.1.2011).

the Constitution,[18] the Act on the Protection of Privacy in Electronic Communications[19] and the Personal Data Act.[20]

The Constitution of Finland

The Constitution[21] protects the home and privacy. According to section 10, everyone's private life, honour and sanctity of the home are guaranteed. Guaranteeing the right to private life seeks to secure everyone's right to live without unnecessary interference.[22] Clearly, positioning can be used in a way that would interfere with an individual's private life.

Positioning may also be seen as covered by section 9 of the Constitution concerning freedom of movement, according to which Finnish citizens and foreigners legally resident in Finland have the right to move freely within the country. Even though positioning does not restrict a person's movement, freedom of movement can be understood to include protection against unjustified monitoring of how he or she exercises the right to move freely.[23]

The Act on the Protection of Privacy in Electronic Communications

The Act on the Protection of Privacy in Electronic Communications[24] plays a central role in safeguarding privacy in positioning activities in Finland.

Section 2 of the Act defines 'location data' as data which show the geographic location of a subscriber connection or terminal device and which are used for a purpose other than

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18 The Constitution of Finland, 11 June 1999 (731/1999); unofficial translation in English available at <*http://www.finlex.fi/fi/laki/kaannokset/1999/en19990731.pdf*> (4.1.2011).

19 Act on the Protection of Privacy in Electronic Communications (516/2004); unofficial translation in English available at <*http://www.finlex.fi/fi/laki/kaannokset/2004/en20040516.pdf*> (4.1.2011).

20 Personal Data Act (523/1999); unofficial translation in English available at <*http://www.finlex.fi/fi/laki/kaannokset/1999/en19990523.pdf*> (4.1.2011).

21 The Constitution of Finland, 11 June 1999 (731/1999), unofficial translation in English available at <*http://www.finlex.fi/fi/laki/kaannokset/1999/en19990731.pdf*> (4.1.2011).

22 Government proposal, HE 309/1993, Hallituksen esitys Eduskunnalle perustuslakien perusoikeussäännösten muuttamisesta; available in Finnish at <*http://www.finlex.fi/fi/esitykset/he/1993/19930309*> (4.1.2011).

23 Helopuro, Sanna; Perttula, Juha & Ristola, Juhapekka: Sähköisen viestinnän tietosuoja, 2. edition (Talentum, Helsinki 2009) p. 187.

24 Act on the Protection of Privacy in Electronic Communications (516/2004); unofficial translation in English available at <*http://www.finlex.fi/fi/laki/kaannokset/2004/en20040516.pdf*> (4.1.2011).

the provision of a network service or communication service. Positioning is not specifically mentioned in the law, but is stated in the legislative history of the Act that the law applies to both network and satellite-based positioning.[25]

To a large degree, the Act does not distinguish between the two forms of positioning. Certain differences can nonetheless be found, mainly with respect to the role of tele-operators. In satellite-based positioning, teleoperators naturally play a minor role, since the location data are usually generated directly on the user's receiver unit. In contrast, in network-based positioning tele-operators are central as producers of location data, and special provisions apply to them.[26] Most provisions, however, are not dependent on the positioning method used and are thus applicable to both forms.

The Act regulates the utilisation of location data in several ways. It emphasises the right of the user to control the use of his or her location data. According to section 18, as a general rule location data can only be used if the person who is the object of positioning has expressly consented to its use; one exception is where consent can unambiguously be inferred from the circumstances. Consent is service specific; that is, it has to be requested separately for each purpose.

The processing and disclosure of location data are regulated by the Act, particularly in section 16. According to that section, location data can only be utilised for certain purposes and to a limited extent. It is specifically stated that processing of location data may not limit the protection of privacy any more than is necessary. Moreover, location data have to be destroyed after processing or rendered such that they cannot be associated with a specific user. According to section 4 of the Act, location data are confidential unless otherwise regulated.

Section 16 of the Act states that if the location data are rendered such that they cannot, in themselves or in combination with other data, be associated with a specific subscriber or user, the aforesaid does not apply. This can be the case when the object of positioning is

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[25] Government proposal, HE 125/2003 Hallituksen esitys Eduskunnalle sähköisen viestinnän tietosuojalaiksi ja eräiksi siihen liittyviksi laeiksi, p. 64 – 65; available in Finnish at <*http://www.finlex.fi/fi/esitykset/he/2003/20030125*> (4.1.2011).

[26] For example, according to section 17 of the Act, teleoperators are allowed to process location data if the subscriber – defined in section 2 of the Act as a legal or natural person who has entered into the agreement - has not forbidden it. The section also provides that the subscriber has the right at any time to forbid the use of his or her location data and that the teleoperator has an obligation to provide information about the utilisation of such data.

only goods or the location data have in some way been rendered anonymous. Anonymised location data can be processed without limitations. For example, the Act does not apply if an item has been given to a carrier to be transported and it is impossible to find out who in fact the driver of the vehicle was. In contrast, if the location data can be associated with the driver – for example by connecting them with other available data – those data are no longer anonymous and the processing of them remains subject to the provisions of the Act.

The Personal Data Act

Another central act for privacy protection in positioning activities in Finland is the Personal Data Act[27] which complements the Act on the Protection of Privacy in Electronic Communications.[28] The Personal Data Act also aims at ensuring privacy protection.

Section 3 of the Personal Data Act defines personal data as any information on a private individual and any information on his or her personal characteristics or personal circumstances where these are identifiable as concerning him or her or the members of his or her family or household. Accordingly, location data, except where anonymous, can be considered personal data as defined by the Act. If location data cannot be associated with a person or his or her family, it is not considered personal data and the Personal Data Act does not apply.[29]

The Personal Data Act regulates the processing of personal data. Section 5 provides that personal data must be processed lawfully and carefully in a manner that ensures that the privacy of the data subject is not restricted without a basis provided by an Act. Section 6 requires that the purpose of processing personal data be defined before the collection of such data. Section 8 states that the processing of personal data is allowed only if the data subject has unambiguously given his or her consent or if the other general pre-requisites defined by the Act have been met. Section 9 of the Act sets out, among other things, certain principles

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27 Personal Data Act (523/1999); unofficial translation in English available at <*http://www.finlex.fi/fi/laki/kaannokset/1999/en19990523.pdf*> (4.1.2011).

28 Section 3 of the Act on the Protection of Privacy in Electronic Communications (516/2004) states: "If not otherwise provided in this Act, the Personal Data Act (523/1999) applies to the processing of personal data."

29 Innanen, Antti & Saarimäki, Jarkko: Internet-oikeus (Edita Publishing Oy, Helsinki 2009), p. 333 – 334.

related to data quality which require that the personal data processed be accurate and necessary for the declared purpose.

4.2 Positioning in Employment Relationships

In Finland, the law enacted to promote privacy in employment – the Act on the Protection of Privacy in Working Life[30] – does not include a provision on positioning and the use of location data. The central applicable law is the Act on the Protection of Privacy in Electronic Communications discussed above.

The provisions of the Protection of Privacy in Electronic Communications discussed above also apply to positioning in employment relationships. Particularly important is the requirement of consent, whereby, as a rule, an employer is only allowed to use positioning with the consent of the employee. Provisions of the Act on the processing and disclosure of location data, which limit the use of data to certain purposes and allow use only to the extent necessary, are also applicable and equally important.

These provisions, complemented by those in the Personal Data Act, form the basis for the protection of employees' privacy and the utilisation of their location data. The Act on the Protection of Privacy in Working Life complements the legal framework by setting general requirements for processing personal data. Section 4 sets out the requirement of consent in the collection of an employee's personal data and section 3 states that the employer is only allowed to process such personal data, which are connected with the employment relationship and are directly necessary for it.

Another provision of interest in the Act on the Protection of Privacy in Working Life is found in section 21, which requires co-operation between the employer and the employees in organising technical monitoring and data network use. Positioning can be understood as technical monitoring in the sense intended by the provision and is therefore subject to the co-operative procedure specified elsewhere in the law. Section 21 further requires that after such procedures the employer has an obligation to inform employees about the purpose of the monitoring and the methods used.

These provisions seek a balance between the employee's right to privacy and the employer's right to surveillance and control in that they permit positioning in the employment relationship but only on certain conditions; the principal ones being

[30] Act on the Protection of Privacy in Working Life (759/2004); unofficial translation in English available at <*http://www.finlex.fi/fi/laki/kaannokset/2004/en20040759.pdf*> (4.1.2011).

necessity, a relevant connection with the employment relationship and the consent of the employee.

4.3 Positioning of Minors

In Finland, the question of the use of location data on minors has been addressed in the Act on the Protection of Privacy in Electronic Communications. Section 16 of the Act sets out the basic principle that the guardians of minors under the age of fifteen have the authority to grant consent to and prohibit the processing of location data. Minors over fifteen years old may decide themselves on the use of their location data.[31]

Given that minors over fifteen may decide on how their location data is used, it seems that their privacy is not especially compromised. Another, more complicated question regarding privacy is the relationship between minors under the age of fifteen and their guardians. Guardians, usually parents, have general control over matters concerning their children and, as mentioned above, products and services for tracking children are available that make it technically possible for parents to monitor where their children are. Naturally, all minors have the right to privacy also with respect to their guardians.

In Finnish law, the age of fifteen is commonly considered a limit at which minors may decide on certain things; for example section 3 of the Young Workers' Act[32] provides that a person aged fifteen or older can enter into a contract of employment. Nonetheless, some regulations require that children under the age of fifteen – and even as young as under the age of twelve in the case of the Child Welfare Act[33] – can influence certain decisions concerning them.[34]

In particular, certain provisions of the Constitution and the Child Custody and Right of Access Act[35] seek a balance between the control of guardians and privacy of minors, including

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31 Innanen, Antti & Saarimäki, Jarkko: Internet-oikeus (Edita Publishing Oy, Helsinki 2009), p. 349. See also Helopuro, Sanna; Perttula, Juha & Ristola, Juhapekka: Sähköisen viestinnän tietosuoja, 2. edition (Talentum, Helsinki 2009), p. 170 - 172.

32 Young Workers' Act (998/1993); unofficial *translation in English available at <http://www.finlex.fi/fi/laki/kaannokset/1993/en19930998.pdf>* (4.1.2011).

33 Child Welfare Act (417/2007); unofficial translation in English available at *<http://www.finlex.fi/fi/laki/kaannokset/2007/en20070417.pdf>* (4.1.2011).

34 Helopuro, Sanna; Perttula, Juha & Ristola, Juhapekka: Sähköisen viestinnän tietosuoja, 2. edition (Talentum, Helsinki 2009), p. 171.

35 Child Custody and Right of Access Act (361/1983); available in Finnish at *<http://www.finlex.fi/fi/laki/ajantasa/1983/19830361>* (4.1.2011).

minors under the age of fifteen, by requiring that, as a rule and to the extent possible, minors have the right to influence decisions that concern them. Section 6 of the Finnish Constitution states that children are to be allowed to influence matters pertaining to them to a degree corresponding to their level of development. Section 4 of the Act on Child Custody and Right of Access similarly obligates children's guardians to take into account the opinion of the children in decisions concerning them to the extent that is possible with respect to their age and level of development.

Thus, in practice, guardians are required to discuss matters with minors also under the age of fifteen prior to making decisions, provided that it is possible considering the children's age and the level of development. After the minors' opinion has been ascertained, guardians are required to take it into account in their decisions.[36]

To a large degree, these provisions serve to balance and clarify the roles of minors and their guardians with respect to positioning activities and the use of location data.

5. Concluding Remarks

The aim of the present paper has been to examine privacy problems arising in positioning and the utilisation of location data and to explore the legal framework related to privacy protection in positioning activities. Of particular interest is the complexity of privacy protection in positioning in employment relationships and the positioning of minors.

As noted above, international space law does not seem to solve the privacy problems related to positioning activities. There is no specific privacy-oriented satellite positioning regulation in the European Union either and only few states have enacted laws directly related to positioning; even fewer have laws that address privacy issues related to positioning.

Despite the fact that specific regulations concerning privacy in satellite positioning are rare or lacking, there are many norms and regulations that become applicable and limit positioning and the utilisation of location data. In the European Union, the main instruments in this regard are the Directive on the processing of personal data and the protection of privacy in the electronic communications sector and the Directive on the protection of individuals with regard to the processing of personal data and on the free movement of such

[36] See also Helopuro, Sanna; Perttula, Juha & Ristola, Juhapekka: Sähköisen viestinnän tietosuoja, 2. edition (Talentum, Helsinki 2009), p. 171.

data. In Finland, the central regulations are the Act on the Protection of Privacy in Electronic Communications and the Personal Data Act.

As the case study of Finland has shown, many of the general privacy issues related to satellite positioning in Finland are covered by the current legislative framework, in particular the Acts cited above. Among other things, these instruments regulate the processing and disclosure of location data and, most importantly, generally require the consent of the person who is the object of positioning.

The positioning of minors and positioning in employment relationships have been shown to be especially complex issues where privacy is concerned. However, in Finland many of these issues are covered by the current legislation as the case study has shown.

In sum, it can be stated that under the Finnish legislation positioning and the use of an employee's location data in the employment relationship is permitted on certain conditions. First and foremost, positioning and the use of an employee's location data require necessity and a relevant connection with the employment relationship. If these requirements are met, positioning can principally be conducted with the consent of the employee and following the norms applicable to the processing of personal and location data.

Where minors are concerned, the Finnish legislation permits minors between fifteen and eighteen years of age to control their own location data, while such information on minors under the age of fifteen is principally controlled by their guardians, usually parents; the guardians are nevertheless obliged to take into account the opinion of the minors to the extent possible with respect to their age and level of development.

It can be concluded that, despite the lack of privacy-oriented positioning regulation in international space law, European Union law and national legislation, positioning is by no means uncontrolled. The paper has shown that several regulations related to privacy protection become applicable and set limits on positioning and the utilisation of location data.

Even though many aspects of privacy in positioning are covered by the current legal framework, further clarification of the potential legal problems as well as further co-operation between states would be welcomed. In the modern world, location data, as well as people and goods, move across the borders, and privacy issues in this regard may eventually prove to be increasingly global in scope. ■

Legal Aspects of Regional Space Cooperation in Latin America, Asia and Africa

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1. Introduction

The principle of international cooperation has guided the legal framework of space activities since the beginning of the space era. At present, there are countries in all the regions with space capabilities which can conduct regional efforts to transform the principle of space cooperation into real advantages for improving human development. This paper presents an overview of legal aspects in institutional and non-institutional models of regional space cooperation in Latin America, Asia-Pacific and Africa. The conclusion drawn from the examination of the three regions is that all strategies for effective space cooperation need three elements: scientific rationale, political will and legal agreements. African and Asia-Pacific regions have gathered these three elements, but one region is still on its way to find the means to implement effective space cooperation in legal terms.

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2. Legal Basis of International Space Cooperation

The legal framework of international cooperation is based on Charter of the United Nations (UN Charter).[1] UN General Assembly makes recommendations for promoting international cooperation (Articles 13 (1.a) and (1.b)). The functions of UN General Assembly on international cooperation are supported by the Economic and Social Council (ECOSOC). ECOSOC and the specialized agencies coordinate international cooperation in different fields (Articles 55, 56, 57, 58 and 62 (1), 63 (2)).

In the case of space cooperation a special committee, the Committee on the Peaceful Uses of Outer Space (COPUOS), promotes international space cooperation and the progressive development of international space law. In this regard, the Legal Subcommittee of COPUOS has elaborated the UN treaties and principles on outer space. It can be observed that all the body of space law includes the principle of international space cooperation. However, there are two main documents that deal with space cooperation: the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (Outer Space Treaty);[2] and the Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the interest of all states, taking into particular account the needs of developing countries (Declaration on Space Benefits).[3]

2.1 International cooperation and the Outer Space Treaty

International cooperation in the scientific and legal aspects of space activities is a fundamental principle of the Outer Space Treaty. International cooperation is the maxim that has guided the development of space law.

Article 1, para. 1, stipulates that the exploration and use of outer space shall be carried for the benefit of all countries and shall be the province of all mankind.[4] It can be argued that this principle implies international cooperation to share benefits with countries without space technologies and limited access to the use and exploration of outer space. Article 1, para 3, indicates that states shall facilitate and encourage international cooperation in scientific investigation in outer space.

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1 The UN Charter was signed on 26 June 1945, and entered into force on 24 October 1945.

2 UN Doc. GA/RES/2222 (XXI), annex, entered into force 10 October 1967.

3 UN Doc. GA/RES/51/122.

4 The adoption of this principle in space law was a step forward to conciliate sovereign and community interests in the use and exploration of outer space.

Article III, indicates that the performance of space activities shall be in accordance with international law and UN Charter, which establishes the principle of international cooperation to promote development and the solution of international problems. Article V, refers to international cooperation in the form of assistance to astronauts of other State Parties to the Treaty, in order to protect the life and health of astronauts, who are regarded as envoys of mankind in outer space. Article IX, notes the need of international cooperation in the efforts to protect the outer space environment. Article X, allows state Parties to request for opportunities to observe the launching of space objects by other states under the principle of international cooperation. Article XI, invites states to share information about their national space activities. This article was formulated as an invitation, therefore the commitment to maintain the updated information requires international cooperation and good faith from the States Parties to the treaty to send the information to the Secretary General of United Nations through UN Office for Outer Space Affairs (UNOOSA) regularly.

In brief, the Outer Space Treaty provides the main principles to conduct the use and exploration of outer space, within these principles international cooperation is included. International cooperation is the golden rule of space law. The question is how to take advantage of this favorable legal framework to enhance the participation of developing countries in regional or international space projects.

2.2 International cooperation and the Declaration on Space Benefits

This Declaration is based on UN Charter, the Outer Space Treaty, relevant resolutions and recommendations of the Second UN Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE-82).[5] The Declaration on Space Benefits clarifies the guidelines of space cooperation, identifying modes and terms of space cooperation; and, the scope of the commitment to support developing countries to access the use and exploration of outer space.

Para. 1 of the Declaration on Space Benefits refers to Article I, para. 1 of the Outer Space Treaty, which emphasises the exploration and use of outer space for the benefit of all countries. This principle of the Outer Space Treaty is developed in the Declaration on Space Benefits. Para. 2, recognizes the freedom to participate in international cooperation in equitable and mutually acceptable basis. Para. 3, emphasizes the role of developed countries in

[5] UN Doc. A/CONF.101/10 (1982).

promoting and fostering international cooperation. Para 4, identifies the modes of cooperation in which regional cooperation is mentioned. Para 5, indicates some possible areas of space cooperation. Para 6, refers to the active and responsible role of national and international players, in order to consider the use of space applications and international cooperation in their developmental goals. Para 7, suggests to strengthen the role of COPUOS as a forum to exchange information about international cooperation. Para 8, advices States to contribute to the UNOOSA Program on Space Activities and other initiatives of international cooperation.

International space cooperation in the use and exploration of outer space taking into particular account the needs of developing countries has been well addressed in the legal sphere; the differences come into scene when we compare how each region has implemented this principle.

3. The Archetype of the European Space Agency

This section addresses European space cooperation. Europe is included in this paper because Europe achieved the first successful example of regional space cooperation. European countries faced in the 1960's a limited access to the exploration and use of outer space. By that time space activities were dominated by the United States and the former Union of Soviet Socialist Republics. Nevertheless, space scientists envisaged the advantages of space cooperation, elaborated their ideas and intentions into a concrete space program and sought the support of policy makers and diplomats to consolidate international cooperation in a multilateral agreement. Europe has implemented the principle of space cooperation in practical terms providing the region with a tool to improve regional development and strengthen areas such as science, technology, innovation and industry. Perhaps the institutional model of space cooperation in Europe is not suitable for other regions due to their own current circumstances, but it is worth to have a quick review of the European space cooperation when regional cooperation is on discussion.

All the regions in less or more level consider the model of the European Space Agency (ESA) as a prototype for regional space cooperation. In this context, it can be observed that the proposal of having a Latin-American Space Agency (LASA) and the draft of LASA Convention included the same guidelines of ESA Convention.[6] The same situation occurred with the Asia-Pacific Space Cooperation Organization (APSCO)

[6] *See* R. González, *South American Space Agency Proposal*, 19 Journal of Space Law 258 (1982).

Convention. For instance, APSCO Convention includes fair return, and mandatory and optional programs.

ESA is a successful case of regional space cooperation, but the establishment of ESA relied on 15 years of previous work, done by the European Space Research Organization (ESRO),[7] the European Launcher Development Organization (ELDO),[8] and the European Space Conferences (ESC). In addition, it can be mentioned that the process of European integration has facilitated space cooperation (or perhaps vice versa).

Before adopting the Convention for the Establishment of ESA in 1975, Europe had already established regional space facilities (by ESRO and ELDO). Furthermore, Europe had expert staff from ESRO and ELDO and other important aspect is that Europe had clear objectives for ESA, because ESA coordinated the continuity of the ESRO and ELDO space programs. Another aspect to note is that all the European countries with space capabilities[9] participated in the establishment of ESRO and later they supported the establishment of ESA.

In the overview of space cooperation in Latin-America, Asia and Africa, the elements that facilitated institutional space cooperation in Europe should be considered in the analysis. Sometimes a regional space institution is not a viable solution for implementing regional space cooperation when the main elements are not there.

4. South – South Space Cooperation in the Regional Context

The majority of countries in Latin America, Asia-Pacific and Africa are considered developing countries or newly industrialized countries. This section presents how these three regions have dealt with the promotion and implementation of regional space cooperation.

4.1 Latin-American Region

Latin-American space cooperation has a long history. In 1960, the Inter-American Committee for Space Research (IACSR) was established under provisional status in a

[7] Convention for the Establishment of a European Space Research Organization, COPERS/AWG/ 18rev.6 (1962).

[8] Convention for the Development and Construction of Space Vehicle Launchers (1962).

[9] France, England, Germany and Italy.

declaration signed by Argentina, Brazil, Chile, Peru and the United States of America. The IACSR organized different events in the region to promote space science and research. Unfortunately, the IACSR disappeared in less than one decade instead of reaching a permanent status.[10]

In 1982 during the Second UN Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE 82) the idea of Latin-American space cooperation was considered again. The delegation of Chile proposed the creation of the South-American Space Agency (SASA).[11] One year later the idea evolved from SASA to LASA.[12]

Since the 1990s the Space Conferences of the Americas (CEA, *Conferencia Espacial de las Américas*) have considered the idea of establishing LASA or some mechanism for promoting regional space cooperation, among other topics. CEAs is a regional forum to discuss regional and international space cooperation in relation to the development of the region. The first CEA was held in Costa Rica in 1990, second CEA in Chile in 1993, third CEA in Uruguay in 1996, fourth CEA in Colombia in 2002, fifth CEA in Ecuador in 2006 and sixth CEA in Mexico in 2010.[13] CEAs have adopted different declarations and plans of action; nevertheless, this is not a legal document.

During the last CEA in Mexico in November 2010, the Declaration of Pachuca was adopted. Para 9. of the Declaration of Pachuca, calls for communication among Latin-American countries to identify topics of common interest in space applications. In this context, the approach has been that a topic of common interest for the Latin-American region should be the use of remote sensing applications for water management. Water management should be a priority topic of regional interest, because the improvement of water management has a positive impact in different areas of national and regional development *e.g.,* improving people's lives, food and water security, environmental protection, tele-epidemiology and natural disaster management.[14]

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10 C. Jimenez Monroy, Legal and Institutional Aspects of Latin-American Space Cooperation AQUARELSat: The Water Monitoring Constellation, (diss. Leiden) 20 (2010).

11 N. Jasentuliyana, International Space Programmes and Policies: Proceedings of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE), Vienna, Austria, August 1982, 195 (1984).

12 *See* A. Cocca, *El Papel de America Latina en el Derecho del Espacio Ultraterrestre*, in the Proceedings of the Latin American Conference International Air Transport and Activities in Outer Space Mexico, 14-18 August, 1988, at 372 (1989).

13 *See* Jimenez Monroy, *supra note* 10, at 27.

14 *See id*. 75-102.

Further para.18 of the Declaration of Pachuca invites American countries to participate in forums and programmes such as the Global Earth Observation System of Systems (GEOSS) Symposium of the Americas. In this regard, only ten Latin-American countries are Members of the Group on Earth Observation (GEO),[15] which is leading efforts to build a GEOSS.

It seems that the strategy of Latin-American region is to advance in small steps towards regional space cooperation through the adoption of Declarations and plans of action.

Even though Latin America doesn't have a regional satellite project there are examples of sub-regional and bilateral space cooperation in the region. For instance the Central American Association of Aeronautics and Space has been exploring the possibility to develop the first Central American meteorological satellite with payload instruments which have been developed by Central American scientists. This project is funded by the Central American Integration System (SICA, *Sistema de Integración Centroamericano).*[16]

In addition, the Andean Community of Nations (CAN, *Comunidad de Naciones Andinas*)[17] has a common geostatiorary orbital position at 67° west. This common geostationary position is used under a regulatory framework for its operation adopted by the four country members of CAN.[18] The initial project was to put a satellite of the regional system named Simon Bolivar in this orbital position. However, due to problems of time and deadlines with the International Telecommunication Union (ITU), at the end CAN has signed a long-term agreement with SES WORLD SKIES. In the middle of 2010 SES WORLD SKIES satellite AMC-4 was relocated to the CAN orbital position 67° West. It must be noted in this example the cooperation among the country members of the CAN for the common utilization of orbit/ frequencies resources.

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15 The Latin-American GEO Members are Argentina, Belize, Brazil, Chile, Costa Rica, Honduras, Mexico, Panama, Paraguay and Peru. In addition, there are two participating organizations in GEO which are from the Latin-American region: the Water Centre for the Humid Tropics of Latin America and de Caribbean (CATHALC) and the Central American Commission for the Environment and Development (SICA/CCAD) at http://www.earthobservations.org (last visited 2 December 2010).

16 *See* Asociación Centroamericana de Aeronautica y del Espacio at: *http://www.acaeca.org* (last visited 28 November 2010); BBC Mundo, America Central pone la mira en el espacio (22 November 2010) at: *http://www.bbc.co.uk* (last visited 3 December 2010).

17 Member States are: Bolivia, Colombia, Ecuador and Peru.

18 *See generally*, Decisions 395, 479, 672 and 654 adopted by CAN. Comunidad Andina, Secretaria General Telecomunicaciones, Normativa en Materia de Telecomunicaciones *http:// www.comunidadandina.org/telecomunicaciones.htm* (last visited 4 December 2010).

Regarding bilateral agreements in space cooperation, Argentina and Brazil provide a successful example of bilateral space cooperation with the Basic Agreement in Cooperation in Peaceful Applications of Space Science and Technology between the Government of the Republic of Brazil and the Government of the Argentine Republic signed on 9 April 1996. A further protocol for cooperation programs based on this Basic Agreement in Cooperation was signed in 1998.

Finally, the portrait of Latin-American space cooperation will not be completed without mention that the region has the Regional Center for Space Science and Technology Education in Latin America and the Caribbean (CRECTEAL) affiliated to UN, with campuses at Brazil and Mexico.

4.2 Asia-Pacific Region

Asia-Pacific space cooperation has more legal aspects to discuss in the sphere of institutional and non-institutional regional space cooperation. It should be noted that in the Asia-Pacific region there are different nations with space capabilities: China, India, Japan and South Korea. These countries have space agencies, national space legislation and policy, national satellites, and space centers with launch sites.

China has led the establishment of the Asian-Pacific Space Cooperation Organization (APSCO), and Japan the Asia-Pacific Regional Space Agency Forum (APRSAF). And India hosts the Center for Space Science and Technology Education in the Asia and Pacific region (CSSTEAP) affiliated to the UN since 1995.

In order to implement space cooperation in the Asia-Pacific region, in 1992 China, Pakistan and Thailand proposed the initiative of Asia- Pacific Multilateral Cooperation in Space Technology and Applications (AP-MCSTA), which was agreed by 16 Asia-Pacific countries.[19] AP-MCSTA organized conferences, workshops and meetings.

AP-MCSTA was a flexible mechanism to work on space cooperation in the Asia-Pacific region towards its institutionalization.

In 1994 a Memorandum of Understanding on the Development of a Small Multi-Mission Satellite (SMMS) was signed in Thailand by China, Iran, Mongolia, Pakistan, Republic of Korea and Thailand.

[19] APSCO, history at: *http://www.apsco.int/history.aspx* (last visited 6 September 2010).

In 2001 the Secretariat of the AP-MCSTA was established in Beijing, China. The Secretariat facilitated the coordination of the Asia-Pacific projects and organized training courses for decision makers of Asian countries.[20]

During 2003 a Drafting Group on the Asian-Pacific Space Organization (APSCO) Convention held meetings to elaborate the final version of the APSCO Convention. At the end of 2003 and beginning of 2004, APSCO Convention was sent to 25 countries in the Asia-Pacific Region. In 2005 eight countries signed the APSCO Convention: Bangladesh, China, Indonesia, Iran, Mongolia, Pakistan, Peru and Thailand.

In September 2008 the HJ-A Satellite (SMMS) was launched from Taiyuan Satellite Launch Center.

In December 2008 APSCO held its first meeting with the participation of nine signatory states: Bangladesh, China, Indonesia, Iran, Mongolia, Pakistan, Peru, Thailand and Turkey. This meeting coincided with the inauguration ceremony of APSCO. Regarding APSCO members, it is important to mention that there are nine signatory states of the APSCO Convention, but only seven have ratified the APSCO Convention: Bangladesh, Iran, Mongolia, Pakistan, Peru, Thailand and China.

After the adoption of the APSCO Convention, the Rules of Procedure for the Council, the Financial Rules, the Regulations on staff members, the working plan and financial arrangements have been elaborated.

On the other hand, the Asian region has also a forum of space agencies called the Asia-Pacific Regional Space Agency Forum (APRSAF) since 1993. APRSAF is a forum to discuss issues of space cooperation in the Asia-Pacific region.[21] This forum has also provided a platform to work on cooperative projects, seminars and training courses. Some interesting initiatives of APRSAF are: (1) Sentinel-Asia: Disaster Management Support System in the Asia-Pacific Region; (2) Space Application for Environment (SAFE), and; (3) the Satellite Technology for the Asia-Pacific Region (STAR) Program.[22] This Initiative

[20] H. Zhao, *Current Legal Status and Recent Development of APSCO and its Relevance to Pacific Rim Space Law and Activities*, 35/2 Journal of Space Law 570 (2009).

[21] H. Zhao, Asia-Pacific Cooperation Organization Convention in Proceedings of the 50th Colloquium on the Law of Outer Space, Hyderabad, India 4 (2007).

[22] Asia-Pacific Regional Space Agency Forum (APRSAF), at: *http://www.aprsaf.org/* (last visited 3 September 2010).

of APRSAF is a good example of non-institutional space cooperation,[23] a functional model to facilitate cooperation in space activities in the Asia-Pacific region.

Nevertheless, an ideal scenario could be to merge in the future APSCO and APRSAF to consolidate space cooperation in the Asian-Pacific region.

4.3 African Region

African countries, carrying out national space activities are Algeria, Egypt, Morocco, Nigeria and South Africa.[24]

Algeria and Nigeria are Members of the Disaster Monitoring Constellation. In this respect, satellites from Algeria and Nigeria were built under the Know-How Transfer Training (KHTT) program at Surrey in 1996.[25] In addition, since 1998 The African region has two centers of space education affiliated to UN: the African Center for Space Science and Technology- in French language (CRASTE-LF), and the African Regional Center for Space Science and Technology Education- in English language (ARCSSTE-E) in Nigeria.

There are different initiatives to promote and coordinate space cooperation in the African region. For instance it can be mentioned the following: the African Institute of Space Science (AISS), the Regional African Satellite Organization (RASCOM), the African Resources and Environmental Management Satellites Constellation (ARMS), and the African Leadership Conference on Space Science and Technology for Sustainable Development (ALC).[26]

ALC is a forum 'for projecting the need for Science & Technology (S&T) applications in African countries'.[27] ALC is also a forum to discuss space technology applications for

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[23] Another example of space cooperation under a non-institutional model is the international constellation named: the Disaster Monitoring Constellation (DMC). *See*, Jimenez Monroy, *supra note* 10, at 67.

[24] A. Gbem, Space Developments in African Countries: an Overview, XXXIV Annals of Air and Space Law 847 (2009).

[25] SpaceDaily, SSTL Readies First DMC Satellite for November Launch (25 November 2002) at: *http://www.spacedaily.com/news/microsat-02o.html* (last visited 2 September 2010).

[26] Gbem, *Id. See also,* Space Mart: Africa establishes new space partnerships, at: *http://www.spacemart.com/reports/Africa_Establishes_New_Space_Partnerships_999.html* (last visited 25 May 2010).

[27] *Id.*, at 879. Gbem explains that the African countries aimed to increase awareness on the importance of S&T programmes. With this objective in mind, in 2003 during the 48th session of COPUOS, after consultations the African Members decided to hold a biennial event named ALC.

Africa's development and the involvement of African countries in space activities. African countries organize ALC every two years.

The first ALC was held in November 2005, in Nigeria, during which the ARMS initiative was mentioned. In October 2007, the second ALC held in South Africa called for regional cooperation and emphasized the importance of S&T in Africa's socio-economic development, among other things. Two months later in December 2007 Nigeria held the first International Academy of Astronautics (IAA). African Regional Conference under the topic Space for Africa: Path to Knowledge and Development.[28]

During the third ALC for sustainable development held on December 7-9, 2009 in Algeria, the Governments of Algeria, Kenya, Nigeria and South Africa signed an agreement on ARMS Constellation. It was quoted that the 'ARM constellation is a result of the four teams in Algeria, Nigeria, Kenya and South Africa working together'.[29] This constellation seeks to make space technology more accessible for applications in food security, environmental monitoring, land use, water management and public health.[30]

It is interesting to note that ARMS is part of a very well elaborated system named the African Resources Management System, which is composed of the (1) ARM constellation; (2) ARM Application Infrastructure (ARMAC); (3) ARM Information Services (ARMIS), and; (4) ARM Public Awareness (ARMPA).[31]

The legal agreement on ARMS constellation is a functional form to start implementing regional space cooperation in the African region without a regional space institution. This solution is a non-institutional design of space cooperation.

5. Conclusion

This paper presents an overview of regional space cooperation in Latin America, Asia-Pacific and Africa in order to identify the legal aspects that are involved in space cooperation. In this respect, the analysis confirms that there are legal elements whether we refer to

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28 *Id*, at 849.

29 S. Mostert & M. Jacobs, ARM constellation-Establishing a regional remote sensing asset, 63 Acta Astronautica 227 (2008). *Id.* at 227.

30 United Nations Information Service, The Third African Leadership Conference Launches Two Regional Space Partnerships (UNIS/OS/391-7 December 2009) at: *http://www.unis.unvienna.org/unis/pressrels/2009/unisos391.html* (last visited 29 august 2010).

31 Mostert & Jacobs, *Id*., at 222.

institutional space cooperation like APSCO in Asia; or non-institutional space cooperation like ARMS constellation in Africa and APRSAF in Asia.

The legal aspects in Asian institutional space cooperation include the adoption of the Convention for the Establishment of the APSCO and other secondary regulations for the operation of APSCO. In this way, Asian countries which have ratified APSCO Convention accepted legal rights and obligations to implement space cooperation in the Asia-Pacific region guided by the space institution called APSCO.

It is submitted that there is a general model of space cooperation based on the institutional design of ESA, but the practice has demonstrated that non-institutional frameworks of space cooperation can also work well. Space cooperation in Africa with the ARMS Constellation is an example.

In Africa four countries have signed a multilateral agreement for operating ARMS Constellation without creating an African space organization. It can be argued that the strategy of Africa is the most effective way to start regional space cooperation, starting with a concrete satellite project and drafting a multilateral agreement to guide the operation of ARMS Constellation. In addition, the operation of a satellite constellation like ARMS will provide tangible benefits for national and regional development while increasing awareness of general public and policy makers about the importance of space-based applications.

The case of the Latin-American region follows a different strategy from Africa and Asia, because it is difficult to identify a legal aspect in their plans of space cooperation. They are still discussing plans to implement space cooperation in CEAs, and it is not clear how they will proceed forward, whether with an institutional or non-institutional cooperation model.

In this connection, there is no doubt that space conferences in these three regions are good starting points to identify the priority areas for space applications, and discuss the way to implement space cooperation in legal terms. These regions need to be creative and design suitable solutions in accordance with their needs and space capabilities. Regional space conferences provide a diplomatic framework to facilitate and promote space cooperation in the regions. However, the declarations adopted in such conferences donot have legal bearing in practical terms if they are not reflected in legal instruments such as conventions or multilateral agreements to establish obligations and duties of participating countries.

In the case of ESA, Asia and Africa the path have been the transition from the space conferences to the legal implementation of space cooperation through multilateral agreements.

Another element to be considered in the implementation of regional space cooperation is the role of the countries with space capabilities that have guided common regional efforts. In Asia, China supported the creation of APSCO and Japan the creation of APRSAF. In Africa, in particular South Africa has been leading regional space cooperation with the help of Nigeria and Algeria. In Latin America, Brazil and Argentina should be the ones that lead Latin-American countries towards regional space cooperation, but this is yet to take shape.

Space cooperation jumps from theoretical objectives to practical results when there is scientific and technical rationale behind space cooperation. To this end, countries need to support meetings of scientists to work on concrete space projects. Once a project is defined an intergovernmental working group could start drafting a legal agreement for the operation of the space project on multilateral or regional basis. Finally, the only way to ensure effective space cooperation is through legal agreements. ■