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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);

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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. ■