

# THE EMERGENCE OF SPACE LAW

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## I. INTRODUCTION

Space law exists today as a widely regarded, separate field of jurisprudence; however, it has many overlapping features involving other fields, including international law, contract law, tort law, and administrative law, among others.<sup>1</sup> Development of space law concepts began early in the twentieth century and blossomed during the second half of the century into its present state. It is not yet widely taught in law schools, but space law is gradually being accorded more space in law school curricula.

Substantial notional law and concepts of space law emerged prior to the first orbiting of a man made satellite named Sputnik in 1957. During the next decade (1958-1967), an intense effort was made to bring law into compliance with the realities of expanding spaceflight activities. During the 1960s, numerous national and international regulatory laws emerged to deal with satellite launches and space radio uses and to ensure greater international awareness and governmental presence in the oversight of ongoing activities in space.

Just as gradually developed bodies of maritime law emerged to regulate the operation of global shipping, aeronautical law emerged to regulate the expansion of global civil aviation, and telecommunication law emerged to regulate the global uses of radio and wire communication systems, a new body of law is emerging to regulate the activities of nations in astronautics. We know that new body of law as Space Law.

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<sup>1</sup> Portions of the following article were drawn from Stephen E. Doyle, *A Concise History of Space Law: 1910-2009*, in NEW PERSPECTIVES ON SPACE LAW: THE PROCEEDINGS OF THE 53RD IISL COLLOQUIUM ON THE LAW OF OUTER SPACE: YOUNG SCHOLAR'S SESSION I (Mark J. Sundahl & V. Gopalakrishnan eds., Int'l Inst. Space L. 2011), available at <http://www.iislweb.org/docs/NewPerspectivesonSpaceLaw.pdf>.

One aspect of satellite passage above national territories, or over flight, 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 over flight for peaceful or scientific purposes.<sup>2</sup> Was there to be a concept of “innocent passage” at extreme altitudes that would parallel the maritime concept of “innocent passage” of a ship transiting national territorial waters? The issue of “peaceful uses of outer space” has remained a perplexing and unresolved issue of definition for many decades.

## II. DEVELOPING THE SPACE LAW CONCEPT

### A. *PRE-SPACEFLIGHT CONCEPTS OF APPROPRIATE LAW*

As noted above, development of space law concepts began early in the twentieth century. By 1955 there was an already expanding litany of proposed laws to regulate the operations of spaceflight. The first published book on space law was published in the form of a monograph in 1932.<sup>3</sup> It was a remarkably prescient survey of the needs and extent of the law that would emerge related to spaceflight activities. The Czech engineer, attorney, inventor, pilot, and author, Vladimir Mandl, was far ahead of human technological capability at the time, but no less able to see what was needed. Like Mandl, other authors in the 1940s and 1950s became convinced that the use of rockets would eventually permit human penetration of space beyond the atmosphere, and the literature was expanding and deepening the discussion and consideration of the needs for space law. The stimulus that drove jurists to stop talking about space law and to begin establishing it was the orbiting in October 1957 of the Soviet satellite Sputnik. The

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<sup>2</sup> See PEACEFUL AND NON-PEACEFUL USES OF SPACE—PROBLEMS OF DEFINITION FOR THE PREVENTION OF AN ARMS RACE (B. Jasani ed., Taylor and Francis 1991) (published for the United Nations Institute for Disarmament Research [UNDIR] by Taylor and Francis), available at [http://unidir.org/bdd/fiche-ouvrage.php?ref\\_ouvrage=0-8448-1709-0-en](http://unidir.org/bdd/fiche-ouvrage.php?ref_ouvrage=0-8448-1709-0-en).

<sup>3</sup> VLADIMIR MANDL, WELTRAUM-RECHT: EIN PROBLEM DER RAUMFAHRT [SPACE LAW: A PROBLEM OF SPACE] (J. Bensheimer 1932).

international community, primarily through the United Nations, put actions in motion to deal with the need for space law.

## B. *INTERWEAVING SPACE LAW INTO THE FABRIC OF ANTHROPOCENTRIC JURISPRUDENCE*

A shroud of secrecy fell over most of the significant 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 provide aircraft jet-assisted take-off (JATO) and for tactical ground-to-ground barrage rocketry. 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. In the United States, only Robert Goddard in New Mexico<sup>4</sup> and the Guggenheim Aeronautical Laboratory at the California Institute of Technology (GALCIT)<sup>5</sup> were conducting seminal experiments with rocketry. By 1939, the world stage was well set for the military development and applications of rocketry that occurred during the Second World War.<sup>6</sup>

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<sup>4</sup> Robert Hutchings Goddard (1882-1945) was an American physicist and experimental rocketeer. For a survey of his early life and works, see Frederick C. Durant III, *Robert H. Goddard and the Smithsonian Institution*, in *FIRST STEPS TOWARD SPACE: PROCEEDINGS OF THE FIRST AND SECOND HISTORY SYMPOSIA OF THE INTERNATIONAL ACADEMY OF ASTRONAUTICS 57* (Frederick C. Durant III & George S. James eds., Smithsonian Annals of Flight Series No. 10, Smithsonian Inst. Press 1974), available at [http://www.sil.si.edu/smithsoniancontributions/AnnalsofFlight/pdf\\_lo/SAOF-0010.pdf](http://www.sil.si.edu/smithsoniancontributions/AnnalsofFlight/pdf_lo/SAOF-0010.pdf) (republished as VOLUME 6 OF THE AAS HISTORY SERIES: FIRST STEPS TOWARD SPACE: PROCEEDINGS OF THE FIRST TWO HISTORY SYMPOSIA OF THE INTERNATIONAL ACADEMY OF ASTRONAUTICS (IAA) (Frederick C. Durant III & George S. James eds., Univelt 1986) [hereinafter REPUBLISHED FIRST STEPS TOWARD SPACE]). For diary excerpts and papers by Robert Goddard about himself and his work, see also *THE PAPERS OF ROBERT H. GODDARD* (Ester C. Goddard & G. Edward Pendray eds., McGraw-Hill 1970).

<sup>5</sup> Frank J. Malina, *On the GALCIT Research Project 1936-1938*, in *REPUBLISHED FIRST STEPS TOWARD SPACE*, *supra* note 3, at 113, 125-126.

<sup>6</sup> Detailed and reliable accounts of the history of this period are in *WILLY LEY, ROCKETS, MISSILES, AND SPACE TRAVEL* (The Viking Press, rev. ed. 1958) (revised and enlarged edition with additional satellite data) and *ALFRED J. ZAEHRINGER, SOVIET SPACE TECHNOLOGY* (Harper & Brothers 1961). See also *WALTER DORNBERGER, V2: DER SCHUSS INS WELTALL: GESCHICHTE EINER GROSSEN ERFINDUNG [V2: THE SHOT INTO SPACE: HISTORY OF A GREAT INVENTION]* (Bechtle Verlag 1952) (this history of the Peenemünde Research and Development program was later published in English language versions as *WALTER DORNBERGER, V-2* (Viking 1954)); *WERNHER VON BRAUN, FREDERICK I. ORDWAY III, & DAVE DOOLING, SPACE TRAVEL: A HISTORY: AN UPDATE OF HISTORY OF ROCKETRY AND SPACE TRAVEL* (4th ed., HarperCollins 1985) (1966) (originally published as *WERNHER VON BRAUN & FREDERICK I. ORDWAY, HISTORY OF ROCKETRY AND SPACE TRAVEL* (Thomas Y. Crowell 1966) with revised editions in 1969 and 1975 and the cited updated edition with Dave Dooling in 1985). See also *WILLY LEY, ROCKETS, MISSILES, AND MEN IN SPACE* (rev. ed., Signet Books 1969) (the final edition of a series of revisions by Willy Ley that spanned twenty-five years from its original publication as *WILLY LEY, ROCKETS: THE FUTURE OF TRAVEL BEYOND THE STRATOSPHERE* (Viking Press 1944)); *FREDERICK I. ORDWAY III & MITCHELL R. SHARPE, THE ROCKET TEAM* (Thomas Y. Crowell 1979) (about the assembly,

Following the Second World War, in the latter 1940s and 1950s, the national military uses of rocketry were advanced rapidly in the USSR and the United States. The International Council of Scientific Unions (ICSU) decided in the early 1950s to conduct a global scientific survey, which they called the International Geophysical Year or IGY. Data would be collected by a sixty-six nation group in collaboration from July 1, 1957, to December 31, 1958, and collected data, in uniform formats, would be stored for universal access in World Data Centers in countries around the world. The IGY was the reason for announcements in July 1955 by the United States and the USSR that man-made satellites would be built and launched into orbit around Earth.<sup>7</sup> These developments accelerated consideration and publication containing views of many pundits about what the law in outer space should be.<sup>8</sup>

National and international laws developed in parallel in the 1960s and 1970s. As the uses of space expanded during the final quarter of the century, new international laws and regulations appeared less frequently and were more limited in scope, while expanding national laws began to emerge with greater frequency. Today there are more than twenty nations with substantial bodies of domestic law relating to the astronautical activities of their nationals, whether governmental or civilian entities.<sup>9</sup>

Space law has many overlapping aspects involving other fields of law. From the outset, because of its globe encompassing nature, space law has been universally recognized as an

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transport and work of the German ex-patriot rocket team that came to the United States); WERNHER VON BRAUN FREDERICK I. ORDWAY, *HISTORY OF ROCKETRY AND SPACE TRAVEL*, (Thomas Y. Crowell, 1966). For early rocketry in the USSR, histories are gradually emerging in the annual historical colloquia of the International Academy of Astronautics being published by Univelt Publishers for the American Astronautical Society in that society's Historical Series, see Univelt Inc., AAS History, <http://www.univelt.com/History.html> (last visited Sept. 6, 2012).

<sup>7</sup> See *THE INTERNATIONAL GEOPHYSICAL YEAR: INITIATING INTERNATIONAL SCIENTIFIC SPACE COOPERATION* (Stephen E. Doyle & A. Ingemar Skoog eds., Int'l Astronautical Fed'n 2012), available at [http://www.iislweb.org/docs/2012\\_IGY.pdf](http://www.iislweb.org/docs/2012_IGY.pdf).

<sup>8</sup> STEPHEN E. DOYLE, *ORIGINS OF INTERNATIONAL SPACE LAW AND THE INTERNATIONAL INSTITUTE OF SPACE LAW OF THE INTERNATIONAL ASTRONAUTICAL FEDERATION* (Univelt 2002).

<sup>9</sup> For a list of and the content of the existing national laws in the world regarding spaceflight, see United Nations Office for Outer Space Affairs, National Space Law Database, <http://www.unoosa.org/oosa/en/SpaceLaw/national/state-index.html> (last visited Sept. 6, 2012).

interwoven part of international law. When the United Nations began its consideration of the need for space law, negotiators concluded immediately that space law must include extant international law. In the first formal Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, the United Nations General Assembly “solemnly declar[ed]” that States should be guided by the following principles:

1. The exploration and use of outer space shall be carried on for the benefit and in the interests of all mankind.
2. Outer space and celestial bodies are free for exploration and use by all States on a basis of equality and *in accordance with international law*.
3. Outer space and celestial bodies are not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.
4. The activities of States in the exploration and use of outer space *shall be carried on in accordance with international law*, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting co-operation and understanding.<sup>10</sup>

These solemn declarations continued, but the earliest of them make eminently clear that the intention of the community of nations from the beginning was to have space law and international law fully integrated. As a consequence, the earliest teaching of space law in our universities was relegated to one or a few lectures within established courses on international law or international economic policy. Only as the body of space law expanded in the latter 1960s and the 1970s did full semester courses dedicated to space law appear in a few law schools.

During the quarter century 1960 to 1985, more than half a dozen new international organizations appeared to participate in development, launch, and operation of space systems, primarily to provide earth oriented services such as communications, navigation, meteorology, tracking, and earth resources monitoring. In addition, national defense systems appeared in the United States and in other countries. Other forms of international organizations and

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<sup>10</sup> Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, G.A. Res. 1962 (XVIII), at ¶¶ 1-4 (Dec. 13, 1963) (emphasis added).

educational/research institutes emerged to promote astronautics, to facilitate international information distribution about activities in space, and to provide educational and research services supporting astronautics. By the end of the twentieth century, space systems operations comprised an expanding worldwide multi-billion dollar industry.<sup>11</sup>

Another aspect of overlap arises from the fact that from the beginning, when governments funded and supported the development and fabrication of space technology, work was done by industrial entities pursuant to contracts and or cooperative agreements. Thus the applicability and utility of contract law emerged at the outset of spaceflight activity and has expanded apace with the expanding programs of scientific, commercial, civil governmental, and military space programs. All modern space operational systems are dependent upon and implemented pursuant to contract arrangements between and among the many involved parties. All spaceflight activities require licenses: (radio and launch) satellite manufacturers; tracking system operators; satellite owning and monitoring entities; and, in many cases, national regulatory bodies. All these actors are bound by laws, regulations, contracts, or conventions. This complex focused on spaceflight activity is what comprises space law.

Where human activity involves motion at high speeds; large moving objects; high pressure and high temperature operational systems, such as rockets; and large electrical and sensing systems, such as satellites, it is inevitable that some of these planned activities will result in harm to property or persons. Concern about the handling of liabilities arising out of spaceflight activities was addressed early and resulted in prompt international agreement on the liability for damages caused by a man-made space objects. In the UN's 1963 Declaration of Applicable Principles, it was provided that: "States bear international responsibility for national

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<sup>11</sup> The most comprehensive, readable, and reliable work covering the entire body of extant space law is FRANCIS LYALL & PAUL B. LARSEN, *SPACE LAW: A TREATISE* (Ashgate 2009).

activities in outer space, whether carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried on in conformity with the principles set forth in the present Declaration.”<sup>12</sup>

Thus it was recorded early in the history of spaceflight that national governments were responsible for their own and their citizens’ activities in space. Later treaty making produced a solemn agreement in 1972 comprising a Convention on International Liability for Damage Caused by Space Objects, also known as the Liability Convention.<sup>13</sup> Therefore, insofar as spaceflight was involved, tort liabilities of all types and the laws related to them became the subjects of international agreements promulgated by the United Nations.

Similarly from the outset, the United Nations and select member States paid close attention to the need to provide administrative procedures for registration, notification of activities, licensing, limitations on certain categories of military activities, matters of environmental protection, and other issues requiring forms of regulation or administration. Thus, there arose a body of administrative procedures related to spaceflight activities, some at national levels and others at international levels, whether regional or global. The complexities and implications of spaceflight activities are so great and so expansive that a body of administrative law is an essential part of the maintenance of order in the use of space.<sup>14</sup>

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<sup>12</sup> G.A. Res. 1962 (XVIII), *supra* note 10, at ¶ 5.

<sup>13</sup> Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187. By year-end 2008, the Liability Convention had been ratified by eighty-six nations and signed by an additional twenty-four nations. For current numbers, see the latest annual Proceedings of the International Institute of Space Law, published by the American Institute of Aeronautics and Astronautics. International Institute of Space Law, Proceedings, <http://www.iislweb.org/proceedings.html> (last visited Sept. 6, 2012).

<sup>14</sup> For a well-researched and reliable account of law-making in the United Nations from 1957 to 1982, see CARL Q. CHRISTOL, *THE MODERN INTERNATIONAL LAW OF OUTER SPACE* (Pergamon Press 1982).

### III. THE UNITED NATIONS AND INTERNATIONAL ORGANIZATIONS AND DEVELOPING SPACE LAW

#### A. *THE UNITED NATIONS COMMITTEE ON THE PEACEFUL USES OF OUTER SPACE*

The decades of the 1960s and 1970s 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 group, 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 United States 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. The COPUOS was a unique organ of the 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, was the previously cited 1963 Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space.<sup>15</sup> COPUOS then proceeded to elaborate five treaties implementing this 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, also known as the Outer Space Treaty;<sup>16</sup>

- Agreement on the Rescue of Astronauts, the Return of Astronauts, and the Return of Objects Launched into Outer Space;<sup>17</sup>

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<sup>15</sup> G.A. Res. 1962 (XVIII), *supra* note 10 (adopted unanimously on Dec. 13, 1963).

<sup>16</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty]; G.A. Res. 2222 (XXI) (Dec. 19, 1966) (adopted on Dec. 19, 1966, opened for signature on Jan. 27, 1967, entered into force on Oct. 10, 1967).



- Convention on International Liability for Damage Caused by Space Objects;<sup>18</sup>
- Convention on Registration of Objects Launched into Outer Space;<sup>19</sup> and
- Agreement Governing the Activities of States on the Moon and Other Celestial Bodies.<sup>20</sup>

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.

### *B. UNCOPUOS GROWTH THROUGH TIME*

Between 1980 and 2000 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;<sup>21</sup>
- Principles Relating to Remote Sensing of the Earth from Outer Space;<sup>22</sup>
- Principles Relevant to the Use of Nuclear Power Sources in Outer Space;<sup>23</sup> and
- 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.<sup>24</sup>

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<sup>17</sup> Agreement on the Rescue of Astronauts, the Return of Astronauts, and the Return of Objects Launched into Outer Space, Apr. 22, 1968, 19 U.S.T. 7570, 672 U.N.T.S. 119; G.A. Res. 2345 (XXII) (Dec. 19, 1967) (adopted on Dec. 19, 1967, opened for signature on Apr. 22, 1968, entered into force on Dec. 3, 1968).

<sup>18</sup> Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187; G.A. Res. 2777 (XXVI) (Nov. 29, 1971) (adopted on Nov. 29, 1971, opened for signature on Mar. 29, 1972, entered into force on Sept. 1, 1972).

<sup>19</sup> Convention on Registration of Objects Launched into Outer Space, Nov. 12, 1974, 28 U.S.T. 695, 1023 U.N.T.S. 15; G.A. Res. 3235 (XXIX) (Nov. 12, 1974) (adopted on Nov. 12, 1974, opened for signature on Jan. 14, 1975, entered into force on Sept. 15, 1976).

<sup>20</sup> Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, G.A. Res. 34/68, Dec. 5, 1979 (opened for signature on 18 Dec. 1979, entered into force on 11 July 1984).

<sup>21</sup> Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting, G.A. Res. 37/92 (Dec. 10, 1982).

<sup>22</sup> Principles Relating to Remote Sensing of the Earth from Outer Space, G.A. Res. 41/65 (Dec. 3, 1986).

<sup>23</sup> Principles Relevant to the Use of Nuclear Power Sources in Outer Space, G.A. Res. 47/68 (Dec. 14, 1992).

The number of nations involved in UNCOPUOS continued to grow over the years, going from eighteen initial members to sixty-nine members.

<b>Resolution Number</b>	<b>Date</b>	<b>Number of Members</b>
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

**Table 1:** Growth of nations' involvement in UNCOPUOS 1958-2007.

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

*C. INTERNATIONAL ORGANIZATIONS INVOLVED WITH SPACE RELATED ACTIVITIES*

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:

<b>International Organization</b>	<b>Date of Creation</b>
International Astronautical Federation	1952
International Council of Scientific Unions, Committee on Space Research (ICSU/COSPAR)	1958
UN <i>ad hoc</i> COPUOS	1958
UN Space Unit (Secretariat)	1959
UNCOPUOS	1959
International Academy of Astronautics	1959-1960

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<sup>24</sup> 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, G.A. Res. 51/122 (Dec. 13, 1996).

and the International Institute of Space Law (IAA/IISL)	
European Space Research Organization (ESRO) and the European Space Organization (ELDO)	1962
International Telecommunication Satellite organization (INTELSAT-Interim)	1964
INTELSAT (Permanent)	1971
International Satellite Communication Organization ( INTERSPUTNIK)	1971
European Space Agency (ESA)	1975
European Telecommunication Satellite Organization (EUTELSAT)	1975
Arabic Satellite Communications Corporation (ARABSAT)	1976
International Maritime Satellite Organization (INMARSAT)	1979
Multiple navigation satellites systems	1970-1980
European Meteorological Satellite Organizations (EUMETSAT)	1986
UN Office of Outer Space Affairs (OOSA, Secretariat)	1992

**Table 2:** Spaceflight Generated International Organizations

#### IV. DEVELOPING NATIONAL AND REGULATORY SPACE LAW

##### A. *SPACE LAW AND REGULATORY MACHINERIES EMERGE*

There are numerous readable and informative histories of the development of rocketry and civil organizations supporting astronautical development.<sup>25</sup> On the development of space law by the United Nations, an excellent descriptive work was done by Professor Carl Christol of the University of Southern California.<sup>26</sup> Others focused on the work being done broadly by governments and international organizations in the 1950s and early 1960s, using brief historical discussions as springboards to offer ideas of what the law ought to be in the future.<sup>27</sup> The body

<sup>25</sup> See, e.g., DURANT, *supra* note 4; FRANK WINTER, *PRELUDE TO THE SPACE AGE: THE ROCKET SOCIETIES, 1924-1940* (Smithsonian Inst. Press 1983).

<sup>26</sup> Christol, *supra* note 14.

<sup>27</sup> See, e.g., ANDREW G. HALEY, *SPACE LAW AND GOVERNMENT* (Appleton-Century-Crofts 1963); MYRES S. MCDUGAL, HAROLD D. LASSWELL & IVAN A. VLASIC, *LAW AND PUBLIC ORDER IN SPACE* (Yale Univ. Press 1963).

of formal and customary law, national and international, expanded through the 1960s and 1970s, and governmental institutions emerged, along with industrial and international organizations to become space system operators and/or space operations regulators.<sup>28</sup>

National laws devoted to space activities emerged slowly in the 1960s, but began increasing in number more rapidly during the final quarter of the twentieth century. There is one recent book that captures the entire story of the development of space law in the twentieth century and it is probably the best single work on space law that exists. That is *Space Law: A Treatise*, written by Francis Lyall and Paul B. Larsen, two professors of law with more than forty years each engaged in teaching space law and participating in organizations promoting and explaining the development of space law.<sup>29</sup>

Today, we can count more than twenty nations with dedicated bodies of legislation devoted to astronomical affairs, we have five major treaties developed and promulgated through the United Nations Committee on the Peaceful Uses of Outer Space, and there are now six UN promulgated declarations of principals related to the operations of nations in space. The twentieth century produced many laws, regulations, institutions, and operational space systems, which cumulatively have provided us with real-time global communications; global navigational capability; real-time global meteorological monitoring; defensive early warning satellite systems; and national and regional defense systems. These institutions and operational space systems have also provided us with information about our Earth, our moon, the planets of the solar

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<sup>28</sup> STEPHEN E. DOYLE, THE IMPACT OF SPACEFLIGHT AND SPACE EXPLORATION ON LAWS AND GOVERNMENTAL STRUCTURES OF THE UNITED STATES (NASA History Office 2011) (a study prepared for the NASA History Office).

<sup>29</sup> LYALL & LARSEN, *supra* note 11. Lyall and Larsen were classmates in 1964 at the McGill Institute of Air and Space Law and maintained an active bilateral relationship throughout their teaching years, although Lyall was at the University of Aberdeen, Scotland, and Larsen was in Washington, D.C., originally with the United States Federal Aviation Administration and later on the law faculty at Georgetown in the District of Columbia. A Lyall and Larsen classmate, Nandasiri Jasentuliyana, joined the United Nations Secretariat upon leaving McGill, working at the UN and publishing on space law for almost fifty years. Jasentuliyana published numerous volumes of merit on the development of space law as it occurred. Dr. Jasentuliyana rose eventually to the position of Director, Office of Outer Space Affairs of the UN in Vienna, Austria, where, prior to retirement, he also served as Deputy Secretary General.

system, and many aspects of astronomy still being examined to discover what we have uncovered. All of this has been achieved without a shot fired in anger and with unprecedented cooperation among nations and organizations on a global basis.

#### B. *NATIONAL SPACE LEGISLATION IN THE UNITED STATES*

The relevant law of the United States offers a good example of how legislative requirements change with time. Here, the sequence of significant changes in the legislative bases of space law in the United States is reviewed. 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 continually with time.

The first major law in the United States was the *National Aeronautics and Space Act of 1958*,<sup>30</sup> which established the National Aeronautics and Space Administration (NASA) and set out basic national policies concerning activities in or related to space. This was followed by the *Communications Satellite Act of 1962*,<sup>31</sup> which authorized creation of the Comsat Corporation and proposed the establishment of a global communication satellite system (which eventually became Intelsat). Annual acts authorize and appropriate funding to support national space programs. As the effort to land on the moon approached, the United States 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

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<sup>30</sup> National Aeronautics and Space Act of 1958, Pub. L. No. 85-568, 72 Stat. 426.

<sup>31</sup> Communications Satellite Act of 1962, Pub. L. No. 87-624, 76 Stat. 423.

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.”<sup>32</sup>

The next significant law adopted by the United States Congress, the *International Maritime Satellite Telecommunications Act*, anticipated creation of the International Maritime Satellite Organization.<sup>33</sup> Increased use of national and international programs of remote sensing of the Earth led to the United States’ adoption of the *Land Remote-Sensing Commercialization Act of 1984*,<sup>34</sup> and that same year the United States Congress adopted the *Commercial Space Launch Act*.<sup>35</sup> As noted earlier, neither technology nor relevant circumstances remain static, and four years later the Congress adopted the *Commercial Space Launch Act Amendments of 1988*.<sup>36</sup> In 1990 Congress considered creation of patents in space and adopted an act to provide for inventions made in outer space.<sup>37</sup> In 1992, questions of remote sensing were revisited.<sup>38</sup> Law-making and national policy formulation and articulation continue with regularity, but forms of law and policy declarations vary widely from country to country.

## V. DEVELOPMENTS IN INTERNATIONAL ORGANIZATIONS INVOLVED WITH SPACE ACTIVITIES

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 and 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

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<sup>32</sup> Anne M. Platoff, Where No Flag Has Gone Before: Political and Technical Aspects of Placing a Flag on the Moon (Oct. 11, 1992) (a paper presented to the 26th Meeting of the North American Vexillological Association, October 11, 1992, San Antonio, Texas and prepared for the Lyndon B. Johnson Space Center under contract NAS9-18263, August 1993), available at <http://www.jsc.nasa.gov/history/flag/flag.htm>.

<sup>33</sup> International Maritime Satellite Telecommunications Act, Pub. L. No. 95-564, 92 Stat. 2392 (1978).

<sup>34</sup> Land Remote-Sensing Commercialization of 1984, Pub. L. No. 98-365, 98 Stat. 451.

<sup>35</sup> Commercial Space Launch Act of 1984, Pub. L. No. 98-575, 98 Stat. 3055.

<sup>36</sup> Commercial Space Launch Act Amendments of 1988, Pub. L. 100-657, 102 Stat. 3900.

<sup>37</sup> Pub. L. No. 101-580, 104 Stat. 2863 (1990) (amending patent law for inventions made in outer space, see 35 U.S.C. § 105 (2006)).

<sup>38</sup> Land Remote Sensing Policy Act of 1992, Pub. L. No. 102-555, 106 Stat. 4163.

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*.<sup>39</sup> These sources prohibit the placement of nuclear or other weapons; weapons tests; the establishment of military bases, installations, or fortifications; or military maneuvers in space or on celestial bodies.<sup>40</sup> 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 International Institute of Space Law (IISL) Standing Committee on the Status of International Agreements Relating to Activities in Outer Space contained in the IISL annual *Proceedings*.<sup>41</sup>

As stated above, 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 and Larson treatise on space law.<sup>42</sup> For teachers, an excellent introductory text is available in Isabella Diedericks-Verschoor's introduction to space law.<sup>43</sup>

## VI. CONCLUSIONS

Spaceflight has stimulated many responses since its inception over fifty years ago. We have seen bilateral competition, but also 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

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<sup>39</sup> Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water, Aug. 5, 1953, 14 U.S.T. 1313, 480 U.N.T.S. 43.

<sup>40</sup> See Outer Space Treaty, *supra* note 16, at art. IV.

<sup>41</sup> See, e.g., INTERNATIONAL INSTITUTE OF SPACE LAW, PROCEEDINGS OF THE INTERNATIONAL INSTITUTE OF SPACE LAW, 2008 xvii-xxx (Am. Inst. Aeronautics & Astronautics 2009).

<sup>42</sup> LYALL & LARSEN, *supra* note 11.

<sup>43</sup> I. H. PH. DIEDERIKS-VERSCHOOR, AN INTRODUCTION TO SPACE LAW (2d rev. ed. Kluwer Law Int'l 1999).

mix of events that have led to this unprecedented spirit of cooperation and information sharing. Shared benefits of nations agreeing to work together using resources located in or at least partly in outer space include:

- enhanced understanding of the Earth/Sun relationship, its nature, and importance;
- enhanced understanding of our solar system, its planets, moons, and the space beyond;
- global real time communications (internet);
- global real time television;
- global real time meteorological information;
- 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 fifty years; but we still have a long way to go. With the foundation of space law and the international cooperation it reflects and encourages, prospects for humanity's future are encouraging.