ROY BALLESTE*

Space Horizons:
An Era of Hope in the Geostationary Orbit

Exploration is in our nature. We began as wanderers, and we are wanderers still. We have lingered long enough on the shores of the cosmic ocean. We are ready at last to set sail for the stars.

—Carl Sagan[1]

* Dr. Roy Balleste is a Professor of Law and is the Director of the LL.M. program in Cybersecurity Law & Policy at St. Thomas University School of Law. Balleste's research and writing focuses on the crossroads of cybersecurity, rules of engagement, and space law. He was the 2017 recipient of the space law Nicolas Mateesco Matte Prize at McGill University. Professor Balleste teaches internet governance law and cybersecurity law. He is a founding partner of ABH Aerospace, LLC. This Article is an homage to two scholars that he admires: Dr. Siegfried Wiessner and Dr. Ram Jakhu.

1 CARL SAGAN, COSMOS 206 (Ballantine Books 2013) (1980).

I
POINT OF DEPARTURE

Dreams and illusions are precious. It is dreams about the future that propel ideas forward. The reexploration of the Moon is within reach, and plans to visit Mars are now common in the news.[2] While returning to the Moon is exciting enough, there are financial considerations that now propel these plans. Nations, such as

> the United States[,] . . . Russia, China, and India, have each announced their intent to establish a base on the Moon, in part with the purpose—or, in the case of the United States, at least the exploratory goal—of seeking to mine and bring to Earth helium-3[,] . . . an isotope of helium rarely found naturally on Earth . . . .[3]

This in itself is a source of one particular dream, as helium-3 "is theoretically an ideal fuel for thermonuclear fusion power reactors, which could serve as a virtually limitless source of safe and non-polluting energy."[4] These dreams do not stop with the Moon. Elon Musk, a long-time advocate of the colonization of Mars, has stated his desire "to terraform the Martian atmosphere so that future generations of humans can live there;" he also noted how important it is to have a human presence on more than one planet so that the future survival of humanity is assured, "especially if a catastrophic event ever occurs on Earth."[5]

But the world is divided by frontiers and ideologies that keep slowing down the inhabitants of planet Earth from reaching out toward the stars. For humanity, the idea of doing good deeds for the benefit of others is constantly challenged by the greed and desire for power by individuals. While there may be a shadow of war lurking on the horizon, outer space is a domain that offers great hope for humanity. General Carl von Clausewitz once noted that "[w]ar is the province of chance."[6] For General Clausewitz, war was an intruder seeking to invade the human existence, where "chance" could not be allowed any

---

2 *Moon to Mars Overview*, NASA, https://www.nasa.gov/content/journey-to-mars-overview [https://perma.cc/D4DP-ST9N] (last updated Apr. 5, 2019).

3 Richard B. Bilder, *A Legal Regime for the Mining of Helium-3 on the Moon: U.S. Policy Options*, 33 FORDHAM INT'L L.J. 243, 243 (2009).

4 *Id.* at 246.

5 Thomas J. Herron, *Deep Space Thinking: What Elon Musk's Idea to Nuke Mars Teaches Us About Regulating the "Visionaries and Daredevils" of Outer Space*, 41 COLUM. J. ENVTL. L. 553, 554 (2016).

6 CARL VON CLAUSEWITZ, THE LIVING THOUGHTS OF CLAUSEWITZ (1945), *reprinted in* THE ESSENTIAL CLAUSEWITZ: SELECTIONS FROM "ON WAR" 7 (Joseph I. Greene ed., Dover Publ's, Inc. 2003).

margin of access as it would increase "the uncertainty of every circumstance, and derange[] the course of events."[7] It is science, or, more precisely, technological innovations, that offer tools to create hope and achieve dreams. The process to set the stage must turn to States' conduct in outer space, which is directly related to the principles of international space law. This stage introduces us to the problem: a narrow orbital band around our planet called the geostationary orbit (GEO). The future apportionment of this region of space is a matter of urgency with consequences for all States. This situation necessitates a search for a solution in the form of a management process. A legal framework for the common interest of all States is needed to address both historical and modern challenges. The telecommunications needs of humanity, in turn, are tied to that modern challenge. Thus, this Article centers on the geostationary orbit, its future management, and the challenges associated with its inherent scarcity. The equitable access under the law to this orbit is in direct conflict with the realization that it is congested and limited in orbital slots.[8]

Today, the activities of humanity are shaped by the activities of spacefaring nations beyond the edge of the atmosphere and in the great expanse of outer space. In between the planet and the expanse, at "35,800 kilometers over the [E]arth's equator," a unique orbital region exists.[9] Consider the satellites navigating around our planet; each one travels a particular lane known as an orbit. An *orbit* is "[t]he path relative to a specified frame of reference, described by the centre of mass of a satellite or other object in space subjected primarily to natural forces, mainly the force of gravity."[10] One specific type of orbit is the geostationary orbit. The positioning of satellites around planet Earth necessitates unique orbital locations and the ability to manage them along with radio frequencies for broadcasting, which, in turn, is not a simple matter.[11] The International Telecommunication Union (ITU), a specialized agency of the United Nations, declared in the preamble to

---

7 *Id.*

8 *See* Mark Holmes, *Hot Orbital Slots: Is There Anything Left?*, VIA SATELLITE (Mar. 1, 2008), http://www.satellitetoday.com/publications/via-satellite-magazine/features/2008/03/01/hot-orbital-slots-is-there-anything-left/ [https://perma.cc/8M6P-N2L7].

9 Andrzej Gorbiel, *The Legal Status of Geostationary Orbit: Some Remarks*, 6 J. SPACE L. 171, 171 (1978).

10 Int'l Telecomm. Union [ITU], *Radio Regulations: Articles*, art. 1, sec. 8, ¶ 1.184 (2016) (emphasis omitted) [hereinafter ITU Radio Regulations 2016].

11 Stephan Hobe, *Geostationary Orbit*, *in* MAX PLANCK ENCYCLOPEDIA OF PUBLIC INTERNATIONAL LAW, ¶ 1 (Oxford Univ. Press 2007).

the Radio Regulations that radio frequencies are limited natural resources.[12] This is the crux of their importance and is tied to future regulatory challenges.

The ITU regulations help identify an official characterization for the geostationary orbit and offer definitions about this orbit. However, it is the preamble that first identifies the challenge:

> In using frequency bands for radio services, Members shall bear in mind that radio frequencies and any associated orbits, including the geostationary-satellite orbit, are limited natural resources and that they must be used rationally, efficiently and economically, in conformity with the provisions of these Regulations, so that countries or groups of countries may have equitable access to those orbits and frequencies, taking into account the special needs of the developing countries and the geographical situation of particular countries . . . .[13]

Since 1971, "the World Administrative Radio Conference . . . recognized the geostationary orbit as limited natural resources like the frequencies for terrestrial radio communications . . . ."[14] Like human existence, those involved in the management of this orbital arc reached a new frontier. "Many nations, although without technology to access space, requested the geostationary positions for possible future use" due to the fear of losing access to this limited resource.[15]

Outer space is a mysterious and alluring environment for space lawyers. In the horizon, at night, traveling in the southern hemisphere, the Magellanic Clouds remind us about the future and exciting new opportunities.[16] The accessibility to future resources in outer space evokes notions of a new age of exploration. In 1956, Wilfred Jenks, an academic and pioneer of space law, discussed the relationship of State sovereignty on Earth in the context of outer space beyond the atmosphere.[17] He explained that, in outer space, sovereignty is never constant due to characteristics such as "[t]he revolution of the earth on

---

12 ITU Radio Regulations 2016, *supra* note 10, at pmbl., ¶ 0.3.

13 *Id.*; *see also* James J. Gehrig, *Geostationary Orbit – Technology and Law*, *in* PROCEEDINGS OF THE NINETEENTH COLLOQUIUM ON THE LAW OF OUTER SPACE 267, 273 (1977).

14 HENGNIAN LI, GEOSTATIONARY SATELLITES COLLOCATION 5 (2014).

15 *Id.*

16 *See* Hartmut Frommert & Christine Kronberg, *The Large Magellanic Cloud, LMC*, STUDENTS FOR EXPLORATION & DEV. SPACE, http://messier.obspm.fr/xtra/ngc/lmc.html [https://perma.cc/ER4V-54XD] (last modified Mar. 11, 2004).

17 C. Wilfred Jenks, *International Law and Activities in Space*, 5 INT'L & COMP. L.Q. 99, 103 (1956).

its own axis, its rotation around the sun, and the motions of the sun and the planets through the galaxy."[18]

To exert sovereignty over outer space, as Jenks put it, would be "a meaningless and dangerous abstraction."[19] These profound words are at the center of the message contained in the 1958 *General Assembly Resolution on the Question of the Peaceful Use of Outer Space*.[20] The resolution recognized the use of outer space for peaceful purposes as a common interest of humanity.[21] The resolution compelled nations to set aside national rivalries and come to a mutual understanding that space exploration is for the benefit of humanity.[22] For the drafters of the document, cooperation was understood as an ingredient of mutual understanding in line with friendly relations.[23] Humanity was expected to be bold and to challenge preconceived notions of State relations in an age that opened a cosmic ocean of uncharted waters.

For the upcoming space traveler of the twenty-first century, this may become another environment to be exploited, or another area to be conquered and mastered. The new space traveler will be in harm's way exploring the unknown simply because humanity must return to outer space. It will be a new environment capable of supporting space activities and unimaginable adventures. If Magellan had used a different approach to explore the oceans and had allowed physical or political obstacles of that time to thwart his greatest dreams, would he have attempted to circumnavigate the world?[24] Would he have been able to see giants?[25] The story of Magellan reminds us that, similar to the early navigators of the Age of Exploration, we can only envision what will be required of space travelers and their activities. Indeed, it takes only a moment to appreciate the example of Magellan, who carried with him Portugal's most precious traits: navigational data, risk of human life, and a desire of discovery.[26] These very same traits will accompany astronauts in future missions.

---

18 *Id.*

19 *Id.* at 103–04.

20 *See* G.A. Res. 1348 (XIII), Question of the Peaceful Use of Outer Space, pmbl. (Dec. 13, 1958).

21 *Id.*

22 *Id.*

23 *Id.*

24 *See* LAURENCE BERGREEN, OVER THE EDGE OF THE WORLD: MAGELLAN'S TERRIFYING CIRCUMNAVIGATION OF THE GLOBE 31 (2003).

25 *Id.* at 162.

26 *Id.* at 172.

James Gehrig, a presenter at the 1976 Proceedings of the Nineteenth Colloquium on the Law of Outer Space, examined the earlier writings of Arthur C. Clarke, which, at the time, were increasing in popularity.[27] Gehrig noted that Clarke had "described quite accurately how three 'satellite stations' positioned on the 42,000 kilometer circular orbit whose plane coincided with that of the Earth's equator would give near complete communications coverage of the globe."[28] Gehrig also noted that Clarke was proven correct in fewer than twenty years "with the launch and positioning of Syncom 3."[29] This space object is remembered as the first communications satellite positioned in a "geosynchronous orbit whose orbital plane coincided (very nearly) with the plane of the Earth's equator . . . [in an area] called the geostationary orbit."[30] The characteristics of the GEO are unique, for it provides an environment where satellites complete one revolution around the Earth every twenty-four hours, the same time needed for the planet to rotate on its axis.[31] Gehrig explained that space objects rotating in a twenty-four hour period are known as "geosynchronous satellites."[32] "The geostationary orbit, a ring of space six earth radii above the equator, is where communications satellites must be placed in order to assume a fixed position in the sky."[33]

The value of geostationary positions is due to their dependability to relay messages "between large numbers of geographically isolated communicators."[34] "Satellites traveling [in] this [orbit] are said to be in geosynchronous, or geostationary, orbit" due to their position "on an equatorial path in the direction of the earth's rotation, [remaining] above the same location on the surface of the planet and from that location . . . appear to be stationary."[35] There are particular electromagnetic spectrum bands that allow for messages to travel quickly.[36] These frequencies are transmitted in a wide array of

---

27 Gehrig, *supra* note 13, at 267.

28 *Id.*; *see generally* Arthur C. Clarke, *Extra-Terrestrial Relays: Can Rocket Stations Give World-Wide Radio Coverage?*, WIRELESS WORLD, Oct. 1945, at 305, 305.

29 Gehrig, *supra* note 13, at 267.

30 *Id.*

31 *Id.*

32 *Id.*

33 Martin A. Rothblatt, *Satellite Communication and Spectrum Allocation*, 76 AM. J. INT'L L. 56, 56 (1982).

34 *Id.*

35 Christian A. Herter, Jr., *The Electromagnetic Spectrum: A Critical Natural Resource*, 25 NAT. RESOURCES J. 651, 656 (1985).

36 Rothblatt, *supra* note 33, at 57.

wavelength bands, with the *C band*, the *Ku band*, and the *Ka band* being those with "desirable signal propagation characteristics."[37] The key lies in the position of the satellite. Those located in a geosynchronous Earth orbit have the additional benefit of accessing roughly one-third of the Earth's surface area.[38] Thus, the location of the GEO is significant given that "very high radio frequencies emitted from one location on the earth's surface are received by a satellite, and can be sent back to a different location on the earth."[39]

Among future challenges are the upcoming launches of satellites that will trek around our planet in orbits characterized by their function, following a particular inclination relative to the equator.[40] There are three major orbiting areas: low-Earth orbit (LEO), medium-Earth orbit (MEO), and geostationary orbit (GEO).[41] The LEO begins at around sixty miles up—the area where the International Space Station is found—and is followed by the less crowded MEO—where GPS satellites reside.[42] The greatest and most precious spatial resource—the GEO—includes satellites at 22,300 miles from the surface of Earth, which are traveling or rotating at the same speed as Earth and gaze "continuously at . . . continent-sized areas on the ground."[43] This particular orbit is very valuable given that half of all satellites are positioned at this location, which has become critical due to its many uses:

- missile early-warning;
- nuclear testing detection;
- electronic intelligence;
- commercial communication;
- direct broadcasting (such as direct television and radio services).[44]

Thus, the value and importance of a geostationary position is derived from the overall advantages of its location. Indeed, satellites in the GEO are ideal for the distribution of broadcasts and remote sensing, given that these satellites possess an unobstructed view of "as much as

37 *Id.*

38 JOINT CHIEFS OF STAFF, JOINT PUB. 3-14, SPACE OPERATIONS, at I-4 (10 Apr. 2018).

39 Herter, *supra* note 35, at 656.

40 *See* JAMES CLAY MOLTZ, CROWDED ORBITS: CONFLICT AND COOPERATION IN SPACE 21 (2014).

41 *Id.*

42 *Id.*

43 *Id.*

44 *Id.* at 21–22.

forty percent of the Earth's surface."[45] Article I of the Outer Space Treaty declares that the "exploration and use of outer space . . . shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind."[46] The treaty also states that "[outer space] shall be free for exploration and use by all States without discrimination of any kind, on a basis of equality and in accordance with international law . . . ."[47] In this light, the realities and future challenges of outer space use, as influential legal scholar Myres McDougal once hoped, would be one of a legal process of authoritative decision-making reflecting community expectations.[48] McDougal would have agreed that the community's expectations of the spacefaring nations would be conducive to a required equitable share of resources in outer space.[49] Thus, the use of the geostationary orbit required the realization that "due to technical considerations, the number of artificial satellites . . . placed in it without causing mutual interferences, is limited."[50] Article 44, paragraph 196 of the International Telecommunication Convention highlights the spirit of the Radio Regulations:

> In using frequency bands for radio services, Member States shall bear in mind that radio frequencies and any associated orbits, including the geostationary-satellite orbit, are limited natural resources and that they must be used rationally, efficiently and economically . . . .[51]

Thus, the maximization of the geostationary orbit has become an urgent matter. This urgency will be addressed in Subsection A below. For now, it is worth noting the critical importance of accessing that orbit. "Issues such as frequency bands and separation of satellites has to be taken into account."[52] For this reason, the future challenge is one of accepting that, for now, the GEO resource is regrettably finite. There is

---

45 Lawrence D. Roberts, *A Lost Connection: Geostationary Satellite Networks and the International Telecommunication Union*, 15 BERKELEY TECH. L.J. 1095, 1100 (2000).

46 G.A. Res. 2222 (XXI), at 13, art. 1, Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (Dec. 19, 1966) [hereinafter Outer Space Treaty].

47 *Id.*

48 Myres S. McDougal, *The Prospects for a Regime in Outer Space*, *in* LAW AND POLITICS IN SPACE 105, 106–07 (Maxwell Cohen ed., 1964).

49 *Id.*

50 Gorbiel, *supra* note 9, at 171.

51 Constitution and Convention of the International Telecommunication Union, art. 44, ¶ 196, Dec. 22, 1992, 1825 U.N.T.S. 331.

52 Holmes, *supra* note 8.

no doubt that access to this valuable real estate implies governance challenges. What should be the human thing to do? Should humanity abandon all hope for peaceful coexistence in outer space at a time when tensions escalate at the international level, or should it look to the stars in search of answers?

A. Envisioning Orbital Technology

The GEO is a finite resource because only so many satellites can orbit Earth in this space. Some experts believe that no orbital slots remain unused or unclaimed.[53] Other experts, however, believe that some still exist, although there are "fewer slots available for commercial firms to provide services to already established markets."[54] The main problem addressed by this Article is that the geostationary orbit is congested and "[t]here is not an inexhaustible supply of attractive orbital slots for satellite operators."[55] Some experts have envisioned potential remediation actions, yet the problem persists. These remedial measures include

- a 2-degree spacing requirement;
- a move to a 4.5-degree spacing for Direct Broadcast Satellites; or
- operating with underused frequency bands.[56]

The GEO has the potential to improve telecommunications. But to enjoy these benefits, policy makers must endeavor to live in an evolving world "still divided into nation states, but . . . rapidly becoming a single global civilization."[57] For example, President Jimmy Carter—as he drafted a momentous message that would be carried by Voyager 1 into interstellar space—stated the following regarding the craft and its cargo:

> This is a present from a small distant world, a token of our sounds, our science, our images, our music, our thoughts, and our feelings. We are attempting to survive our time so we may live into yours. We hope someday, having solved the problems we face, to join a community of galactic civilizations. This record represents our hope

53 *Id.*

54 *Id.*

55 *Id.*

56 *See id.*

57 Jimmy Carter, Voyager Statement by the President, AM. PRESIDENCY PROJECT (July 29, 1977), https://www.presidency.ucsb.edu/documents/voyager-spacecraft-statement-the-president [https://perma.cc/HN3A-7MQF].

> and our determination, and our good will in a vast and awesome universe.[58]

These words invite us to reconsider our preconceived notions about borders and national divisions and instead promote the continued spirit of the Outer Space Treaty. This spirit is in line with the ITU Constitution, Convention, and Radio Regulations, which together delineate principles in three main areas:

> - "frequency spectrum allocations to [various] . . . radiocommunication services;
> - rights and obligations of Member administrations in obtaining access to spectrum/orbit[al] resources;
> - international recognition of these rights by recording frequency assignments and . . . orbital positions used or intended to be used in the [ITU] Master International Frequency Register."[59]

Section VIII of the ITU Radio Regulations addresses the technical terms with definitions relating to space. These definitions are included in the revision of the Radio Regulations, which complements the Constitution and the Convention of the ITU.[60] These definitions incorporate the decisions of the World Radiocommunication Conferences from 1995 (WRC-95) to 2012 (WRC-12).[61] The ITU Radio Regulations provide the following guiding definitions:

> 1. *geosynchronous satellite*: "An earth satellite whose period of revolution is equal to the period of rotation of the Earth about its axis."[62]
> 2. *geostationary satellite*: "A geosynchronous satellite whose circular and direct orbit lies in the plane of the Earth's equator and which thus remains fixed relative to the Earth; by extension, a geosynchronous satellite which remains approximately fixed relative to the Earth."[63]

---

58 *Id.*

59 Yvon Henri, Orbit/Spectrum Allocation Procedures Registration Mechanism 1 (Oct. 1, 2002) (unpublished manuscript presented to the World Meteorological Organization Workshop), https://www.wmo.int/pages/prog/www/TEM/RFworkshop/ITUorbitSpectrumProcedures.doc [https://perma.cc/A24T-9DRP].

60 *See* ITU Radio Regulations 2016, *supra* note 10, at art 1., sec. VIII.

61 *Id.*

62 *Id.* ¶ 1.188 (emphasis omitted).

63 *Id.* ¶ 1.189 (emphasis omitted).

> 3. *geostationary-satellite orbit*: "The orbit of a geosynchronous satellite whose circular and direct orbit lies in the plane of the Earth's equator."[64]

As States continue to use their orbital spaces, scholars and practitioners will need to reevaluate the emerging technologies of telecommunications. Professor Ram Jakhu, Project Manager of the Manual on International Law Applicable to Military Uses of Outer Space (MILAMOS), McGill University's Institute of Air & Space Law, has noted that international space law "created a fundamental legal principle of freedom of exploration and use of outer space by all States."[65] This equal freedom of use and exploration by all States—without discrimination of any kind—is not unlimited since States "must carry out [their] space activities with due regard to the corresponding interests of all other States."[66] This is critical, because, as he noted, "radio frequencies and associated orbits . . . are limited international natural resources," which turns the discussion to the realization that a finite orbit must be used "rationally, efficiently, and economically so that countries or groups of countries may have equitable access."[67] This equitable use was anticipated by the 1996 Declaration on International Cooperation in the Exploration and Use of Outer Space.[68] The Declaration predicted future technological developments that would influence the evolution of new spacefaring nations. Without a doubt, mathematics would become the additional ingredient of clarification in this puzzle.

II
A GEOSTATIONARY RESOURCE

What should be the starting point to address the challenges posed above? A suitable starting point is a consideration of the astronomical implications associated with the use of outer space. Any policy designed to explore future opportunities in outer space should avoid the failings of scarcity suffered as a consequence of excessive claims of

---

64 *Id.* ¶ 1.190 (emphasis omitted).

65 Ram Jakhu, Sixty Years of Development of International Space Law 6 (Apr. 8, 2016) (unpublished manuscript), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2801728 [https://perma.cc/SF8Y-445K] (hereinafter Jakhu, Sixty Years).

66 *Id.*

67 *Id.* at 8.

68 G.A. Dec. 51/122, U.N Doc A/RES 51/122 (Dec. 13, 1996).

property rights.[69] This scarcity has been shown to bring about the degradation of a limited resource used in common, or the tragedy of the commons.[70] The tragedy's story shows the ultimate and unfortunate result of actions in the commons—as a consequence of being open to all, the resource falls prey to separate self-interests.[71] The tragedy of the commons originated with Garrett Hardin, and from it we learn that valuable resources can become scarce if rules of behavior are not set in place.[72] Yet, outer space is a completely foreign environment for all States. Present legal challenges stress well-established legal notions that overshadow questions of the viability of the GEO. To be sure, in outer space, national borders are unremarkable. The great expanse of outer space is limitless. There is no doubt the drafters of the Outer Space Treaty recognized this reality in the language of Article II: "Outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means."[73] The quest for outer space orbits begins with mathematics.

These mathematics, interestingly, require an understanding of the motion of planets around the Sun, now owed to the laws of Kepler.[74] His first law noted that the planets were moving in ellipses, "with the Sun at one focus."[75] The second law became more revealing, as it noted that while "a planet travels in its orbit, an imaginary line connecting the planet to the Sun sweeps equal areas in equal intervals of time."[76] How the planets behaved while moving in their orbits, thus, allowed for calculations that revealed a predetermined trajectory.[77] To these laws, Kepler added his third law, which explained that "the square of a planet's orbital period is proportional to the cube of its mean distance, or semi-major axis, from the Sun."[78] The combination of these figures

---

69 SUSAN J. BUCK, THE GLOBAL COMMONS 100 (1998).

70 *See* Garrett Hardin, *The Tragedy of the Commons*, SCIENCE, Dec. 13, 1986, at 1243–48 (1968); *see also* ELINOR OSTROM, GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION 2–3 (James E. Alt & Douglass C. North eds., 2015).

71 *See* Hardin, *supra* note 70; *see also* OSTROM, *supra* note 70.

72 *See* Hardin, *supra* note 70; *see also* OSTROM, *supra* note 70.

73 Outer Space Treaty, *supra* note 46, at art. II.

74 DEBRA ANNE ROSS LAWRENCE, MASTER MATH: ESSENTIAL PHYSICS 87 (Course Tech. 2013) (2012).

75 *Id.*

76 *Id.* at 88.

77 *Id.*

78 *Id.*

revealed calculations of astronomical units that even in the present day continue to be equally relevant to all planets orbiting around the Sun.[79] In addition, when Kepler's laws were later combined with the laws of Newton, a formula was achieved for the understanding of orbiting satellites, also known as the laws of motion.[80] In particular, by understanding the behavior of the planets, Moon, and Sun in relation to each other, Newton was able to realize the Law of Universal Gravitation, the one and significant force that keeps satellites in orbit.[81]

If mathematics clarifies the status of the orbits in outer space, then humanity's ingenuity becomes that part of exploration that offers to all equally the advantages associated with the GEO. The challenge would be in the sharing of this resource that was—and continues to be—far from equal. Several of the GEO's advantages have been noted:

a. No need for complex reception or transmission mechanisms;
b. Direct Broadcast Satellites (DBS) have substantial reach of the globe;
c. Ability to provide remote sensing of the earth's surface;
d. Ability for navigational guidance;
e. Use of solar energy platforms;
f. Provides strategic location for manned space stations and spacecraft terminals.[82]

For these reasons, as noted earlier, a policy designed to explore future opportunities in outer space should avoid the failings of scarcity.[83] This scarcity, as noted in Hardin's tragic story, shows the ultimate result of actions in the commons, as a consequence of being open to all, while unfortunately falling prey to separate self-interests.[84] The tragedy of the commons demonstrates that valuable resources can become scarce if rules of behavior are not set in place.[85] Hardin's scarcity example is illustrated by cattle owners with access to a pasture field and their cows sharing this resource.[86] As the owners sent in more

79 *Id.*

80 *Id.*

81 *Id.* at 91.

82 Georgetown Space Law Group, *The Geostationary Orbit: Legal, Technical and Political Issues Surrounding Its Use in World Telecommunications*, 16 CASE W. RES. J. INT'L L. 223, 224 (1984).

83 BUCK, *supra* note 69.

84 *See* Hardin, *supra* note 70; *see also* OSTROM, *supra* note 70.

85 *See* Hardin, *supra* note 70; *see also* OSTROM, *supra* note 70.

86 *See* Hardin, *supra* note 70; *see also* OSTROM, *supra* note 70.

cows than the field was able to sustain, the collective overgrazing degraded the resources.[87] Hardin's example can be extrapolated to space objects, while emphasizing the dangers associated with a crowded geostationary orbit. Is this orbit destined to be degraded by political and economic forces that will further weaken an already limited resource? This issue demands a solution applicable to all members of the world community to enhance the prospects for a world public order of human dignity in outer space.

A. Public Order in Outer Space

The telecommunications needs of humanity require an examination of the resources available in the geostationary orbit, while seeking a minimum public order to enhance the activities of the State. There is an urgency associated with humanity's need to secure a "minimum public order in the whole earth-space arena."[88] The public order can be understood as "a democratically-organized, rationally-managed 'free society' encompassing all peoples and providing the greatest enjoyment of human values for the largest number of individuals."[89] Because of such elements, the creation of public order in space would result in the greatest enjoyment for the largest number of individuals of the GEO. This public order is achieved by taking into consideration three main characteristics of human society: the earth-space social process, claims of authority, and common interests in the control of space activities.[90] Thus, this order creates a "pattern of value shaping and sharing" that harmonizes "with the requirement of human dignity."[91] The words of Article 1(2) of the Outer Space Treaty arose with the exploratory activities of human beings and reiterates that "the exploration and use of outer space . . . shall be carried out for the benefit and in the interests of all countries."[92] This, in essence, is what public order is: a goal to maximize "access by all to all the values humans desire, i.e., the things they want out of life (and not just those things they need as determined usually by someone other than themselves)."[93]

---

87 *See* Hardin, *supra* note 70; *see also* OSTROM, *supra* note 70.

88 MYRES S. MCDOUGAL ET AL., LAW AND PUBLIC ORDER IN SPACE 157 (1963).

89 Frederick Samson Tipson, *The Lasswell-McDougal Enterprise: Toward a World Public Order of Human Dignity*, 14 VA. J. INT'L L. 535, 536 (1974).

90 MCDOUGAL ET AL., *supra* note 88, at 4.

91 *Id.* at 145.

92 Outer Space Treaty, *supra* note 46, at art. I(2).

93 Siegfried Wiessner, *Law as a Means to a Public Order of Human Dignity: The Jurisprudence of Michael Reisman*, 34 YALE J. INT'L L. 525, 528 (2009).

This public order can be achieved within a society that enjoys an assured protection of its interests with effective representation. This public order can be reflected by a society living free from severe deprivations caused by illicit coercion.[94] There is an inescapable reality that space activities occur in a realm of a disunited world.[95] The efforts to maintain a legal regime for the GEO, without a doubt, made States realize that the use of outer space is a "dichotomy between peaceful and other uses."[96] The challenge at hand has been one that requires a balanced approach of the uses. States' activities in outer space are driven by their unique political reasons.[97] Thus, the preeminent role that officials of nation-states play in contemporary international law is highlighted by their prescription and application of "policy on behalf of [humanity]."[98] Another way to look at these uses is to consider that "[t]he global public interest in outer space was recognized by the international community [in] the . . . 1967 Outer Space Treaty."[99]

A public order for the GEO should be one that meets the principles of international space law and, preferably, is used for the benefit of humanity. In this manner, the Outer Space Treaty includes a "common interest" general principle, in which the "use of outer space . . . [must] be carried out for the benefit and in the interests of all countries."[100] Both noted the guiding principle of the "province of all mankind" in Article I(1) of the treaty, which states that "[t]he exploration and use of outer space . . . shall be carried out for the benefit and in the interests of all countries . . . and shall be the province of all mankind."[101] On the other hand, the search for a proper balance in a future public order of the geostationary orbit seems to look as fanciful as the story of Atlantis

94 *Id.* at 531.

95 *Id*.

96 *Id*.

97 Ronald L. Spencer, Jr., *International Space Law: A Basis for National Regulation*, *in* NATIONAL REGULATION OF SPACE ACTIVITIES 1, 1 (Ram S. Jakhu ed., 2010).

98 Myres S. McDougal, *The Emerging Customary Law of Space*, 58 NW. U. L. REV. 618, 624 (1963).

99 Ram Jakhu, *Legal Issues Relating to the Global Public Interest in Outer Space*, 32 J. SPACE L. 31, 31 (2006).

100 Outer Space Treaty, *supra* note 46, at art. I; Ram S. Jakhu & Isavella Maria Vasilogeorgi, *The Fundamental Principles of Space Law and the Relevance of International Law*, *in* IN HEAVEN AS ON EARTH? THE INTERACTION OF PUBLIC INTERNATIONAL LAW ON THE LEGAL REGULATION OF OUTER SPACE 21, 21–22 (Stephan Hobe & Steven Freeland eds., 2013).

101 Outer Space Treaty, *supra* note 46.

and the legends of the mythic island of ancient times, vividly described by Plato.[102]

While the story of Atlantis may be chimeric in nature, the management of satellites in the geostationary orbit likely will not be. Space law pioneer Wilfred Jenks accurately noted that when faced with challenges associated with technology, international space law will have to quickly evolve with a theoretical approach to offer solutions.[103] In this situation, Jenks noted, international lawyers should give "preliminary consideration to the problems which will confront them as a matter of urgency if the current efforts of scientists and engineers specialising in astronautics and electronics should suddenly achieve a dramatic success."[104] Jenks was concerned with the evolving nature of technology. For this eminent scholar, the evolution of legal principles needed to keep pace with technological discoveries and their application. This evolution must follow the provisions of the Outer Space Treaty governing the geostationary interests of the global community.

III
STATUS OF THE GEOSTATIONARY ORBIT

The continuous use of the geostationary-satellite orbit and frequency resources has brought about a congestion that prompted the ITU member States to consider the question of equitable access.[105] The outcome of the ITU member States' consideration of equitable access materialized with the establishment of a regulatory regime intended to provide access to the frequency-orbital positions with "a certain amount of frequency spectrum . . . set aside for future use by all countries, particularly those which are not in a position . . . to make use of these resources."[106] The process was designed with the idea of providing each country with a predetermined orbital position.[107] This process was designed to guarantee each nation "equitable access to the spectrum/orbit resources," while "safeguarding [each nation's] basic

---

102 N.S. Gill, *Atlantis as It Was Told in Plato's Socratic Dialogues*, THOUGHTCO., https://www.thoughtco.com/platos-atlantis-from-the-timaeus-119667 [https://perma.cc/YHV6-KQXB] (last updated Oct. 5, 2018); *see also* CHARLES BERLITZ, THE MYSTERY OF ATLANTIS (1977).

103 Jenks, *supra* note 17, at 101.

104 *Id.*

105 Henri, *supra* note 59, at 2.

106 *Id.*

107 *Id.*

rights."[108] Access to valuable orbits in the hands of a select few would be a difficult proposition.

The management of a limited resource such as the GEO requires a higher recognition of the common good. It was Jean-Jacques Rousseau who observed the basis for the legitimacy of a government.[109] "How much more legitimate is it to say with the wise Plato, that the perfect felicity of a kingdom consists in the obedience of subjects to their prince, and of the prince to the laws, and in the laws being just and constantly directed to the public good!"[110] This public good, on the other hand, cannot be unilateral. The idea of resorting to claims of sovereignty may have been tempting at a time of limited accessibility to outer space. This is what happened to those nations located on the Earth's equator that signed "[t]he 1976 Declaration of the First Meeting of Equatorial Countries, known as the Bogotá Declaration, . . . to assert sovereignty over those portions of the geostationary orbit that continuously lie over their national territory."[111] However, Article II of the Outer Space Treaty is clear that "[o]uter space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means."[112]

As noted earlier, the GEO is not just congested but is accessible only to those who can reach it. If there must be equitable access under the law, then the allocation of this finite resource is problematic because the majority of the orbit resource "remains accessible on the first-come, first-served basis."[113] This means, as Jakhu explained, that the practice of first-come, first-served—disfavored by developing nations—continues to govern a major segment of the radio spectrum.[114] It was also noted that due to the unplanned bands having remained subject to the first-come, first-served process, "some may assert that [the] worst

---

108 *Id.*

109 JEAN-JACQUES ROUSSEAU, THE SOCIAL CONTRACT AND DISCOURSES 127 (G.D.H. Cole trans., BN Publishing 2007).

110 *Id.*

111 Ferdinand Onwe Agama, *Effects of the Bogota Declaration on the Legal Status of Geostationary Orbit in International Space Law*, 8 NNAMDI AZIKIWE U. J. INT'L L. & JURIS. 24, 25 (2017).

112 Outer Space Treaty, *supra* note 46, at art. II.

113 Jannat C. Thompson, *Space for Rent: The International Telecommunications Union, Space Law, and Orbit/Spectrum Leasing*, 62 J. AIR L. & COM. 279, 295 (1996); *see also* Remarks by Ram Jakhu, *Developments in the International Law of Telecommunications*, 83 AM. SOC'Y INT'L L. PROC. 385, 391 (1989) [hereinafter Jakhu Remarks].

114 Jakhu Remarks, *supra* note 113.

attributes were preserved" from older regulations.[115] Could it be said that the system fails to completely protect those whom it intended to benefit? This situation, as Thomas Hobbes would note, is a reflection of relentless desire for power.[116] This observation prompts an examination of a limited resource and its flawed management.

The governance of the GEO must be understood beyond the context of the ITU Constitution and Convention and managed in accordance with Article 1(1) of the Outer Space treaty:

> The exploration and use of outer space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind.[117]

For this reason, regulation is merely a selfish and specific desire to gain control purely for the attainment of even more control.[118] This seems to be in accordance with Jakhu's observation that given that the system "specifies only a nominal position in a predetermined arc of the orbit . . . [,] an orbital position of a country can be moved within that arc without that country's consent."[119] "This may create serious difficulties, especially for the late-comer countries because the rule of 'first-come, first-served' applies to the actual occupation of the orbital positions within that predetermined arc."[120] For these reasons, Jakhu also observed that technologically developed nations were, and continue to be, favored by this system.[121]

It is not enough to acknowledge the finite attribute of the GEO orbit. What highlights the urgency of this matter is that it is also an international "natural limited resource" since it is not limited to a particular nation.[122] This means that its management will be successful only if its use is subject to a legal framework.[123] The task ahead is not

---

115 Milton Smith, *A New Era for the International Regulation of Satellite Communications*, 14 ANNALS AIR & SPACE L. 449, 454 (1989).

116 *See generally* THOMAS HOBBES, LEVIATHAN 49–54 (J.M. Dent & Sons Ltd 1943) (1651).

117 Outer Space Treaty, *supra* note 46, at art. I(1).

118 *See id.*

119 Jakhu Remarks, *supra* note 113, at 391.

120 *Id.*

121 *Id.*

122 Oscar Fernandez-Brital, *Geostationary Orbit*, *in* PROCEEDINGS OF THE TWENTY-FIRST COLLOQUIUM ON THE LAW OF OUTER SPACE 14, 15 (Mortimer D. Schwartz ed., 1978).

123 *Id.*

easy, but one that requires management for the common interest.[124] To achieve a solution, it is helpful to first address additional and historical legal considerations.

A. The Bogotá Declaration

The member States that signed the Bogotá Declaration expected the world to accept their definition of the geostationary orbit's existence as one based uniquely on gravitational forces, while not taking into consideration its relation to outer space.[125] The claim of the eight nations—Brazil, Colombia, Congo, Ecuador, Indonesia, Kenya, Uganda, and Zaire (now the Democratic Republic of the Congo)—was rejected by both States that had launched satellites into that orbit and those that had not.[126]

The Bogotá Declaration of 1976 claimed "sovereignty up to the geostationary orbit (GSO) above their territories [(22,300 miles or 36,000 kilometers).]"[127] This is, of course, incompatible with Article 44(2) of the ITU Constitution, which states in relevant part that "radio frequencies and . . . the geostationary-satellite orbit[] are limited natural resources and that they must be used rationally, efficiently and economically, in conformity with the provisions of the Radio Regulations, so that countries or groups of countries may have equitable access to those orbits and frequencies."[128]

In addition, Article 22 of International Radio Regulations notes that "[n]on-geostationary-satellite systems shall not cause unacceptable interference to and, unless otherwise specified in these Regulations, shall not claim protection from geostationary-satellite networks in the fixed-satellite service and the broadcasting-satellite service."[129] Therefore, given that the geostationary orbit is a part of outer space,

---

124 *See id.*

125 Michael J. Finch, *Limited Space: Allocating the Geostationary Orbit*, 7 NW. J. INT'L L. & BUS. 788, 790 (1986) (citing the Bogatá Declaration).

126 *Id.*

127 Gbenga Oduntan, *The Never Ending Dispute: Legal Theories on the Spatial Demarcation Boundary Plane Between Airspace and Outer Space*, 1 HERTFORDSHIRE L.J. 64, 75 (2003).

128 Constitution and Convention of the International Telecommunication Union, *supra* note 51, at art. 44(2).

129 ITU Radio Regulations 2016, *supra* note 10, at art. 22, sec. II, ¶ 22.2.

under Article II of the Outer Space Treaty, this resource falls under the general prohibition of appropriation.[130]

While it may be reassuring to refer back to Article I of the Chicago Convention in matters of States' "complete and exclusive sovereignty over the airspace above [their] territory," the Convention arguably applies only to aircraft because it never defined "airspace."[131] However, as Professor John Cooper foresaw, there was a need to reach agreement on what was supposed to be the upper boundary of every State in relation to outer space, given that these States had no possible theory that would grant them authority to exercise sovereignty in outer space "beyond the region of the earth's attraction."[132]

B. The 1967 Outer Space Treaty

The allocation of positions in this orbit, as noted earlier, follows the spirit of Article I, paragraph 2, of the Outer Space Treaty.[133] From the beginning,

> [t]he pioneering work [in international space law] has been carried out by the COPUOS in the initiation and continual progressive development of international space law. Within a few months of the emergence of the space age in 1957, the UN General Assembly adopted its first resolution on outer space.[134]

The legal basis for activities in the exploration and use of outer space arose out of this early history. "Since [that] first resolution, the UN has laboriously negotiated . . . five international treaties" including the Outer Space Treaty.[135] It is known as "one of the most significant law-making treaties concluded in the second half of the twentieth

---

130 Ram S. Jakhu, *The Principle of Non-Appropriation of Outer Space and the Geostationary Satellite Orbit*, *in* PROCEEDINGS OF THE TWENTY-SIXTH COLLOQUIUM ON THE LAW OF OUTER SPACE 21, 21 (1983).

131 Finch, *supra* note 125, at 792.

132 John C. Cooper, *High Altitude Flight and National Sovereignty*, 4 INT'L L.Q. 411, 417 (1951).

133 Outer Space Treaty, *supra* note 46, at art. I.

134 Jakhu, Sixty Years, *supra* note 65, at 5; *see also*, G.A. Res. 1348 (XIII), *supra* note 20.

135 Jakhu, Sixty Years, *supra* note 65, at 5.

century."[136] As of January 2019, there are 109 State parties to the treaty.[137] Article III of the Treaty provides further guidance:

> States Parties to the Treaty shall carry on activities in the exploration and use of outer space, including the Moon and other celestial bodies, in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international co-operation and understanding.[138]

The legal status of the geostationary orbit should be directly related to the location of space objects. Yet, there will always be that temptation to bring about comparisons. It is worth a brief look at one particular example for purposes of contrasting it with the principles of the Outer Space Treaty. For example, the Antarctic Treaty System reflects language similar to that used in the "U.N. General Assembly resolutions on outer space and the deep seabed."[139] It could be said that the Antarctic Treaty has been a management success that responds to the principles of international law.[140] The Antarctic Treaty, which entered into force on June 23, 1961, notes in Article I(1) the requirement of peaceful purposes prohibiting any "measure[] of a military nature," including the testing of any type of weapon.[141] Article II emphasized the freedom of scientific investigation and cooperation.[142] Article IV halted all claims of sovereignty.[143] Finally, Article IX(a) aims at the use of the continent for only peaceful purposes.[144] The instruments of international space law are juxtaposed within a much more complex political landscape. Jakhu explained that

---

136 Vladimir Kopal, *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies*, U.N. AUDIOVISUAL LIBR. INT'L L. (Dec. 19, 1966), http://legal.un.org/avl/ha/tos/tos.html [https://perma.cc/J27K-R43J]; s*ee also*, Ram Jakhu & Steven Freeland, *The Sources of International Space Law*, 56 PROC. INT'L INST. SPACE L. 461, 466 (2013).

137 *See* Comm. on the Peaceful Uses of Outer Space, Status of Int'l Agreements Relating to Activities in Outer Space as of 1 January 2019, U.N. Doc. A/AC.105/C.2/2019/CRP.3 (Apr. 1, 2019) [hereinafter Comm. on the Peaceful Uses of Outer Space].

138 Outer Space Treaty, *supra* note 46, at art. III.

139 KEMAL BASLAR, THE CONCEPT OF THE COMMON HERITAGE OF MANKIND IN INTERNATIONAL LAW 245 (1998).

140 Olav Schram Stokke & David Vidas, *Effectiveness and Legitimacy of International Regimes*, *in* GOVERNING THE ANTARCTIC: THE EFFECTIVENESS AND LEGITIMACY OF THE ANTARCTIC TREATY SYSTEM 13, 13 (Olav Schram Stokke & Davor Vidas eds., 1996).

141 The Antarctic Treaty art. I, Dec. 1, 1959, 12 U.S.T. 794, 402 U.N.T.S. 71.

142 *Id.* at art. II.

143 *Id.* at art. IV(2).

144 *Id.* at art. IX(1)(a)–(f).

"[t]he expansion of space applications, especially for satellite communications, and the increasing reliance of the militaries on space systems are . . . resulting in the abuse of ITU rules and procedures as well as in radio signal interference."[145] Lessons can be inferred from the Antarctic regime. Indeed, the Antarctic Treaty offered clarifications as to what "peaceful purposes" meant, but it also added confusion as to whether its clauses were extended by analogy to the outer space arena.[146] The drafters of the treaty had a different context in mind for the terms "military" and "peaceful," inapplicable to the stakeholders and resources found in outer space. Indeed, Judge Manfred Lachs, another pioneer of space law, explained

> Einstein's caveat that analogies have been "a source not only of the most fruitful theories, but also of the most misleading fallacies," . . . [where] [o]ne has simply to beware of its pitfalls and seek to grasp reality as comprehensively as possible in proceeding from tried systems to the construction of new ones.[147]

In 1998, Professor Susan Buck made a somewhat disturbing—although realistic—assessment regarding the governance of the global commons.[148] While recognizing outer space as part of the global commons, Buck noted that its status had remained that way only because access to it had been difficult and the value of its resources had not been "enough to justify the effort of acquiring them."[149] The problem is, as Buck explained, that now technology is advanced enough to enable plans of exploitation of these resources.[150] She alluded to the concept of a new international law to fit the times.[151] The access to the geostationary orbit and its satellite broadcasting benefits, for example, are tempered by the "inevitable conflict between the equitable and efficient allocation of resources."[152] Professor Carl Q. Christol, former member of the U.S. Department of State's Advisory Committee on International Law and pioneer of space law, observed that views on the availability of radio frequencies and orbital positions were "influenced by the language of Article 33(2) of the 1973 ITU

---

145 Jakhu, Sixty Years, *supra* note 65, at 28.

146 MCDOUGAL ET AL., *supra* note 88, at 398.

147 MANFRED LACHS, THE LAW OF OUTER SPACE: AN EXPERIENCE IN CONTEMPORARY LAW-MAKING 21 (1972).

148 BUCK, *supra* note 69, at 1.

149 *Id.*

150 *Id.*

151 *Id.* at 2.

152 Finch, *supra* note 125, at 798.

Convention."[153] Christol highlighted the operative words which reiterate that "radio frequencies and the geostationary satellite orbit are limited natural resources."[154] It is the allocation of these resources that requires careful governance.

IV
ALLOCATION OF RESOURCES

In 2002, it was noted that the "international law governing space activities" was related to what had been called the "global commons."[155] While human activities in outer space have offered new opportunities, they must be understood in the context of emerging problems and responsibilities.[156] One of these responsibilities is related to non-appropriation. It would be impossible to overestimate the importance of the lack of exceptions associated with the non-appropriation principle enshrined in Article II of the Outer Space Treaty.[157] While claiming ownership over outer space is prohibited, it has been noted that the Outer Space Treaty "has not contained any explicit principle that would regulate economic activities."[158] In 2017, the geostationary orbit continued to be a closely monitored challenge. This is evident by the invitation of the Scientific and Technical Subcommittee of UNCOPUOS to the ITU "to make a report concerning its contribution to the peaceful uses of outer space, including the use of the geostationary satellite orbit (GSO) and other orbits."[159] The ITU had already made observations by providing an extensive survey from the ITU Radiocommunication Bureau's 2016 Annual Space Report on the use of the geostationary satellite orbit and other orbits.[160] The ITU Radiocommunication Bureau 2016 Annual Space Report provided the annual list of "geostationary space networks for which information has been communicated to the Bureau . . . in application of the provisions of Article 9 [(advance publication of information on satellite networks or satellite systems and affecting

153 Carl Q. Christol, *International Space Law and the Use of Natural Resources: Solar Energy*, 15 BELG. REV. INT'L L. 28, 31 (1980).

154 *Id.* at 31–32.

155 Proceedings of the United Nations/International Institute of Air and Space Law Workshop on Capacity Building in Space Law, U.N. Doc. ST/SPACE/ 14 (2003).

156 *Id.*

157 *Id.* at 13.

158 *Id.* at 14.

159 Comm. on the Peaceful Uses of Outer Space, *supra* note 137, ¶ 1.

160 *Id.* ¶ 2.

coordination)] and/or Article 11 [(notification and recording of frequency assignments)]."[161]

A. Thoughts on a Solution

Space is for everybody. It's not just for a few people in science or math, or for a select group of astronauts. That's our new frontier out there, and it's everybody's business to know about space.

—Christa McAuliffe, Teacher and Challenger Astronaut[162]

The next step is to consider the best possible solution. Could past trends in decisions associated with this challenge offer clarification? The protection of the geostationary orbit offers guidance to those seeking to protect it within the analysis of Professor Siegfried Wiessner, the first scholar to consider the geostationary orbit from the point of view of Roman law. Wiessner noted that regulation "does not arise automatically from technical necessities . . . . It is not a static body . . . [and] is a continuing process of interaction in which, at the global level, decision-makers of individual territorial communities unilaterally put forward claims . . . ."[163] Wiessner would probably say that the geostationary orbit is directly related to the claims for access to that resource, where States are mainly interested in their own security, which is also susceptible to external demands from the other States, the private sector, and international organizations.[164]

Could it be possible for Wiessner to devise a regime under which this finite resource could be distributed among the numerous claimants in the world community?[165] He was preoccupied with this critical issue and proposed what he called "a flexible framework of inclusive control over the area, based on the view of the orbit as a *res publica internationalis.*"[166] This Roman property classification proved to be an ingenious idea and one that deserves support now and into the future.

---

161 Comm. on the Peaceful Uses of Outer Space, Rep. of the Int'l Telecommunication Union on the Use of the Geostationary Satellite Orbit (GSO) and Other Orbits, U.N. Doc. A/AC.105/C.1/2017/CRP.14 (Jan. 25, 2017).

162 *See* Jerry Woodfill, *Space Quotes*, NASA JOHNSON SPACE CTR., https://er.jsc.nasa.gov/seh/quotes.html [https://perma.cc/EK7A-HTT8] (last updated Feb. 15, 2000, 11:00 AM).

163 Siegfried Wiessner, *The Public Order of the Geostationary Orbit: Blueprints for the Future*, 9 YALE J. INT'L L. 217, 235 (1983) [hereinafter *Blueprints for the Future*].

164 *Id.* at 236.

165 *Id.* at 218.

166 *Id.*

Wiessner agreed that "[m]uch of the criticism ha[d] been directed against the doctrine of prior notification as encapsulated in the slogan 'first come, first served.' "[167] "Highly developed countries [were] the predominant users of the geostationary orbit."[168] The debate centered on the concept that "a priori allotment of frequencies and orbital positions . . . would leave many of the allotted frequencies and orbital positions unused, because less developed countries generally lacked facilities, money, or the need to use them."[169] On the other hand, this allotment allocation was "perceived by the major present users as preventing optimum use of the orbit."[170] He also described the troubling woes of India, while noting that developing States did not see a benefit in the traditional approach of first come, first served.[171] As India's chief delegate noted at the World Administrative Radio Conference (WARC) of 1979, developing countries "are the people who seek access much later, whose resources are limited and who are in fact not in a position to pay any penalties."[172] Wiessner appropriately turned to the wisdom of the Romans in search of a solution for a modern problem. The concept that he designated, *res publica internationalis*, requires a two-pronged approach.

First, if the Roman law solution was to help resolve the imbalance of the traditional approach, then the concepts of *res* and *res publica* required a closer look.[173] These concepts originated from what Roman jurists designated as a *res* (or thing).[174] Along this concept, Wiessner envisioned an International Space Agency—one model favored from a group of four he proposed, and the one with the highest degree of inclusive control.[175] Thus, Wiessner chose the property classification of *res publica*, which in Roman law concentrates on public things that belong to the populous.[176] Wiessner concluded that the concept of *res*

167 *Id.* at 244.

168 *Id.* at 239.

169 *Id.* at 241.

170 *Id.*

171 *Id.* at 244.

172 *Id.* at 245–46.

173 *Id.* at 260.

174 J.A.C. THOMAS, TEXTBOOK OF ROMAN LAW 125 (1976).

175 *Blueprints for the Future*, *supra* note 163, at 268.

176 THOMAS, *supra* note 174, at 12; *see also* ANDREW BORKOWSKI, TEXTBOOK ON ROMAN LAW 143 (1994).

publica would be useful in a new regime for the management of the geostationary orbit.[177]

Second, his legal approach was an ingenious and practical approach for *res publica* given that the geostationary orbit belongs to the nations of the world and, for this reason, would be a resource to be controlled by States while enjoyed by all humanity.[178] This international aspect, as Wiessner designated it, further extended the concept of *res publica* for the international realities of modern space law. He explained that

> [t]he geostationary orbit is a heavily used and, at the same time, finite resource. This factual context and the basic community policy of ensuring equitable access call for a regime of shared inclusive control. Thus, in a most general way, the resource at hand may safely be called a *res publica internationalis*.[179]

A *res publica internationalis* management regime would ultimately improve the present allocation approach but would have to consider two additional observations noted by Jakhu and Singh. First, there was an exception contained in Article 48 of the ITU Constitution.[180] This observation noted that installations were exempt from the application of ITU rules and regulations if they were for purposes of national defense, and in turn, the Radio Regulations were not applicable to military uses of radio frequencies—the "single largest group of users essentially outside the ITU regulatory regime."[181] The second observation involved dispute settlement, which offered no way to resolve disputes involving interference problems.[182] These observations taken together highlighted the necessity to avoid or prevent any nation from monopolizing or encroaching upon the equal right of access to outer space in contravention of the Outer Space Treaty.[183] A long-term solution would benefit from a plan where *res publica internationalis* would be suited to allocate satellite orbital spaces owned by all States. The ultimate goal would be to establish a plan that would guarantee for all nations equitable access and equitable use of orbital slots with appropriate radio frequencies.[184] The solution,

---

177 *Blueprints for the Future*, *supra* note 163, at 263.

178 THOMAS, *supra* note 174, at 129.

179 *Blueprints for the Future*, *supra* note 163, at 266.

180 *See* Ram Jakhu & Karan Singh, *Space Security and Competition for Radio Frequencies and Geostationary Slots*, 58 ZEITSCHRIFTFUR LUFT- UND WELTRAUMRECHT [ZLW] 74, 88 (2009) (Ger.).

181 *Id.*

182 *Id.*

183 *Id.* at 91.

184 *Id.* at 92.

as they noted, would be the establishment "by ITU member states of flexible *a priori* allotment plan(s) for some specific services and radio frequency bands for their equitable distribution by setting up detailed rules and procedures for the use of radio frequencies and orbital positions" with monitoring through a regional or compulsory independent neutral organization.[185] Hopefully, future policy makers will take a serious look at these concepts.

CONCLUSION

Planet Earth and our petty conflicts diminish in significance when we consider the cosmological expanse and our unimportant place in it. There is enough to be optimistic about in the future. But there are also challenges ahead. In a not-too-distant future, humanity may need the resources found in our solar system, and beyond, to survive. Given the critical nature of telecommunications, future challenges remain—for example, when satellites provide the means for communications from Earth to connect with humans on the Moon, Mars, and other celestial objects. Thus, the nature of international space law centers on human existence itself. The goal, therefore, should be the sharing of a resource that involves international stewardship while simultaneously promoting the spirit of the Outer Space Treaty and protecting "the province of all mankind."[186]

The immeasurable expanse of outer space is one full of mysteries. It is one that challenges all notions of comprehension or delimitation. It is in outer space where we find a new world that promises great marvels of technology in orbit and beyond our planet's orbit. But ultimately, our success in space depends on ourselves. The late astrophysicist and cosmologist Carl Sagan shared the following observations in his last book:

> If we can't think for ourselves, if we're unwilling to question authority, then we're just putty in the hands of those in power. But if the citizens are educated and form their own opinions, then those in power work for *us*. In every country, we should be teaching our children the scientific method and the reasons for a Bill of Rights. With it comes a certain decency, humility and community spirit. In the demon-haunted world that we inhabit by virtue of being

185 *Id.* at 92–93.

186 Outer Space Treaty, *supra* note 46, at art. I.

> human, this may be all that stands between us and the enveloping darkness.[187]

Sagan's vision does not stop with those previously made statements. The words within his last book are further motivation to consider that humanity has "arranged a global civilization in which most crucial elements . . . communications . . . protecting the environment . . . profoundly depend on science and technology."[188] Thus, managing the legal difficulties of the geostationary orbit will be one factor that enables human space development. It will require good will and a desire to enter a new space age.

---

187 CARL SAGAN, THE DEMON-HAUNTED WORLD: SCIENCE AS A CANDLE IN THE DARK 434 (Ballantine Books 1997).

188 *Id.* at 26.