

THE DEVELOPMENT OF INTERNATIONAL LAW AND THE PEACEFUL USES FOR OUTER SPACE

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I very much appreciate the invitation to deliver the Nandasiri Jasentuliyana Keynote Lecture this year. Dr. Jasentuliyana devoted most of his professional life in ensuring that the law of outer space, like other branches of international law, became a reality. But apart from his expertise, no one who has met Dr. Jasentuliyana would have failed to be impressed by his humanity and deep courtesy. In tribute to his contribution to the development of the law of outer space, I have made it my task today to speak on the development of international law and the peaceful uses of outer space.

International law has incredible breadth and depth. It governs a multiplicity of inter-State activities and spreads its wings over a variety of subject-matters: from war to peace and from the earth to outer space. International law also has great flexibility and is capable of reflecting developments in science and technology. Its reach now extends from the depths of the ocean and the heights of aerospace to the rims of bioethics and cyberspace. International law has always kept its pace with the best and worst aspects of human activity: from developments in the field of medicine to improving the human condition, to the development of nuclear technology, which is capable of saving human lives as well as eradicating the human race.

International law has also kept up to speed with the development of technology

where transport and communication are concerned. The initial means of land transport were walking and swimming. The invention of the wheel made animal transport more efficient through the introduction of vehicles.¹ Water transport through rowing or sailing vessels was also one of the first forms of transport. The industrial revolution brought about fundamental changes in the way people and goods moved.² The invention of the steam engine as applied in rail transport³ made the use of animals redundant. In its application on steam ships, the steam engine also made the use of rowing or sailing vessels unnecessary, especially in the quick transport of heavy cargoes across the globe. The invention of the combustion engine made road transport increasingly popular with the automobile.⁴

The twentieth century has been witness to the most radical changes in the field of transport. At the beginning of the twentieth century the controllable airplane was invented, and by the end of World War I it became a fast means of transporting people and goods.⁵ It was against the background — of this rapid technological development — that in 1957 the first artificial satellite to orbit the Earth, Sputnik 1, was launched by the Soviet Union.⁶ The United States followed with Explorer I in January 1958. In 1961 the first human space flight, Vostok 1, made one orbital flight around the Earth with Soviet cosmonaut Yuri Gagarin aboard. The United States NASA Apollo 8 achieved the first manned lunar orbiting mission in 1968. Thereafter, in 1969 the first manned lunar

landing took place with the Apollo 11 mission. The International Space Station, a habitable research laboratory, became humanity's eleventh space station upon the launch of its first component on November 20, 1998, and has ensured an uninterrupted human presence in space for over a decade.⁷ In 2004, SpaceShipOne was used for the first privately funded space flight.

Space law is one of the branches of public international law. Fundamental principles of international law are reflected in various norms regulating outer space, from the peaceful uses of outer space and the principle of non-discrimination in its use, to the non-extension of the principle of sovereignty to space and the characterization of astronauts as "envoys of mankind". Public international law is continually challenged to keep up with the developmental speed and ever-growing physical reach of space technology. It is therefore pertinent to examine how international law has reacted to the phenomenon of the exploration and various uses of outer space over the past five decades. As States and mankind are capable of both useful and malevolent activities, so have these been extended to outer space in terms of its use both for peaceful and non-peaceful purposes. Before immersing ourselves in the development of international law regarding the multifarious uses of outer space however, it is necessary to examine the definition of "outer space".

Space agreements and other space law instruments have never authoritatively defined the term "outer space". It has proven difficult for the States concerned to agree on a legal definition in the context of rapidly developing technology, and their apprehension that a legally binding definition might restrict their sphere of space activities and operations.⁸ Nevertheless, this legal notion includes the Moon and other celestial bodies other than the Earth,⁹ but does not purport to regulate space activity beyond the solar system.¹⁰ It is also pertinent to point to the distinction

between airspace and outer space. The air space above a State's land area and territorial waters is subject to "the complete and exclusive sovereignty" of the respective State,¹¹ whereas according to international law, outer space "is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means".¹² Some State practice and highly qualified publicists have indicated that outer space begins at an altitude of approximately 80 – 110 km above sea level, but the exact altitude at which airspace ends and outer space begins has been heatedly debated.¹³ Opposing views among States as to the necessity of the definition and delimitation of outer space, as well as the methodology to be adopted should such definition be necessary, continue unabated up to this day.¹⁴

I. The Development of International Space Law

A. Resolutions in the 1950s and 1960s

With the launch of Sputnik 1 in 1957, the international community commenced discussions regarding the need to regulate this new activity. The crux of the discussion, mainly among the Soviet Union and the United States, was whether, by analogy to international air law, space activities could come under the regulation of international law.¹⁵ There were two overriding considerations of the Superpowers: first, the clarification of the legal status of outer space and celestial bodies, and second, the potential military uses of outer space. This discussion eventually moved in the late 1950s before the United Nations. In 1957, the United States proposed in a memorandum submitted to the General Assembly that the United Nations should establish a multilateral control system as a first step toward the objective of "assuring that future developments in outer space would be devoted exclusively for peaceful and scientific purposes".¹⁶

In 1958, the *ad hoc* Committee on the Peaceful Uses of Outer Space was created,¹⁷ which became a permanent body a year later.¹⁸ This committee, which became known as “COPUOS”, prepared two key General Assembly resolutions, adopted in 1961 and 1963 respectively, laying down two foundational principles of international space law.¹⁹ First, States resolved that international law, including the United Nations Charter, applies to outer space and celestial bodies, and that outer space should be used for “peaceful” purposes. Second, it was established that outer space and celestial bodies were not to be subject to any kind of national appropriation. Significantly, the 1963 resolution approved a draft Declaration of the Basic Principles Governing the Activities of States Pertaining to the Exploration and Use of Outer Space,²⁰ which contained a set of principles regulating activities conducted in outer space.

Although the 1963 Declaration did not establish binding norms of international law, it was considered during the period of its adoption to be the basis for a future legally binding treaty. In 1966, the two major space powers submitted their proposals to the General Assembly: the United States submitted a draft Treaty Governing the Exploration of the Moon and Other Celestial Bodies,²¹ and the Soviet Union submitted a draft Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, the Moon and other Celestial Bodies.²² Negotiations that would lead to the conclusion of the Outer Space Treaty began in July 1966, initially in Geneva and later in New York. At the end of that year, the General Assembly adopted a resolution recommending the Outer Space Treaty for signature and ratification by States.²³

B. Treaty Framework: The Outer Space Treaty & Four Space Conventions

The Treaty on Principles Governing the Activities of States in the Exploration

and Use of Outer Space, Including the Moon and Other Celestial Bodies was opened for signature on 27 January 1967, and it entered into force on 10 October of the same year.²⁴ Today, 100 States have ratified the Outer Space Treaty, and a further 26 States have signed it.²⁵ The Outer Space Treaty provides the basic framework on international space law. It lays down the main principles of law applicable to outer space activities, including the non-appropriation principle and the use of the Moon and other celestial bodies exclusively for peaceful purposes. Given that national security concerns of States and their commercial interests related to air navigation did not appear to be of particular relevance in relation to outer space, the principle of sovereignty was not extended to outer space. States were inspired by “the great prospects opening up before mankind as a result of man’s entry into outer space” and “the common interest of all mankind in the progress of the exploration and use of outer space for peaceful purposes”.²⁶

The Outer Space Treaty is not a comprehensive instrument comprising all existing and foreseeable aspects of space activities. It was therefore followed by the conclusion of four subject-specific instruments. First, in 1968, the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space was adopted.²⁷ It is an instrument dealing with space-related activities on earth, and incorporates the international legal duty to help astronauts in distress. Second, in 1972, the Convention on International Liability for Damage Caused by Space Objects was adopted.²⁸ Elaborating on the responsibility and liability principles of the Outer Space Treaty, its Article II provides that a launching State shall be absolutely liable to pay compensation for damage caused by its space objects on the surface of the Earth or to aircraft in flight. Third, in 1975, the Convention on Registration of Objects Launched into Outer Space was opened for

signature.²⁹ Article II (1) of this Convention requires the launching State of a space object that is launched into earth orbit or beyond to register such space object by means of an entry in an appropriate registry which it shall maintain. The launching State is also obliged to inform the Secretary General of the United Nations of the establishment of such a registry. Fourth, in 1979, the Agreement Governing the Activities of States on the Moon and other Celestial Bodies was adopted.³⁰ The 1979 Agreement was intended to apply specifically to the Moon and the other celestial bodies within the solar system, and required that all resource extraction and allocation be made by an international regime.

C. Resolutions: 1980s, 1990s, 2000s

The Moon Agreement proved largely unsuccessful. Only thirteen States have ratified it, and a further four States have signed it up to this day.³¹ Following the near-failure of this Agreement, the international community opted for soft law making, instead of framing new Conventions. As a result the General Assembly began developing sets of principles of a non-binding nature, intended to be of recommendatory value. In 1982, the Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting were adopted.³² This is an instrument on direct broadcasting by satellite that balances the differing interests of a trans-border broadcaster, which might be a State or a private entity, and the receiving State. In 1986, the Principles Relating to Remote Sensing of the Earth from Outer Space were adopted, and which in turn balances the interests of sensing States or enterprises and those of the sensed States.³³ In 1992, the Principles Relevant to the Use of Nuclear Power Sources in Outer Space were adopted.³⁴ This set of principles provided the guidelines and criteria for the safe use of nuclear reactors and radioisotope generators in outer space, balancing the necessity of the

use of nuclear power sources on certain space missions with the necessary compliance with international nuclear safety standards. In 1996, the adoption of a Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries took place.³⁵ The objective of this declaration was to balance the interests of developing countries with those of the developed space-faring countries in the use and exploration of outer space. The most recent resolutions were adopted by the General Assembly of the United Nations in 2004 and 2007 respectively, the former dealing with the application of the concept of the “launching State”,³⁶ and the latter with recommendations on enhancing the practice of States and international inter-governmental organizations in registering space objects.³⁷

Recently, other non-binding guidelines and codes of conduct have also been adopted. The Space Debris Mitigation Guidelines³⁸ and International Charter on Space and Major Disasters³⁹ represent two of the more topical non-binding instruments that have been adopted in recent years. The former encompasses technical guidelines that would mitigate the exponential growth in the number of artificial space debris in Earth orbit, and has received support from many States and governmental agencies. The latter provides for a framework in which space assets may be used in the aftermath of a major disaster on Earth for monitoring and management.

II. The Principle of Peaceful Uses of Outer Space

A. Travaux Préparatoires

The inclusion of the principle mandating the peaceful use of outer space in the 1967 Outer Space Treaty was not politically unmotivated. United States President Eisenhower’s immediate reaction

to the Soviet Union's success with Sputnik aimed to limit the potential military implications by working out treaty obligations on the prevention of an arms race in outer space.⁴⁰ Whatever the motivation behind it, the principle on the peaceful activities of space exploration had a moderating effect on the arms race in outer space, which could have led human kind to the brink of war and to the complete destruction of its civilization.⁴¹ During the 1950s, the term "peaceful" definitely meant "non-military".⁴² This is evident in the first General Assembly resolution on space adopted in 1957.⁴³ It prioritised the conclusion of a disarmament agreement, which would provide *inter alia* for a joint study of an inspection system designed to ensure that the sending of objects through outer space shall be exclusively for peaceful and scientific purposes.⁴⁴ The United States expressed its support for this proposal, not only by putting it forward to the General Assembly, but also by incorporating the principle of peaceful uses of the outer space into its domestic law. The National Aeronautics and Space Act, adopted by the United States Congress on 29 July 1958, stated that: "it is the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind".⁴⁵ On the other hand, the Soviet Union proposed a complete ban of all military uses of outer space to the United Nations.⁴⁶

The proposals by the United States and the Soviet Union regarding a potential international agreement within the framework of the United Nations regulating the uses of outer space were both directed towards preventing an arms race in outer space. In 1959, in its first report, the *ad hoc* Committee on the Peaceful Uses of Outer Space stressed that outer space was the common heritage of all mankind and that its exploration and use had to be for the benefit of all mankind.⁴⁷ A 1962 General Assembly resolution entitled "International Cooperation in the Peaceful Uses of Outer

Space" tasked COPUOS to elaborate comprehensive legal principles governing the peaceful use of outer space.⁴⁸ Furthermore, during the discussions before COPUOS that same year, the Indian delegate expressed a position, reflecting the attitude of the majority of States at that point, namely that: "Outer space should be a kind of warless world, where all military concepts of this earth should be totally inapplicable...There should be only one governing concept, that of humanity and sovereignty of mankind".⁴⁹ The subsequent 1963 "Principles Declaration" adopted by the General Assembly affirmed that the peaceful use of outer space should be "for the benefit and in the interests of all mankind".⁵⁰ This Declaration constituted the foundation for the 1967 Outer Space Treaty. By that stage in the negotiations, however, the complete demilitarization of outer space was not palatable to the two Superpowers, which were both spending enormous amounts of money on space programs with military incentives. This was evident in the negotiations of the 1967 Outer Space Treaty, where attempts by some delegations to bring about a complete demilitarization of outer space were rejected by both superpowers.⁵¹

B. Textual Interpretation: Ordinary Meaning of Term "Peaceful"

Article IV confirmed the undertaking of States "not to place in orbit around the Earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner".⁵² Article IV prohibited the "establishment of military bases, installation and fortifications, the testing of any type of weapons and the conduct of military manoeuvres on celestial bodies". At the same time, it allowed for "the use of military personnel for scientific research or for any other peaceful purposes", and "the use of any equipment or facility necessary for the peaceful exploration of the Moon and other celestial bodies". To the extent

that the term “peaceful” is used in the text of the Outer Space Treaty, it is interpreted to mean “non-military” rather than “non-aggressive”. Article IV places an obligation on States not to place weapons of mass destruction in Earth orbit, and not to establish military installations on the Moon and other celestial bodies. In line with the provisions of the 1969 Vienna Convention on the Law of Treaties, therefore, the meaning ascribed to the term “peaceful” in this context must necessarily refer to “non-military”.

C. Object and Purpose of the Outer Space Treaty

Moreover, Article IV of the Outer Space Treaty has to be interpreted in light of its object and purpose. It must therefore be read in the context of the “interest of all mankind” clause found in the Preamble of the same Treaty. Furthermore, Article I paragraph 1 of the Outer Space Treaty provides that “[t]he 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...and shall be the province of all mankind”. As early as 1952, Oscar Schachter considered outer space to be the “common property of all mankind over which no nation would be permitted to exercise domination”. This, he thought, would “dramatically emphasize the common heritage of humanity and...might serve...to strengthen the sense of international community which is so vital to the development of a peaceful and secure world order”.⁵³ Instead of allowing individual States to exercise sovereignty over outer space, sovereignty would vest in the international community as a whole. In the same vein, Professor Matte characterizes outer space law as representing an enhanced orientation of a new structure of law, which shifts the emphasis away from State sovereignty towards the interest of the international community.⁵⁴

The principle of the peaceful use of outer space is generally regarded as a constitutive element of the principle that outer space should be used in the interest of all mankind.⁵⁵ It acknowledges that the enhanced community purpose cannot be furthered successfully without restricting the area to exclusively peaceful uses. The incorporation of these two principles in the Outer Space Treaty was from the outset closely linked with the limitation on the military use of outer space.⁵⁶ Certainly, the non-peaceful use of outer space is not for the benefit of all mankind; quite the contrary. It therefore follows in my opinion that outer space should not be militarized, or used for any military purposes. Even if the Outer Space Treaty does not explicitly prohibit all military uses at all times, if read in light of the interest of the entirety of the international community, then such uses should not be allowed. The Outer Space Treaty can therefore be interpreted as mandating complete demilitarization of outer space.

It is unfortunate that a minimalist interpretation has been given to the term “peaceful” as “non-aggressive”, instead of “non-military”.⁵⁷ This position has attracted some doctrinal support.⁵⁸ Nevertheless, if the full implications of this interpretation are explored, humanity may find itself in an absurd situation. In the words of Professor Vlasic: “[i]f ‘peaceful’ means ‘non-aggressive’, then it follows logically – and absurdly – that all nuclear and chemical weapons are also ‘peaceful’, as long as they are not used for aggressive purposes”.⁵⁹ Moreover, if such an interpretation is accorded to the term “peaceful”, one wonders how to interpret the term “non-aggressive” when explicitly stipulated in Article IV (2). Given that acts of aggression are explicitly prohibited under international law,⁶⁰ and in particular that use of force is prohibited under Article 2 (4) of the United Nations Charter, then in my opinion Article IV of the Outer Space Treaty must stipulate that the moon and other celestial

bodies shall be used exclusively for non-military purposes.⁶¹

D. Subsequent State Practice

1. "Peaceful" as "Non-Aggressive"

The interpretation of the term "peaceful" as "non-aggressive", and the narrow understanding of Article IV of the Outer Space Treaty, clearly permits non-aggressive military space missions. It also does not specifically prohibit the use of intercontinental ballistic missiles, nor the use of collateral military activities, such as reconnaissance, surveillance and intelligence collection capabilities through the use of satellite imagery and space-based electronics. Moreover, satellite communications provide an extraordinary new control over military forces deployed throughout the world. The Global Positioning System (GPS) was initially instituted by the United States as a military space system that was integrated into virtually all aspects of military operations so as to provide indirect strategic support to military forces and to enable the application of remote tactical operations in near-real-time through precision weapons guidance. Additionally, radar satellites offer the potential to detect opposing forces on the ground in all weather conditions and at all times.

2. Passive Versus Active Military Uses of Outer Space

Another qualification that exists in the literature insofar as the use of outer space is concerned is the distinction between passive and active military uses of outer space.⁶² "Passive use" refers to non-destructive activities, whereas active military uses are destructive. Passive military systems are not weapons in and of themselves; such systems include reconnaissance, early warning communications, navigation and other satellites in order to effectively use and coordinate aircraft, tanks, missiles, ships and other military assets on Earth.⁶³ Active

military uses of outer space involve the use of weapons with destructive impact in outer space, rather than on Earth. Examples of such systems include space-based lasers and kinetic-energy weapons that may be launched as satellite payloads.

Another related distinction that is often found in doctrinal literature is the one between the militarization and the weaponization of outer space. The former category involves non-intrusive military activities conducted in space, and the latter involves potentially intrusive, and thus destabilizing, military space activities.⁶⁴ Recent years have witnessed an increasing tolerance of the passive militarization of outer space. The distinction between passive and active military space use constitutes a threshold up to which point the international community seems willing to accept in terms of the military uses of outer space.⁶⁵ However, it should be noted that the non-objection to the passive military uses of outer space does not necessarily imply that the international community is prepared to accept active military uses in the outer space theatre.

3. Towards Active Military Uses of Outer Space?

Outer space has been used militarily since the beginning of the space age. According to the Stockholm International Peace Research Institute, more than 70% of all satellites launched in outer space serve full or partial military purposes. In September 1999, the United States Congress adopted the National Missile Defence Act, stipulating the deployment "as soon as is technologically possible [of] an effective National Missile Defence System capable of defending the territory of the United States against limited ballistic missile attack (whether accidental, unauthorized or deliberate)".⁶⁶ The US Space Command also presented a "Long-Range Plan" consisting of a comprehensive military strategy for outer space through to 2020, which provides *inter alia* for the deployment

of weapons in outer space.⁶⁷ In 2000, the Pentagon commissioned the development of a “space-based laser readiness demonstrator”, accompanied by the prediction from the US Air Force that “new technologies will allow the fielding of space-based weapons of devastating effectiveness to be used to deliver energy and mass as force projection in tactical and strategic conflict”.⁶⁸

4. The Case for the Militarization of Outer Void Space

Professor Bin Cheng argues that insofar as the immense void space in between the innumerable celestial bodies is concerned, apart from the limitation on the stationing of weapons of mass destruction, the 1967 Treaty as a whole, including its Article IV, leaves States entirely free to use outer void space in any way they wish, including using it for military purposes, particularly in self-defence in accordance with the rules of international law, and specifically Article 51 of the United Nations Charter.⁶⁹ He concludes that outer void space has not been reserved exclusively for peaceful or non-military purposes. The range of activities in outer void space that Professor Bin Cheng opines is legally permitted is worryingly large. States remain free to deploy any type of military satellite in outer void space, including reconnaissance, communications, early warning and other satellites. They may also construct manned or unmanned military space missions, carry out military exercises and manoeuvres, station or use any weapons there as long as such weapons are not nuclear weapons or weapons of mass destruction, including anti-satellite weapons, and ballistic missile defence systems. States are also permitted to send through or into outer void space any weapon, whether or not nuclear, or of mass destruction, against any target on earth, in outer space or any celestial body.⁷⁰

This argument, however, rests on a fragmented conception of outer space,

which should be conceived as a whole entity, and not as two distinct ones: celestial bodies and the void space in between them. Both celestial bodies and the space in between make up the entirety of outer space. Therefore, Article IV regulates by necessary implication the entirety of outer space, and not only celestial bodies. Furthermore, Bin Cheng argues that what he terms as “void outer space” should be regulated in accordance with international law, pointing to Article 51 of the UN Charter. This logic, however, ignores the fact that the most relevant provision insofar as the regulation of outer space is concerned is Article 2 (4) of the UN Charter, which not only prohibits the use of force, but also the threat of the use of force. The placement of weapons in outer space – both on celestial bodies and in the void space between them, may be construed as a threat that they may be used; and therefore may violate the prohibition on the threat of the use of force

III. The Peaceful Uses of Outer Space

The advancement of technology has led to various peaceful uses of outer space. A number of satellites have been launched into outer space to provide services to people on Earth. Satellites are now used for a multiplicity of purposes, from managing natural resources to facilitating relief efforts during emergencies. Technology has advanced to such a point that “space tourism” is now a reality.

A. Communications

Communication satellites form a worldwide network in different orbits, and they are used to transmit information from one point to another. In 1964, the International Telecommunications Consortium (INTELSAT) was established on the basis of agreements signed by governments and operating entities.⁷¹ In 1965, the world’s first commercial communications satellite, Early Bird (Intelsat I) was launched into synchronous orbit, and a few months later, it started

providing television and voice services. By 1969, the world's first global satellite communications system was complete. That same year, INTELSAT transmitted television images of Neil Armstrong's first steps on the moon, with a record of 500 million television viewers. By 2000, Intelsat made the Olympic Games in Sydney available to a record four billion people worldwide, as broadcasters used more than 40,000 hours of capacity provided by 10 INTELSAT satellites⁷². In more recent years, mobile satellite communication has become increasingly important. This is performed by privately financed systems, such as IRIDIUM⁷³ and Global Star.⁷⁴ Furthermore, telecommunication satellites, along with ground-based networks, provide access to the World Wide Web. The Internet has become an indispensable tool of easy and instant transmission of information across the globe.

B. Geostationary Orbit

The Geostationary Orbit is a circular orbit located at an approximate distance of 36,000 km directly above the Earth's equator. Any object positioned in the Geostationary Orbit seems to be stationary in the sky when viewed from the Earth due to its rotation being equivalent to the rotation of the Earth. It is a privileged position because the transmitters that communicate with satellites in Geostationary Orbit do not have to be angled in varying positions to track them. The Geostationary orbit is thus extremely useful for weather observations, remote sensing, direct broadcasting and telecommunications.⁷⁵ However, in order to avoid harmful radio-frequency interference, a limited number of satellites can be operated in Geostationary Orbit because there are a limited number of orbital slots available. This has led to disagreement between countries wishing to have access to the same orbital slots⁷⁶. That is why the International Telecommunication Union, a specialized agency of the United Nations is

tasked with the allocation of such orbital slots⁷⁷.

A competing conception of the legal status of the geostationary orbit has been adopted by some equatorial countries in the Bogota Declaration of 1976. These equatorial States consider the geostationary orbit not as part of outer space, but rather as segmented parts of the territory over which they exercise their national sovereignty. Such States therefore consider this orbit to be a scarce natural resource, whose importance and value increase rapidly together with the development of space technology and with the growing need for communication. As a result, the Equatorial States that met in Bogota in 1976 declared their national sovereignty over the geostationary orbit.⁷⁸ This claim runs counter to Article II of the 1967 Outer Space Treaty, which stipulates that outer space is not subject to national appropriation by claim of sovereignty. It may be noted that the Bogota Declaration seems to have been based on the lack of international legal agreement as to the delimitation between the Earth and outer space.⁷⁹ The legal status of the geostationary orbit therefore seems to be tied to the controversy over a legal definition of outer space.

C. Remote Sensing

Remote sensing is the observation of the Earth's surface from space through the use of the properties of electromagnetic waves emitted, reflected or diffracted by the sensed objects, for the purpose of improving natural resources management, land use and protection of the environment.⁸⁰ Given that the footprint of most remote sensing satellites covers the entire globe, they are essential tools in studying large-scale phenomena, such as ocean circulation, deforestation and desertification. They can be used in diverse fields of human interaction, from meteorological services in forecasting weather to criminologists' work in recreating scenes of accidents and crimes. Dynamic applications of spatial satellite

imaging are invaluable to insurers and risk managers in acquiring data and information on natural or man-made disasters. Furthermore, the combination of satellite imaging with geomorphology and Internet streaming has given rise to systems like Google Earth and Streetview, both of which showcase the technological possibilities of a world-wide central database of very high resolution images.⁸¹

Remote sensing is a classic case of dual-use technology. Apart from its application for economic development and humanitarian purposes, it has potential for support to military objectives. The United States, Russia, and recently China, have focused on building space assets for military applications.⁸² An estimated number of two hundred satellites may be operating in exclusive military mode in space. These are capable of high-quality data collection, and coverage that provide a near-real-time capability for monitoring events around the world,⁸³ contributing significant amounts of information to military intelligence.

Remote sensing is regulated by the Principles Relating to Remote Sensing of the Earth from Outer Space.⁸⁴ As mentioned earlier, these came about in 1986 after a series of resolutions calling for a detailed consideration of the legal implications of remote sensing of the Earth from space.⁸⁵ Principle IV of this resolution stipulates that remote sensing activities shall be conducted according to the principles found in Article I of the Outer Space Treaty, namely 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. Given that not all States have remote sensing capabilities due to a lack of resources, Principle XII gives the right to sensed States to have access to primary and processed data concerning the territory under its jurisdiction on a non-discriminatory basis and on reasonable cost terms. Moreover, under Principle XII, sensed States also have the right to access

the available analysed information concerning the territory under its jurisdiction in the possession of any State participating in remote sensing activities on the same basis and terms, taking particularly into account the needs and interests of the developing countries. Furthermore, Principle XIII stipulates that States carrying out remote sensing of the Earth from space shall enter into consultations with a State whose territory is sensed in order to make available opportunities for participation and enhance the mutual benefits to be derived therefrom.

D. Global Navigation Satellite System

The uses of satellites for navigation purposes are growing in significance. Global navigation satellite system (“GNSS”) is hailed as the “greatest scientific revolution of the twenty first century”.⁸⁶ It is a constellation of orbiting satellites that work in tandem with a well-developed network of ground stations to detect and deliver high precision data regarding three-dimensional position and time. Such systems include the Global Positioning System (“GPS”) of the United States, the Global Navigation Satellite System (“GLONASS”) of the Russian Federation, both of which are functional, and the European Galileo system, which is scheduled to be fully operational in 2014. The People’s Republic of China has also indicated that it will expand its regional Beidou navigational system into the global Compass navigation system by 2020. Applications of GNSS are growing in air, maritime, and land transportation, mapping and surveying, precision agriculture, power and telecommunications networks, and disaster warning and emergency response. High growth is expected of the satellite-location-based market, with revenues exceeding USD\$10 billion by 2013.⁸⁷ By the year 2000, civilian users outnumbered military users by 100 to 1 and the ratio was increasing. The Compound Annual Growth Rate of the GPS market was growing by approximately 22%⁸⁸ to reach around 900

million ground-based units by 2013. Questions of liability incurred by a malfunctioning of satellites for possible accidents have arisen, and a legal framework for long-term liability in this field has recently emerged.⁸⁹

E. Space Tourism

Space tourism is a term broadly applied to the concept of travel beyond Earth's atmosphere by private paying customers. This term includes suborbital flights as short excursions to the edge of Earth's atmosphere, travel to low earth orbit or orbital flights, including longer stays in orbital facilities, as well as parabolic flights in specially-equipped aircraft to experience short periods of weightlessness.⁹⁰ In 2001, Dennis Tito paid 20 million USD to fly into space on board of a Russian Soyuz spacecraft, which docked at the International Space Station. In 2004, the privately funded SpaceshipOne made two suborbital journeys to an altitude of more than 100 kilometres within two weeks while carrying the equivalent weight of two passengers with the same reusable manned spacecraft, winning the Ansari X-Prize.⁹¹ Since 2005, Virgin Galactic has been making it possible for individuals to pay a deposit of 20,000 USD to reserve a place on SpaceShipTwo. The starting price for space travel of this variety is 200,000 USD. The price includes an inside view into the process of building a fleet of five sub-orbital vehicles that carry six paying passengers per vehicle.⁹²

In light of the increasing interest of private companies exploring possibilities to provide services for space flight and space tourism to the general public, the question arises as to the legal regime applicable to space tourists. Several issues have been raised insofar as space tourism is concerned, including questions of the role of international institutions in space traffic management, the safety and legal status of crew, passengers and vehicles, the registration of vehicles, as well as third

party and passenger liability. The commercialization of space tourism constitutes a major challenge for space law. Terms such as "object" and "personnel" in the Outer Space Treaty clearly do not adequately cover persons who are paying passengers in a spacecraft.⁹³ A regime of private international space law governing the relationship between space tourists and operators of space vehicles is currently lacking.⁹⁴ Furthermore, it is unclear whether air or space law applies because of the unresolved issue of the delimitation of air space and outer space. Future space flights could give rise to considerations of a single aerospace treaty regime in which notions of liability and registration should be considered from an air law, as well as a space law angle, with a view of reconciling both legal regimes.⁹⁵

F. International Space Station

The International Space Station ("ISS") is a common undertaking by the United States, Russia, Japan, Canada, and ESA member States, particularly France, Germany and Italy.⁹⁶ Launched in October 2000, it has been manned since 2 November of the same year.⁹⁷ Ever since its docking it has been visited by 196 individuals from eight different countries.⁹⁸ The International Space Station is a research platform in space aiming to advance scientific knowledge based on experiments conducted in space, to develop and test new technologies and to derive Earth applications from new technologies developed onboard.⁹⁹ The International Space Station is the result of several agreements, mainly the International Government Agreement of 1998, and the bilateral Memoranda of Understanding concluded between NASA and other space agencies of the cooperating agencies.¹⁰⁰

G. Space Debris

Artificial space debris consists of "all man-made objects, including elements and fragments thereof, in Earth orbit or re-entering the atmosphere".¹⁰¹ It is also

known as space junk or space waste. Examples of orbital debris include derelict spacecraft and upper States of launch vehicles, carriers for multiple payloads, debris created as a result of spacecraft or upper stage explosions or collisions, solid rocket motor effluents, and tiny flecks of paint released by thermal stress or small particle impacts.¹⁰² 19,000 pieces larger than 10 centimetres have been identified in Earth orbit, 90 per cent of which is artificial space debris.¹⁰³ The principal source of orbital debris is satellite explosions and collisions. Orbital decay of space debris does not occur after a century or more if located above 1,000 kilometres above the Earth's surface.

Since the orbits of these objects often overlap with the trajectories of spacecraft, debris presents a very real risk of potential collision. The risk of collision is higher in the geostationary orbit because satellites tend to cluster at this altitude due to its great utility. Space debris can physically damage functional satellites, especially where objects travel at very rapid speeds. The worst such incident occurred in February 2009 when an operational US Iridium satellite and a derelict Russian Cosmos satellite collided.¹⁰⁴ Furthermore, orbital debris can disrupt precisely positioned satellites by knocking them off balance. Space debris can also interfere with the observation function of some satellites by scattering light into the telescope of the satellite.

Various instruments address space debris at different levels of government, but no international treaty has emerged regulating this issue. The leading space agencies of the world have formed the Inter-Agency Space Debris Coordination Committee ("IADC") to address orbital debris issues and to encourage operations in Earth orbit which limit the growth of orbital debris.¹⁰⁵ Since 1994, orbital debris has been a topic of assessment and discussion in the Scientific and Technical Subcommittee of COPUOS. In 1995, NASA was the first

space agency in the world to issue a comprehensive set of orbital debris mitigation guidelines.¹⁰⁶ In 1997, based on the NASA guidelines, the US Government developed a set of Orbital Debris Mitigation Standard Practices.¹⁰⁷ In 2002, the IADC adopted a set of guidelines designed to mitigate the growth of the orbital debris population.¹⁰⁸ Five years later, the Scientific and Technical Subcommittee of COPUOS adopted a set of space debris mitigation guidelines very similar to the IADC guidelines.¹⁰⁹ These were endorsed by the United Nations General Assembly in January 2008.¹¹⁰

Orbital debris poses a risk to the continued reliable use of space-based services and operations and to the safety of persons and property in space and on Earth. The creation of orbital debris should be minimized in order to preserve the space environment for future generations. Various authors argue that an international treaty regime should make spacecraft operators liable for debris-caused damage to property, and that it should require reasonable debris-mitigation measures to be taken for every mission.¹¹¹ More specifically, Professor Bin Cheng argues that a way to address the space debris problem is for States to divest jurisdiction over their inactive space objects so that any State would be free to remove the disowned objects without incurring liability.¹¹² He further argues that the Outer Space Treaty could further be amended to hold States strictly liable for damage caused by debris that they do not "disown".¹¹³ Space debris mitigation practices should be implemented in order to secure the preservation of a sustainable orbital environment.

IV. Space Law Imbued with the Principles of Public International Law

As one of the numerous branches of public international law, many of the principles in space law reflect fundamental principles of international law, such as the prohibition of the use of force. However,

given the unique nature of outer space and the rapidity of technological developments in this area, some departures have been noted from established principles of international law, such as the principle of the non-extension of the principle of sovereignty in outer space, and the potential creation of “instant” international customary law.

A. Peaceful Uses of Outer Space and Prohibition of the Threat of Use of Force

The spirit of the Outer Space Treaty 1967, as reflected in its Preamble, encapsulates the interest of all “mankind” in the progress of the exploration and exploitation and use of outer space for peaceful purposes, as well as the promotion of international co-operation. The Outer Space Treaty, in conjunction with the United Nations Charter and other obligations in international law, must be implemented in light of the peaceful uses of outer space principle. The prohibition of the threat of use of force enshrined in Article 2 (4) of the United Nations Charter, and the obligation to use outer space exclusively for peaceful purposes as enshrined in Article IV of the Outer Space Treaty 1967, should be applied by all States in the interest of all mankind, irrespective of States’ economic and scientific development. As noted earlier, the term “peaceful” has been accorded three different meanings: “non-military”, “non-aggressive” and “non-weaponed”. However this term is interpreted, it is clear that any activity that poses a threat of the use of force is prohibited.

B. Non-Extension of the Principle of Sovereignty to Outer Space

Outer space is a common area beyond national jurisdiction. It is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or any other means.¹¹⁴ The Declaration of Bogota of 1976 by Equatorial States over the geostationary orbit runs counter to this

provision, and it has therefore not acquired widespread acceptance. Nevertheless, recent years have seen a shift away from the recognition of outer space as a common area free of State sovereignty under international law. This has been particularly evident in efforts to “address goals of space sovereignty” and to “establish international space sovereignty policy” in a “Space Faring Nations Treaty”, which is intended to guarantee the “protection of national (commercial) space assets”.¹¹⁵ Be that as it may, the abolition of the non-extension of the principle of State sovereignty to outer space would only be possible with the consent of States parties to the Outer Space Treaty. Any plan for “space superiority” will be contrary to the clause of the Outer Space Treaty mandating the use of outer space for the benefit of all mankind, and its obligation to use outer space in the interest of all States.

C. Instant International Customary Law

Professor Bin Cheng argued as early as 1965 that that international customary law may be created instantly.¹¹⁶ He argues that State practice, instead of being a constitutive element of customary international law, is merely evidence of the existence and contents of the underlying rule and of the requisite *opinio juris*. From this point of view, there is no reason why *opinio juris* may not grow in a very short period of time among the members of the United Nations, with the result that a new rule of international customary law comes into being. This argument is raised in the context of General Assembly resolutions 1721 and 1962, where the agreements between the two space powers made their unanimous adoption possible. Professor Bin Cheng therefore argues that the two Space powers may well be held to be bound by these *pacta de contrahendo* to observe the principles contained in these resolutions in their relations *inter se*.

However, in the *North Sea Continental Shelf Cases*, the Court held that State practice is “an indispensable requirement” that “within the period in question, short though it may be...should have been both extensive and virtually uniform”.¹¹⁷ Professor Van Hoof argues that “customary law and instantaneousness are irreconcilable concepts”.¹¹⁸ Professor Weil writes that instant custom is “no mere acceleration of the custom-formation process, but a veritable revolution in the theory of custom”.¹¹⁹ While the context in which Professor Bing Cheng argued is understandable, State practice requires at least some time for the practice of States to be seen to be in line with the new customary rule that has emerged.

V. Conclusion

Throughout its evolution, the international law of outer space has remained true to its original mission, namely that outer space should be used for peaceful purposes, and for the benefit of mankind. Space law has had to adapt from its application to initially purely research-oriented space flights to its role now in regulating an activity that has profound impact on the rest of the world. The international law of outer space now regulates the use of outer space for governments, education, remote sensing of resources as well as emergency management. In this regard, space law has benefited from a close interaction with international law. Now, international law is called upon to demonstrate the necessary flexibility to enable private actors to engage in outer space activities. In facing up to this challenge, space law must continue to abide by international law, to be respectful of the interests of all mankind, and not to succumb to purely military or commercial objectives. The international legal order to be elaborated has to safeguard the peaceful and beneficial uses of outer space for the international community as a whole. Outer space is the province of all mankind, and in the end, according to the late United States

Secretary of State for Defence, “the root of man’s security does not lie in his weaponry, but lies in his mind”.¹²⁰

Dr. Jasentuliyana devoted his professional life to the realization of outer space as the province of all mankind.

NOTES

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² See Barker, Theo and Gerhold, Dorian, *The Rise and Rise of Road Transport, 1700 – 1990*, (Cambridge UP, 1995).

³ See Lachs, Manfred, “Views from the Bench: Thoughts on Science, Technology and World Law” 86 *American Journal of International Law* 673 (1992).

⁴ See generally Carpenter, Rolla C., *Internal Combustion Engines. Their History, Construction and Operation*, (2010)

⁵ Kane, Robert, *Air Transportation*, (15th ed., Kendall Hunt Publishing, 2008).

⁶ McDougall, Walter A., *The Heavens and the Earth: A Political History of the Space Age*, (John Hopkins UP, 1997).

⁷ Kitmacher, G., *Reference Guide to the International Space Station*, (Apogee Books, 2006)

⁸ Vladlen S. Vereshchetin, “Outer Space”, *Max Planck Encyclopedia of Public International Law*, available at www.mpepil.com, at para. 1.

⁹ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (adopted 18 December 1979, entered into force 11 July 1984) 1363 UNTS 3, Article 1.

¹⁰ This follows from the title and text of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and other Celestial Bodies (signed 27 January 1967, entered into force 10 October 1967) 610 UNTS 205 [hereinafter the “Outer Space Treaty”].

¹¹ Convention on International Civil Aviation (signed 7 December 1944, entered into force 4 April 1947) 15 UNTS 295, Article 1.

¹² Outer Space Treaty, Article 2.

¹³ Hobe, Stephan, "Definition and Delimitation of Outer Space", *ECSL Proceedings* 1997, p. 49 (57).

¹⁴ See, for example, UNGA Committee on the Peaceful Uses of Outer Space "Report of the Legal Sub-Committee on its Forty-eighth Session, held in Vienna from 4 to 15 April 2005" [28 April 2005] UN Doc A/AC.105/850 and the unedited verbatim transcripts for meetings of the UNGA Committee on the Peaceful Uses of Outer Space Legal Subcommittee UN Doc COPUOS/Legal/T.715-720 and 726.

¹⁵ Stephan Hobe, "Current and Future Development of International Space Law" in Proceedings of United Nations/Brazil Workshop on Space Law "Disseminating and Developing International and National Space Law: The Latin America and Caribbean Perspective" ST/SPACE/28 (2005), at p. 4.

¹⁶ US Memorandum submitted to the First Committee of the United Nations General Assembly, 12 January 1957, UN Doc. A/C.1/738, printed in Department of State, "Documents on Disarmament 1945-1959 (1960, publication 7008), Vol. 2, at p. 733.

¹⁷ United Nations General Assembly resolution 1348 (XIII) of 13 December 1958.

¹⁸ United Nations General Assembly resolution 1472 (XIV) of 12 December 1959.

¹⁹ United Nations General Assembly resolution 1721 (XIV) of 20 December 1961; United Nations General Assembly resolution 1962 (XVII) of 13 December 1963.

²⁰ UN Doc A/C.1/881, A/AC.105/C.2/L.1.

²¹ A/AC.105/32.

²² A/6352.

²³ United Nations General Assembly resolution 2222 (XXI) of 19 December 1966.

²⁴ 610 UNTS 205, available at: <http://www.oosa.unvienna.org/oosa/SpaceLaw/outerspt.html>.

²⁵ Outer Space Treaty Signatures available at: <http://www.oosa.unvienna.org/oosatdb/showTreatySignatures.do>.

²⁶ The Outer Space Treaty, Preamble.

²⁷ 672 UNTS 119. It was adopted by the General Assembly on 19 December 1967 with resolution 2345 (XXII). It opened for signature on 22 April 1968, entered into force 3 December 1968.

²⁸ 24 UST 2389, TIAS No. 7762. It was adopted by the General Assembly on 29 November 1971 with resolution 2777 (XXVI). It was opened for

signature on 29 March 1972, and entered into force on 29 March 1972.

²⁹ 1023 UNTS 15. It opened for signature on 14 January 1975, and entered into force on 15 September 1976.

³⁰ It was signed on 5 December 1979, UN Doc A/RES/34/68. It opened for signature on 18 December 1979, and entered into force on 11 July 1984. It collected only a limited number of ratifications and signatures.

³¹ Moon Agreement signatures available at <http://www.oosa.unvienna.org/oosatdb/showTreatySignatures.do>.

³² United Nations General Assembly resolution 37/92 of 10 December 1982.

³³ United Nations General Assembly resolution 41/76 of 3 December 1986.

³⁴ United Nations General Assembly resolution 47/68 of 14 December 1992.

³⁵ United Nations General Assembly resolution 51/122 of 13 December 1996.

³⁶ United Nations General Assembly resolution 59/115 of 10 December 2004.

³⁷ United Nations General Assembly resolution 62/101 of 17 December 2007.

³⁸ See generally

http://orbitaldebris.jsc.nasa.gov/library/Space%20Debris%20Mitigation%20Guidelines_COPUO_S.pdf

³⁹ Text available at: <http://www.disasterscharter.org/web/charter/charter.rter>.

⁴⁰ R. Handberg, *Seeking New World Vistas: The Militarization of Space*, New York, 2000, at p. 44.

⁴¹ 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, New York, 19 December 1966, Audiovisual Library of International Law, available at: <http://untreaty.un.org/cod/avl/ha/tos/tos.html>.

⁴² See, for example, Article I of the Antarctic Treaty, 1 December 1959; 402 UNTS 71, making clear that "peaceful" means "non-military".

⁴³ United Nations General Assembly resolution 1148 (XII) of 14 November 1957.

⁴⁴ Ibid, para. I (f). See also United Nations General Assembly resolution 1348 (XIII) of 13 December 1958, Preamble, paras. 1 and 3.

⁴⁵ Section 102(a), National Aeronautics and Space Act, House Resolution, H.R. 12575,

Public Law 86-568, 85th Congress, First Session, 29 July 1958, at p. 5.

⁴⁶ UN Doc. A/3818, Annexes, 17 March 1958, Point 1 of the Draft Treaty of the Soviet Union.

⁴⁷ UN Doc. A/4141, 14 July 1959.

⁴⁸ United Nations General Assembly resolution 1802 (GV XVII), 14 December 1962.

⁴⁹ UN Doc. A/AC.105/PV.3, 20 March 1962, at p. 63.

⁵⁰ United Nations General Assembly resolution 1962 (GV XVII), 13 December 1963.

⁵¹ UN Doc. A/AC.105/C.2/SR.65, 22 July 1967, at pp. 9-10.

⁵² Article IV, Outer Space Treaty, which confirmed the undertaking made in United Nations General Assembly resolution 1884 (XVIII) of 17 October 1963. For a commentary of Article IV of the Outer Space Treaty see: C.-J. Cheng, "Military Use of Outer Space: Article IV of the 1967 Space Treaty Revisited" in C.-J. Cheng and D.H. Kim (eds.), *The Utilization of the World's Air Space and Free Outer Space in the 21st Century* (2000); M. Filho, "Total Militarization of Space and Space Law: The Future of the Article IV of the 1967 Outer Space Treaty", *Proceedings from the 40th Colloquium on the Law of Outer Space*, 1998, p. 358.

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⁵⁷ C.-J. Cheng, "Military Use of Outer Space: Article IV of the 1967 Space Treaty Revisited" in C.-J. Cheng and D.H. Kim (eds.), *The Utilization of the World's Air Space and Free Outer Space in the 21st Century* (2000), at p. 309. See also: B. Cheng, *Studies in International Space Law* (1997), especially Chapter 19 on "Definitional Issues in Space Law: The 'Peaceful Use' of Outer Space".

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⁵⁹ B. Jasani (ed.), *Peaceful and Non-Peaceful Uses of Space* (1991), at pp. 44-45.

⁶⁰ Declaration on Principles of International Law Concerning Friendly Relations and Cooperation Among States in Accordance with the Charter of the United Nations, UN General Assembly resolution 2625 (XXV) of 24 October 1970, text available at: <http://www.un.org/documents/ga/res/25/ares25.htm>.

⁶¹ C.-J. Cheng, "Military Use of Outer Space: Article IV of the 1967 Space Treaty Revisited" in C.-J. Cheng and D.H. Kim (eds.), *The Utilization of the World's Air Space and Free Outer Space in the 21st Century* (2000), at p. 321.

⁶² See for example: C.Q. Christol, "Outer Space: Battle Ground for the Future?" in M. Cohen and M.E. Gouin (eds.), *Lawyers and the Nuclear Debate* (1988); R.M. Bowman, "The Militarization of Space? The Real Issue is the Weaponisation of Space", paper submitted to the International Progress Organization, 24 September 1984, at p. 2; S. Gorove, "Limiting the Use of Arms in Outer Space: Legal and Policy Issues", *Proceedings from the 25th Colloquium on the Law of Outer Space* (1983), at p. 181.

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⁶⁹ C.-J. Cheng, "Military Use of Outer Space: Article IV of the 1967 Space Treaty Revisited" in C.-J. Cheng and D.H. Kim (eds.), *The Utilization of the World's Air Space and Free Outer Space in the 21st Century* (2000), at pp. 329-30.

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