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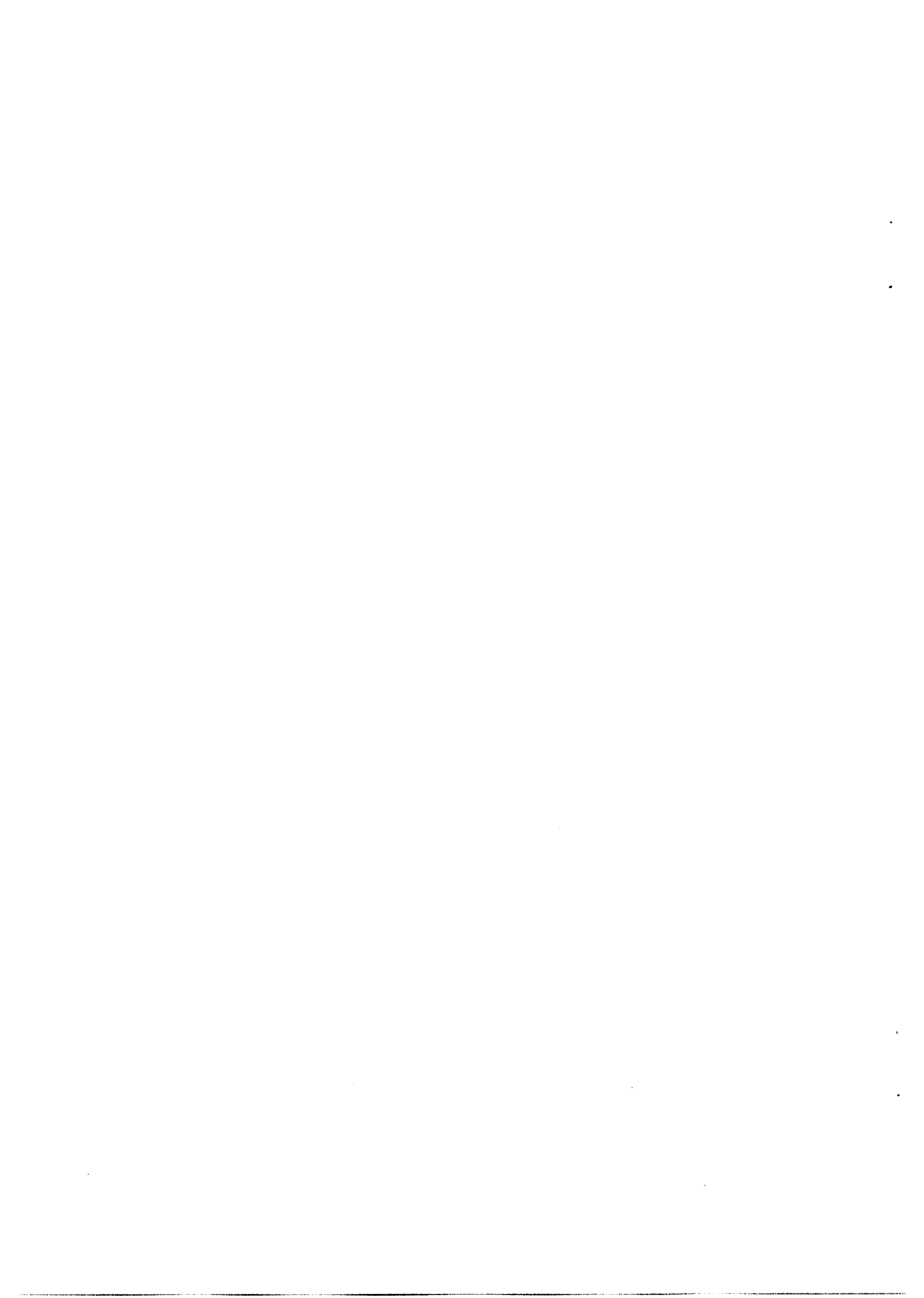
Legal Subcommittee

of the United Nations Committee on the Peaceful Uses of Outer Space

NEW DEVELOPMENTS AND THE LEGAL FRAMEWORK COVERING THE EXPLOITATION OF THE RESOURCES OF THE MOON

29 March 2004

1. The Legal Subcommittee of the Committee on the Peaceful Uses of Outer Space agreed at its forty-second session that the International Institute of Space Law (IISL) and the European Centre for Space Law (ECSL) should be invited to hold a symposium on space law at the forty-third session of the Subcommittee (A/AC.105/805, para. 10).
2. The present document is a compilation of the presentations delivered during the Symposium.



IISL/ECSL SPACE LAW SYMPOSIUM 2004

On the occasion of the 43rd Session of the
Legal Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space

NEW DEVELOPMENTS AND THE LEGAL FRAMEWORK COVERING THE EXPLOITATION OF THE RESOURCES OF THE MOON

Office for Outer Space Affairs, Vienna, Austria
Monday, 29 March 2004

Chairman: *Amb. Peter Jankowitsch*, Chair, Supervisory Board, Austrian Space Agency
(Past Chair, COPUOS), Austria
Rapporteur: *Sergiy Negoda*, Legal Officer (Office for Outer Space Affairs)
Coordinator: *Ms. Tanja Masson-Zwaan*, Secretary, IISL

PROGRAMME

- 16h00 *Words of Welcome*
Nandasiri Jasentuliyana, President, IISL
- 16h05 *Article II of the Outer Space Treaty, the status of the moon and resulting issues*
Dr. Leslie Tennen, Sterns & Tennen, Phoenix, AZ, USA
- 16h25 *Exploitation of the Resources of the High Sea and Antarctica: lessons for the Moon?*
Prof. Armel Kerrest de Rozavel, University of Brest, France
- 16h45 *ILA Resolution 1/2002 with regard to the CHM principle in the Moon Agreement*
Prof. Dr. Stephan Hobe, Institute of Air and Space Law, University of Cologne, Germany and General Rapporteur of the ILA Space Law Committee
- 17h05 *The Moon Treaty : The Road Ahead*
Dr. Rajeev Lochan, Assistant Scientific Secretary of ISRO, India
- 17h25 *Discussion*
- 17h50 *Concluding Remarks*
Prof. Sergio Marchisio, Chairman of the UN COPUOS Legal Subcommittee

Article II of the Outer Space Treaty, the Status of the Moon and Resulting Issues

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Introduction

The non-appropriation principle is under assault. A cornerstone of international space law, the doctrine embodied in Article II of the Outer Space Treaty¹ and Article 11 of the Moon Agreement² is seen by some as an unwarranted intrusion on the rights of the private sector to conduct business in space. National prestige, technological advancement, and the quest for scientific discovery all have driven space programs at different times, while the current focus on commercial development has considerations of private gain taking center stage.

Launch services and telecommunications satellites are the most developed segments of space industry, but they continue to suffer from occasional technical and business failures. The opportunities for private enterprise in space abound, although the formula for success so far has been elusive. No doubt a wide variety of novel and useful space applications will be found. Unfortunately, a disturbing trend has emerged, whereby some view the shortest path to profit is by violating space law, especially Article II of the Outer Space Treaty.³

Claims to Celestial Property

The assault on Article II comes from many sources, and takes many different forms. Web sites which proclaim to be the self-anointed "registry" for claims to extraterrestrial acreage are appearing more and more frequently, each with its own fanciful rules, regulations and requirements. Deeds purporting to represent such extraterrestrial real estate readily are available through the web and elsewhere.⁴ In addition to claims of ownership, proposals have been made to capture, relocate, and mine celestial bodies to oblivion.⁵

¹ Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, *opened for signature* January 27, 1967, 18 U.S.T. 2410, T.I.A.S. No. 6347, 610 U.N.T.S. 205, *text reproduced in* UNITED NATIONS TREATIES AND PRINCIPLES ON OUTER SPACE 3 (2002) [hereinafter referred to as the "Outer Space Treaty"].

² Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, *entered into force* July 11, 1984, 1363 U.N.T.S. 3, *text reproduced in* UNITED NATIONS TREATIES AND PRINCIPLES ON OUTER SPACE 27 (2002), and 18 I.L.M. 1434 (1979) [hereinafter referred to as the "Moon Agreement"].

³ The Outer Space Treaty has received widespread acceptance, while the Moon Agreement has been ratified by only ten states. Thus, while the discussion in the text will refer primarily to Article II of the Outer Space Treaty, the arguments also apply to the Moon Agreement in the appropriate context.

⁴ See Britt, *Lunar Land Grab: Celestial Real Estate Sales Soar*
http://www.space.com/scienceastronomy/mystery_monday_040202.html (February 2, 2004)

⁵ Benson, *Space Resources: First Come First Served*, in PROCEEDINGS OF THE 41ST COLLOQUIUM ON THE LAW OF OUTER SPACE 46 (1999).

There is a common theme to these endeavours, that is, the implicit renunciation of the concept of non-appropriation of outer space, including the Moon and other celestial bodies, in favour of unfettered private ownership of extraterrestrial property. The proponents of these proposals attempt to distinguish the application of the non-appropriation doctrine to private entities in general, or to their favoured projects in particular.¹ Alternatively, it has been urged that the non-appropriation principle presents an insurmountable obstacle to profit-making activities in space, and therefore should be abandoned by the community of nations.²

The non-appropriation principle is not alone as a target for would-be entrepreneurs. The space environment itself is being threatened by missions which have as their primary object the creation or distribution of debris. For example, human cremains have been launched into orbit on more than one occasion, and these missions served no purpose other than private gain at the expense of the natural environment of space.³ Another private venture claims to be on target to launch, before the end of this year, a payload of business cards and other detritus to disburse over the lunar surface. It is claimed that for a fee, this company will allow anyone to send their own scrap of paper to be deposited on the Moon.⁴ These missions appear to be in direct contravention of the provisions of Article IX of the Outer Space Treaty, and Article 7.1 of the Moon Agreement.

A mission to deliver debris to the Moon for profit may have important implications for the non-appropriation principle. Specifically, it has been reported that one vendor of "lunar deeds" intends to establish a physical presence on the Moon, perhaps by littering the surface with cards or other papers carried by such a "lunar debris express." It is asserted that this physical presence will add to and reinforce the rationale by which this vendor claims ownership of the Moon. While this may seem preposterous, this particular vendor alone claims to have sold deeds to millions of acres on the Moon,⁵ and there is the distinct possibility that hundreds of thousands of people around the world have been deceived.

Non-Appropriation and International Security

The expression of the non-appropriation principle, as set forth in Article II, does not stand in isolation, but rather must be considered in conjunction with other articles of the Outer Space Treaty. In this regard, the following articles may be particularly relevant:

¹ See, e.g., White, *Real Property Rights in Outer Space*, in PROCEEDINGS OF THE 40TH COLLOQUIUM ON THE LAW OF OUTER SPACE 370, 379 (1998); Wasser, *The Law That Could Make Privately Funded Space Settlement Profitable*, 5 SPACE GOVERNANCE 55 (1998).

² See Quiat, *Financing Infrastructure for Space Stations and Related Business Development*, 5 SPACE GOVERNANCE 176 (1998); O'Donnell, Robinson & Robinson, *This Treaty Needs a Lawsuit*, in PROCEEDINGS OF THE 40TH COLLOQUIUM ON THE LAW OF OUTER SPACE 185 (1998).

³ See Hoffman, *Space Cemeteries - A Challenge for the Legal Regime of Outer Space*, in PROCEEDINGS OF THE 43RD COLLOQUIUM ON THE LAW OF OUTER SPACE 380 (2001). An exception concerned the transport of a vial of cremains of Eugene Shoemaker to the Moon. Although not done for commercial purposes, such mission nevertheless was ill advised. See Sterns, *The Scientific/Legal Implications of Planetary Protection and Exobiology*, PROCEEDINGS OF THE 42ND COLLOQUIUM ON THE LAW OF OUTER SPACE 483 (2000).

⁴ Britt, *supra* note 3.

⁵ *Id.*

- Article 1, paragraph 1, which requires that activities in outer space be conducted for the benefit and in the interests of all mankind;
- Article 1, paragraph 2, which provides that states shall have free access to all areas of celestial bodies;
- Article IV, which specifies that all activities on the Moon and other celestial bodies shall be conducted exclusively for peaceful purposes;
- Article VI, which obligates states to authorize and provide continuing supervision of the activities of their non-governmental entities in space; and
- Article VII, which establishes international liability for damages.

The non-appropriation principle was among the earliest tenets of space law to be accepted by the community of nations. The doctrine was articulated in U.N.G.A. Resolution 1721 in 1961,¹ a mere four years after the launch of the first Sputnik. The prohibition on the appropriation of space was re-affirmed in 1963 by U.N.G.A. Resolution 1962.² The non-appropriation principle expressed in these two resolutions was incorporated in the precursor drafts of the Outer Space Treaty submitted to the U.N. Committee on the Peaceful Uses of Outer Space by both the Soviet Union³ and the United States.⁴

Prior to the entry into force of the Outer Space Treaty, the non-appropriation principle was not positive international law. Nevertheless, states uniformly adhered to the principle in their activities in space. Thus, contrary to historical precedent on Earth, states did not lay claim to the vast reaches of space based on their explorations. Moreover, states also did not rush to assert claims, for whatever they might be worth, in anticipation of the entry into force of the Outer Space Treaty in 1967. The practice of states in space has been a substantial departure from the experiences on Earth during the age of exploration and colonization through the 20th century expeditions to Antarctica.

The adoption of the non-appropriation principle by the global community served several historical purposes, including, notably, the maintenance and preservation of outer space for peaceful purposes.⁵ The pacific character of space activities has promoted an atmosphere contributing to the peaceful relations between states, and the concomitant reduction in the possibility that space would become the cause of, or the arena for, armed conflict.

¹ International Co-operation in the Peaceful Uses of Outer Space, G.A. Res. 1721(XVI)A, U.N. Doc. A/4987, at ¶ 1(b) (December 20, 1961).

² Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, G.A. Res. 1962 (December 13, 1963), *text reproduced in* UNITED NATIONS TREATIES AND PRINCIPLES ON OUTER SPACE 39 (2002).

³ Draft Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, the Moon and Other Celestial Bodies, art. II, *text reprinted in* Report, Committee on the Peaceful Uses of Outer Space, at Annex I, U.N. Doc. A/AC.105/35 (September 16, 1966).

⁴ Draft Treaty Governing the Exploration of the Moon and Other Celestial Bodies, art. I, at 4, U.N. Doc. A/AC.105/32 (June 17, 1966).

⁵ See Outer Space Treaty, *supra* note 1, at art. IV.

Respect for the non-appropriation principle has helped to ensure the right of all states to engage in the exploration and use of space.¹ Moreover, the maintenance of outer space for peaceful purposes has fostered an environment where activities by both the public and the private sectors can be conducted, without the necessity for fortifications or militarily defensive armaments. The contribution to international peace and security has been a tangible benefit of space law for all mankind,² and underscores the importance of space to the future of the inhabitants of this planet.

Abrogation of Article II - Boon or Boondoggle?

In view of the importance of Article II to international peace and security, calls to abandon the doctrine must be viewed with critical skepticism. Abrogation of the non-appropriation principle cannot be justified merely because some believe that such action would be more convenient for space commerce. Rather, the principle must remain as a fundamental precept of the *corpus juris spatialis* unless and until it clearly can be demonstrated that the abandonment of the doctrine would not result in the export of armed hostilities into Earth orbit and beyond. That case has not yet been made.

The vacuum which would ensue should the non-appropriation principle cease to exist would not necessarily be conducive to the development of space commerce and the interests of the private sector. To the extent that claims could be made, would there be a "space rush" with a clean slate of celestial treasures open and available to be grabbed by the quickest or the strongest? Although states did not assert claims to the Moon or other celestial bodies based on space explorations in the early 1960's, would considerations of equity not allow claims, similar to historical precedents on Earth, to be made retroactively? Should claims for exploratory "firsts" after the entry into force of the Outer Space Treaty in 1967 also be recognized as an appropriate basis for the assertion of claims in outer space? Should the Bogota Declaration³ be given effect? What would be left for private parties to claim, and on what criteria should claims be based?

The claims which could be asserted over outer space, including the Moon and other and celestial bodies, would not necessarily be consistent nor compatible with each other. On Earth, the enforcement of conflicting and overlapping claims ultimately has depended on military means. Clearly, the risk of disputes between competing claimants in space would be significant, and armed conflicts beyond the confines of this planet become not merely foreseeable but inevitable. Thus, an atmosphere of insecurity would pervade the outer space environment, and the cost of conducting missions would increase in direct proportion to the defensive planning, armaments and weaponry made necessary for protection of personnel and spacecraft.

The cost of doing business in space would increase from other sources as well. States claiming sovereignty over an area in outer space, or on the Moon or other celestial bodies, would have little incentive not to impose substantial tribute in the form of taxes, royalties, duties, auction fees or other charges, for the use or occupation of their space property by other parties.

¹ See *id.* at art. I.

² See Sterns & Tennen, *Institutional Approaches to Managing Space Resources*, in PROCEEDINGS OF THE 41ST COLLOQUIUM ON THE LAW OF OUTER SPACE 33, at text & note 11 (1999)(citing statement by Eilene Galloway)[hereinafter referred to as "Sterns & Tennen, Institutional Approaches"].

³ Declaration of the First Meeting of Equatorial Countries, Bogota, Columbia, December 3, 1976, text reproduced in N. JASENTULIYANA & R.S.K. LEE, II MANUAL ON SPACE LAW 383 (1979).

These costs could be imposed by several different entities, each asserting overlapping, inconsistent and contradictory claims.¹ If private entities were able to assert their own claims of appropriation, separate and apart from the claims of states, the situation would become even more murky and convoluted.

The assertion of overlapping and competing claims in space would metamorphose the ability of all states to explore and utilize areas on or below the surface of celestial bodies from a right as guaranteed by Article I of the Outer Space Treaty, to a commodity available only to the highest bidder. Monopolies and other anti-competitive practices would inhibit and restrict rather than enhance and promote space commercialization. Therefore, it is clear that the abrogation of the non-appropriation principle would add significant levels of insecurity, inefficiency and expense to commercial ventures in space.²

Private Entities and National Appropriation

The necessity of the non-appropriation principle is firmly established, but it has been asserted that the scope of Article II excludes private entities. Thus, the conclusion has been put forward that the utilization of the term “national” appropriation necessarily exempts private entities, and thereby permits so called “private appropriation.” No persuasive arguments have been offered to justify such conclusion, which is both fallacious and specious. Moreover, the Moon Agreement clearly expresses the preclusion of claims of ownership of the surface or subsurface of the Moon and other celestial bodies, or to natural resources in place by states as well as by a “non-governmental entity or any natural person”.³ Notwithstanding such explicit language, deeds to lunar acreage are offered for sale even in states that have ratified the Moon Agreement.⁴

National Activities in Space Law

The term “national,” as used in the Outer Space Treaty, is defined by Article VI thereof to include all activities, irrespective of whether conducted by governmental or non-governmental entities. “National” appropriation prohibited by Article II, therefore, extends to and is fully applicable to appropriation conducted by public as well as private entities, all of which are considered to be “national” activities by definition pursuant to Article VI.⁵

Can States License Violations of International Law?

The ability of non-governmental entities to conduct activities in space is recognized by Article VI, however, private entities must be authorized to conduct activities in space by the

¹ Sterns & Tennen, *Institutional Approaches*, *supra* note 17, at text & notes 43-46.

² See Lee, *Creating an International Regime for Property Rights Under the Moon Agreement*, in PROCEEDINGS OF THE 42ND COLLOQUIUM ON THE LAW OF OUTER SPACE 409, 415 (2000); Sterns, Stine & Tennen, *Preliminary Jurisprudential Observations Concerning Property Rights on the Moon and Other Celestial Bodies in the Commercial Space Age*, in PROCEEDINGS OF THE 39TH COLLOQUIUM ON THE LAW OF OUTER SPACE 50, 54 (1997).

³ Moon Agreement, *supra* note 2, at art. 11.3.

⁴ Britt, *supra* note 3

⁵ Statement of Prof. Kerrest during the UNITED NATIONS - REPUBLIC OF KOREA WORKSHOP ON SPACE LAW (November, 2003).

appropriate state of nationality.¹ A state cannot grant more authority to a non-governmental entity than is possessed by the state itself. Accordingly, it is apparent that states do not have the ability to authorize and license their nationals, or other entities subject to their jurisdiction, to engage in conduct such as appropriation of outer space and celestial bodies, which is prohibited to the state by positive international law.²

This is not a controversial concept, and cannot be the subject of serious dispute. That is, if it is asserted that a state can indeed authorize its nationals to “privately appropriate” areas of the Moon and other celestial bodies, notwithstanding Article II, then it must also be asserted that the state can similarly authorize its nationals to conduct other activities, in their capacity as private entities, in contravention of other articles of the Outer Space Treaty. Thus, under this construct, there would be no legal impediment to prevent states from licensing their nationals to place nuclear weapons or other kinds of weapons of mass destruction in Earth orbit or on celestial bodies, notwithstanding the prohibitions contained in Article IV of the Outer Space Treaty. After all, Article IV, like Article II, does not have an explicit reference to private entities within its provisions.

The foregoing analysis does not need to be limited to the Outer Space Treaty, or to other international instruments comprising the *corpus juris spatialis*. To be consistent, it must be asserted that a state could “privatize” its nuclear testing procedures, and license a private entity to conduct nuclear weapons tests above ground, in the atmosphere, or in outer space, contrary to the provisions of the Nuclear Test Ban Treaty.³ Just like Article II, the Nuclear Test Ban Treaty is devoid of any explicit reference to the private sector. Obviously, the illogic of the argument, carried to its ultimate conclusion, would negate virtually every bilateral or multilateral agreement ever made. States would engage in every activity they agreed to restrict or limit by the convenient subterfuge of conducting the activity through the guise of the private, rather than the public, sector.⁴

Claims Registries and National Appropriation

The celestial claim registries similarly are unable to establish any legitimacy. For example, it has been suggested that states could unilaterally establish a domestic registry to document claims of their nationals to space resources, purportedly consistent with the non-appropriation principle. The “consistency” is provided by the artifice of proclaiming this registration scheme simply “not to be appropriation.” Thus, one group of proponents has asserted that “[i]n doing so, the nation could make it clear that it was *not claiming* sovereignty over such

¹ Outer Space Treaty, *supra* note 1, at art. VI.

² See C.W. JENKS, *SPACE LAW* 201 (1965); van Traa-Engelman, *Clearness Regarding Property Rights on the Moon and Other Celestial Bodies*, in *PROCEEDINGS OF THE 39TH COLLOQUIUM ON THE LAW OF OUTER SPACE* 38, 42 (1997); Sterns, *Stine & Tennen*, *supra* note 20, at 54 (1997).

³ Treaty Banning Nuclear Weapons Tests on the Surface of the Earth, in the Atmosphere, or in Outer Space, *entered into force* October 10, 1963, 14 U.S.T. 1313, T.I.A.S. No. 5433, 480 U.N.T.S. 43.

⁴ Sterns & Tennen, *Privateering and Profiteering on the Moon and Other Celestial Bodies: Debunking the Myth of Property Rights in Space*, in *PROCEEDINGS OF THE 45TH COLLOQUIUM ON THE LAW OF OUTER SPACE* 56 (2003), and 31 *ADV. SPACE RES.* 2433 (2003).

resources, but *simply recognizing the claims* of its citizens (emphasis added).”¹ This is a distinction without a difference.

The recognition of claims by a state is only one side of the coin. The other side is the exclusion or rejection of any competing or conflicting claims. The establishment of a “claims registry” would constitute a *de facto* exclusion of other states and their nationals, which by its very nature would constitute a form of national appropriation.² Moreover, any form of state recognition of claims by its nationals to extraterrestrial property would constitute national appropriation “by any other means” prohibited by Article II, no matter what euphemistic label is employed to mask the obvious.

Regulation of the Use of Celestial Property

The focus on private ownership of celestial property is misdirected. The fee simple ownership of property is not an invariably necessary component to the commercial use of resources, even on Earth. Numerous examples can be found where a private entity is able to legally and profitably extract and utilize resources from property which it does not own. Grazing leases on public lands, offshore oil platforms, and logging rights are all examples where profit is available to private enterprise despite the absence of property ownership.³

The fee simple ownership of extraterrestrial property similarly is irrelevant to the profitability of a venture providing products or services derived from celestial resources. Thus, the private sector should concentrate on the development of profitable ventures based on the use of extraterrestrial resources. Ownership is relevant only where it is intended that the source of the profit is derived from the claim of ownership, and the corresponding alienation thereof for economic consideration.⁴

The extant space treaties did not have as their primary purpose the detailed regulation of commercial activities and the relationships among private entities or between states and private entities. Virtually every article of the Outer Space Treaty has relevance to commercial ventures in one context or another. Most provisions of the current space treaties might be considered ambiguous in the literal text, and have both positive as well as negative implications for commercial development. Thus, the non-appropriation doctrine in this regard is double edged: while it prevents an entity from establishing a monopoly, it prevents the competition from establishing one as well.

¹ Dasch, Smith & Pierce, *Conference on Space Property Rights: Next Steps*, in PROCEEDINGS OF THE 42ND COLLOQUIUM ON THE LAW OF OUTER SPACE 178 (2000).

² Pop, *Appropriation in Outer Space, The Relationship Between Land Ownership and Sovereignty on the Celestial Bodies*, 16 SPACE POLICY 275, 278 (2000); Reif, *Project 2001: Conclusions and Recommendations of the Working Group on Privatization*, in PROCEEDINGS OF THE 44TH COLLOQUIUM ON THE LAW OF OUTER SPACE 3, 8 (2002).

³ See, e.g., 43 U.S.C.A. §§ 315 (grazing); 1181a (timber); 1331 (oil); see also Christol, *The Natural Resources of the Moon: The Management Issue* in PROCEEDINGS OF THE 41ST COLLOQUIUM ON THE LAW OF OUTER SPACE 3 (1999) (observing that parties have sold or leased portions of the International Telecommunications Union allotments to third parties, without claiming ownership thereof in light of article 33 of the ITU Convention, which grants only the right to use an orbital position or frequency allocation for a limited period of time).

⁴ See Summary of Discussion, in PROCEEDINGS OF THE 41ST COLLOQUIUM ON THE LAW OF OUTER SPACE 289, 290 (1999) (statement of Dr. Jasentuliyana).

Protection of the Private Sector

The interests of the private sector are directly served by the express recognition of the ability of non-governmental entities to conduct activities in space, subject to the authorization and continuing supervision of the appropriate state of nationality.¹ The Outer Space Treaty does not mandate any particular form of regime for the authorization and continuing supervision of non-governmental entities in space, and states have adopted several different forms of administrative oversight consistent with national interests and policies.² Nevertheless, states have a duty to ensure that missions which receive licenses are conducted in conformity with international law.³

The requirement of state authorization and continuing supervision will afford a significant measure of protection to private entities. States which grant a license to a private entity to conduct a mission in space would be unlikely to directly interfere *in situ* with a project operated in a legal and lawful manner. The licensing state also would be unlikely to license another private entity to directly interfere with a previously authorized mission. In the event harmful interference was caused or threatened by the activities of governmental or non-governmental entities of another state, international consultations could be conducted in accordance with article IX of the Outer Space Treaty. Should interference occur, liability could be imposed pursuant to the provisions of the Outer Space Treaty, and where applicable, the Liability Convention.⁴ While further elaboration and refinement of regulation of non-governmental entities in space, of course, will be necessary, and much will be influenced by future events, the extant *corpus juris spatialis* contains the basic parameters within which both domestic and international regulation will be developed.

The question for the private sector ultimately is what will be the substance of the future regulation of space commerce? This will be addressed in detail by other speakers at this Symposium, with particular reference to the concept of the common heritage of mankind, and will not be discussed in detail herein. However, it is submitted that the form of regulation may vary with the locus of a mission. That is, no single model of regulation will be appropriate or effective for all venues, such as celestial bodies, and the surface, subsurface or portions thereof, or the projects which may be conducted by a variety of entities. Thus, what may be appropriate for the Moon may not be adequate for Mars, or Deimos and Phobos, or the asteroids, or the Apollo-Amour class asteroids, *et cetera*.⁵

Experiences with the Law of the Sea Convention, and the World Trade Organization, may provide useful guidance for the regulation of space commerce. Specifically, the foundational

¹ Outer Space Treaty, *supra* note 1, at art. VI.

² See generally F.G. VON DER DUNK, PRIVATE ENTERPRISE AND PUBLIC INTEREST IN THE EUROPEAN 'SPACESCAPE' (1998).

³ Outer Space Treaty, *supra* note 1, at art. III.

⁴ Convention on International Liability for Damage Caused by Space Objects, *opened for signature* March 29, 1972, 24 U.S.T. 2389, T.I.A.S. No. 7762, 961 U.N.T.S. 187, *text reproduced in* UNITED NATIONS TREATIES AND PRINCIPLES ON OUTER SPACE 13 (2002).

⁵ Jenks, *supra* note 25, at 201; for a discussion of the definition of celestial bodies, see Fasan, *Asteroids and Other Celestial Bodies - Some Legal Differences*, 26 J. SPACE L. 33 (1998).

instruments for both the LOS¹ and the WTO² were modified in 1994. These modifications demonstrated that international agreement can be achieved on trade and commerce issues in traditional as well as non-traditional venues, when emphasis is placed on market principles, as well as legal process and procedures.³ These examples, furthermore, illustrate that certain characteristics may be of paramount importance for any international regulatory authority, including: utilization of flexible and evolutionary approaches to limit bureaucratic structures; the promotion of international cooperation; the preservation of equality of opportunity; appropriate representation of states commensurate with their interests; and finally, the creation of juridical regimes which are neutral arbiters, and which do not engage in unfair competition with private entities subject to their regulatory authority.

Conclusion

The non-appropriation principle has been essential for the promotion of international peace and security, and preventing the spread of armed conflict to outer space, including the Moon and other celestial bodies. The preservation of space for peaceful purposes inures to the direct benefit of the interests of space commercialization. The purposes served by the non-appropriation principle remain as valid today as when the doctrine was first articulated in the early days of the space age. This is sufficient reason in and of itself for Article II to remain a basic precept of international space law.

The view that the non-appropriation principle presents an obstacle and hindrance to space commerce is short-sighted and myopic. Abrogation of Article II would not be as beneficial as the opponents of the doctrine assume. Overlapping and conflicting claims by states and other entities will lead to an unstable and insecure environment for the private sector activities, and a jumble of contradictory authorities asserting some perceived right to control activities on "their" celestial property. Furthermore, there may be nothing left to be claimed. The rights of states to assert claims, both prospectively and retroactively, would have to be respected. The current vendors and registrars of extraterrestrial deeds already claim to own everything in the cosmos, even with Article II as a component of positive international law.

The abrogation of the non-appropriation principle will have further negative implications for the private sector. The cost of doing business in space would increase by the monetary tribute which will be exacted by every claimant to a particular area for the use of that area. The ability to explore all areas of the cosmos will become a commodity, rather than a right as under current international law. Moreover, space commerce will become even more expensive by the costs incurred as a result of the necessity to plan, construct and deploy defensive armaments and

¹ G.A. Res. 48/263 (July 28, 1994).

² Uruguay Round's Understanding on Rules and Procedures Governing the Settlement of Disputes, *text reproduced in* GATT, *The Results of the Uruguay Round of Multilateral Trade Negotiations: The Legal Texts* (1994); *see also* Final Act Embodying the Results of the Uruguay Round of Multilateral Negotiations, *opened for signature* April 15, 1994, *in* *Uruguay Round of Multilateral Trade Negotiations: Legal Instruments Embodying the Results of the Uruguay Round of Multilateral Trade Negotiations done at Marrakesh on April 15, 1994*, 33 I.L.M. 1143 (1994).

³ The United States has indicated that the restructuring of the seabed mining regime along free market lines comports with the principle of the common heritage of mankind. U.S. Senate, 103rd Cong., 2nd Sess., UNITED NATIONS CONVENTION ON THE LAW OF THE SEA, WITH ANNEXES, AND THE AGREEMENT RELATING TO THE IMPLEMENTATION OF PART XI OF THE UNITED NATIONS CONVENTION ON THE LAW OF THE SEA, WITH ANNEX, Treaty Document 103-39, at 61 (1994).

fortifications. Ultimately, the enforcement of claims in space will be dependent upon military means.

The prohibition of national appropriation in Article II applies with equal force to non-governmental entities as a matter of definition pursuant to Article VI. In addition, an interpretation which excludes the private sector from the ambit of Article II, and permits states to license so-called "private appropriation," also would have to exclude the private sector from other articles of the Outer Space Treaty, and, for that matter, all other international agreements. Such an interpretation clearly is illogical and cannot form the basis for the assertion of private rights in international law.

The focus on the unfettered private ownership of celestial property is misplaced, as the ability to provide goods and services derived from the resources of space is not dependent upon the assertion of fee simple ownership of areas on celestial bodies. The future regulation of space commerce will center on the use of space resources in accordance with international law. The extant *corpus juris spatialis* inherently is neither pro- nor anti- the private sector. On the other hand, the requirement that the activities of non-governmental entities in space be authorized and supervised by the appropriate state of nationality, together with the provisions concerning international consultations and international liability for damages, provide a firm foundation on which the protection of the private sector in space can be constructed.

Finally, the "lunar debris express" mission illustrates the need for effective and efficient licensing regimes. While the details of the mission have not been able to be verified,¹ it is difficult to conceive of a state granting approval for a mission specifically designed spread trash over the lunar surface. It is also doubtful that the intent of a paying customer to declare ownership of the Moon was explicitly included in the disclosures made during any licensing process. As a practical matter, a license applicant may not be aware of all the intentions of its clients and customers, and it may not even be foreseen that acts or declarations in contravention of law are planned. Nevertheless, should authority for any such mission be granted in the first instance, it would be both appropriate and prudent for the license to be cancelled, revoked or restricted pending modification of the mission plan to conform to the obligations of international law.

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¹ Britt, *supra* note 3.

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**New Developments and the Legal Framework Covering the
Exploitation of the Resources of the Moon**
Office for Outer Space Affairs, Vienna, Austria

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*Article II of the Outer Space Treaty, The Status
of the Moon, and Resulting Issues*

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***Article II of the Outer Space Treaty, The Status of the Moon, and
Resulting Issues***

- The non-appropriation principle is under assault
- Seen by some as an unwarranted intrusion on the rights of the private sector to conduct business in space
- National prestige, technological advancement, and the quest for scientific discovery all have driven space programs
- Current focus on commercial development has considerations of private gain taking center stage
- Disturbing trend has emerged, whereby the shortest path to profit is by violating space law, especially Article II

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- The assault on Article II comes from many sources, and takes many different forms
- Web sites which proclaim to be the self-anointed “registry” for claims to extraterrestrial acreage
- Deeds purporting to represent extraterrestrial real estate readily are available through the web and elsewhere
- Proposals to capture, relocate, and mine celestial bodies to oblivion

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- Common theme: implicit renunciation of the concept of non-appropriation of outer space, including the Moon and other celestial bodies
- Favor unfettered private ownership of extraterrestrial property
- Attempt to distinguish the application of the non-appropriation doctrine to private entities in general, or to their favored projects in particular
- Alternatively, urged that the non-appropriation principle presents an insurmountable obstacle to profit-making activities in space, and therefore should be abandoned

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- Non-appropriation principle is not alone as a target
- The environment of space is threatened by missions which have as their primary object the creation or distribution of debris
 - Launch of human cremains into orbit
 - Mission to disburse business cards and other detritus over lunar surface
- Serve no purpose other than private gain at the expense of the natural environment of space
- Appear to be in direct contravention of the provisions of Article IX of the Outer Space Treaty, and Article 7.1 of the Moon Agreement

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- Implications of a mission to deliver debris to the Moon for profit for the non-appropriation principle
- Vendor of “lunar deeds” intends to establish a physical presence on the Moon
- Asserted that this physical presence will add to and reinforce the rationale by which this vendor claims ownership of the Moon
- May seem preposterous, but this particular vendor alone claims to have sold deeds to millions of acres on the Moon
- Distinct possibility that hundreds of thousands of people around the world have been deceived

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- Article II must be considered in conjunction with other articles of the Outer Space Treaty
- Article I, paragraph 1: activities in outer space be conducted for the benefit and in the interests of all mankind
- Article I, paragraph 2: states shall have free access to all areas of celestial bodies
- Article IV: activities on the Moon and other celestial bodies shall be conducted exclusively for peaceful purposes
- Article VI: obligates states to authorize and provide continuing supervision of the activities of their non-governmental entities in space
- Article VII: international liability for damages

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- Non-appropriation principle was among the earliest tenets of space law
- Articulated in U.N.G.A. Resolution 1721 in 1961, a mere four years after the launch of the first Sputnik
- Re-affirmed in 1963 by U.N.G.A. Resolution 1962
- Incorporated in the precursor drafts of the Outer Space Treaty submitted to COPUOS by both the Soviet Union and the United States

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- UN Resolutions not positive international law
- States uniformly adhered to the non-appropriations principle in their activities in space
- Contrary to historical precedent on Earth, states did not lay claim to the vast reaches of space based on their explorations
- States also did not rush to assert claims in anticipation of the entry into force of the Outer Space Treaty in 1967
- Practice of states in space has been a substantial departure from the experiences on Earth during the age of exploration and colonization through the 20th century expeditions to Antarctica

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- Adoption of the non-appropriation principle served several historical purposes
- Maintenance and preservation of outer space for peaceful purposes
- Promoted an atmosphere contributing to the peaceful relations between states, and the concomitant reduction in the possibility that space would become the cause of, or the arena for, armed conflict
- Helped to ensure the right of all states to engage in the exploration and use of space
- Fostered an environment where activities by both the public and the private sectors can be conducted, without the necessity for fortifications or militarily defensive armaments
- The contribution to international peace and security has been a ***tangible benefit*** of space law for all mankind, and underscores the importance of space to the future of the inhabitants of this planet

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Abrogation of Article II - Boon or Boondoggle?

- Calls to abandon the doctrine must be viewed with critical skepticism
- Abrogation cannot be justified merely because some believe that such action would be more convenient for space commerce
- The principle must remain as a fundamental precept of the *corpus juris spatialis* unless and until it clearly can be demonstrated that the abandonment of the doctrine would not result in the export of armed hostilities into Earth orbit and beyond

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- Vacuum created by abrogation would not necessarily be conducive to the development of space commerce and the interests of the private sector
- To the extent that claims could be made, would there be a “space rush” with a clean slate of celestial treasures open and available to be grabbed by the quickest or the strongest?
- Would considerations of equity not allow claims, similar to historical precedents on Earth, to be made retroactively?
- Should claims for exploratory “firsts” after the entry into force of the Outer Space Treaty in 1967 also be recognized as an appropriate basis for the assertion of claims in outer space?
- Should the Bogota Declaration be given effect?
- What would be left for private parties to claim?
- On what criteria should claims be based?

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- Claims would not necessarily be consistent nor compatible
- On Earth, the enforcement of conflicting and overlapping claims ultimately has depended on military means
- Clearly, the risk of disputes between competing claimants in space would be significant, and armed conflicts beyond the confines of this planet become not merely foreseeable but inevitable
- An atmosphere of insecurity would pervade the outer space environment, and the cost of conducting missions would increase in direct proportion to the defensive planning, armaments and weaponry made necessary for protection of personnel and spacecraft

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- The cost of doing business in space would increase from other sources as well
- States claiming sovereignty over an area in outer space, or on the Moon or other celestial bodies, would have little incentive not to impose substantial tribute in the form of taxes, royalties, duties, auction fees or other charges, for the use or occupation of their space property by other parties
- These costs could be imposed by several different entities, each asserting overlapping, inconsistent and contradictory claims
- If private entities were able to assert their own claims of appropriation, separate and apart from the claims of states, the situation would become even more murky and convoluted

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- The assertion of overlapping and competing claims in space would metamorphose the ability of all states to explore and utilize areas on or below the surface of celestial bodies
- From a right as guaranteed by Article I of the Outer Space Treaty
- To a commodity available only to the highest bidder
- Monopolies and other anti-competitive practices would inhibit and restrict rather than enhance and promote space commercialization
- It is clear that the abrogation of the non-appropriation principle would add significant levels of insecurity, inefficiency and expense to commercial ventures in space

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Private Entities and National Appropriation

- The necessity of the non-appropriation principle is firmly established, but it has been asserted that the scope of Article II excludes private entities
- The conclusion has been put forward that the utilization of the term “national” appropriation necessarily exempts private entities, and thereby permits so called “private appropriation”
- No persuasive arguments have been offered to justify such conclusion, which is both fallacious and specious
- The Moon Agreement clearly expresses the preclusion of claims of ownership of the surface or subsurface of the Moon and other celestial bodies, or to natural resources in place by states as well as by a “non-governmental entity or any natural person”
- Notwithstanding such explicit language, deeds to lunar acreage are offered for sale even in states that have ratified the Moon Agreement

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National Activities in Space Law

- “National,” as used in the Outer Space Treaty, is defined by Article VI to include all activities
 - Irrespective of whether conducted by governmental
 - Or non-governmental entities
- “National” appropriation prohibited by Article II extends to and is fully applicable to appropriation conducted by public as well as private entities, all of which are considered to be “national” activities by definition pursuant to Article VI

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Can States License Violations of International Law?

- Private entities must be authorized to conduct activities in space by the appropriate state of nationality pursuant to Article VI
- A state cannot grant more authority to a non-governmental entity than is possessed by the state itself
- Accordingly, it is apparent that states do not have the ability to authorize and license their nationals, or other entities subject to their jurisdiction, to engage in conduct such as appropriation of outer space and celestial bodies, which is prohibited to the state by positive international law

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- This is not a controversial concept, and cannot be the subject of serious dispute
- If it is asserted that a state can indeed authorize its nationals to “privately appropriate” areas of the Moon and other celestial bodies, notwithstanding Article II, then it must also be asserted that the state can similarly authorize its nationals to conduct other activities, in their capacity as private entities, in contravention of other articles of the Outer Space Treaty
- Under this construct, there would be no legal impediment to prevent states from licensing their nationals to place nuclear weapons or other kinds of weapons of mass destruction in Earth orbit or on celestial bodies, notwithstanding the prohibitions contained in Article IV of the Outer Space Treaty
- After all, Article IV, like Article II, does not have an explicit reference to private entities within its provisions

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- This analysis does not need to be limited to the Outer Space Treaty, or to other international instruments comprising the *corpus juris spatialis*
- To be consistent, it must be asserted that a state could “privatize” its nuclear testing procedures, and license a private entity to conduct nuclear weapons tests above ground, in the atmosphere, or in outer space, contrary to the provisions of the Nuclear Test Ban Treaty
- Just like Article II, the Nuclear Test Ban Treaty is devoid of any explicit reference to the private sector
- The illogic of the argument, carried to its ultimate conclusion, would negate virtually every bilateral or multilateral agreement ever made
- States would engage in every activity they agreed to restrict or limit by the convenient subterfuge of conducting the activity through the guise of the private, rather than the public, sector

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Claims Registries and National Appropriation

- The celestial claim registries similarly are unable to establish any legitimacy
- It has been suggested that states could unilaterally establish a domestic registry to document claims of their nationals to space resources, purportedly consistent with the non-appropriation principle
- The “consistency” is provided by the artifice of proclaiming this registration scheme simply “not to be appropriation”
- Thus, one group of proponents has asserted that “[i]n doing so, the nation could make it clear that it was *not claiming* sovereignty over such resources, but *simply recognizing the claims* of its citizens”
- This is a distinction without a difference

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- The recognition of claims by a state is only one side of the coin
- The other side is the exclusion or rejection of any competing or conflicting claims
- The establishment of a “claims registry” would constitute a *de facto* exclusion of other states and their nationals, which by its very nature would constitute a form of national appropriation
- Any form of state recognition of claims by its nationals to extraterrestrial property would constitute national appropriation “by any other means” prohibited by Article II, no matter what euphemistic label is employed to mask the obvious

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Regulation of the Use of Celestial Property

- The focus on private ownership of celestial property is misdirected
- The fee simple ownership of property is not an invariably necessary component to the commercial use of resources, even on Earth
- Numerous examples can be found where a private entity is able to legally and profitably extract and utilize resources from property which it does not own
 - Grazing leases on public lands
 - Offshore oil platforms
 - Logging rights

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- Fee simple ownership of extraterrestrial property similarly is irrelevant to the profitability of a venture providing products or services derived from celestial resources
- The private sector should concentrate on the development of profitable ventures based on the use of extraterrestrial resources -- Ownership is relevant only where it is intended that the source of the profit is derived from the claim of ownership, and the corresponding alienation thereof for economic consideration

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- The extant space treaties did not have as their primary purpose the detailed regulation of commercial activities and the relationships among private entities or between states and private entities
- Virtually every article of the Outer Space Treaty has relevance to commercial ventures in one context or another
- Most provisions of the current space treaties might be considered ambiguous in the literal text, and have both positive as well as negative implications for commercial development
- Thus, the non-appropriation doctrine in this regard is double edged: while it prevents an entity from establishing a monopoly, it prevents the competition from establishing one as well

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Protection of the Private Sector

- The interests of the private sector are directly served by the express recognition in Article VI of the ability of non-governmental entities to conduct activities in space, subject to the authorization and continuing supervision of the appropriate state of nationality
- The Outer Space Treaty does not mandate any particular form of regime for the authorization and continuing supervision of non-governmental entities in space
- States have adopted several different forms of administrative oversight consistent with national interests and policies
- Nevertheless, states have a duty to ensure that missions which receive licenses are conducted in conformity with international law

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- The requirement of state authorization and continuing supervision will afford a significant measure of protection to private entities
- States which grant a license to a private entity to conduct a mission in space would be unlikely to directly interfere *in situ* with a project operated in a legal and lawful manner
- The licensing state also would be unlikely to license another private entity to directly interfere with a previously authorized mission

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- In the event harmful interference was caused or threatened by the activities of governmental or non-governmental entities of another state, international consultations could be conducted in accordance with article IX of the Outer Space Treaty
- Should interference occur, liability could be imposed pursuant to the provisions of the Outer Space Treaty, and where applicable, the Liability Convention
- Further elaboration and refinement of the regulation of non-governmental entities in space
- The extant *corpus juris spatialis* contains the basic parameters within which both domestic and international regulation will be developed

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- Question for the private sector ultimately is what will be the substance of the future regulation of space commerce?
- Submitted that the form of regulation may vary with the locus of a mission
- No single model of regulation will be appropriate or effective for all venues, such as celestial bodies, and the surface, subsurface or portions thereof, or the projects which may be conducted by a variety of entities
- What may be appropriate for the Moon may not be adequate for Mars, or Deimos and Phobos, or the asteroids, or the Apollo-Amour class asteroids, *et cetera*

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- Recent experience with the Law of the Sea Convention, and the World Trade Organization, may provide useful guidance for the regulation of space commerce
- Amendments to the LOS and modification to the WTO in 1994
- Demonstrated that international agreement can be achieved on trade and commerce issues in traditional as well as non-traditional venues, where emphasis is placed on market principles and legal process and procedures

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- These examples further illustrate that certain characteristics may be of paramount importance for any international regulatory authority
 - Utilization of flexible and evolutionary approaches to limit bureaucratic structures
 - Promotion of international cooperation
 - Preservation of equality of opportunity
 - Appropriate representation of states commensurate with their interests
 - The creation of juridical regimes which are neutral arbiters, and which do not engage in unfair competition with private entities subject to their regulatory authority

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Conclusion

- The non-appropriation principle has been essential for the promotion of international peace and security, and preventing the spread of armed conflict to outer space, including the Moon and other celestial bodies
- Preservation of space for peaceful purposes inures to the direct benefit of the interests of space commercialization
- View that the non-appropriation principle presents an obstacle and hindrance to space commerce is short-sighted and myopic
- Abrogation of Article II would not be as beneficial as the opponents of the doctrine assume

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Conclusion

- Unstable and insecure environment for the private sector activities
- Jumble of contradictory authorities
- The cost of doing business in space would increase by the monetary tribute which will be exacted by every claimant to a particular area for the use of that area
- The ability to explore all areas of the cosmos will become a commodity, rather than a right under current international law
- Space commerce will become even more expensive by the costs incurred as a result of the necessity to plan, construct and deploy defensive armaments and fortifications
- Ultimately, the enforcement of claims in space will be dependent upon military means

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- The future regulation of space commerce will center on the use of space resources in accordance with international law
- The requirement that the activities of non-governmental entities in space be authorized and supervised by the appropriate state of nationality, together with the provisions concerning international consultations and international liability for damages, provide a firm foundation on which the protection of the private sector in space can be constructed.
- Finally, the “lunar debris express” mission illustrates the need for effective and efficient licensing regimes
- Should authority for any such mission be granted in the first instance, it would be both appropriate and prudent for the license to be cancelled, revoked or restricted pending modification of the mission plan to conform to the obligations of international law



Exploitation of the Resources of the High Sea and Antarctica: lessons for the Moon? ¹

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Introduction.*

As you know, Hugo de Groot known as Grotius, a Founding Father of modern international law supported the freedom of the sea. He wanted to demonstrate that the Dutch had the right to sail to the East Indies and to engage in trade with the people there.²

To support this demonstration, Grotius qualified the sea as “res communis” that is to say a thing (res) which may be used by everybody and thus which cannot be appropriate by anyone. From the seventeenth century the use of the high sea as a mean of communication was accepted as “res communis”. This legal status is quite appropriate to this kind of utilisation as the use of somebody does not impede the use of somebody else. On the other hand, the consumable resources of the sea, mainly fishes, were supposed to be unlimited. They were “res nullius” i.e. things which belong to nobody and thus may be appropriate by anyone. When a fish is in the sea it belongs to nobody, but when it has been caught, it is the property of the fisherman. High sea could not be appropriate its living resources could.

When it became clear that the resources of the sea were no more unlimited, they could not stay “res nullius”. It became obvious that, if everybody could appropriate them, they would soon be destroyed. When mineral resources of the bottom of the sea were discovered, a new legal framework was required. These resources are consumable, they are destroyed by their first use, they cannot be “res communis” as common use is impossible. If you use them, you necessarily appropriate them. States and particularly developing States did not want them to continue to be considered as “res nullius”. A new notion was necessary in order to maintain as common property things which are destroyed by use. The solution was the “*Common Heritage of Mankind*” principle. The resource as a whole is common, but as a part, it may be exploited and legally appropriate³. The consequence is the difference between “res communis” and “common heritage”: if the “common heritage” is exploited, an international management of the resource is a necessity. Only the owner of the resource –here Mankind- (or its representative) may authorize an appropriation of a part of the common resource.

¹ This is a provisional text of the oral presentation delivered in French.

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² *The freedom of the sea or the right which belongs to the Dutch to take part in the East Indian Trade by Hugo Grotius* translated with a revision of the Latin text of 1633 by Ralph Magoffin New York university press 1916 Chapter 1 page 12.

³ LOS convention article 137 / 2 : « *All rights in the resources of the Area are vested in mankind as a whole, on whose behalf the Authority shall act. These resources are not subject to alienation. The minerals recovered from the Area, however, may only be alienated in accordance with this Part and the rules, regulations and procedures of the Authority* ». (http://www.un.org/Depts/los/convention_agreements/texts/unclos/part11-2.htm)

I The Common Heritage of Mankind principle for the High Sea.

I will not enter into the discussion to know whether the idea of Common Heritage of Mankind has been first defined in June 1967 before the UN COPUOS by professor Cocca or if it was in November of the same year by the representative of Malta, Arvid Pardo before the UN General Assembly. It is clear that we have here many reasons which are not scientific to support the first position.

In a narrow sense, Common Heritage “patrimoine”, or “patrimonium” does not exclude appropriation, it does not make the resource “res extra commercium”, “res sacrae” notion which would prohibit exploitation. It decides that this appropriation is made by Mankind. Then, the questions are to know what is Mankind and who is going to represent it.

Mankind, humanité is an interesting but complex notion. It includes not only the current population of the Earth, but also the coming generations. This is to be considered when decisions of use of the resources are to be taken. The destruction of these resources should not be done for a short sighted profit. It should be controlled and used for benefit of current and future generations as well.

The second question which has been seen as a problem is the necessity for Mankind to be represented by an organ entitled to take decisions and to rule exploitation of the common resources. Within the current little organised international society this representation is not obvious.

Part XI of the Montego Bay Convention modified by the 1994 New York agreement deals with these issues. It creates an intergovernmental organisation: the Authority, whose main organs are the Assembly and the Council. As revised by the 1994 agreement, the system has been accepted by most States. It takes into consideration the interest of developed countries without whom nothing can be made in such a highly technical field on the one side, and the interest of developing countries guaranteed by the common heritage principle on the other side.

I will not study the whole system it should be much too long, I will only emphasise on the most significant issue: who decides the granting of a licence for exploitation. It is of course the main issue as it is the authorisation to appropriate a part of the common resource. The rules governing these decisions are taken by the Assembly on proposal of the Council. As a general rule, decision-making in the organs of the Authority should be by consensus. If all efforts to reach a decision by consensus have been exhausted, decisions by voting in the Assembly shall be taken by a two-thirds majority of members present and voting.¹ An interesting particularity has been adopted in the New York 1994 agreement: two chambers have been created among the Council, one for the developing States, one for the developed ones. The majority for a vote on such matter should be as usual two-third but should also include a majority in each chamber.

The Law of the Sea convention and the 1994 New York agreement set the rules to be applied by the Authority to manage the common heritage in the name of Mankind.

As you know, the current activity is very low in the “Area”. The reason is economical and technical, it is not a consequence of its legal status. The case of Antarctica is different.

¹ Annex section 3 point 1 and 2. (http://www.un.org/Depts/los/convention_agreements/texts/unclos/agxis3.htm)

II Mining Antarctica: the Wellington draft convention.

In 1988 the parties to the Antarctic treaty decided to organize the possibility to use the mineral resources of Antarctica. As you know, the legal status of Antarctica is very complicated. Some States claim for sovereignty on a part of this continent, some others refuse these claims and hold the continent for international domain. When you note that some States claim the same part of territory and that both the United States and the Russian Federation, have maintained the basis to a claim without claiming, you will see how complicated this situation is. The Antarctic Treaty of 1959 is said to have “frozen” the claims and the oppositions to the claims. Without solving this legal problem, it enables activities on the continent under the control of the most interested countries called the “*Consultative Parties*”.

Despite this complex legal situation and despite the fact that some States consider themselves as sovereign on some territories, a draft status for mining the continent was adopted without a clear position on the legal status of the resources. This text never entered into force and will not. Following the reservation of Australia and France, the Consultative Parties of the Antarctic treaty decided in 1991 to restrain from mining Antarctica and to “*commit themselves to the comprehensive protection of the Antarctic environment and dependent and associated ecosystems and hereby designate Antarctica as a natural reserve, devoted to peace and science*”.¹

Nevertheless, the Wellington draft convention stays an interesting example of what may be done to set an international status for international exploitation of mineral resources.

The main difference with the status of the seabed and ocean floor is that the Wellington convention does not qualify the resources. Given the opposition between parties to the Antarctic treaty on the claim issue, such a definition was impossible². The mineral resources of Antarctica have not been declared “Common Heritage of Mankind”. It seems that if the convention had been in force some States not taking part in the “club” of the Consultative Parties may have had some strong opposition to the system. The legal status of these resources is very ambiguous like the legal status of Antarctica itself. Like in the Washington Antarctic Treaty, the Wellington convention does not solve the legal problem of appropriation, it found a pragmatic solution through agreement. Whether they claim, reserve their claim or refuse the claims, every Consultative Party agrees to authorise mining under the control of an international body. A very comprehensive “international regime” is set in force in order to respect other utilisations and the environment of the continent.

On the institutional level, the convention creates two kind of organs. The *Special Meeting of Parties* and the *Advisory Committee* represent the parties to the Convention, they advise the

¹ Protocol on environmental protection to the Antarctic treaty (Madrid 1991) article 2: *objective and designation*.

² It is interesting to note the special reference which is made by article 29 / 2 at point a and b to “*the member, if any, or if there are more than one, those members of the Commission identified by reference to Article 9(b) which assert rights or claims in the identified area (a) and to b. the two members of the Commission also identified by reference to Article 9(b) which assert a basis of claim in Antarctica; (USA and USSR)*”. In the last paragraph of article 29 it is nevertheless reaffirmed that - “*Nothing in this Article shall be interpreted as affecting Article IV of the Antarctic Treaty*” (at point 7). This special position of claiming States is even more important in article 32 Decision making of the regulatory Committee. The vote of half the claiming States members of the committee and of half the non claiming States is required.

The fact that this convention is dealing with mineral resources may explain this special reference to States supposed to claim rights on these resources even if many States refuse these claims.

Antarctic Mineral Resources Commission and the Regulatory Committees which have a decision power.

The *Special Meeting of Parties* shall be open to all Parties. It shall “*consider whether identification of an area by the Commission in accordance with the request contained in the notification would be consistent with this Convention, and shall report thereon to the Commission*”¹

A scientific, technical, environmental advisory committee is open to all parties who shall advise the Commission and the Regulatory Committee, it will provide a forum for consultation and cooperation.

The “Antarctic Mineral Resources Commission” is the central organ of the system. Its members are mainly the Consultative Parties and other parties accepted by consensus.

The Commission manages the activities under the convention. It examines whether the proposed activities may be conducted in a way respecting the fragile environment of the continent. It identifies areas for possible exploration and development, adopts measures relating to these activities. The decisions are taken by a vote with a 2/3 majority and consensus on some special important issues like budget and identification of possible exploration and development areas.²

Regulatory Committees are created for each area identified by the Commission. Membership of these committees ensure an equitable sharing of responsibility, it includes claiming States and non claiming States. The Committees have an important role of management. For instance they consider applications for exploration and development permits; approve Management Schemes; issue exploration and development permits and monitor exploration and development activities.

As we see, the Antarctic Mineral Resources Commission and the Regulatory Committees play, *mutatis mutandis*, the role usually played by States when national resources are involved or by the Authority for the seafloor in the Law of the Sea Convention. Even if the resources of Antarctica had not been declared “Common Heritage of Mankind”, an international regulatory mechanism and body was needed and accepted.

III Resources of Outer space.

We have today to look at the moon and other celestial bodies and their possible mineral resources. Even if the Moon agreement is in force, we know that few States have to ratify it and therefore it is not really applicable for the time being. Therefore, I will only consider the currently applicable rules specially the Outer Space treaty as such or as rules accepted as customary law.

Like the High Sea, Outer Space is “*free for exploration and use by all States*”. It is also “*not subject to national appropriation*”. These characteristics define a “*res communis*”. It applies to orbits like it does for navigation on the sea.

¹ Article 28 and 40.

² Article 22 : *Decision making in the Commission.*: A decision by consensus is required for questions about the budget (articles 21 and 35) and identification of possible exploration and development areas (article 41 (2))

But unlike the High Sea and Antarctica, resources of Outer Space cannot be appropriated by any means. The point is certain: according to article 2 of the OST: “*the moon and other celestial bodies, (are) not subject to national appropriation*” by any means. The wording of the rule is very general, it applies to any “national activity”, “*whether such activities are carried on by governmental agencies or by non-governmental entities*” as stated in article VI of the treaty¹.

Authorising the mining of consumable non renewable goods is undisputedly a way of appropriation, therefore it is forbidden by the treaty. If a State accepts to grant permits to mine the moon, it commits a violation of the treaty and of well accepted customary space law. What are the practical consequences of such a violation. The first one is usual in international law: the State is internationally responsible for its violation of international law. By the way it is also responsible for the violation by a national “non governmental entity” according to article VI of the treaty. Given the practical difficulty to force an implementation of international law, it may not refrain some States to do so.

It seems that an other consequence may be much more damaging to persons wanting to violate the rule: if a mineral is mined illegally from the moon or any other celestial body, this mineral and any product made from it when used on the Earth, are unlawful. If they happen to come under the jurisdiction of a State refusing this appropriation, it may be seized by local tribunals and courts. It was the case for instance when Chile nationalized copper mines. The nationalized companies obtained the seizure of the copper when exported. Such a procedure may be used if the moon is illegally mined.

I do not think that any entrepreneurs will accept to take such a risk. Mining the moon or any other celestial body is going to be very expensive. When such an amount of money is involved, serious investors need a stable and accepted legal framework. This preoccupation was common rule for searching and exploiting offshore oil in non delimited continental shelves.

Is it possible to set a legal framework for mining the moon? If it becomes interesting to mine the moon or any other celestial body what would be the solution?

National appropriation is forbidden by the treaty and by international customary law. The only possibility is *international* appropriation.

I would like to propose a theory to be discussed: There is two ways to legally mine the moon:

The first one is to internationally mine the moon by setting an international body in charge of this activity. From the experience of the seafloor and the international Enterprise created by part XI of the Montego-bay convention. I will certainly not support this idea.

The second possibility is to use the Common Heritage of Mankind principle. Paradoxically, given the current treaties and customary rules, if we refuse an international Enterprise, it seems the only solution.

¹ We can find in article 6 of the Moon agreement some interesting indications of customary law at the time of the drafting of this agreement and certainly still now. For instance the non appropriation principle does not forbid *collecting and removing moon samples*. Saying so, I am not saying that the moon agreement is applicable, I only stress the fact that, at the time of this agreement, collecting samples was not considered as contrary to the customary and conventional principle of non appropriation.

Many oppose this notion, they think that it impedes exploitation of the moon. The paradox is that they are wrong: the Common Heritage Principle is the only way to organise a legal exploitation of the moon and other celestial bodies.

As national appropriation is forbidden there no way for a State to authorise a mining activity on the moon.

There is of course no way to accept a mining by private entities without a State's authorisation. There are many reasons for that which I will not study here. One of them being that, as such, non governmental entities have no rights to explore or use Outer Space (as we know, according to article 1 of the OST this use *shall be free for exploration and use by all States*, in the contrary, as stated in article VI of the same treaty, the use by non-governmental entities *shall require authorization and continuing supervision by the appropriate State*)

The only possibility is to authorise international appropriation. Who is going to authorise this mining activity? No State, nobody but an international Authority.

Declaring the moon : "Common Heritage of Mankind" is the only way to mine it. For the time being resources of the moon are "res extra commercium" no appropriation is possible whether it is an appropriation of the resources as a whole through claim of sovereignty or as a part through mining. If, like for the seafloor, the moon is declared "Common Heritage of Mankind", the resources as a whole is appropriated by Mankind., Mankind may authorises appropriation of a part of them by mining. As astonishing as it may be, it seems to be the only solution to legally mine the moon. In this way, the legal status of the resources being defined, an international Authority can then authorise a mining activity on the moon.

Conclusions.

The past experience of the seabed and of Antarctica shoes that mining an international space needs an international Authority to play the role of a State in a place where no territorial sovereignty can regulate and control.

It also shoes that, if national appropriation is prohibited when consumable and non renewable resources are concerned, there is two ways to exploit international resources: to create an international Enterprise or to declare the whole resource Common Heritage of Mankind in order to enable Mankind to authorise a partial appropriation.

ILA Resolution 1/2002 with Regard to the Common Heritage of Mankind Principle in the Moon Agreement

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and

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I. Introduction

According to the Terms of Reference emanating from the 68th ILA Conference in Taipei 1998, the Space Law Committee became involved with the commercial aspects of space activities.¹ It structured its work in a way that, as a first step, a review of the space treaties presently in force was undertaken in order to enable the Committee to come up with recommendations as to the need for changes to keep pace with the present international context. This international context was understood as characterized by a growing commercialisation and privatisation of space activities. Project 2001 of the Institute of Air and Space Law of the University of Cologne had exemplified the new challenges of growing commercialisation.² Moreover, the current Project 2001 Plus undertaken by the Institute of Air and Space Law of the University of Cologne in a cooperation with the German Aerospace Center that started in 2001 puts the process of commercialisation and privatisation in the context of globalisation and Europeanisation.³

In the following, the main focus of attention will be placed on the Moon Agreement in order to explain how the Space Law Committee reached at its conclusion as contained in ILA Resolution 1/2002 that reads as follows:

*“(4) Regarding the 1979 Moon Agreement:
Considering further that the common heritage of mankind concept has developed today as also allowing the commercial uses of outer space for the benefit of mankind, and that certain adjustments are suggested to Article XI of this Agreement concerning the international regime to be set up for the exploitation of Moon resources which will make it more realistic in today’s international scenario, ...”*

¹ ILA Resolution 5/98 of the 68th Conference of the International Law Association held in Taipei.

² See the proceedings of the final conference of Project 2001 Plus in Karl-Heinz Böckstiegel (ed.), Project 2001 – Legal Framework for the Commercial use of Outer Space, Studies in Air and Space law (S. Hobe ed.), vol. 16, Köln/Berlin et al. 2002.

³ See for a brief description of Project 2001 Plus S. Hobe/J. Hettling, Challenges to Space Law in the 21st century – Project 2001 Plus, IISL Proceedings of the 45th Colloquium on the Law of Outer Space Houston 2002, 2003, 57 – 62.

II. The Deliberations of the ILA Space Law Committee and at the 70th Conference

The Committee Chair had decided to entrust four Special Rapporteurs to make reports about the current status of the main space legislation relevant to commercial space activities, mainly the 1967 Outer Space Treaty,¹ the 1971 Liability Convention,² the 1974 Registration Convention,³ and the 1979 Moon Agreement.⁴ The Rescue Agreement was left out because it was not found to be particularly significant with regard to commercial applications.

With regard to the Moon Agreement, the respective Special Rapporteur considered the fact that this Agreement had achieved so far only a very little number of ratifications. Neither industrialized nor even developing countries had become parties to the Agreement. As a consequence, he recommended to seriously consider to discard this Agreement and draft a new one. Moreover, it would be very significant that, although Article 18 of the Moon Agreement calls for putting the question of the review of the Moon Agreement again on the Agenda of the General Assembly of the United Nations in order to consider on whether or not revisions were required and the fact that the Moon Agreement entered into force in 1982, no such action was taken by the General Assembly so far. On the other hand, the Special Rapporteur of course identified several provisions in the Moon Agreement that were especially relevant to commercial space activities and highlighted of course Article 11 proclaiming the Moon and its natural resources as the common heritage of mankind, thereby identifying some concepts for an international regime of the functioning of such commercial uses under the common heritage of mankind concept.⁵

Commentators among the Committee members also highlighted the importance of Article 11. On the one hand, the opinion was voiced that the freedom to use celestial bodies would not extend to its natural resources;⁶ others referred to the fact that the common heritage of mankind principle would be an evolution of the commonly accepted common province clause as contained in Article I paragraph 1 of the Outer Space Treaty.⁷

Furthermore, commentators pointed to the fact that the Moon Agreement would give special consideration to the interests of those States who have directly or indirectly contributed to the exploration of the Moon.⁸

¹ Professor Dr. Stephan Hobe, Cologne. The report has been summarized in ILA, Report of the 69th Conference in London 2000, 573 et seq.

² Professor Maureen Williams, Buenos Aires. Her report has been summarized in ILA Report, supra note 4, 574 et seq.

³ Professor Vladimir Kopal, Pilsen. His report has been summarized in ILA Report, supra note 4, 575.

⁴ Dr. Frans von der Dunk, Leiden. His report has been summarized in ILA Report, supra note 4, 576.

⁵ Von der Dunk, supra note 7.

⁶ Bin Cheng, Comment, in ILA Report, supra note 4, 586.

⁷ Nandasiri Jasentulyana, Comment, in ILA Report, supra note 4, 587 et seq.

⁸ Vladimir Kopal, Comment, in ILA Report, supra note 4, 588.

At its 70th Conference held in April 2002 in New Delhi, the Committee by presenting its findings went into an in-depth discussion particularly with regard to the question of how to deal with the 1979 Moon Agreement. The discussion dealt basically with attempts to clarify the notion of the common heritage of mankind concept. The Special Rapporteur had made some suggestions on a modification of the Moon Agreement that were particularly topical in view of current claims to real estate on the Moon. There was, inter alia, the recommendation to include into Article 4 para 1 a clause to the effect that “commercial exploitation and use” was only permissible in conformity with the provisions of Article 11. Moreover, it was recommended to replace the common heritage language in Article 11 by the concept of province of all mankind. Furthermore, it was clarified in these suggestions that whereby the Moon and other celestial bodies could not be subject to national appropriation, this would not preclude the commercial exploitation as long as this would be in line with the special requirements as contained in the Moon Agreement. With regard to the operative part of the common province clause as the core of the legal regime governing the exploitation of Moon resources, an international regime was proposed that should include as a minimum a licensing obligation by means of national law with respective guidelines, the establishment of a transparent, fair and comprehensive monitoring system in respect of these license activities and a procedure for its international registration.

Moreover, it was recommended that until such international regime was established, the commercial exploitation and use of the Moon was permitted only under the condition that it would not seriously harm the interests of other State parties. Furthermore, it was recommended that Article 11 para 7 lit. d) that requires and equitable sharing of all parties in the benefits derived from the Moon resources should be abandoned.¹

The discussion at the Conference mainly centred around the question on whether or not the common heritage language of the Moon Agreement should be recommended to be withdrawn or to be upheld. Whereas some speakers favoured the replacement by the common province clause as contained in Article I para 1 of the Outer Space Treaty, other speakers referred to the example of the Law of the Sea Convention where, on the one hand, by way of the 1994 Agreement on the Implementation of Part XI of the Montego Bay Convention, the conception of common heritage of mankind was considerably altered, on the other hand, the very wording “common heritage of mankind” was upheld.²

At the end of a lengthy discussion, the General Rapporteur summarized the opinions by stating that the Moon Agreement as it stood would not in principle prohibit commercial uses because the current development of international law would lead to interpreting the common heritage of mankind concept as implying the possibility of commercial uses of outer space for the benefit of mankind. Therefore, only certain adjustments should be made to Article 11 on the international regime to be set up for the exploitation of the Moon resources.³

This was considered the main opinion of the Committee and allowed the adoption of the above mentioned Resolution.

¹ Frans von der Dunk, in: Report of the ILA 70th Conference 2002, 219.

² See in particular Rainer Lagoni, in: ILA Report of the 70th Conference 2002, 222.

³ See Stephan Hobe, in: Report of the 70th ILA Conference, 226.

III. Concluding Remarks: The Contents and Purpose of this Resolution

ILA Resolution 1/2002 is a major break-through in the interpretation of international space law. The stumbling block of the uncertainties about the notion and exact design of the concept of common heritage of mankind that had been introduced into international law and in particular into international maritime and international space law in the 1970ies and 1980ies has gone through a specific development by subsequent State practice.¹ The most important example of such subsequent State practice is certainly the 1994 Agreement on the Implementation of Part XI of the Montego Bay Convention.² But also the discussion in the United Nations Legal Subcommittee on the subject of "Legal aspects related to the application of the principle that the exploration and utilisation of outer space should be carried out for the benefit and in the interests of all States taking into particular account the needs of developing countries" that was held in the 1990ies led to interesting conclusions as to a guarantee of the State's freedom to determine aspects of their participation in international cooperation in the exploration and use of outer space including the Moon and other celestial bodies.³

In its original conception, the common heritage of mankind concept contained five different elements: a non-appropriation element, a scientific investigation element, a peaceful use element, an environmental protection element, and finally and probably most importantly the economic element.⁴ For any current interpretation, however, one must take into consideration that with the 1994 amendment to the Law of the Sea Convention major parts of part XI of the Law of the Sea Convention concerning the common heritage of mankind conception were modified. First, the parallel system of fields to be presented to the Seabed Authority for exploitation was abandoned; moreover, any mandatory transfer of technology had been abandoned, and decisions of the Council of the International Deep Seabed Authority through its shift to a 2/3 majority for decision-making must take more into consideration any minority standpoint and thus especially those of the developed States. Moreover, the language of the Resolution concerning space benefits calls for the freedom of States to determine all aspects of their participation in international cooperation for the exploration and use of outer space that however shall be carried out for the benefit and in the interests of all States irrespective of their degree of scientific or technological development and shall be the province of all mankind. Particular account shall be given to the needs of developing countries. In other words: any one-sided obligation imposed upon industrialized countries to contribute to an enlargement of opportunities of deep-seabed

¹ See for a description Stephan Hobe, *Aspects of the Current Development of the Common Heritage of Mankind Concept*, in: ECSL (ed.), *Proceedings of the 6th Summer Course on Space Policy and Space Law*, Paris 1998, 93, 100 et seq; id., *Common Heritage of Mankind – An Outdated Concept in International Space Law?*, in: IISL-98 – IISL 4.04, *Proceedings of the 41st Congress of the IISL*, 1999, 271, 277 et seq. For an account of the importance of subsequent state practice on the interpretation of international treaty (and customary) law see Art. 31 para 3 lit. b of the Vienna Convention on the Law of Treaties and Stephan Hobe/Otto Kimminich, *Einführung in das Völkerrecht*, 8th ed. 2004, 216.

² Reprinted in ILM 1994, 1309.

³ Analysis by Hobe, *Common Heritage of Mankind*, supra note 15, 280 et seq.

⁴ See for a description Wilhelm Kewenig, *Common Heritage of Mankind – politischer Slogan oder völkerrechtlicher Schlüsselbegriff*, in: *Liber Amicorum H.-J. Schlochauer*, 1981, 385 et seq; Rüdiger Wolfrum, *The Principle of the Common Heritage of Mankind*, *Zeitschrift für öffentliches Recht und Völkerrecht* 43 (1983), 312; Thomas Fitschen, *Common Heritage of Mankind*, in: Rüdiger Wolfrum (ed.), *United Nations: Law, Policies and Practice*, vol. 1, 1995, 149 et seq.

mining (or for the securing of space benefits) was abandoned. This allowed in the case of the Law of the Sea the industrialized world to ratify the Convention that little later came into force.

Which conclusions can be drawn with respect to the different elements of the common heritage of mankind conception? First of all, it is important to note that there is no uniform common heritage of mankind principle in international law because the specific characteristics of the five elements under the concept of common heritage of mankind may differ, depending on the area to which they are applied. For example, the characteristics of common heritage with respect to the deep seabed (including *inter alia* a seabed authority, i.e. international administration) and the Moon Agreement without any such authority differ considerably.

Second, one can however make conclusions with regard to the different elements of which obviously the commercial element of the common heritage of mankind conception is of particular importance in our context:

- (1) There is a general acceptance of the non-appropriation of the area and of the resources. In my opinion the non-appropriation of the area of common concern (deep seabed, outer space as well as the celestial bodies and, though in a different context, Antarctica) are part of customary international law of peremptory character in the sense of Art. 53 and 64 of the Vienna Convention on the Law of Treaties of 1969.¹ Furthermore as so called statutory provisions for the common spaces they are self-executing, i.e. do not need special implementation by national legislation.
- (2) Moreover, there is a general acceptance on the peaceful, i.e. non-aggressive use of the area of common spaces.
- (3) There is furthermore consensus of the scientific investigation element. The common spaces to which the concept of common heritage of mankind is applicable are open to scientific investigation under the conditions set by international law.
- (4) There is a certain unclarity with regard to the environmental protection element. Whereas it is clear in principle that the preservation of the common heritage *per se* is one of the major goals of this conception, it is not entirely clear yet how the heritage approach is linked to the protection of the environment of common spaces outside national jurisdiction.
- (5) The major problem is certainly the economic element. It remains controversial. However, as has been demonstrated above, State practice gives evidence of the fact that any rigid application of the idea of an equitable sharing of resources and benefits derived from the exploitation of common spaces has been abandoned. Rather there seems to be an indication for a shift towards less rigid forms of cooperation whereby it is still clear that some form of preferential treatment as well as actions to the advantage of the developing countries remain within the scope of the economic element of the common heritage of mankind conception. The concrete implementation is open to the free decision of the States. The idea that economic activities in areas outside national jurisdiction are not solely governed by the absolute freedom of action of States, but that this freedom of action is limited by the necessity of cooperation whereby the interests of the developing countries have to be taken into consideration still determines the distinct shape of the common heritage of mankind conception with regard to economic uses.

¹ See on the formation and prerequisites of customary international law, Hobe/Kimminich, *supra* note 15, 184 et seq.

The Moon Treaty

The Road Ahead

INDIA/ECSL SPACE LAW SYMPOSIUM 2004

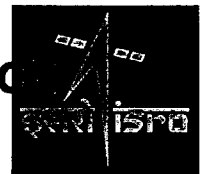
New Developments and the Legal Framework
covering the Exploitation of the Resources of the
Moon

Monday, 29 March 2004

DR. RAJEEV LOCHAN

INDIAN SPACE RESEARCH ORGANISATION

Scientific Importance of the Moon



- ☾ Moon: A link in the formation of planetary systems
- ☾ Moon is Pristine: Monitor of early Earth
- ☾ Monitor of Interplanetary space
 - Radiation and particles from the Sun
 - Monitor of solar activity & Interstellar space
 - Impact of interplanetary bodies

Missions to Moon



Missions from USSR / Russia

Luna 24 missions in 1957 to 1976

Zond 5 missions in 1965 to 1970

Missions from USA

Ranger 9 missions in 1961 to 1965

Lunar Orbiter 5 missions in 1966 and 1967

Surveyor 7 missions in 1966 to 1968

Apollo 9 missions in 1968 to 1972

Clementine 1994

Lunar Prospector 1997

Asiasat / SES-1 1997

Japanese HITEN 1990

What is known about Moon?



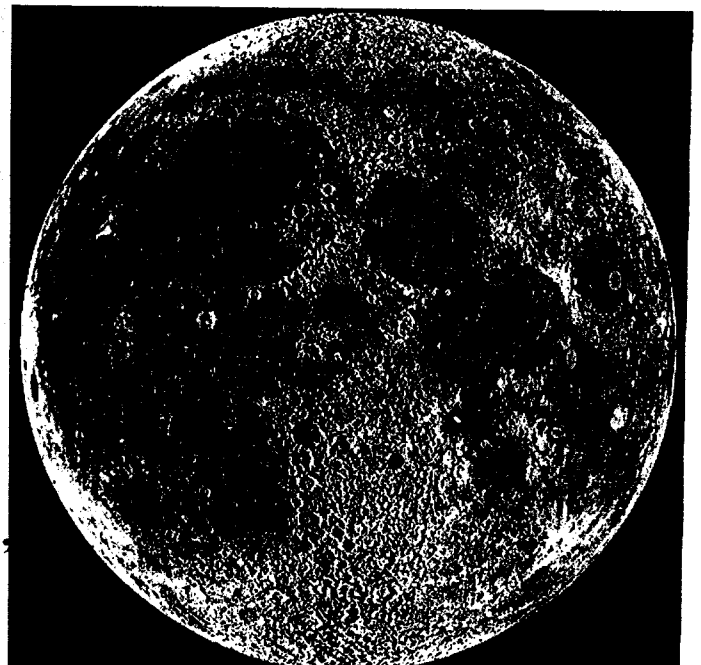
● Landing and Sample Return Missions

Apollo 11-17 (13),
Luna 16, 20, 24 (1969-74)

● Orbiting Missions

Clementine (1994)
UVVIS, NIR, LWIR, LIDAR
Mineral Mapping

Lunar Prospector (1998)
 γ -ray, α , Neutron Spectrometers,
Magnetometer, Electron
Reflectometer, Doppler Gravity
Chemical Mapping, Water (?)



Recent Moon Missions



Japanese Mission Hiten - (Formerly MUSES A) launched in 1990 performed a sophisticated circumnavigation and was finally directed to impact on south far side

Feb-May 1994 CLEMENTINE orbiter observed Moon and mapped practically entire lunar surface with 200 m resolution

LUNAR PROSPECTOR'S 18-month mission since Jan 1998 gave valuable data on mapping of thorium, potassium etc and indicated a large amount of Water at shadowed polar regions

Renewed Interest in Moon



ESA's Moon Mission SMART-1 in 2003 by Ariane 5 as Piggy Back Ion drive in 12 months to Moon

Japan's Second Moon Mission Lunar

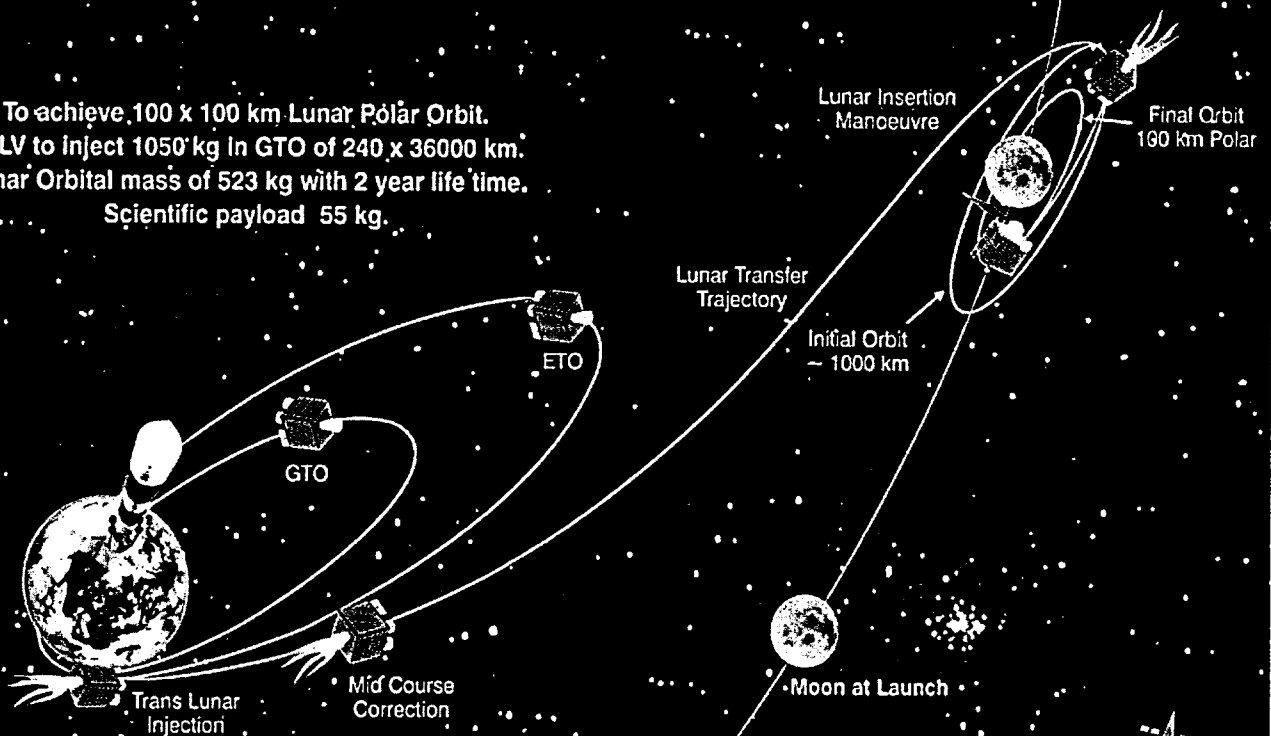
Japan has long-term plans for a permanent Moon Base

China recently announced its Moon Programme

INDIA'S FIRST MISSION TO MOON

CHANDRAYAAN-1

To achieve 100 x 100 km Lunar Polar Orbit.
PSLV to inject 1050 kg in GTO of 240 x 36000 km.
Lunar Orbital mass of 523 kg with 2 year life time.
Scientific payload 55 kg.



Expanding the scientific knowledge about the moon, upgrading India's technological capability and providing challenging opportunities for planetary research for the younger generation



Indian Mission to Moon



- ◆ Objectives: Mineral, Chemical and Photogeologic mapping
- ◆ Configuration : 100 km polar orbiter
- ◆ Observation Period : 2 years
- ◆ Payloads:

Hyper Spectral Imager (HySI) (0.4-0.9 μ m)

Laser Ranging (LLRI)

Terrain Mapping Camera (TMC)

Lo energy X-ray spectrometer (LEIS) (10-100KeV)

High Energy X-ray spectrometer (HEX) (10-200KeV)

Objectives of Chandrayaan-1



• Simultaneous Mineralogical, Chemical, Photogeological mapping

- To map the South Pole-Aitken region (ejecta and basin surface) for elements (Mg, Fe, (Mg#) and Ca etc. to verify crustal evolution models
- To detect any ^{222}Rn (16.7 KeV) leaking from the lunar interior
- To detect any ^{210}Pb (46.5 KeV) depositing at polar or cold regions due to transport and decay of radon
- To improve upon the gravity models of the Moon

High spatial and spectral resolution

What's new about the mission

- First attempt to study the energy region of 10-200 keV (X- γ ray region)

^{210}Pb mapping of the lunar surface, particularly at the lunar poles and degassing and transport of volatiles on the lunar surface can be understood

- Wedge filter Hyper Spectral Imager (HySI)
Programmable spectral (15nm) spatial (80 m) resolution in selected spectral region (400nm-900nm) for mineralogical mapping

- High resolution X-ray (600nm) sensors for chemical mapping

Better Spatial resolution (100 m Km)

- Terrain Mapping Camera for 5m spatial resolution
Population of small meteorites and better DEM

The Moon Treaty

- Adopted by GA on Dec 5, 79 (34/68)
- Opened for signature on Dec 18, 79
- E into F : July 11, 1984
- January 1, 2003 : 10 R & 5 S

Unanimous acceptance in UN GA and yet
very poor response

What Does Treaty Permit?

Article 6

†1 : Freedom of scientific investigation without discrimination of any kind, on the basis of equality, and in accordance with international law

†2 : Permission to collect & remove samples

Article 8

†1 : Permits exploration and use on or below surface,

†2 : Permits : Landings and relaunch from the Moon

Placement of personnel, space vehicles, equipment, facilities, stations and installations anywhere on or below the surface of the Moon and their free movement over or below the surface of the Moon

Article 9

Establishment of manned and unmanned stations

Article 11 of the Moon Treaty

- †1 : The Moon and its natural resources are the CHM
- †2 : National appropriation prohibited
- †3 : Right of ownership prohibited
- †4 : Right to exploration and use of the Moon without discrimination of any kind, on the basis of equality and in accordance with international law and the terms of this Agreement
- †5 : Establish an international regime, including appropriate procedures, to govern the exploitation of the natural resources of the Moon in accordance with §18 as such exploitation is about to become feasible
- †6 : Inform UNSG, the public & the scientific community of any discovery of resources

Article 11 of the Moon Treaty continued

- †7 : The main purposes of the international regime
 - The orderly and safe development of the natural resources of the Moon;
 - The rational management of those resources;
 - The expansion of opportunities in the use of those resources;
 - An equitable sharing by all States Parties in the benefits whereby the interests and needs of the developing countries, as well as the efforts of those countries, which have contributed, to the exploration, shall be given special consideration.
- †8 : Activities to be compatible with the purposes specified

Question of Review

OST 67 & RA68 : No provision

Liability convention 72 (§ XXVI)

- By Request
 - Five years after E into F
 - Request by one third of the state parties
 - Concurrence of majority of states
- Without Request
 - Ten years after E into F
 - Provisional Agenda of UN GA
 - In the light of past experience, whether it requires revision

Question of Review *continued*

Registration Convention 1975 (§ X)

"Such review shall take into account in particular any relevant technological developments, including those related to identification of space objects"

Moon Treaty 1979 (§ 18)

"A review conference shall also consider the question of the implementation of the provisions of §11, ¶5, on the basis of the principle referred to in ¶1 of that article and taking into account in particular any relevant technological developments."

o§11, ¶5 : Establishment of an international regime, including appropriate procedures, to govern the exploitation of the natural resources of the Moon as such exploitation is about to become feasible

o§11, ¶1 : The Moon and its natural resources are the CHM

A Lesson from the Past

In the past, International Legal Regimes have been very kind to the first arrivals and rather cruel to the late entrants

Space Debris

Environmental Degradation

Antarctica Treaty

Late entrants invariably belong to the developing or underdeveloped nations

Sustainability should be woven into the basic fabric of the international legal regimes so that the future generation do not get deprived of their due

Concluding Remarks

- The Treaty has permitted peaceful missions to the Moon
- The Treaty has served the cause of science very well
- Enabling Technology for commercial exploitation is round the corner
 - Extended periods of human presence in space
 - Technology for assembly and manufacturing
 - A near permanent stepping stone into space has been laid
- Exploitation of resources of the moon is inevitable.
- The Treaty also provides a way for commercial exploitation
- The treaty also permits review and reconsideration of the Treaty

↓
Let us Re Engineer the Treaty.
Together. Quickly.

Thank You