

Space and Society

George D. Kyriakopoulos

Space Resource Utilization and Exploitation: The Suspended Step of International Law

Foreword by Leslie I. Tennen

 Springer

Space and Society

Founding Editor

Douglas A. Vakoch, METI International, San Francisco, USA

Series Editors

Erik Persson, Department of Philosophy, Lund University, Lund, Sweden

Tony Milligan, King's College London, London, UK

Stella Alexandrova Tkatchova, Ixelles, Belgium

David Dunér, History of Science and Ideas, Lund University, Lund, Sweden

Daniela de Paulis, ROTTERDAM, The Netherlands

Sandra Häuplik-Meusburger, Institute for Architecture and Design, Vienna University of Tech. (TU Vienna), Wien, Austria

The Space and Society series explores a broad range of topics in astronomy and the space sciences from the perspectives of the social sciences, humanities, and the arts. As humankind gains an increasingly sophisticated understanding of the structure and evolution of the universe, critical issues arise about the societal implications of this new knowledge. Similarly, as we conduct ever more ambitious missions into space, questions arise about the meaning and significance of our exploration of the solar system and beyond. These and related issues are addressed in books published in this series. Our authors and contributors include scholars from disciplines including but not limited to anthropology, architecture, art, environmental studies, ethics, history, law, literature, philosophy, psychology, religious studies, and sociology. To foster a constructive dialogue between these researchers and the scientists and engineers who seek to understand and explore humankind's cosmic context, the Space and Society series publishes work that is relevant to those engaged in astronomy and the space sciences, while also being of interest to scholars from the author's primary discipline. For example, a book on the anthropology of space exploration in this series benefits individuals and organizations responsible for space missions, while also providing insights of interest to anthropologists. The monographs and edited volumes in the series are academic works that target interdisciplinary professional or scholarly audiences. Space enthusiasts with basic background knowledge will also find works accessible to them.

The series was founded by Springer together with Founding Editor **Douglas A. Vakoch**.

George D. Kyriakopoulos

Space Resource Utilization and Exploitation: The Suspended Step of International Law

George D. Kyriakopoulos
School of Law
Kapodistrian University of Athens
Athens, Greece

ISSN 2199-3882

Space and Society

ISBN 978-3-031-96335-3

<https://doi.org/10.1007/978-3-031-96336-0>

ISSN 2199-3890 (electronic)

ISBN 978-3-031-96336-0 (eBook)

© The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Switzerland AG 2025

This work is subject to copyright. All rights are solely and exclusively licensed by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

If disposing of this product, please recycle the paper.

To my father, who will always live in me.

Foreword

Public international law has as its *raison d'être* the promotion of international peace and security. Although challenges to the global public order exist in multiple contexts, the potential for disruptions to international relations is especially present in endeavors which lack a general consensus on the applicable legal rules. Such is the situation facing the nascent but burgeoning commercial space industry. Private enterprise is poised to exploit the capabilities pioneered by government space programs and literally take commerce to new and unimaginable heights on the Moon, asteroids, and beyond. It is widely believed that these celestial bodies could contain vast riches of resources that can be used for the benefit of mankind, yet legal rules and regulations have not kept pace with the technological capabilities of the private sector to discover and exploit these resources.

To date, the governance of private enterprise in space has consisted of principles set forth in the Outer Space Treaty of 1967, with some influence by the Moon Agreement of 1979, and a gallimaufry of soft law statements, national laws, and international studies and accords. Prof. George D. Kyriakopoulos has taken on the ambitious task of trying to sort through this maze with a fresh perspective and succeeded in producing a concise and elucidating exposition of the dilemma facing international space law, with a pragmatic solution, presented in a style that is thorough while not excessively technical.

Prof. Kyriakopoulos has dismantled the trap that so many other commentators have fallen into that frame the discussion in terms of “property rights” in space resources. All too often proposals are advanced that engage in convoluted logic and elaborate rationalizations to justify a pre-ordained position that sanctions various traditional forms of property rights sought to be claimed by the private sector in space resources notwithstanding the non-appropriation provision in Article II of the Outer Space Treaty. Prof. Kyriakopoulos charts a different course.

In this book, Prof. Kyriakopoulos reviews the inadequacy of the domestic legislation of states that purport to grant or recognize private sector property rights in space resources *vis-a-vis* the non-appropriation principle as expressed in both the Outer Space Treaty and the Moon Agreement. He also provides a detailed and insightful discussion of the diplomatic activities of the member states in the United

Nations Committee on the Peaceful Uses of Outer Space leading to the establishment of the current Working Group on Space Resources, tempered by the fact that there has not been a new treaty devoted to space since the Moon Agreement in 1979. Prof. Kyriakopoulos critically examines the Building Blocks of the Hague International Space Resources Governance Working Group, noting that the fundamental principles set forth therein regarding priority rights, resource rights, and safety zones do not reflect *de lege lata* but are *de lege ferenda* and will require substantial revision of current space law if they are to be implemented. The Artemis Accords also are analyzed, with their implicit emphasis on promoting a state practice recognizing property rights in space resources as a predicate to claiming legal acceptance of this activity through having acquired customary force.

After identifying the inadequacies of unilateral state legislation, the protracted difficulty COPUOS experienced in obtaining consensus to establish the Working Group on Space Resources and its inability to produce a new treaty in more than 40 years, and the inherent weaknesses of the Hague Building Blocks and the Artemis Accords, Prof. Kyriakopoulos arrives at a pragmatic and thought-provoking solution that invokes the jurisdiction of the International Court of Justice.

Prof. Kyriakopoulos is well qualified to take on this task, as an internationally recognized and respected expert on space law. He has been an inspiration to students around the world, including as the coach of numerous moot court teams from the School of Law of the National and Kapodistrian University of Athens and the author of very successful cases for the Manfred Lachs Space Law Moot Court Competition, where I have had the pleasure of working with him as a Co-Chair of the International Institute of Space Law Moot Court Committee. In that role, I particularly appreciated his most recent subtle and clever incorporation of the names of some of his favorite students into the moot court fact situation.

Prof. Kyriakopoulos has included the full texts of the Outer Space Treaty and other pertinent instruments and materials as a useful reference. His book flows like many conversations he and I have had, whether discussing the intricacies and nuances of space law or the sublime elegance of the music of the Allman Brothers Band. This book should inspire many conversations in the space law community and beyond.

Law Offices of Sterns and Tennen
Phoenix, AZ, USA

Leslie I. Tennen

Acknowledgments

I am grateful to my research assistants:

Ms. Niki Giannakou, Attorney at Law, Athens Bar Association, LL.M. National Kapodistrian University of Athens,

Mag. iur. Arthur Gehr, LL.M. Leiden University,

Ms. Nariat Pashaeva, LL.M. University of Oslo,

Ms. Foteini Daliani, LL.M. National and Kapodistrian University of Athens, LL.M. UCLA,

Mr. Alexandros Vourdas, Attorney at Law, Athens Bar Association, LL.M. National Kapodistrian University of Athens,

who supported this project by undertaking focused research on assigned topics under my direction.

Disclaimer The views expressed in this book are those of the author and do not reflect the views of the Greek Ministry of Foreign Affairs or any other Greek government agency.

Contents

1	Introduction	1
2	Realizing the Need to Take a Step: Applicable International Law Is Not Enough	7
3	Uncertainty of the Next Step: The Limitations of Academic Approaches in Offering a Satisfactory Response	29
4	Uncertainty of the Next Step #2: Reconciling State Perspectives Within the UNCOPUOS	51
5	Uncertainty of the Next Step #3: Exploring Appropriate Responses Through International Instruments and Projects	85
6	Taking a Firm Step: Reviving International Law	109
7	Conclusion	143
	Annexes	147
	Bibliography	183
	Index	193

Abbreviations

A.A.S.L.	American Association of School Librarians
A.S.I.L.	American Society of International Law
Adv. S. Res.	Advances in Space Research
art.	Article
CEO	Chief executive officer
COPUOS	Committee on the Peaceful Uses of Outer Space
COSPAR	Committee on Space Research
COVID	SARS-CoV-2 (2019-nCoV) coronavirus
Doc.	Document
Dr.	Doctor
ECOSOC	Economic and Social Council
Ed.	Editor
Eds.	Editors
ESA	European Space Agency
Et seq.	et sequentia
GA	General assembly
GEO	Geostationary orbit
GRULAC	Group of Latin America and the Caribbean
GSO	Geosynchronous orbit
H.R.	Human resources
HEO	Highly elliptical orbit
HG	Hague International Space Resources Governance Working Group
i.e.	<i>id est</i>
IAC	International Astronautical Congress
ICAO	International Civil Aviation Organization
ICJ	International Court of Justice
ID	Identity
IISL	International Institute of Space Law
ISRU	<i>In situ</i> resource utilization
ITLOS	International Tribunal for the Law of the Sea
ITU	International Telecommunication Union

J. Space L.	Journal of Space Law
J.I.L.	Journal of International Law
J.S.L.	Journal of Space Law
L.J.	Law Journal
LSC	Legal Subcommittee (COPUOS)
MEO	Medium Earth Orbit
Mr.	Mister
NASA	National Aeronautics and Space Administration
NEO(s)	Near-Earth Object(s)
No.	Number
Op. cit.	Opus citatum
OS	Outer space
OST	Outer Space Treaty
p.	Page
par.	Paragraph
PCIJ	Permanent Court of International Justice
Res.	Resolution
SC	Security Council
STSC	Scientific and Technical Subcommittee (COPUOS)
U.A.E.	United Arab Emirates
U.S.	United States
UK	United Kingdom
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
UNCOPUOS	United Nations Committee on the Peaceful Uses of Outer Space
UNGA	United Nations General Assembly
USA	United States of America
USSR	Union of Soviet Socialist Republics
v., vs.	Versus
VCLT	Vienna Convention on the Law of Treaties
vol.	Volume
WG	Working group

Chapter 1

Introduction



In recent years, the development of activities related to the exploration, exploitation, and use of outer space's natural resources has been the subject of continuous and intense debate. While this constitutes a space activity oriented toward the future—requiring not only technological advancement but also the mobilization of substantial financial resources—these prerequisites alone are insufficient. A further indispensable condition is the establishment of a legal framework capable of effectively addressing and regulating the complex issues that inevitably arise.

In this evolving landscape, new space actors—primarily from the private sector—are stepping into domains that, until recently, were regarded as largely “exotic.” This shift presents significant legal challenges, as the existing body of international space law, shaped during the 1950s to 1970s, was originally designed to govern activities conducted almost exclusively by States.

It is generally accepted that the term “space resource utilization” includes: (a) activities in Earth orbits; (b) *in situ* resource utilization (ISRU); and (c) the extraction and appropriation of natural space resources for commercial purposes (the so-called space mining). The definition of exactly which activities need to be regulated, and which space resources will be subject to regulation, is currently being considered by the Working Group on Legal Aspects of Space Resource Activities of the Legal Subcommittee (LSC) of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS).¹ Said working group was created in the context of the agenda item of the LSC “General exchange of views on potential legal models for activities in the exploration, exploitation and utilization of space resources.”²

¹Mainly since the 62nd Session of the UNCOPUOS Legal Subcommittee (20–31 March 2023).

²For the definitions of “resources,” “exploration,” and “exploitation” as they have evolved in the context of activities on the international seabed, see the relevant developments in Chap. 6.

In relation to these activities, the following should, in the first place, be noted: It is accepted, since the inception of human activity in outer space, that placing a space object in orbit is a lawful activity under international law and space law, compatible with the fundamental principles of space law, such as the principle of freedom of use and exploration of space and the principle of non-appropriation. More than 70 States currently have at least one satellite in orbit (with a steadily increasing trend),³ and the relevant technology—or the associated provision of services by advanced space-faring States or international organizations—is fully accessible to most States.

In situ resource utilization (ISRU) is the collection, processing, storing, and use of materials encountered during human or robotic space exploration that replace materials that would otherwise be brought from Earth to accomplish a mission critical need at reduced overall cost and risk.⁴ ISRU, provided that it does not conflict with Article IX of the 1967 Outer Space Treaty (OST) (which will be considered *ad hoc*), is an activity which falls within the limits of Articles I(1)(b), II and III OST, as it can be justified in the light of the freedom of use, exploration and scientific investigation of outer space, and, in principle, does not constitute an acquisition of property. In any case, a future *ad hoc* regulation of the ISRU could mitigate any potential tensions, should such use be made by numerous users in a common area on a celestial body.

A relevant provision concerning ISRU is included in U.S. Executive Order 13914 of April 6, 2020 on “Encouraging International Support for the Recovery and Use of Space Resources,” which, *inter alia*, states that: “Successful long-term exploration and scientific discovery of the Moon, Mars, and other celestial bodies will require partnership with commercial entities to recover and use resources, including water and certain minerals, in outer space.”⁵

³According to pixalytics.com (which uses data from the Union of Concerned Scientists (UCS)), in the beginning of 2023, there were 6718 operational satellites into orbit, which corresponds to 67.28% of the total orbiting objects. the same source counts 3266 useless objects which can be considered as space debris. The United States controls most of these satellites (4511), followed by China (586), the United Kingdom (561), Russia (177) and India (62). Source: <https://www.pixalytics.com/satellites-orbiting-earth-2023/> (last visit on 23.1.2024).

⁴Sackstender K.R. & Sanders G.B., “In-Situ Resource Utilization for Lunar and Mars Exploration”, 45th AIAA Aerospace Sciences Meeting and Exhibit, 08 January 2007–11 January 2007, Reno, Nevada, in: <https://arc.aiaa.org/doi/pdf/10.2514/6.2007-345> (last accessed: 23.01.2024).

⁵<https://www.federalregister.gov/documents/2020/04/10/2020-07800/encouraging-international-support-for-the-recovery-and-use-of-space-resources> (last accessed: 23.01.2024).

1.1 The Prospect of Mining and Commercial Exploitation of the Natural Space Resources of the Celestial Bodies

According to NASA, there are about 100,000 Near-Earth Objects (NEOs)⁶ and a large number of them potentially contain water and important minerals, such as nickel, cobalt, and iron. However, is “space mining” of these resources currently feasible based on existing technological capabilities?

On 6 August 2014, the European Space Agency’s (ESA) Rosetta spacecraft arrived at Comet 67P/Churyumov-Gerasimenko and the Philae space shuttle landed on the comet on 12 November 2014. On 8 September 2016, NASA launched the OSIRIS-REx spacecraft with the mission to approach and land on the asteroid Bennu. The spacecraft returned to Earth on 24 September 2023 and dropped off material from Bennu into the Utah desert, before embarking on a new mission to explore the asteroid Apophis (OSIRIS-APEX).⁷ These missions, although experimental, clearly pave the way to the commercial exploitation of the resources of celestial bodies (comets, asteroids, and planets) in the near future.

During the Cold War, the competition between the United States and the Soviet Union to “conquer” outer space resulted in a set of fundamental principles, first enshrined in United Nations General Assembly Resolution 1962 (XVIII) of 13 December 1963 and then codified in the 1967 Outer Space Treaty (OST). In this context, the need to seek a balance—initially between the—then—two superpowers, which were the only ones operating in outer space—on possible claims to the existing “wealth” in space led to the adoption of the principle of non-appropriation (Article II OST). At that time, the existing technological capabilities did not allow for the exploitation of space mineral resources. Today, however, the circumstances have changed, and it is highly likely that in the near future we will witness growing competition among States for access to and control over the mineral resources of celestial bodies. This prospect clearly underscores the need for the establishment of a global regulatory regime governing such resources, as unilateral actions are likely to generate significant tensions among the States involved. Any such regime must remain consistent with the foundational principles of international space law, which, to date, have not been formally contested by States.

⁶See NASA, Near-Earth Object Survey and Deflection Analysis of Alternatives, Report to Congress, March 2007, in: https://www.nasa.gov/wp-content/uploads/2015/01/171331main_neo_report_march07.pdf (last accessed: 28.01.2024). As designated by NASA, “Near-Earth Objects (NEOs) are comets and asteroids that have been nudged by the gravitational attraction of nearby planets into orbits that allow them to enter the Earth’s neighborhood. Composed mostly of water ice with embedded dust particles, comets originally formed in the cold outer planetary system while most of the rocky asteroids formed in the warmer inner solar system between the orbits of Mars and Jupiter. The scientific interest in comets and asteroids is due largely to their status as the relatively unchanged remnant debris from the solar system formation process some 4.6 billion years ago”—<https://cneos.jpl.nasa.gov/about/basics.html> (last accessed: 28.01.2024).

⁷See <https://www.nasa.gov/osiris-rex> (last accessed: 28.01.2024).

This is the central question addressed in this book: how to agree on an effective regime for the management of space resources that will be universally accepted by the international community. Moreover, what challenges would such a regime pose to existing international space law.

As will be shown below, the *Magna Carta* of space law, the Outer Space Treaty of 1967, does not contain any specific provisions on this issue, since the priorities of the two superpowers, the United States and the Soviet Union, who were the main space players of the time, were different. A few years later, the Moon Agreement of 1979 would consider the Moon and its natural resources as “the common heritage of mankind” and would, among other things, provide for an international regime “to govern the exploitation of the natural resources of the Moon as such exploitation is about to become feasible.” However, although this international treaty has entered into force, it has so far been ratified by only 17 States.⁸ Its provisions are therefore far from describing a generally accepted international legal framework on the exploitation of space resources.

Conversely, we are now living in the era of “NewSpace”⁹ activities: this term describes the increasing involvement of the private sector in the space domain, mainly through commercial applications. The provision of services *via* satellites, space tourism, and the transport of cargo and people to the International Space Station are—so far—the main manifestations of a trend toward the commercialization of space, in which private operators are increasingly involved. Clearly, in the context of NewSpace, the issue of space resources is inherently important to the emerging “space economy”¹⁰ and therefore of great interest to stakeholders in the new space era.

The absence of a solid and convincing international legal framework has led some countries, such as the United States or Luxembourg, to take unilateral legislative initiatives in order to create an environment of legal certainty and thus give the necessary impetus to the funding of the research and technology required to make the exploitation of the resources of the celestial bodies technically feasible in the

⁸On 1 January 2023, 18 States had ratified the Moon Agreement. However, on 5 January 2023 Saudi Arabia notified its withdrawal from the treaty, a withdrawal which took effect on 5 January 2024—see <https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/status/index.html> (last accessed: 28.01.2024).

⁹See: https://www.esa.int/About_Us/Business_with_ESA/Global_Space_Economic_Forum/New_Space_and_the_role_of_public_support; <https://professionalprograms.mit.edu/blog/technology/what-is-new-space-economy/> (last accessed: 28.01.2024).

¹⁰The main features of the modern space economy are increasing private investment, the proliferation of start-ups, and the intense activity of large private companies (such as Space X). As one of the four pillars defined in the Dubai Declaration (adopted at the first High Level Forum: Space as a driver for socio-economic sustainable development, Dubai, United Arab Emirates, 24 November 2016), the space economy has a special place in the context of the Space2030 agenda. See: “What is the New Space Economy?” <https://professionalprograms.mit.edu/blog/technology/what-is-new-space-economy/>; “What is the Space Economy?” <https://space-economy.esa.int/article/33/what-is-the-space-economy>; OECD Handbook on Measuring the Space Economy, 2nd Edition, 2022, <https://doi.org/10.1787/8bfef437-en>.

short term. However, as will be shown below, the legitimacy of such initiatives, from the point of view of international law, is highly questionable and remains in the minority on the international scene, at least for the time being.

1.2 In Search of a Legal Framework: International Law in Limbo

The combination of the above conditions has led to an impasse on the issue of regulating the management of space resources, further complicated by the fact that the international space community appears entirely unwilling to move toward the adoption of a new binding international instrument after the 1979 Moon Agreement. In this context, the current state of international law could be likened to the old, iconic film by Director Theo Angelopoulos, *The Suspended Step of the Stork* (1991), where the protagonists stand on a dubious step, at the borderline, facing an uncertain path:

The titular step comes from two bookend scenes. In the first, a Greek colonel walks along a bridge linking the two countries and stops right at the frontier line. In the distance we see rifle-toting Albanian guards. The colonel holds his right foot in the air hovering above the line. He says, “Greece ends at the blue line. *If I take one more step I will be somewhere else, or die.*” At the end of the film the Greek television reporter repeats this gesture (as does the symbolic journey, which both the mythical Ulysses figure played by Marcello Mastroianni and the journalist take). This sense of repetition, of history repeating itself and the journey commencing once again, is, in one sense, also the film’s source of hope (emphasis added).¹¹

Accordingly, international law is currently at crossroads regarding its future direction on the issue of space resources. The diversity of views and positions among States, the rigidity of existing space law, and the reluctance of States to undertake new conventional commitments at the international level all contribute to a state of legal stagnation and inertia.

However, Article III of the Outer Space Treaty of 1967 states that:

States Parties to the Treaty shall carry on activities in the exploration and use of outer space, including the Moon and other celestial bodies, *in accordance with international law*, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international cooperation and understanding (emphasis added).

Consequently, the primacy of international law must be restored, and international law must find a way forward. It must take a next, decisive step in the governance of the use and exploitation of space resources. This book, after first navigating through the applicable law and highlighting its structural and substantial lack of adequacy (Chap. 2), further documents whether the current impasse will ultimately prove irreparable, despite the systematic pursuit of suitable interpretative approaches by

¹¹ Donato Totaro, “The Suspended Step of the Stork: Theo Angelopoulos among the Greats”, *Off Screen*, Volume 20, Issue 2, February 2016, <https://offscreen.com/view/the-suspended-step-of-the--stork-theo-angelopoulos> (last visit on 28.1.2024).

space law scholars (Chap. 3) and the active engagement of States—both through their participation in relevant international *fora* (Chap. 4) and their promotion of international cooperation *via* agreements, though not on a global scale (Chap. 5). Finally, this book explores the conditions, ways, and means under which the desired, firm step of international law can take place (Chap. 6).

Chapter 2

Realizing the Need to Take a Step: Applicable International Law Is Not Enough



As noted in the Introduction, significant legal deadlocks persist in relation to the exploration and use of space resources. These impasses stem primarily from the absence of explicit provisions in the existing *corpus* of international space law concerning space resources. At the same time, national legislative efforts remain inadequate, as they often diverge from or are incompatible with the fundamental principles of international space law.

2.1 Perplexity of International Instruments

2.1.1 *The 1967 Outer Space Treaty*

In connection with the law governing space resource activities, the Outer Space Treaty of 1967,¹ which is largely accepted by the international community as the *magna carta* of space law, has raised heated debates concerning the content of rights and obligations envisaged in its Articles I and II. These two Articles of the OST are fundamental for the legal regime governing space activities, given that they establish the rights and freedoms of States in outer space, while at the same time providing for limitations to these freedoms.

First, as already stressed, according to Article III OST, activities for the exploration and use of outer space, including the Moon and other celestial bodies, must be conducted in conformity with International Law:

¹ Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, entered into force Oct. 10, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205, [hereinafter OST].

Article III

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

In this context, the main applicable provisions relating to the exploration and use of outer space, are Articles I and II OST. Article I provides for freedom of exploration and use of outer space, including the Moon and other celestial bodies, and freedom of access to all regions of celestial bodies:

Article I

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

Outer space, including the moon and other celestial bodies, shall be free for exploration and use by all States without discrimination of any kind, on a basis of equality and in accordance with international law, and there shall be free access to all areas of celestial bodies.

There shall be freedom of scientific investigation in outer space, including the moon and other celestial bodies, and States shall facilitate and encourage international co-operation in such investigation.

... whereas Article II introduces a restriction on the exercise of the freedoms guaranteed in Article I, by establishing the principle of non-appropriation:

Article II

Outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.

It follows that the combination of Articles I and II OST renders outer space and its resources *res communes omnium*, hence subject to access and use by anyone, in exclusion of exercise of sovereignty or property rights over them.

On this note, the interpretation of Article II OST has caused great controversy throughout the international community with respect to potential mining activities on the moon and other celestial bodies for commercial purposes. The conflicting views on this issue are evident both at the level of legal theory and at the level of state practice.

2.1.1.1 The Non-appropriation Principle vs. Property Rights in Outer Space

As already mentioned, Article I para. 2 of the OST establishes the principle of freedom of exploration and use of the outer space. This “freedom of exploration and use” is not limitless: It must be interpreted in the light of art. II of the same treaty, which sets out the principle “of non-appropriation”. Same principle is contained in art. 11 para. 2 of the 1979 Moon Agreement:²

²Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, adopted on 5 December 1979, opened for signature on 18 December 1979, entered into force on 11 July 1984. 1363/U.N.T.S./3 (hereinafter “The Moon Agreement” or “MOON”). It is important that, in accordance with art. 1 of the Moon Agreement, references to the moon in the treaty shall be understood as applicable to all celestial bodies within the solar system, other than the Earth.