Colonies on the Moon (and/or Mars)? New Challenges for International and National Law

*George D. Kyriakopoulos**

Abstract

The planned creation of colonies on said celestial bodies implies the establishment of permanent human communities on them as well as the creation of permanent structures on (or below) their surface. Obviously, this will be a new phase in the context of space use and exploration. Although, in the light of international law and space law, there can be no colonies (in the traditional sense) in outer space, plans for inhabiting the Moon or Mars can be legally justified in the context of the freedom of exploration and use of outer space. However, the spirit and the provisions of the space treaties in force do not seem able to provide a robust legal framework for the creation of such "space communities". Consequently, the adoption of a specific, *ad hoc* legal framework could substantially facilitate the functioning of permanent space settlements. No one, however, can rule out the prospect of these newly founded communities opting for an independent and autonomous course through the adoption of their own laws.

1. "Space Colonization" as a New Phase of Space Exploration: New Challenges and Dilemmas

From the beginning of the Space Age, one of the fundamental principles of the law regulating space activities was the freedom of exploration and use of outer space. This principle is established in Article I para. 2 of the 1967 Outer Space Treaty,[1] according to which Outer space, including the Moon and other celestial bodies, shall be free for exploration and use by all States

* George (Georgios) D. Kyriakopoulos is assistant Professor of International Law at the School of Law, National and Kapodistrian University of Athens

1 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, adopted on 19 December 1966, opened for signature on 27 January 1967, entered into force on 10 October 1967, 610/U.N.T.S./205 (hereinafter "Outer Space Treaty" or "OST").

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.

In this regard, it would be useful to refer to the two keywords of the aforementioned principle – "use" and "exploration": Whereas "use" refers to the utilization/exploitation of outer space for economic and/or non-economic ends,[2] "exploration" is "the activity of searching and finding out about something", but also "the act of traveling to a place or searching a place in order to learn about it".[3] The latter definition, focusing on the concept of travel, better reflects the sense of space exploration.

1.1. Robotic Missions and Human Spaceflight Programs

Spacecraft typology as outlined by NASA (Flyby, Orbiter, Atmospheric, Lander, Penetrator, Rover, Observatory spacecraft, Communications & Navigation) clearly describes the different types of relevant missions and, consequently, gives an idea of the complexity of space exploration.[4] In addition to these, essentially robotic, missions, one should add the human spaceflight programs (such as Gemini, Apollo, Space Shuttle, Soyuz or the International Space Station) in the context of which humans (crew and/or passengers) are present aboard a spacecraft. This type of mission, which is associated with some of the most heroic and thrilling moments of the Space Adventure, seems to be particularly appealing to both governments and individuals today, despite the obvious dangers that lurk in space.

1.2. Human Expansion into Outer Space #1: The Aspirations of States and International Organizations

Through Space Policy Directive 1 (2017), the United States have already expressed their intention to "… enable human expansion across the solar system... [and] lead the return of humans to the Moon for long-term exploration and utilization, followed by human missions to Mars and other destinations".[5] Russia and China, for their part, announced, in 2018, that they plan to jointly build a lunar base.[6] Since 2015, the European Space Agency (ESA) has put forward the multinational Moon Village concept,

2 See S. Hobe, "Article I", *in* S. Hobe, B. Schmidt-Tedd, K.-U. Schrogl & G. Meishan Goh (eds.), *Cologne Commentary on Space Law*, Vol. 1 O Space Treaty, Carl Heymanns Verlag, 2009, p. 21 (hereinafter "CoCoSL 1"). 7 Cf. UNGA Resolution 1348 of 13 December 35.

3 Https://dictionary.cambridge.org/dictionary/english/exploration (last visit on 23.9.2020).

4 Https://solarsystem.nasa.gov/basics/chapter9-1/ (23.9.2020).

5 Https://www.whitehouse.gov/presidential-actions/presidential-memorandum-reinvigorating-americas-human-space-exploration-program/ (22.9.2020).

6 See https://www.cnbc.com/2020/07/15/russia-space-chief-dmitry-rogozin-dismisses-nasas-moon-program-considering-china-lunar-base.html (22.9.2020).

which aims to be "a collaboratively designed and expandable permanent lunar settlement".[7] It is perfectly indicative of the renewed international interest in space exploration that, in early 2021, three different missions were headed to Mars: The UAE space probe Hope, the Chinese Tianwen-1 orbiter and NASA's Perseverance rover.[8]

1.3. Human Expansion into Outer Space #2: The Aspirations of the Private Sector

Similar projects are equally advanced by the private sector: In 2012, Dutch organization MarsOne announced that it was seeking money in order to land the first humans on Mars and then leave them there to establish a permanent human colony. MarsOne went bankrupt in 2019, nevertheless private sector aspirations to settle on the Red Planet are more pronounced. According to Elon Musk, founder of SpaceX, Mars colonization is a priority for humanity, in order for it to be conserved in the event of a third world war… "It's important to get a self-sustaining base on Mars because it's far enough away from earth that [in the event of a war] it's more likely to survive than a moon base…".[9] The words of Elon Musk clearly echo the firm belief of the late Stephen Hawking that Humakind should inhabit another planet in order to ensure the survival of the human race.[10]

1.4. Fundamental Dilemmas: "Colonization" vs. Planetary Protection

However, opposed views have also been expressed. Astronomer and researcher Lucianne Walkowicz draws the attention to the fact that there may be life on Mars, of such a nature and scale that it cannot be remotely detected or that we will deliberately overlook, when our future plans for the Red Planet pass into the implementation phase. Walkowicz has stated: "Let's not use Mars as a backup planet".[11] This declaration obviously echoes a famous *dictum* of Carl Sagan from his book *Cosmos*:

"What shall we do with Mars?... There are so many examples of human misuse of the Earth that even phrasing this question chills me. If there is life on Mars, I believe we should do nothing with Mars. Mars then belongs to the

7 See https://astronomy.com/news/2019/05/moon-village-humanitys-first-step-toward-a-lunar-colony as well as https://www.esa.int/About_Us/Ministerial_Council_2016/Moon_Village (12.2.2021).

8 See the relevant report in: https://news.sky.com/story/mars-three-new-space-missions-are-about-to-reach-the-red-planet-heres-what-you-need-to-know-12208547 (21.2.2021).

9 Https://www.theguardian.com/technology/2018/mar/11/elon-musk-colonise-mars-third-world-war (23.9.2020).

10 *Time*, 4 May 2017, https://time.com/4767595/stephen-hawking-100-years-new-planet/ (12.2.2021).

11 See https://www.space.com/37679-lucianne-walkowicz-talks-mars-ethics.html and https://youtu.be/h2KQoHMCwlw (12.2.2021).

Martians, even if the Martians are only microbes. The existence of an independent biology on a nearby planet is a treasure beyond assessing, and the preservation of that life must, I think, supersede any other possible use of Mars".[12]

Such reflections are at the core of a discussion on the *ethics* of space exploration and inevitably bring to the fore fundamental dilemmas, as the concept of planetary protection contains clear priorities and objectives which are in sharp contrast with the necessities of human relocation to other planets.[13]

In view of the aforementioned, it is obvious that, at present, there is a keen interest in the migration of humans to other celestial bodies, as part of space exploration, mainly on the Moon or Mars, and the terms "colonization" and "colony" are frequently used in relation with this perspective. The planned creation of "colonies" – or, in general, human settlements on said celestial bodies implies the establishment of permanent human communities on them as well as the creation of permanent structures on (or below) their surface. Obviously, this will be a new phase in the context of space exploration (and use of outer space). However, it is not quite clear whether international (as well as space) law in force is adequate to regulate such a perspective, which, as of today, is also beyond the scope of national space legislations. This paper is intended to identify any gaps and weaknesses in the regulatory framework, particularly in view of the unprecedented circumstances that will inevitably arise from human relocation to the Moon or Mars.

2. Colonies and Colonialism in International Relations and Self-Determination

2.1. The Colonial Expansion

Historically, colonialism was "a practice of domination, which involve[d] the subjugation of one people to another".[14] In essence, colonialism "usually involved the transfer of population to a new territory, where the arrivals lived as permanent settlers while maintaining political allegiance to their country of origin". Given the above, colonialism described "any non-metropolitan territory of a State"[15] or, in other words, it was about an authoritarian

12 C. Sagan, *Cosmos*, Ballantine Books, New York, 1980, p.108-109.

13 In this respect, see G.D. Kyriakopoulos, «Where Law Meets Cinema: James Cameron's Avatar as Food for Thought About the Anthropocentric Nature of Space Law», *Proceedings of the international Institute of Space Law*, vol. 58, 2015, p.303-318.

14 Colonialism, Stanford Encyclopaedia of Philosophy, https://plato.stanford.edu/entries/colonialism/ (18.09.2020).

15 "Colony", J.P. Grant & J.C. Barker, *Parry & Grant Encyclopaedic Dictionary of International Law*, OUP, 3rd Edition, 2009, p.107.

"control of a territory's public sector by a metropole".[16] From a legal point of view, the colonial power claimed sovereignty over alien territory[17] and the population living there, in order to obtain economic benefits through the exploitation of resources and the use of labor. Colonial control took place through the occupation of territories that were characterized as *terrae nullius*, despite the existence of indigenous peoples. The creation of colonies by the Europeans sought a legitimizing basis, mainly under the cloak of a "civilizing mission" against indigenous peoples and tribes.

Being an ancient phenomenon, colonialism essentially flourished after the 15th century, first with the discovery of the Americas and later with the colonization of Asia and Africa, in both cases by the European States at that time. Particular reference must be made to the General Act of the Berlin Conference of 1884-1885, bearing mainly on the sharing of Africa among the colonial powers of Europe.[18]

On the basis of the aforementioned, it is clear that the main characteristics of Western colonialism were a) occupation of territory, b) transfer of population to this territory and c) domination over indigenous peoples. As will be shown below, all these elements not only are not accepted by modern international law but also can hardly exist in the context of future "space communities".

2.2. The End of Colonial Rule: Self-Determination and Permanent Sovereignty over Natural Resources

In the post-war international community, colonialism came to an end[19] under the emergence and development of strong national liberation movements, despite the unwillingness of the European colonial powers to accept the new state of affairs.[20] At the level of international law, this important change in

16 D.B. Abernethy, *The dynamics of global dominance: European overseas empires*, 1415-1980, Yale UP, 2000, pp.363 & 367.

17 See N. Yahaya, "The European Concept of Jurisdiction in the Colonies", in S. Allen, D. Costelloe, M. Fitzmaurice, P. Gragl & E. Guntrip (eds.), *The Oxford Handbook of Jurisdiction in International Law*, Oxford UP, 2019, p.60 *et seq*.

18 See P.M. Dupuy & Y. Kerbrat, *Droit International Public*, 12e Ed., 2014, Dalloz, Paris, para. 59. For a detailed report about the phases of western colonialism, see Thomas Benjamin (ed.), *Encyclopedia of Western Colonialism since 1450*, Thomson Gale, First ed., 2007, p.XIV *et seq*.

19 It its preambulatory part, UNGA Resolution 1514 [A/Res/1514(XV)] recognized "that the peoples of the world ardently desire[d] the end of colonialism in all its manifestations".

20 See P. Milza, *Les relations internationales de la Seconde Guerre Mondiale à nos jours*, Fondation Nationale des Science Politiques, Service de Polycopie, 1984-1985, p.73 *et seq*. Decolonization occurred in two phases, one between 1945 and 1953 (Middle East, Asia) and the second one between 1954 and 1962 (mainly Africa) and was favoured by the positive approach of the United States and the Soviet Union – *idem*; M. Vaïsse, *Les relations internationals depuis 1945*, Armand Colin, "U", 14e éd., 2015, p.40 *et seq*.

international relations was put forward through the principles of self-determination and of the permanent sovereignty (of peoples) over (their) natural resources.

2.2.1. Self-Determination

After 1945, the right to self-determination was closely associated with the decolonization. Article 1 para. 2 of the UN Charter provides that one of the purposes of the United Nations is "to develop friendly relations among nations based on respect for the principle of equal rights and self-determination of peoples, and to take other appropriate measures to strengthen universal peace". A corresponding reference is made in Article 55. Further, Resolution 1514(XV) of the UN General Assembly[21] provides that 'All peoples have the right to self-determination; by virtue of that right they freely determine their political status and freely pursue their economic, social and cultural development'. Similar assertions appeared in other important UN documents [such as General Assembly Resolution 2625(XXV)[22] or the common art. 1 para. 1 of the International Covenants on Civil and Political Rights[23] and on Economic, Social, and Cultural Rights[24]] as well as in Principle VIII (Equal rights and self-determination of peoples) of the (non-binding) Helsinki Final Act of 1 August 1975.[25]

Being one of "the essential principles of contemporary international law",[26] self-determination was ideally supplemented by the principle of Permanent Sovereignty over Natural Resources.

2.2.2. Permanent Sovereignty over Natural Resources

The Principle of Permanent Sovereignty over Natural Resources[27] came to the fore as an important implication of self-determination: General Assembly

21 General Assembly resolution 1514 (XV), Declaration on the Granting of Independence to Colonial Countries and Peoples (14 December 1960), available from https://undocs.org/en/A/Res/1514(XV) (23.9.2020).

22 General Assembly resolution 2625 (XXV), Declaration on Principles of International Law concerning Friendly Relations and Cooperation among States in accordance with the Charter of the United Nations (24 October 1970), available from https://www.undocs.org/en/A/RES/2625(XXV) (23.9.2020).

23 International Covenant on Civil and Political Rights, New York, 16 December 1966, 999 U.N.T.S. 171.

24 International Covenant on Economic, Social and Cultural Rights, New York, 16 December 1966, 993 U.N.T.S. 3.

25 Organization for Security and Co-operation in Europe, Helsinki Final Act, 1 August 1975, available from https://www.osce.org/helsinki-final-act (23.9.2020).

26 ICJ, *East Timor* (Portugal v. Australia), Judgment, I.C.J. Reports 1995, para. 29.

27 For a detailed overview of said principle, see S. Hobe, "Evolution of the Principle on Permanent Sovereignty Over Natural Resources: From Soft Law to a Customary Law Principle?", *in* M. Bungenberg & S. Hobe (Eds.), *Permanent Sovereignty over Natural Resources,* Springer, Cham, Heidelberg, New York, Dordrecht, London, 2015, p.1-13.

Resolution 1803 (XVII) proclaimed that "the right of peoples and nations to permanent sovereignty over their natural wealth and resources must be exercised in the interest of their national development and of the well-being of the people…" (para. 1).[28] Further, Resolution 3171 (XXVIII) referred to 'the inalienable rights of States to permanent sovereignty over all their natural resources, on land within their international boundaries as well as those in the sea-bed and subsoil thereof within their national jurisdiction and in the superjacent waters.[29] This principle was further reiterated in the Declaration on the Establishment of a New International Economic Order [para. 4(e)][30] as well as in the Charter of Economic Rights and Duties of States (Article 2).[31]

The principle of permanent sovereignty over natural resources is also recognized and enshrined in the Energy Charter Treaty (Article 18).[32] In the *Armed Activities* case, the International Court of Justice held that said principle "is [also] a principle of customary international law".[33]

3. Perspectives of "Colonialism" in Outer Space? Key Legal Issues

3.1. International Law Applies in Outer Space

According to article III of the Outer Space Treaty, "activities in the exploration and use of outer space" must be carried on "in accordance with international law". Consequently, fundamental principles of international law, such as self-determination and permanent sovereignty over natural resources, are applicable in outer space activities. What is more, the application of these principles in relation to human relocation to Mars or to the Moon implies that human presence on the celestial bodies cannot legally take the form of a "colony", at least as this concept developed on Earth

28 General Assembly resolution 1803 (XVII), "Permanent sovereignty over natural resources" (14 December 1962), available from https://www.un.org/ga/search/view_doc.asp?symbol=A/RES/1803%28XVII%29 (23.9.2020).

29 General Assembly resolution 3171 (XXVIII), "Permanent sovereignty over natural resources" (17 December 1973), available from https://digitallibrary.un.org/record/191196?ln=en (23.9.2020).

30 General Assembly resolution 3201 (S-VI), Declaration on the Establishment of a New International Economic Order (1 May.1974), available from http://www.un-documents.net/s6r3201.htm (23.9.2020).

31 General Assembly resolution 3281 (XXIX), Charter of Economic Rights and Duties of States (12. December 1974) available from https://undocs.org/en/a/res/3281(XXIX) (23.9.2020).

32 Energy Charter Treaty, signed on 17/12/1994, entered into force on ,1998/04/16 2080 UNTS 100.

33 ICJ, *Armed Activities on the Territory of the Congo* (Democratic Republic of the Congo v. Uganda), Judgment, I.C.J. Reports 2005, p. 168, at para. 244.

throughout history. This assertion is further corroborated by fundamental precepts of international space law, as defined below.

3.2. Aspects of International Space Law

As a preliminary remark: In accordance with the non-appropriation principle (Article II OST), no State can claim territorial sovereignty over the celestial bodies and, consequently, one of the necessary conditions for the establishment of a "space colony" (occupation of territory and exercise of territorial jurisdiction) cannot be fulfilled. Besides, the element of control over an indigenous population is obviously missing. Thus, Article II OST constitutes another legal barrier to the establishment of colonies (in the traditional sense) on the celestial bodies.[34] However, the case of a permanent human settlement on the Moon or Mars that does not constitute a colony is not affected by Article II. Such a prospect should be further discussed in the light of the freedom of use and exploration of outer space.

3.2.1. Extraterrestrial Settlements under the Light of the Freedom of Use and Exploration of Outer Space

As previously said, the Outer Space Treaty provides for the freedom of exploration and use of outer space in its Article I para. 2. Similarly, the Moon Agreement[35] provides that States "may pursue their activities in the exploration and use of the Moon anywhere on or below its surface" (Art. 8 para. 1). The obvious question is whether the relocation of humans to Mars can be considered as a specific expression of this freedom. Given the broad language of the relevant provision, this should be accepted in principle.[36] However, a close examination of the aforementioned instruments (OST, MOON) will show that both their general spirit and their provisions are not able to provide a robust legal framework for the establishment and functioning of "space communities".[37]

It is noteworthy that Article I para. 2 OST also prescribes the "free access to all areas of celestial bodies" (copied by Article 9 para. 1 MOON), however a

34 Article 11 para. 3 of the Moon Agreement accordingly provides that "Neither the surface nor the subsurface of the moon…shall become property of any State, international intergovernmental or non-governmental organization, national organization or non-governmental entity or of any natural person".

35 *Agreement 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 "Moon Agreement").

36 S. Hobe, "Article I", in CoCoSL 1, p.34.

37 …Having always in mind that the Moon Agreement, although in force, has not yet received a significant number of ratifications and, therefore, cannot be considered as universally accepted. As of 1 January 2020, only 18 States have ratified the Moon Agreement [see http://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/status/index.html (2.2.2021).].

permanent human settlement on the Moon or Mars goes further than a mere "access". What is more, neither the OST nor the MOON sufficiently provide for those infrastructures that would be necessary for a permanent settlement of many people on the Moon or Mars. The OST refers to (and prohibits) "the establishment of military bases, installations and fortifications" (Article IV para. 2) and confers a right to visit "stations, installations, equipment and space vehicles on the Moon and other celestial bodies" (Article XII, repeated by Article 15 para.1 MOON). Accordingly, Article 9 para. 1 of the MOON provides for States Parties the right to "establish manned and unmanned stations on the Moon". It is obvious that the constructions provided for in these instruments are either temporary in nature or relating to special missions, of a scientific or military nature, involving only a limited number of people. However, the facilities required for the accommodation of space settlers should be suitable for permanent residence. Obviously, this is a necessity that does not seem to be covered by the aforementioned provisions. This is so because a permanent, lunar or Martian, settlement would hardly be possible without the establishment of some form of territorial jurisdiction at least covering the area of that settlement. Otherwise, the settlers will be in "territory" that does not belong to any State! It is also difficult to understand how a right of free access to the settlement's facilities (as well as a right to visit) could exist and be exercised by outsiders, without this substantially disrupting the (daily) life in the settlement in question.[38]

It should be further recalled that both the OST and the MOON, insofar as they refer to humans, use the term "astronauts" (Art. V OST, 10 para. 1 MOON) or "personnel" (Art. IV para. 2, VIII OST, 3 paras. 2, 4, 6 para. 3, 8 para. 2, 9 para. 2, 10 para. 1, 11 para. 3, 12 para. 1 MOON). The fact is that the ordinary meaning of the term "personnel" refers to a "body of people employed in an organization, or engaged in a service or undertaking, esp. of a military nature; staff, employees collectively".[39] Obviously, these terms do not refer to permanent lunar or Martian settlers. This could be identified as a gap in international space law as regards the prospect of human relocation to the celestial bodies.[40] This is explained by the fact that the space treaties reflect concerns and necessities of the Cold War era, in

38 See, with regard to such considerations, S. Hobe, "The Legal Framework for a Lunar Base Lex Data and Lex Ferenda", *in* G. Lafferranderie & D. Crowther (Eds.), *Outlook on Space Law over the Next 30 Years: Essays Published for the 30th Anniversary of the Space Treaty*, Springer, 1997, p.139 *et seq*.

39 See K.U. Schrogl & J. Neumann, "Article IV", in CoCoSL 1, p.85.

40 As it has been rightfully pointed out, "A permanent settlement in space will present unique jurisprudential questions, which may not be answered adequately by the extant *jus gentium*… Contemporary *corpus juris spatialis* currently leaves a lacuna regarding the internal organization within a space community" – P.M. Sterns & L.I. Tennen, "International law and 'the art of living in space': The recognition of settlement autonomy", *Space Policy*, Volume 9, Issue 3, August 1993, p.213.

particular the common intention of the two former superpowers not to transfer their rivalry into space.[41] However, the expansion of the human race towards the stars as well as the creation and the functions of human settlements in space seem to require a more detailed legal approach.

3.2.2. Issues of Jurisdiction

Which authority would have jurisdiction over a permanent settlement on the Moon or Mars as well as over the settlers? Obviously, no State can claim (and exercise) jurisdiction *rationae loci* on a celestial body,[42] given the *res communis* character of outer space (including the Moon and other celestial bodies). As far as jurisdiction and control in outer space is concerned, the key provision is Article VIII OST, which prescribes that the State "on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body". Thus, Article VIII provides for extraterritorial jurisdiction of the State of registry,[43] both *ratione materiae* (regarding the space object) and *ratione personae* (regarding the personnel).

Further, Article VI OST provides that States are internationally responsible "for national activities in outer space, including the Moon and other celestial

41 See M. Gallo, M. Avnet, D.A. Broniatowski, "An international approach to lunar exploration in preparation for Mars," *2005 IEEE Aerospace Conference*, Big Sky, MT, USA, 2005, pp.4107-4123 (doi: 10.1109/AERO.2005.1559716, p. 4) (12.2.2021).

42 The principle of territoriality constitutes the essential foundation of jurisdiction: In the context of the *Island of Palmas* case, the arbiter Max Huber had the opportunity to focus on the "principle of the exclusive competence of the State in regard to its own territory" – *Island of Palmas case* (Netherlands, USA), arbitral award of 4 April 1928, R.I.A.A., Vol. II, pp.829-871, at p.838.

43 States can extend their jurisdiction beyond their territory, to the extent permitted under applicable international law. This – extraterritorial – jurisdiction of States was described by the Permanent Court of International Law in the *Lotus* case: "…a State… may not exercise its power in any form in the territory of another State. In this sense jurisdiction is certainly territorial; it cannot be exercised by a State outside its territory except by virtue of a permissive rule derived from international custom or from a convention" – PCIJ, *The Case of the S.S. 'Lotus'* (1927), Judgment of 7 September 1927, PCIJ, Series A, No 10, p. 18-19. However, extraterritoriality is accepted in international law insofar as there is a certain link between the extraterritorial facts and the State wishing to exercise its jurisdiction – see B. Stern, "Quelques observations sur les règles internationales relatives à l'application extraterritoriale du droit", A.F.D.I., vol. XXXII, 1986, p. 20. This link is established on the basis of a set of principles: (active and passive) personality principle, effects principle (objective territoriality), protective principle, universality principle – see in this respect C. Ryngaert, *Jurisdiction in International Law*, Oxford UP, 2nd edition, 2015, p.101 *et seq*.; A. Yokaris & Ph. Pazartzi, *National and International Criminal Enforcement of International Crimes,* Nomiki Vivliothiki, 2012, p.44 *et seq*. (in Greek).

bodies, whether such activities are carried on by governmental agencies or by non-governmental entities". According to the same provision, "The activities of non-governmental entities in outer space, including the Moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty". In order for States to fulfill this obligation (of exercising authorization and control over the space activities of private entities), they have to adopt the necessary measures (in their national laws) to establish their jurisdiction over such activities.[44] To the extent that such activities take place in the territory of a State (e.g., launch operations), this State may exercise territorial jurisdiction. In any other case, the State should take the appropriate measures in order to establish its extraterritorial jurisdiction, both over the persons involved in the space activities and over the objects through which the activity is carried out.

In any case, the jurisdiction that could be exercised, in the case of a permanent community on a celestial body, will be in the form of a jurisdiction *rationae persone*, over the settlers, in combination with a quasi-territorial jurisdiction, over the objects/facilities, according to the effects doctrine.

However, it is questionable whether Article VIII OST could serve as a satisfactory legal basis for the establishment and exercise of such jurisdiction. A *sine qua non* condition for the establishment of the jurisdiction of the State of registry, according to Article VIII, is the existence of an object "launched into outer space". Although the prevailing view in space law is in favor of a broad interpretation of the term "space object", some scholars argue that such objects are no longer considered to be "launched into outer space" after landing on a celestial body.[45] Therefore, in the event that the components of the settlement are transferred from the earth, it is doubtful whether they can be regarded as space objects within the meaning of Article VIII after their installation, assembly and use on lunar or Martian soil. The same is also true of installations which, in whole or in part, are made of extra-terrestrial materials[46] (either by 3D printing or any other appropriate method).[47]

---

44 See M. Gerhard, "Article VI", in CoCoSL 1, p.123; B. Schmidt-Tedd & S. Mick, "Article VII", CoCoSL 1, p.157.

45 St. Gorove, "Toward a Clarification of the Term 'Space Object' – An International Legal and Policy Imperative?", *J.S.L.*, vol. 21, no 1, 1993, p.22; V. Kopal, "Issues Involved in Defining Outer Space, Space Object and Space Debris", *in Proceedings of the 34th Colloquium on Law of Outer Space*, 1991, p.41; A. Bueckling, "The Formal Legal Status of Lunar Stations", *J.S.L.*, 1973, p.114.

46 See St. Gorove, "Sovereignty and the Law of Outer Space Re-examined", *A.A.S.L.*, Vol. II, 1977, p.318; Bueckling, *op. cit.*, p.114; Bin Cheng, "Space Objects and their Various Connecting Factors", *in Outlook on Space Law… op. cit.,* p.205. Also see G.D. Kyriakopoulos, "Jurisdiction and Control over Installations and Facilities Serving Space Tourism Activities", in Proceedings of the international Institute of Space Law, vol. 57, 2014, p.452 *et seq*.

With regard to private (non-governmental) settlement projects, it seems that Article VI OST can provide a safer option for the legal establishment of state jurisdiction. A crucial element, however, will be whether the overall project can be considered as a "national activity" of the State in question.
It is obvious from the aforementioned developments that important issues are raised in connection with an effective implementation of space law in force regarding the creation of permanent settlements on the celestial bodies. In view of this situation, it is obvious that the adoption of *ad hoc* legal frameworks for the permanent settlement and living of people in outer space would be an option capable of providing greater legal certainty. A particularly useful model for such a choice would be the legal instruments that govern and regulate the operation of the International Space Station, which clearly constitutes a successful model of organizing a multinational community in space, even in miniature.[48]

4. Concluding remarks

On the basis of the aforementioned, the following conclusions can be drawn:

1. At present, there is considerable impetus towards the creation of permanent settlements on the celestial bodies nearest to the Earth. However, any transfer of population to a celestial body cannot be considered as a "space colony": international law as well as space law are not receptive to colonial practices. this does not mean, however, that, in the near future, human settlements on the celestial bodies will not be legally accepted. Instead, what matters is to focus on legal norms and principles that are capable of defining an appropriate legal framework for this emerging activity.
2. In general, human settlements on the celestial bodies (either guided by States or driven by the private sector) can be created in the light of the freedom of use and exploration of outer space. However, the

47 See M. Chatzipanagiotis, "3d Printing Using Material from Celestial Bodies: A Method to Circumvent the Non-Appropriation Principle?" (September 2016), Proceedings of the 67th International Astronautical Congress (IAC), Guadalajara, Mexico, 26-30 September 2016, Available at SSRN: https://ssrn.com/abstract=2895440.

48 The International Space Station (ISS) is a multinational space programme between Europe, the United States, Russia, Canada, and Japan. Its purpose is the joint organization of a Space Station in LEO, of a permanent character. The ISS legal framework consists mainly of the International Space Station Intergovernmental Agreement ("the IGA"), four Memoranda of Understanding between the co-operating space agencies as well as a Code of Conduct for the International Space Station Crew. Said documents provide, *inter alia*, for the rights and duties of the co-operating States and regulate jurisdictional issues.

space treaties do not seem to be sufficiently oriented towards an effective and detailed regulation of such space activities, which are not only new but also very complex, to the extent that they constitute a significant challenge to the applicable space law.

3. Last but not least: No one could rule out the possibility that lunar or Martian settlers will finally consider themselves as not bound by earth laws (national and international). They may choose to create (their own) "celestial State", declaring their "independence" (from any Earth authority, national or international), arguing that their (newly formed) community intends to move forward with the adoption of its own "law" ("Instant self-determination"?).[49] Such a course of events will largely affect other, unsettled issues in the context of space activities, as, for instance, the exploitation of space resources ("Permanent sovereignty" – of the settlers – over "their" space resources?) as well as the concept of planetary protection.

Such hypotheses indicate the complex legal issues that can develop as regards the establishment of permanent human communities on the celestial bodies, the inherent limits of space law in force and, consequently, the need for the adoption of appropriate ("tailor-made") new rules.

49 It is interesting to mention that, just a few days after the presentation of this paper in the 2020 IAC, Elon Musk declared that, as regards the planned Mars colony, no Earth-based government should have authority or sovereignty over Martian activities – see https://www.dailymail.co.uk/sciencetech/article-8897601/Elon-Musks-SpaceX-says-not-recognize-Earth-laws-planned-Mars-colony.html?ito=social-twitter_dailymailus (12.2.2021).