Space Mining and Environmental Protection: Recycling International Agreements into New Legal Practices

*Gabrielle Leterre**

Abstract

The increasing interest in extracting natural resources from celestial bodies raises many issues, among which guaranteeing environmental standards is paramount. There is more than a reasonable concern that industrial exploitation of the outer space lead to similar or even greater disasters than the ones already afflicting Earth. There is a consensus among the legal community that international law does provide environmental protection through the Outer Space Treaty in its Article IX. Because of its generality, however, this provision precludes the agreement from effectively protecting the outer space's environment in the context of specific activities. The present contribution aims to explore appropriate legal responses. One, often proposed, is that such a response should take the form of a new international agreement. Considering the lengthy process of treaty-making, and the reluctance of States to adopt binding international documents limiting their freedom in space, there is a high chance that space mining activities will have started by the time there is any kind of international agreement. Therefore, another approach must be envisaged, which rests with the analysis of existing environmental standards that could be leveraged to answer the challenges of space mining activities. Special attention will be paid to the enforcement of the Outer Space Treaty and how it should be combined with what is usually referred to as "soft laws". As a conclusion, the contribution attempts to answer the question of the transforming role of States in complementing existing international standards for the protection of the outer space environment.

* Doctoral Researcher, Université du Luxembourg, Faculty of Law, Economics and Finance, Luxembourg, gabrielle.leterre@uni.lu.

1. Introduction

Raising the issue of the protection of the outer space environment in the specific context of space mining activities may, at the very least, appear premature. Firstly, space mining activities have not yet started and should not for the coming years.[1] Secondly, there is presently no clear international framework that explicitly applies to the activity itself, let alone one that has the capacity to shelter an environmental regime for it. Even if a slow consensus surfaces leaning towards agreeing that space mining is legally acceptable, there is still to decide which, between national legislations or the adoption of an international agreement, should provide the most suitable norms.[2] It seems difficult to seriously consider how to legally protect the environment in the outer space from the negative impact of space mining when none knows exactly when space mining takes place and what kind of law will be applicable to the activity.

However, it would be an exaggeration to pretend that space mining is entirely and solely a virtual issue, both from the standpoint of the law and in the perspective of business developments. With two countries—the United States of America in 2015 and Luxembourg in 2017—having adopted a law expressly recognizing that space resources can be appropriated,[3] a problem has clearly been raised by sovereign entities as regards to the legal existence of space mining. The increasing development of space mining companies also means that space resources exploitation must now be seen as reality.

We have learnt from experience on Earth that any resource exploitation activity is bound to contaminate the surroundings. Conducting space mining activities will be no exception.[4] For this reason, issues related to the protection of the environment should be part of the reflection in the determination of a legal framework for space mining activities.

1 M. Wall, Asteroid Mining May Be a Reality by 2025, 11 August 2015, https://www.space.com/30213-asteroid-mining-planetary-resources-2025.html, (accessed 10.09.2019).

2 UN COPUOS, Report of the Legal Subcommittee on its fifty-eighth session, U.N. Doc. A/AC.105/1203, 62nd Sess. COPUOS, Vienna, Austria, 2019, 12 - 21 April, at 239-267; IISL Directorate of Studies, Does International Space Law Either Permit or Prohibit the Taking of Resources in Outer Space And On Celestial Bodies, And How Is This Relevant For National Actors? What Is the Context, And What Are the Contours and Limits of This Permission or Prohibition? (2016).

3 Commercial Space Launch Competitiveness Act, 51 USC, §51301(25 November 2015) (US); Loi du 20 juillet 2017 sur l'exploration et l'utilisation des ressources de l'espace, Mémorial A n°674 (20 Juillet 2017) (Lux.).

4 R. R. Vondrak, Lunar base activities and the lunar environment, in: W. Mendell (Ed.), The Second Conference on Lunar Bases and Space Activities of the 21st Century, NASA, 1992; F. Lyall, Planetary Protection from a Legal Perspective - General Issues, in: M. Hofmann, P. Rettberg, M. Williamson (Eds.), IAA Cosmic Study "Protecting the Environment of Celestial Bodies", 2010.

Currently, two fundamental treaties substantially address the issue of environmental protection in the outer space: the 1967 Outer Space Treaty [OST] and the 1979 Moon Agreement [MA].[5] The former contains widely accepted principles applicable to all space activities but does not specifically refer to the exploitation of space resources; the latter explicitly envisages this activity and calls for the establishment of a comprehensive legal framework to govern it but has only been ratified by a few States, none of which is a major space faring nation, which considerably limits its application. Hence the question of whether these treaties do offer answers to the future environmental challenges of space mining activities. This contribution provides a positive answer, by delineating solutions within existing frameworks, whether derived from treaties or other commonly accepted legal norms.

2. Protection of the Outer Space Environment in the Space Treaties

2.1. Article IX of the Outer Space Treaty

As the first international legally binding instrument laying down basic rules for human space activities in outer space, the Outer Space Treaty is also the first legally binding instrument addressing environmental issues in space. It contains in its Article IX "a provision, which is designed to protect outer space and celestial bodies from contamination and pollution and to protect the legitimate programs of states from undue interference"[6] . In its paragraph 2, Article IX establishes that:

> "States Parties to the Treaty shall pursue studies of outer space, including the moon and other celestial bodies, and conduct exploration of them so as to avoid their harmful contamination and also adverse changes in the environment of the Earth resulting from the introduction of extraterrestrial matter and, where necessary, shall adopt appropriate measures for this purpose".

The environmental regime of Article IX OST therefore addresses two distinct issues: 1) "forward contamination" *i.e.* the contamination of the outer space environment caused by human activities, and 2) "backward contamination" which is the contamination of the Earth from the introduction of extra-terrestrial material. Since the present research focuses on space mining activities and their potential impact on the outer space environment, our analysis will solely focus on the first issue.

5 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; 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.

6 Speech by Dr. Kurt Waldheim before the 13th Annual Meeting of the American Astronautical Society, Texas (1967), in: P. G. Dembling, D. M. Arons, The Evolution of the Outer Space Treaty, 33 J.A.L.C. 432 (1967) 440.

The importance of Article IX for space mining activities is linked with the fact that, under this provision, the "outer space environment" encompasses the Moon and other celestial bodies. This is where space mining is expected to develop its activities, *i.e.* the Moon and asteroids; this activity being understood as the extraction of "an abiotic resource *in situ* in outer space" to follow the definition of the US Commercial Space Launch Competitiveness Act of 2015.[7]

Regarding the forward contamination, States Parties are required to avoid conducting activities that would cause "harmful contamination" to the outer space environment. The use of "harmful" suggests that not all types of contamination are prohibited. This is consistent with the purpose of the treaty which is for humans to explore and use outer space. Any activity in space is bound to cause some form of contamination.[8] For instance, the Moon's environment was temporally contaminated by rocket exhaust during the Apollo missions.[9] Similarly, it is foreseen that mining activities will cause *inter alia* gas contamination.[10] Therefore, if all types of contamination were prohibited it would be simply impossible to carry out space activities.

"Harmful" also means that the degree of contamination of the outer space environment varies from one activity to another; the type but also the duration of the activity foreseen are criteria that influence the degree of contamination.[11] This explains why States Parties are only required to adopt "appropriate measures" when it is "necessary", since they are better placed to determine how their activity will impact the environment. Despite these limitations, the main outcome of Article IX OST is to impose environmental obligations upon the States Parties through their positive obligation to prevent "harmful contamination".

2.2. Article 7 of the Moon Agreement

Another source for the legal protection of the environment in outer space is to be found in the Moon Agreement. Out of the five space treaties, it is the most advanced from an environmental standpoint,[12] despite its limited acceptance by only 18 States Parties.[13] Though it has little to offer as regards to territorial application or legally binding status, this treaty, contrary to the

7 US Law, *supra* 3.
8 C. Q. Christol, Protection of Space from Environmental Harms, Annals Air & Space L., 4 (1979); Vondrak, *supra* 4, at 340-341.
9 Ibid.
10 Ibid.
11 Ibid.
12 L. Viikari, The Environmental Element in Space Law: Assessing the Present and Charting the Future, M. Nijhoff, Leiden, 2014, p. 62.
13 S. Hobe, P. Stubbe & F. Tronchetti, Historical Background and Context, in: S. Hobe, B. Schmidt-Tedd, & K. Schrogl (Eds.), Cologne Commentary on Space Law II, Carl Heymanns Verlag, Cologne, 2013, p. 336.

Outer Space Treaty, presents the advantage of explicitly applying to resource exploitation activities in space; its purpose being the establishment of a comprehensive legal regime to "govern the exploitation of the natural resources of the Moon and other celestial bodies ".[14] The applicability of the environmental regime set in the Moon Agreement to space mining activities is further made evident by the phrasing "in exploring and using the Moon" at the beginning of Article 7§1 and the fact that the Agreement only applies to the Moon and "other celestial bodies within the solar system";[15] thus only including in its scope areas where space resources can be extracted.

This provision further develops the environmental protection regimes existing under Article IX OST. In 1967, the duty to adopt measures to protect the outer space environment from harm was dependent on the risk of "harmful contamination".[16] Under Article 7§1 MA, there is a paradigm shift with the introduction of the concept of the existence of an "environmental balance" on celestial bodies.[17] States Parties to the Moon Agreement must thus "prevent the disruption" of this balance. Such disruption can come into being by the introduction of "adverse changes" in the environment of the celestial body, by its "harmful contamination through the introduction of extra-environmental matter", or "otherwise".[18] These specifications bring more understanding to the meaning of the provision than the Outer Space Treaty did.[19] Furthermore, the addition of "or otherwise" at the end of the first sentence of paragraph 1 plays the role of a catch-all-phrase which allows for future possibilities; ones that might not have been foreseen at the time of the drafting.[20]

With regards to the States Parties' obligations, where they were only required to "avoid" harmful contamination under the 1967 Treaty they must now "prevent" it. Hence, States Parties to the Moon Agreement are required to take an active role in the protection of the outer space environment. Lastly, the 1979 Agreement establishes new information duties. For instance, States Parties are requested to inform other States Parties and the Secretary-General of the United Nations of the discovery of areas of celestial bodies "having special scientific interest" so that they can potentially be declared "international scientific preserves", thus beneficiating from a special protection regime.[21]

14 Article 11§5 MA.
15 Idem, art. 1§1.
16 Article IX OST.
17 J.-F. Mayence, Article IX of the Outer Space Treaty and the Concept of Planetary Protection: Toward a Space Environment Law?, Proceedings of the IISL, 53 (2011).
18 Article 7§1 MA.
19 F. Bergamasco, Space Mining and The Protection of Extra-Terrestrial Environment in The Light of Article IX of The Outer Space Treaty, Proceedings of the IISL, 60 (2018), p. 4.
20 Q. He, Environmental impact of space activities and measures for international protection, J. Space L., 162 (1988).
21 Article 7§3 MA.

3. Space Law's Shortcomings on Environmental Protection

3.1. The Crippling Effect of the Ambiguous Terminology

The Moon Agreement successfully fills some of the gaps of the Outer Space Treaty by developing the environmental regime of Article IX. It does not, however, solve the recurrent issue in space treaties of undefined terminology. As noted in 2.1., the core element of the environmental regime set up in the Outer Space Treaty rests with the concept of "harmful contamination". Without "harmful contamination" of the outer space environment, there is no obligation to adopt protection measures in virtue of Article IX. Thus, it becomes apparent that the enforcement of the provision is dependent on the meaning of "harmful contamination". Nonetheless, the Outer Space Treaty provides no definition for this corner-stone concept.

3.1.1. Nature of the "Contamination"

Adopting a textual interpretation, the term "contamination" can be understood as the modification of the environment by the introduction of or exposure to undesirable elements.[22] This interpretation is supported by the wording of Article 7§1 MA which refers to "harmful contamination through the introduction of extra-environmental matter". It is also in line with the 1959 report of the *ad hoc* Committee on the Peaceful Uses of Outer Space (COPUOS), which considered that it would be necessary to reach "appropriate agreements to minimize the adverse effects of possible biological, radiological, and chemical contamination".[23] We retrieve the same elements to define contamination by the introduction of or exposure to undesirable elements.

Yet, the price for clarity here might be restriction: should such an interpretation be retained, it would exclude other forms of environmental modifications that were not anticipated in 1967 and 1979.[24] This would even be the case of what is currently considered as one of the most pressing issue as regards to the contamination of outer space: space debris. It might also leave aside some harmful consequences of the extraction of space resources such as modifications of celestial bodies' landscape resulting from space mining activities.[25]

22 International Law Association, Draft International Instrument on the Protection of the Environment from Damage Caused by Space Debris ILA Conference, Buenos Aires, Brazil, 1994; V. Gupta, Critique of the International Law on Protection of the Outer Space Environment, Astropolitics, 14, (2016), p. 35.

23 UN COPUOS, Report of the Ad Hoc Committee on the Peaceful Uses of Outer Space, UN Doc. A/4141, 14th Sess. UN GAOR, Vienna, Austria, 1959, para. 76.

24 G. Chung, Emerging of Environmental Protection Clauses in Outer Space Treaty: a Lesson from the Rio Principles, in: A. Froehlich (Ed.), A Fresh View on the Outer Space Treaty, Springer, New-York (2018), p. 3.

25 Bergamasco, *supra* 19, at 4.

Ultimately, accepting such a restriction would neither be consistent with the purpose of the Outer Space Treaty—which is to allow States Parties to carry out space activities—nor with the rest of Article IX which calls for the consideration of other States' interests. It is therefore necessary to consider a systematic and a teleological interpretation in order to provide more precision while respecting the intended openness of the wording.

3.1.2. Threshold of harmfulness?

Not all forms of contamination are prohibited under the space treaties; only those that are "harmful". This is consistent with the purpose of the treaties since all types of space activities are bound to contaminate the environment with the introduction of extra-environmental material. Prohibiting entirely the contamination of the environment would thus put a stop to all space activities. Hence, the necessity to determine the threshold of "harmfulness" or at least a method to establish it, for the environmental regime to apply.

Unfortunately, no more than they define "contamination", either treaties define a threshold of harmfulness for the outer space environment's contamination. In particular, the question of who is to suffer from the harmful contamination or change is left open.[26] Is it a State Party that is prevented from conducting its own space activities or the environment itself? No answer is given in the treaties, though the former interpretation is more likely to be chosen by the spacefaring nations.[27]

The expressions "disruption of the existing balance" and "adverse changes" in Article 7 MA can be subjected to the same critique. The qualificative "adverse", for instance, implies a change that is perceived as negative.[28] But it is more than likely that the State Party causing the change will not see it that way, particularly so when it would give rise to a legal obligation to prevent it.[29]

The critical lack of precision of the treaties undermines the enforcement of environmental measures actually included in the treaties.[30] Both regimes are based on the principle that measures must be adopted by the States Parties to either avoid or prevent a certain degree of harm to be caused to the environment of celestial bodies.[31] But without an agreement between said Parties, or a settled practice, on what is harmful to the environment of celestial bodies and on the degree of harm that can be tolerated, it is difficult to apply this regime in practice.[32]

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26 Gupta, *supra* 22, at 26.
27 Ibid.
28 Ibid.
29 Article 7§1MA.
30 Bergamasco, *supra* 19, at 4.
31 Article. IX§2 OST and Article 7§1 MA.
32 S. Freeland, Article 7 of the Moon Agreement, in: S. Hobe, B. Schmidt-Tedd, & K.U. Schrogl (Eds.), Cologne Commentary on Space Law II, Carl Heymanns Verlag,

3.2. Legal Obligations of the States Parties

A second issue undermining the outer space environmental regime is the large degree of discretion granted to States Parties in the fulfillment of their legal obligations.[33] The Outer Space Treaty, in particular, provides in its Article IX§2, that "where necessary, States Parties shall adopt appropriate measures".

It is apparent from the term "shall" that the Outer Space Treaty imposes upon the States Parties a positive obligation in addition to the requirement of avoiding harmful contamination of the environment.[34] However, this obligation is dampened by the addition of the terms "necessary" and "appropriate" in the provision.[35] Such provisions leave indefinite the circumstances in which measures would be necessary or appropriate. [36]

As a result, the States Parties to the Outer Space Treaty are left with wide latitude to determine when they should adopt protection measures.[37] Firstly, the treaty gives no indication as to the form they should take; secondly, it is not possible from the wording of Article IX to determine whether the obligation arises when measures are necessary for the protection of the outer space environment *per se* or only when the relevant State deems so. It can only be suspected that spacefaring nations will likely find the latter more favorable to their cause.[38]

These issues were partially remedied in the Moon Agreement.[39] Article 7 does not openly allow its States Parties to discretionarily decide when measures are necessary: neither the term "necessary" nor "appropriate" are present in the provision.[40] Another improvement is the obligation for the Parties to inform the UNSG of the measures adopted.[41] Nonetheless, on both accounts, such improvements are limited. Indeed, just as is the case with the Outer Space Treaty, the form the measures of environmental protection should take and the procedural requirements to inform the UNSG remains undisclosed.[42]

Cologne, 2013, at 374; M. C. Mineiro, FY-1C and USA-193 ASAT intercepts: an assessment of legal obligations under Article IX of the Outer Space Treaty, J. Space L. 34 (2008).

33 Idem.

34 S. Marchisio, Article IX, in: S. Hobe, B. Schmidt-Tedd, & K. Schrogl (Eds.), Cologne Commentary on Space Law I, Carl Heymanns Verlag, Cologne, 2009, at 177; Freeland, *supra* 32, at 374.

35 Lyall, *supra* 4, at 58.

36 Ibid.

37 Viikari, *supra* 12, at 60; Mineiro, *supra* 32, at 340.

38 Gupta, *supra* 22, at 26.

39 He, *supra* 20, at 123.

40 *See* Article 7§1 MA; Article IX§2 OST.

41 Viikari, *supra* 12, at 64.

42 Freeland, *supra* 32, at 374.

States Parties are once more given latitude in their application of their international obligation.
Therefore, though the Moon Agreement partially fills the lacunae of the Outer Space Treaty's environmental regime, it comes with its own legal shortcomings; the most significant of them being that, contrary to the Outer Space Treaty, none of the major spacefaring nations have ratified it. The loose environmental regime of Article IX is the one that is more likely to be applied in practice and the only real limits to States' actions reside in the mandatory compliance with their international obligations under the Outer Space Treaty, to be fulfilled in good faith. [43]

4. Leveraging Existing Mechanisms

4.1. From Hard Rule

In the current state of law, the single environmental provision in the Outer Space Treaty does involve obligations regarding to the protection of the outer space environment but does not allow alone for an effective protection regime. It is therefore important to contextualize it to see if other elements in the treaty, combined with Article IX, would not offer possibilities to reinforce such a regime.
A cornerstone provision, other than requiring States to avoid contaminating the environment of celestial bodies, is to oblige them to show "due regard to the corresponding interests of all other States Parties" and, as such, to avoid causing "harmful interference" with other activities.
In this context, the obligation to avoid contaminating the environment of celestial bodies by conducting space activities could be envisaged as a sub-obligation to not cause harmful interference. Hence, the contamination caused would only be "harmful" to the extent that it would disrupt other States' activities, such as scientific research for instance.[44]
Interpreting the expression "harmful contamination" as meaning a form of "harmful interference" has the considerable advantage of engaging inter-human mutual obligations which is precisely the scope of any legal endeavor.[45] And in the case of the outer space, there are clear obligations if harmful contamination is associated with harmful interference: it opens the door to invoke the consultation mechanism established by Article IX§4.[46]
In practice, a State could legally request consultations with another State to discuss potential harm. The State would have to prove that the environmental damage is affecting its own activity, as arguing that the environment is being

43 Mineiro, *supra* 32, at 340.
44 L. Tennen, Towards a New Regime for Exploitation of Outer Space Mineral Resources, Neb. L. Rev., 88 (2009) 817; Marchisio, *supra* 34, at 177.
45 Bergamasco, *supra* 19, at 2.
46 Viikari, *supra* 12, at 169.

contaminated would not be sufficient ground for the mechanism to be triggered.[47]

Such a regime of environmental protection is even more robust when one considers that the same mechanism allows for the possibility to request consultation even before the damage has occurred since it applies to "planned" activities and experiments.[48] Consultations could thus be used to discuss future activities whose effects on the environment are yet unclear,[49] such as space mining activities.

Ultimately, this approach to Article IX has merits: it not only helps frame the abstract environmental regime of the Outer Space Treaty which legally binds the future space mining actors; it also offers a potential platform between States to discuss environmental issues.

4.2. … To Soft Laws

Such a regime of protection could also be reinforced by non-binding legal instruments. Obviously, it is natural to evoke international treaties when considering international relations of States, to which the environmental protection of the outer space belongs. However, the fact is that it has been close to forty years since the last attempt to provide a binding instrument to regulate space activities with the Moon Agreement.[50] In the meantime, space technology has quickly evolved and new space activities have developed, raising new issues, and, among them, new environmental issues, that were not foreseen in the five space treaties.[51]

This lack of new treaty must not be mistaken for a disinterest in having space environmental issues addressed legally. It is rather the outcome of a new type of legal activism, with the international community favoring the adoption of so-called "soft law" instruments, which could be described as "non-binding principles, norms, standards or other statements of expected behavior".[52] This is for instance the case with the space debris issue as shown by the endorsement of the COPUOS Space Debris Mitigation Guidelines, by the UN General Assembly (UNGA), in 2007.[53]

47 Ibid.
48 Marchisio, *supra* 34, at 180.
49 Viikari, *supra* 12, at 60.
50 UN COPUOS, Responses to the set of Questions provided by the Chair of the Working Group on the Status and Application of the Five United Nations Treaties on Outer Space, UN Doc. A/AC.105/C.2/2017/CRP.17, 56th Sess. COPUOS, Vienna, Austria, 2017, at 2; J. M Beard, Soft Law's Failure on the Horizon: The international Code of Conduct for Outer Space Activities, U. Pa. J. Int'l L., 38 (2017).
51 D. Tan, Towards a New Regime for the Protection of Outer Space as the "Province of all Mankind", Yale J. Int'l L. 25 (2000).
52 Beard, *supra* 50, citing Marco Ferrazzani, at 342; F. von der Dunk, F. Tronchetti, Handbook of Space Law, Edward Elgar Pub. Ltd, Cheltenham, 2015, at 379.
53 G.A. Res. 62/217, UN GAOR, 62nd Sess., at 26, UN Doc. A/RES/62/217 (2008).

Though not legally binding, soft law instruments have the advantage of "maximiz[ing] the goals sought while minimizing the risk taken".[54] Firstly, they allow to overcome domestic political and legal problems since they do not require national ratifications.[55] At the international level, non-binding instruments also enable States to find common solutions without limiting their freedom of action in space,[56] something they have particularly become reluctant to do when it comes to space activities.[57] It must also be noted that the instruments are not reserved to States only and can more easily accommodate private space actors and international institutions.[58]

Secondly, using soft law rather than binding agreements offers more flexibility as it can take the many forms of resolutions, recommendations, guidelines, etc.[59] One such example is the Planetary Protection Policy developed by the Committee on Space Research (COSPAR)[60] of the International Council for Science. This committee promotes scientific research in space on an international level, with an emphasis on sharing information and providing a forum for scientists.[61] In this perspective, COSPAR has adopted in 2002, with amendments in 2005 and 2011, a Planetary Protection Policy which aims "to provide accepted guidelines to guide compliance with the wording of the Outer Space Treaty and other relevant international agreement".[62] While these rules only have recommendary character,[63] it must be noted that the COSPAR's policy has been implemented by two of the most active space agencies: the American National Aeronautics and Space Administration (NASA), and the European Space Agency (ESA) "on behalf of its Member States". [64]

Non-binding instruments do not create, in themselves, legal obligations. It does not mean that they are deprived of legal effect. When followed by entities possessing legal authority, they become a powerful instrument to fill

54 P. J. Blount, Renovating Space: The Future of International Space Law, Denv. J. Intl'l L. & Pol'y, 40 (2011), at 525.
55 Viikari, *supra* 12, at 241.
56 Beard, *supra* 50, at 345-346; Blount, *supra* 54, at 525.
57 Ibid.
58 Viikari, *supra* 12, at 241.
59 Ibid.; Tan *supra* 51, at 181; J. Monserrat Filho, Á. F. dos Santos, Is there a Future for Space Law beyond "Soft Law"?, Proceedings of the IISL, 53 (2011).
60 COSPAR, https://cosparhq.cnes.fr/about/charter (accessed 17.09.2019).
61 M. Hofmann, COSPAR Recommendations in a New Context? Environmental Aspects of Space Mining, Proceedings of the IISL (2017).
62 COSPAR, COSPAR Planetary Protection Policy, 2011, https://cosparhq.cnes.fr/sites/default/files/pppolicy.pdf (accessed 17.09.2019).
63 Hofmann, *supra* 61.
64 NASA, Office of Planetary Protection, https://planetaryprotection.nasa.gov/intpolicy, (accessed 19.09.2019); ESA, Planetary protection, https://www.esa.int/Our_Activities/Human_and_Robotic_Exploration/Exploration/ExoMars/Planetary_protection, (accessed 19.09.2019).

the legal gaps of the space treaties and internationally solve new issues that arise from the evolution of space activities. [65]

5. Conclusion

At this very early stage of the development of space mining activities, the question of their impact on the outer space environment is inseparable from the question of how to regulate space activities at large. Space mining will certainly pose, in the near future, specific harmful environmental challenges. However, the immediate problem is to address in a more general way the possibilities offered by international law to build a regime of protection of the environment.

Article IX OST and Article 7 MA both demonstrate a sincere effort to address environmental issues in space. However, the regime established is in practice difficult to apply, not the least because the ones interpreting treaties are the very same ones potentially harming the environment. It is still a reality that existing treaties legally bind their States Parties, and this provides a too often neglected opportunity to leverage them: especially if one accepts an interpretation favorable to the actors and their projects, then treaties appear as framing the action of the States and not solely limiting it. In other words, it is important to recognize the role of State actors in the building of environmental protection. Furthermore, it is also necessary to reflect on the type of legal endeavors that should be pursued. Where current existing treaty law is not sufficient to deal effectively with new issues, rather than hoping for a new treaty States are reluctant to adopt, compromises should be sought through "soft laws" based on principles actually admitted by States.

This situation may be temporary, pending the agreement on an international framework. For the time present and the immediate future, it has the merit of preventing States from doing as they please without any kind of consideration for the outer space environment, as it integrates their action in a canon of international obligations that are favorable to the environment.

65 Blount, *supra* 54, at 529.