

The Space Resource Mining Activities and the Problems of (In)completeness and (Un)certainty of International Space Law: A Critical Overview of the Main Issues

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I. Introduction

The extensive exploration activity of States, international organisations and private entities carried out in outer space in the last three decades, as well as the emerging new national legislation on activities in this space, are clear signs of the planned exploitation of the space natural resources. As a result, the term 'space mining', meaning the exploitation of raw materials from asteroids and other celestial bodies in space, has become popular. However, the use of outer space for commercial purposes gives rise to great legal uncertainty as there is no treaty law binding on all States active in outer space in this respect. The aim of the paper is to conceptualise and overview the main legal issues related to the commercial exploitation of space natural resources in the light of the issues of certainty and completeness of international space law. The author argues that the analysis of legal issues related to the exploitation of the space natural resources supports the key importance of customary law in this regard and the secondary importance of treaty law. It is customary law that plays a crucial role in legitimating legal certainty in international law, including space law. Although the author claims that it is customs and not treaties that are the

main formal source of international space law, he does not question the role of the latter in the international law-making process. Customary law focuses on the past because it is based on past practice, whereas treaties, especially so-called law-making treaties, look to the future, namely they aim at establishing rules concerning the expected activities of the parties. Two important functions of international agreements cannot be called into question. First, it is international agreements that establish and carry the institutional framework for the operation of the rules of international law, including rules for the settlement of legal disputes. Second, treaty regulations can become a catalyst for practice shaping customary law, including the practice of States that are not parties to them. In this sense, international agreements, as a factor shaping the practice of States, are the material source of the rules of general international law, that is the rules of law effective and opposable *erga omnes*. However, it does not seem possible for the rules of general international law to be established, if the practice resulting from the application of the provisions of a given treaty is not adhered to by States that are not parties to it. Therefore, it is the custom and not the treaty that will become the formal source of the rules of general international law.

The paper consists, in addition to this introduction, of four parts. Part II provides some substantial issues on the relationship between certainty and completeness of law and the formal sources of space law. Part III presents the basic principles of space law as the legal underpinnings of human activity in outer space and it aims to answer the question of (in)completeness of space law. Part IV analyses controversies over the legal status of the natural resources of outer space and their exploitation for commercial purposes. Part V provides the conclusions on the title issue, that is, the legality of space mining in the perspective of completeness and certainty of international space law.

II. Legal (Un)certainly, (In)completeness of Law and the Formal Sources of Space Law

Manfred Lachs, in his 1964 Hague lecture on the legal issues of outer space, stated, among other things, that “an important chapter of the law concerning celestial bodies will have to be written soon: on the exploration and use of their resources”.¹

¹ M. Lachs, *The International Law of Outer Space*, Recueil des Cours 1964, vol. 113, p. 7, 54. See also M. Lachs, *The Law of Outer Space. An Experience in Contemporary Law-making*, Sijhoff, Leiden 1972 (2010 reprinted), pp. 19–25. Today the latter monograph is seen as a “timeless foundational resource for space law academics, students, and practitioners the world over”, as Joanne I. Gabrynowicz and Sara M. Langston put it. See J.I. Gabrynowicz and

However, such a chapter has still not been written, and an attempt to do so in the form of the adoption in 1979 of Agreement Governing the Activities of States on the Moon and other Celestial Bodies² (hereinafter the Moon Agreement) failed. This is because although the Moon Agreement entered into force in 1984, only 18 States have been bound by it until 31 January 2022.³ The use of outer space for commercial purposes, therefore, gives rise to great legal uncertainty. Meanwhile, certainty in law is recognized as one of the basic values of any legal order. Legal certainty is understood as a legitimate possibility to forecast legal decisions. Without this value, no legal order could properly fulfil one of its basic functions, which is to coordinate the actions of legal subjects and to stabilize legitimate expectations regarding their behaviour, including their rights and obligations. For Gustav Radbruch, who to define it used the term *Rechtssicherheit*, it was one of the three main notions of the legal language, alongside justice and utility. At the same time, for Radbruch certainty as a highly ranked legal value is closely linked to the realization of justice.⁴ This latter value is also important, and even crucial, for the space mining because, as Article I of the 1967 Treaty on Principles Governing the Activities of States in the Exploration and the Use of Outer Space, including the Moon and Other Celestial Bodies (hereinafter the Outer Space Treaty) states, “the exploration and use of outer space shall be carried on for the benefit and in the interests of all States and shall be the province of mankind.”⁵

Legal certainty, however, is a ‘matter of degree’, which confirms a contention met in jurisprudence, namely, that a realistic goal of any legal order is the highest possible level of ‘uncertainty absorption.’⁶ It would mean that the phenomenon of uncertainty in law is neither confined to international law, nor is it resolvable in many cases. While legal certainty is a ‘matter of degree’ because it is said that there is no such thing as a legal system in which all the laws are precise, the space mining legal framework is an issue of particular uncertainty. At any rate, hardly any international

S.M. Langston, *Manfred Lachs and His Writings on the Law of Outer Space*, in: Z. Galicki, T. Kamiński, K. Myszona-Kostrzewa (eds), *Manfred Lachs – wybitny prawnik świata*, Warszawa 2011, p. 82.

² Agreement Governing the Activities of States on the Moon and other Celestial Bodies, opened for signature 5 December 1979, 1363 UNTS 3 (entered into force 11 July 1984).

³ <https://treaties.un.org/Pages/showDetails.aspx?objid=080000028003b946>.

⁴ See G. Radbruch, *Rechtsphilosophie*, 8. Aufl., K.F. Koehler, Stuttgart 1973, § 9.

⁵ Treaty on Principles Governing the Activities of States in the Exploration and the Use of Outer Space, including the Moon and Other Celestial Bodies, opened for signature 27 January 1967, 610 UNTS 205 (entered into force 10 October 1967).

⁶ See e.g. H.A. Hart, *The Concept of Law*, 3rd ed., OUP, Oxford 2011, pp. 124–141; J. Kammerhofer, *Uncertainty in International Law: A Kelsenian Perspective*, Routledge, London–New York 2011, pp. 1–5.

law scholar would be ready to argue that the law of outer space is not uncertain in this respect.

This uncertainty is directly related to the problem of completeness of space law. The question arises whether a law that is incomplete because it lacks rules enabling the legal classification of certain actions (ontological incompleteness), or because the meaning of those rules is not clear (epistemological incompleteness), is a sufficiently certain law. In the international space law there are, on the one hand, several rules unquestioned by States, led by the prohibition of the appropriation of space, and, on the other hand, the provisions of treaty law, with the exception of the Moon Agreement, do not explicitly refer to the exploitation of the natural resources of celestial bodies. Therefore, there is a doubt whether the legal framework for such activities is sufficiently complete and, consequently, whether the desired legal certainty has been established within it, aimed at harmonising the legitimate expectations of legal entities related to their rights and obligations. In particular, it is questionable whether the unilateral commercial exploitation of the natural resources of celestial bodies does not violate the basic principles of space law: the freedom of exploration and use of outer space for the 'benefit and in the interests of all States', the prohibition of the appropriation of outer space, the obligation to conduct activities therein in accordance with international law and in the interests of maintaining international peace and security. These principles can be found in the most important space law treaty, the aforementioned 1967 Outer Space Treaty. This treaty, however, did not so much give these principles a legal nature as confirm their binding force, since prior to its adoption they had become rules of customary law in the opinion of the vast majority of States. Today, this view is commonly shared in the academia. Two resolutions of the General Assembly of the United Nations, adopted unanimously by the UN Member States, are regarded as an expression of this customary law: resolution 1721 entitled International Co-operation in the Peaceful Uses of Outer Space of 20 December 1961⁷ and especially resolution 1962 of 13 December 1963 under the symptomatic title Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space⁸ (hereinafter the

⁷ Res. 1721 (XVI).

⁸ Res. 1962 (XVIII). One should keep in mind that, on the one hand, a General Assembly resolution which chooses to assume the name 'declaration' is not thereby rendered legally more binding than any other recommendation, but, on the other, the term 'declaration' has been reserved in the United Nations practice to matters of major importance. This was underlined in a Memorandum of the United Nations Office of Legal Affairs on the Use of the Terms "Declaration" and "Recommendation" of 2 April 1962 (UN Doc. E/CN.4/L.610). Par. 4 of the Memorandum stipulates: " 'declaration', it may be considered to impart, on behalf of the organ adopting it, a strong expectation that Members of the international community will abide by it. Consequently, in so far as the expectation is gradually justified by State practice,

Outer Space Declaration). Thus, Manfred Lachs, in the aforementioned 1964 lecture, did not claim that the status of outer space at that time remained outside the framework of international law, despite the lack of international agreements in this respect.⁹ Instead, he saw the problem in the ambiguity of law on the exploration and exploitation of the natural resources of space, and was, therefore, convinced of the need to develop legal rules in this respect.

To date, this problem has not been resolved unequivocally, despite the adoption of five multilateral and potentially universal international agreements at the United Nations. The aforementioned failure of the youngest of these, the Moon Agreement, and the lack of practice in the exploitation of the natural resources of space and, consequently, the lack of customary law in this respect, raise several fundamental problems in the international legal order, namely:

- does international law sufficiently and, in this sense, completely govern human activity in space?;
- an affirmative answer to this question, that is, the conviction of the completeness of law, raises the question of the formal sources of the binding rules and principles of this law: are these customs, treaties or general principles of law?;
- the opposite belief, that is, the assumption of the lack of a complete, ‘positive’ international legal regulation, generates another question, namely, whether the

a declaration may by custom become recognized as laying down rules binding upon States...”. Par. 5 of the Memorandum states: “In conclusion, it may be said, that in United Nations practice, a “declaration” is a solemn instrument resorted to only in very rare cases relating to matters of major and lasting importance where maximum compliance is expected”. On legal significance of the Resolution 1962 in that time see B. Cheng, *United Nations Resolutions on Outer Space: “Instant” International Customary Law?*, Indian Journal of International Law 1965, vol. 5, p. 23, reprinted in B. Cheng, *Studies in International Space Law*, Clarendon Press, Oxford 1997, pp. 125, 132–136.

⁹ Lachs claimed: “The Declaration of 1963 is to be viewed as the culmination of a certain process. Its great value and strength is that it has created a framework for the law of tomorrow”. M. Lachs, *The International Law of Outer Space...*, p. 99 Today this Declaration is said as an “evidence of generally accepted principles”, as Brownlie put it. I. Brownlie, *Principles of Public International Law*, 7th ed., OUP, Oxford 2008, p. 257. See also J. Crawford, *Brownlie’s Principles of Public International Law*, 9th ed., OUP, Oxford 2019, p. 332; S. Hobe, Kuan-Wei Chen, *Legal Status of Outer Space and Celestial Bodies*, in: R.S. Jakhu, P.S. Demosey (eds), *Routledge Handbook of Space Law*, Routledge, London 2017, p. 26. Prior to the adoption of the *Outer Space Treaty*, Bin Cheng expressed doubts in this respect. Although Cheng proclaimed that the UN General Assembly resolutions “may be used as a means for identifying the existence and contents of a new *opinio juris*”, he claimed that the *Outer Space Declaration* 1962 “expresses non-binding standards of international law”. See Cheng, *United Nations Resolutions...*, pp. 136–142. Similar doubts were raised in the Polish space law scholarship of that time. See e.g. J. Sztucki, *Problemy prawne Kosmosu (Issues of Space Law)*, PISM, Warszawa 1965, pp. 13, 19–20, 110, 115.

- existing gaps can be filled by a particular practice whose legitimacy is the result of the lack of explicit prohibition rules, which is known as the *Lotus* doctrine?;
- how is legal certainty in the international legal order affected from a legality perspective by the resolution of disputed cases based on the interpretative directive arising from the *Lotus* doctrine: “whatever is not explicitly prohibited is permitted”?

III Principles of Space Law, Its Completeness, and Space Mining Activities

It is appropriate to begin the analysis of the problem of completeness of space law and its certainty by recalling the principles of space law known as *corpus iuris spatialis internationalis*. These principles, that is, legal rules with a general scope of application, were established in the already mentioned legal acts: the Outer Space Declaration 1962 and the Outer Space Treaty. The interpretation of these principles should be made on the basis of their mutual relationships and substantive interdependencies. An examination of the meaning of the rules of international law in the context of other rules of a given treaty as well as of the other international legal rules that bind the contracting parties is indicated in the Vienna Convention on the Law of Treaties.¹⁰ This approach known as ‘systemic integration of international law’ was also supported by the International Law Commission in another of its documents, the Report on the Fragmentation of International Law.¹¹ This justifies the aforementioned need to interpret specific principles of space law in the context of its other principles and in the context of international law as a whole. In fact, this follows directly from the Outer Space Declaration and the Outer Space Treaty, which indicate the obligation to act in space in accordance with international law.

These legal acts list the following principles that must be taken into account when analysing the legal issues of space mining:

- the exploration and use of outer space shall be carried on for the benefit and in the interests of all States and shall be the province of mankind (Par. 1 OSD; Art. I OST);

¹⁰ Vienna Convention on the Law of Treaties, opened for signature 23 May 1969, 1155 UNTS 331 (entered into force 27 January 1980), Art. 31(3)(c). Before the entry into force of the VCLT, the rules on the interpretation of treaties were considered as the rules of the customary law of treaties. See R. Gardiner, *Interpretation of Treaties*, OUP, Oxford 2008, pp. 12–19.

¹¹ Conclusions of the Work of the Study Group of the International Law Commission on the Fragmentation of International Law: Difficulties Arising from the Diversification and Expansion of International Law (2006), UN Doc A/Res/61/34, par. 1(1).

- outer space and celestial bodies shall be free for exploration and use by all States on a basis of equality and in accordance with international law (Par. 2 OSD; Art. I OST);
- outer space and celestial bodies are not subject to national appropriation by claim of sovereignty, by means of use occupation, or by any other means (Par. 3 OSD; Art. II OST);
- States 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 (Par. 4 OSD; Art. III OST);
- States shall bear international responsibility for national activities in outer space, including the Moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with international law; 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 (Par. 5 OSD; Art. VI OST);
- in the exploration and use of outer space, States shall be guided by the principle of cooperation and mutual assistance and shall conduct all their activities in outer space with due regard for the corresponding interests of other States (Par. 6 OSD; Art. IX OST).

According to the aforementioned principles, the analysis of the problem of the legal framework of space mining, including the legality of unilateral exploration and exploitation activities of States and private entities in space, should take into account not only the freedom of action of States and private entities under their jurisdiction and the prohibition of appropriation of outer space, but also the maintenance of international peace and security. Community interest is also of great importance in this regard, as the exploration and use of outer space should be carried on 'for the benefit and in the interests of all States' and is explicitly defined in the Outer Space Treaty as 'the province of mankind'. It is therefore necessary to consider whether the prohibition of appropriation is not a logical and factual consequence of this community interest. In any case, each of the listed principles of space law should be interpreted in the context of the other principles. This systemic approach is further reinforced in the Outer Space Declaration and the Outer Space Treaty by the direct emphasis on the obligation of States to carry on all space activities in accordance with international law, including the Charter of the United Nations. However, does the mere binding force of the aforementioned principles ensure the

completeness of international space law in terms of validation (normative validity of legal rules), classification (attachment of a rule to the system of rules) and decision-making (basis for resolving legal disputes)? In particular, the problem is whether such completeness can be ensured in international law only by rules whose normative validity has been explicitly recognised or confirmed by States? An affirmative answer to this question will mean supporting the incompleteness of space law, since the principles of space law do not explicitly refer to the commercial exploitation of the space natural resources. Thus, there is no clear position of States on its legality or illegality. In this sense, there are no rules explicitly recognised by States consenting to such activity. This prompts consideration of an important issue for both the international legal order and national legal orders, namely whether the completeness of law and its certainty is the existing state of affairs or only a certain ideal determining the direction for the development of law. The position in favour of the completeness of international law needs, in any case, to be verified in the context of exploitation activities in outer space.

The position on the completeness of international law in general is taken, for example, by the authors of the latest edition of the most famous treatise on international law. Let this position be used as a reference point for the analysis of the problem of the completeness of space law. According to Oppenheim's International Law:

International law may now properly be regarded as a complete system. By this is meant not that there is always a clear and specific legal rule readily applicable to every international situation, but that every international situation is capable of being determined *as a matter of law*, either by the application of specific legal rules where they already exist, or by the application of legal rules derived, by the use of known legal techniques, from other legal rules or principles. It is thus not permissible for an international tribunal to pronounce a *non liquet*, i.e. to invoke the absence of clear legal rules applicable to a dispute as a reason for declining to give judgment.¹²

In the absence of specific legal rules on the exploitation of the natural resources of outer space, the question arises as to from which other rules and principles of law can specific rules be derived that can be applied to this activity. It is, in other words, about the main formal source of space law. It is not, as it seems, treaty law but customary law. However, the view is expressed that "the general principles and legal regime posited by the Outer Space Treaty can also be upheld against those currently

¹² R. Jennings, A. Watts, *Oppenheim's International Law*, 9th ed., vol. 1, Longman, London–New York, pp. 12–13.

not parties to it”.¹³ It is based on the belief that the Outer Space Treaty is not only an international agreement establishing obligations between the parties, but also a law-making treaty (*traité-loi*) creating “the broad legal framework for an entire specific area”.¹⁴ However, it is difficult to provide a convincing justification for this view, as it makes it impossible to explain the ‘substance’ of the treaty regime beyond its form, that is, the treaty itself. As it seems, a better justification is as follows: the provisions of the Outer Space Treaty which contain the principles of space law are declaratory in nature, that is, they confirm the rules of customary law which is their formal source. In the absence of protests following the commencement of space exploration activities, including the collection of samples of the natural resources of celestial bodies by launched space objects, these principles of customary law constitute general space international law (*corpus iuris spatialis internationalis*), because they are applicable and effective *erga omnes*. I emphasise the importance of general space international law, because I argue that without general international law it is not possible for a clear legal framework to be shaped within which the conduct of space resource exploitation activities would be opposable and effective towards all entities of international law. The uncertainty regarding law on the exploitation of space resources arises precisely from the difficulty of identifying the formal sources of general international law in this respect. Mere general principles of law are insufficient in this regard. Due to the lack of practice, customary law rules have not developed in this field either.¹⁵ The only international agreement that mentions the exploitation of the natural resources of the Moon and other celestial bodies, namely the Moon Agreement, has been signed by only 18 States. For this reason, and due to the lack of exploitation practice in outer space, its rules have not become part of customary law, binding on all States. In any case, the Moon Agreement is not a source of general international law.¹⁶

The Moon Agreement refers to celestial bodies and their natural resources as the “common heritage of mankind” (Article 11 (1)) and obliges the parties to “undertake to establish an international régime, including appropriate procedures, to

¹³ F. von der Dunk, *International Space Law*, in: F. von der Dunk, F. Tronchetti (eds), *Handbook of Space Law*, Edward Elgar 2017, pp. 59–60.

¹⁴ *Ibid.*

¹⁵ Bin Cheng, analyzing the problem of the so-called ‘instant customary international law’ under the space law before the adoption of the *Outer Space Treaty*, argued that “international customary law has in reality one constitutive element, the *opinio iuris*”. See B. Cheng, *United Nations Resolutions...*, p. 139. However, this view was not and still is not justified in the light of the positions of States, the decisions of the International Court of Justice, works of the International Law Commission and opinions of the majority of international legal scholars.

¹⁶ See e.g. V.S. Vereschetin, G.M. Danilenko, *Custom as a Source of International Law of Outer Space*, *Journal of Space Law* 1985, vol. 13, no. 1, pp. 22, 34.

govern the exploitation of the natural resources of the moon as such exploitation is about to become feasible” (Article 11 (5)). Therefore, it is necessary to consider a situation that may arise if the exploitation of the natural resources of space proves to be possible from a technological point of view. The State Parties to the Moon Agreement may seek, acting pursuant to its Article 18 in connection with Article 11(5), to establish an “international regime”, while States that are not parties to it, that is, those questioning the status of the natural resources of celestial bodies as the common heritage of mankind, and/or private entities under their jurisdiction will start unilateral exploitation of these resources for commercial purposes. Moreover, this activity will be conducted both in the conviction that it is in compliance with the prohibition of appropriation of outer space and with the property rights to the extracted resources, which is currently explicitly emphasised by the legislation of the USA or Luxembourg.¹⁷ Will this result in the establishment of two different, even contradictory, legal regimes? If so, neither of them will derive from general international law. This is the origin of the uncertainty about the law on the natural resources of outer space. Serious practical controversies may arise from this uncertainty.

Another legal explanation of this hypothetical scenario is also possible, namely perceiving the basis for such actions in the principle “whatever is not explicitly prohibited is permitted by law”. This view was taken in 2015 by the Board of Directors of the International Institute of Space Law, stating: “[I]n view of the absence of a clear prohibition of the taking of resources in the Outer Space Treaties one can conclude that the use of outer space resources is permitted”.¹⁸ This approach, which is an expression of the legal view known as the *Lotus* position or doctrine, plays an ambiguous role in the context of the certainty of space law. On the one hand, it protects the completeness of law by stating that whatever is not explicitly prohibited by law is legal, or at least not illegal, that is, subject to legal classification.¹⁹ On

¹⁷ Loi du 20 juillet 2017 sur l’exploration et l’utilisation des ressources de l’espace, Journal Officiel du Grand-Duché de Luxembourg, Mémorial a N° 674 du 28 juillet 2017, Art. 1, Art2(3); 2015 U.S. Commercial Space Launch Competitiveness Act, Title IV – *Space Resource Exploration and Utilization*, § 51303, Sec. 403 (Public Law 114–90 – Nov. 25).

¹⁸ International Institute of Space Law, *Position Paper on Space Resource Mining Adopted by Consensus by the Board of Directors on 20 December 2015*, available at: <https://iislweb.space/iisl-position-paper-on-space-resource-mining/> (last accessed: 22 February 2022).

¹⁹ The controversy over the significance for international law of the *Lotus* doctrine revived after the International Court of Justice Advisory Opinion on *Accordance with International Law of the Unilateral Declaration of Independence in Respect of Kosovo*. Jochen Frowein’s polemic against Judge Simma’s declaration to this Advisory Opinion seems to be of particular interest in assessing the significance of the *Lotus* doctrine for completeness of international law, including space law. See J.A. Frowein, *Kosovo and Lotus*, in: U. Fastenrath *et al* (eds), *From Bilateralism to Community Interest: Essays in Honour of Bruno Simma*, OUP, Oxford 2011, pp. 924–931.

the other hand, however, this approach does not sufficiently clarify the relationship of the unilateral activities of States in space to the common or even community interest referred to in Article I of the Outer Space Treaty: the exploration and use of outer space for the benefit and in the interests of all States. It should be remembered that the Permanent Court of International Justice decided in the *Lotus* case on the problem concerning the extent to which a State may apply its domestic law to events and persons outside of its territory in circumstances affecting the interests of the other States. It is a case of unilateral space mining activities. Thus, is legally justified to carry out such activities by a State, say, Luxembourg, solely on the basis of its national law? In any case, such an individualistic approach of particular States without its general acceptance by the other States will not serve legal certainty and, consequently, peaceful cooperation of States. In turn, the legal regime itself would be shaped by a *first come, first served* approach and its acceptance or contestation by States not directly participating in exploitation activities. In the event of protests by States, customary law rules would not be developed as a formal source of general international law. An alternative would be the development of law based on a treaty regime, such as the Moon Agreement, or a new treaty. In such a situation, general international law would not be established without customary law either. Its rules would be developed when the practice shaped in the framework of treaty obligations was also joined by States that were not parties to the treaty. The rules of such law could then be confirmed by a subsequent treaty that would be generally applicable. Thus, the situation of 1967 could be repeated, when the Outer Space Treaty confirmed the fundamental customary rules of outer space law applicable prior to its entry into force.

For the legal assessment of the planned exploitation of the space natural resources, it seems crucial to address the issue of the legal status of those resources. In particular, the issue of whether their legal status is different from the legal status of outer space itself and celestial bodies, which, as no subject of international law has so far questioned, may not be appropriated, seems to be important in this respect.

IV. Controversies over the Legal Status of Space Resources, Their Exploration and Exploitation, and an Issue of Legal (Un)certainly within *corpus iuris spatialis*: Between the *common heritage of mankind* and *Lotus*

The legal status of the space natural resources has so far only been explicitly defined in the space treaty with the lowest number of ratifications/accessions – the Moon Agreement. It considers these resources, along with the Moon and other celestial bodies, the “common heritage of mankind”. Von der Dunk argues that this term

has a different meaning than the term “province of all mankind” used by the Outer Space Treaty and the terms “global commons” and “res communis” used to refer to things, territories and goods beyond the exclusive rights of individual States. The difference between the two, he argues, is that while States enjoy the freedom of action within what is referred to as the province of all mankind/global commons/res communis, if that freedom is not restricted by specific prohibitions, within the common heritage of mankind this freedom has been conditioned, indeed replaced, by the need to establish an “international regime” prior to any exploitation activity.²⁰ The community interest prevails within such a regime over the individual interests of States. As a result, activities within such a legal regime are carried out “on behalf of mankind”, as the UN Convention on the Law of the Sea (UNCLOS)²¹ explicitly underlines in relation to the “Area”. Thus, in contemporary literature on space mining there are frequent references to this UNCLOS regulation.²²

The Moon Agreement is not, as mentioned, a source of general international law, which makes it redundant at this point to analyse the term common heritage of mankind contained in this agreement in relation to the natural resources of outer space. Nevertheless, it should be mentioned that, at the time of the negotiation of the Moon Agreement, States belonging at that time to different political blocs criticised this category at the Committee of the Peaceful Uses of Outer Space (COP-UOS) as ‘vague’ (Canada), ‘imprecise’ (Japan, United Kingdom) or even ‘devoid of legal significance’ (Bulgaria).²³ After the adoption of this agreement, concerns were expressed that the introduction of this ambiguous term into the agreement would give rise to disputes over its interpretation, create problems with the ratification of the Moon Agreement and, consequently, undermine its effectiveness.²⁴ These

²⁰ F. von der Dunk, *International Space Law...*, p. 58. Cf. M. Lachs, *Some Reflections on the State of the Law of Outer Space*, *Journal of Space Law* 1981, vol. 9, no. 1–2, pp. 3, 9; L.M. Fountain, *Creating Momentum in Space: Ending the Paralysis Produced by the Common Heritage of Mankind Doctrine*, *Connecticut Law Review* 2003, vol. 35, p.1753; F. Tronchetti, *Legal Aspects of Space Resource Utilization*, in: F. von der Dunk, F. Tronchetti (eds), *Handbook of Space Law*, Edward Elgar 2017, pp. 769, 785–788.

²¹ UN Convention on the Law of the Sea, opened for signature 10 December 1982, 1833 UNTS 3 (entered into force 16 November 1994), Art. 133–141.

²² See esp. F. Tronchetti, *The Exploitation of Natural Resources of the Moon and Other Celestial Bodies. A Proposal for a Legal Regime*, Martinus Nijhoff, Leiden 2009, chap. 6.

²³ A. Górbiel, *Międzynarodowe prawo kosmiczne*, PWN, Warszawa 1985, p. 138.

²⁴ A. Górbiel, *Międzynarodowe...*, p. 139; A. Górbiel, *International Regulation of the Use of the Lunar Natural Resources and the „Common Heritage of Mankind” Doctrine*, *Acta Universitatis Lodzianensis. Politologia* 1983, vol. 9, p. 3. See also Z. Galicki, *Status prawny Kosmosu*, in: A. Wasilkowski (ed.), *Działalność kosmiczna w świetle prawa międzynarodowego*, Ossolineum, Wrocław 1991, pp. 6, 14–15. Cf. S. Gorove, *Space Resources and the Developing Nations. A Legal Assessment*, in: *International Space Law Miscellanea. Liber Amicorum Honouring*

concerns proved to be justified. As a result, in the academia there are still different views on the legal status of the natural resources of outer space and on the legality of unilateral exploitation activities in the context of the prohibition of appropriation of outer space and its celestial bodies.

In addition to the unclear legal status of the space natural resources, the examination of the legality of space mining should also take into account the differences between exploration and exploitation activities, the use of the natural resources of celestial bodies *in situ* and their use on Earth, and the activities of States and private entities in outer space. The latter issue is related to the currently extensive space exploration activities of private entities and their intentions to exploit outer space for commercial purposes. However, *corpus iuris spatialis* is state-centred, because it was formed at a time when only States were undertaking space activities. One should also bear in mind the ‘Cold War’ origins of space law.²⁵ Moreover, this law was shaped at a time when commercial human mining activities in space were not taken into account. This is the reason for the demand, often heard today, to include private entities in the shaping of legal rules on space mining.²⁶

It is time to put forward the main arguments in favour of and against the legality of space mining. The main argument in favour of its legality is derived from the principle of freedom of exploration and use of outer space and the absence of explicit prohibitions relating to exploitation activities. It is, therefore, claimed that in view of the ambiguity of customary law, or even its absence due to relevant practice, and because of the silence of treaty law on the issue, it is unfounded to presume prohibitions restricting the freedom of exploration and use of outer space by States.²⁷ It is

Professor Andrzej Górbiel, Warszawa 1995, p. 102. In the time of the entry into force of the *Moon Agreement*, opinions were also expressed approving this regulation. See e.g. N. Jasentuliyana, *The Moon Treaty*, in: N. Jasentuliyana (ed.), *Maintaining Outer Space for Peaceful Uses*, The United Nations University 1984, p. 124. See also M. Lachs, *Some Reflections...*, p. 9, who claimed that the term *common heritage of mankind* was in the comparison to the term *province of mankind* an “important progress”.

²⁵ J. Gabrynowicz, *Space Law: Its Cold War Origins and Challenges in the Era of Globalization*, Suffolk University Law Review 2004, vol. 37, pp. 1041, 1043.

²⁶ See e.g. F. Tronchetti, *The Exploitation of Natural Resources...*, pp. 4–5, 239–240; F. Tronchetti, *Legal Aspects...*, pp. 810–812; R.J. Lee, *Law and Regulation of Commercial Mining of Minerals in Outer Space*, Springer, Dordrecht 2012, p. 8; R.S. Jakhu, J.N. Pelton, Y.O. Mankata Nyampong, *Space Mining and Its Regulation*, Springer, Dordrecht 2017, pp. 59–60.

²⁷ See Jinyuan Su, *Legality of Unilateral Exploitation of Space Resources under International Law*, *International and Comparative Law Quarterly* 2017, vol. 66, p. 991; A.D. Pershing, *Interpreting the Outer Space Treaty’s Non-Appropriation Principle: Customary International Law from 1967 to Today*, *Yale Journal of International Law* 2019, vol. 44, no. 1, p. 149; T. Gangle, *The Legality of Mining Celestial Bodies*, *Journal of Space Law* 2015–2016, vol. 40, no. 1–2, pp. 187, 209–210, 212; P. de Man, *The Exploitation of Asteroids and Non-Appropriation*

argued that such a prohibition also does not follow from the principle of common benefit and interests of all States, since interests common to ‘all countries’ are not equivalent to common benefits and interests for ‘each country’.²⁸

The two main arguments against considering the principle of freedom of exploration and use of outer space as the basis for the legality of unilateral exploitation activities in outer space are as follows. First, this principle was adopted by States primarily to protect their freedom of scientific exploration in space, as evidenced by the discussion between States at COPUOS, also after the adoption of the Outer Space Treaty.²⁹ This argument supports a different legal regime for exploration and exploitation activities in space. Thus, activities in the two regimes would be classified differently in the context of ‘property rights’ and the non-appropriation principle. The second, even more important, argument calls into question the presumption that whatever is not explicitly prohibited is permitted by law. It was put forward by a pioneer of international space law, Manfred Lachs, even before the adoption of the Outer Space Treaty. In the aforementioned 1964 Hague lectures, Lachs emphasised that a State’s exclusive rights to outer space, celestial bodies and their resources are not justified by the priority of discovery or the technical feasibility of their use. The prohibition of appropriation is absolute and “applies to outer space as a whole”, claimed Lachs.³⁰ This argument contradicts today’s attempts to justify the exploitation of the natural resources of space on the basis of the *first come, first served* rule. Lachs justified his rejection of the presumption that everything that is not explicitly prohibited is permitted by law on the basis of the protection of rights of States not engaged in space activities. He argued: the rights of entities active in outer space arising from the freedom to conduct such activities are co-determined by the rights of other members of the international community, since these rights “may be affected” by the actions of States active in outer space. According to Lachs,

Principle: Reflections on the Nature of Property Rights in Light of the US Space Resource Act of 2015, Journal of Space Law 2015–2016, vol. 40, no. 1–2, pp. 1, 52–54; P. de Man, *Exclusive Use in an Inclusive Environment: The Meaning of Non-Appropriation Principle for Space Resource Exploitation*, Springer, Dordrecht 2016, *passim*.

²⁸ Jinyuan Su, *Legality...*, pp. 1002–3. See also R.J. Lee, *Law and Regulation...*, p. 161. Lee distinguishes and comments four positions regarding the compliance of commercial space activities with the freedom to explore and use outer space which under Art. I of the *Outer Space Treaty* should be carried out *for the benefit and in the interests of all States* and it is *the province of mankind*. It is worth recalling Manfred Lachs’ opinion given prior to the adoption of the *Moon Agreement*. Lachs claimed: “The law relating to access to outer space must facilitate and not frustrate the endeavors of any State to avail itself for lawful purposes of the rights flowing from it”. M. Lachs, *The Law of Outer Space...*, p. 60.

²⁹ See F. von der Dunk, *International Space Law...*, p. 48. Cf. S. Hobe, Kuan-Wei Chen, *Legal Status of Outer Space...*, pp. 31–34.

³⁰ M. Lachs, *The International Law of Outer Space...*, pp. 51, 54.

in international law there is a close relationship between the subjective and objective criteria determining the limits of States' freedom of action, and outer space is no exception. Therefore, "the freedom to explore and use outer space and celestial bodies is neither absolute nor unqualified".³¹ This argument in different options appears in the contemporary debate, as will be discussed below.

Despite the differences between the two sides to the dispute, in particular the differences concerning the legality of exploitation activities in outer space for commercial purposes from the point of view of the non-appropriation principle, it is worth emphasising the circumstance which unites the adversaries in this dispute. It is the conviction of the need to establish a treaty regime governing human activity in outer space, e.g. similar to the "Area" regulation under UNCLOS. Such a demand, as already mentioned above, is common. The first step towards its fulfilment was the 'international régime' of Article 11(5) of the Moon Agreement. However, the implementation of the provisions of this agreement, or rather the lack thereof, does not inspire optimism with regard to the establishment by States in the near future of a similar treaty regime that would be generally applicable.

There is no doubt that the legal assessment of space mining should first and foremost be made in the light of the principles of States' activities in space confirmed by the Outer Space Treaty. Space law is, therefore, not completely uncertain. In the prism of unilateral exploitation activities for commercial purposes, the non-appropriation principle is brought to the fore. First of all, it is necessary to address the issue of whether this prohibition applies only to outer space and celestial bodies or also to their natural resources. Consequently, it should be considered at this point whether they have the same or different legal status. It should be recalled that the 2015 US's Space Resource Exploration and Utilization Act, on the one hand, requires the US President to "facilitate commercial exploration for and commercial recovery of space resources by US citizens" (§ 51302 (a)(1)) and grants US citizens rights to the space resources obtained³², while, on the other hand, it does not recognise this as appropriation of space.³³ The right to acquire the natural resources of space is also emphasised by the Luxembourg Law of 2017 on the Exploration and

³¹ Ibid., p. 70.

³² Space Resource Exploration and Utilization Act, *supra* note 17, § 51303. *Asteroid resource and space resource rights*: "A United States citizen engaged in commercial recovery of an asteroid resource or a space resource under this chapter shall be entitled to any asteroid resource or space resource obtained, including to possess, own, transport, use, and sell the asteroid resource or space resource obtained in accordance with applicable law, including the international obligations of the United States".

³³ Ibid, Sec. 403 – Disclaimer of Extraterritorial Sovereignty: "It is the sense of Congress that by the enactment of this Act, the United States does not thereby assert sovereignty or sovereign or exclusive rights or jurisdiction over, or the ownership of, any celestial body".

Use of Space Resources (Article 1)³⁴, which at the same time places the requirement to carry out space activities in accordance with the international obligations of Luxembourg (Article 2 (3)). These regulations are based on the clear distinction between the legal status of outer space and celestial bodies and the legal status of their natural resources and on the consequently relative nature of the prohibition of appropriation. They are, therefore, not in line with Lachs' opinion referred to above, according to which the prohibition of appropriation "applies to outer space as a whole".

Is there then a uniform legal regime for celestial bodies and their resources? In view of the difference of opinion between the State Parties to the Moon Agreement and other States such as the USA and Luxembourg, this question is still open. The failure of the Moon Agreement now leads to the conclusion that the prohibition of appropriation of outer space understood as a prohibition precluding the acquisition of rights to natural resources by individual States and/or private entities under their jurisdiction is not supported by the entire community of States. However, only the commencement of exploitation activities in space will enable a more reliable assessment, since only then, faced with a specific practice, will there be acts of members of the international community approving it or questioning its legality. Nevertheless, it is necessary to consider whether the very commencement of such individual exploitation activities falls within the framework of the freedom of States to explore and use outer space or, alternatively, whether it may be qualified as a violation of the prohibition of appropriation of outer space.

It may be helpful in this respect to recall the position of representatives of the New Haven School of 1964. Myres S. McDougal and his associates expressed an opinion at that time that equal access to the use of celestial bodies by all members of the international community was the best means of peaceful use of outer space.³⁵ They predicted that the natural resources of outer space would become generally accessible to both organised and unorganised entities. At the same time, they expressed an assumption which, from today's perspective, still deserves thorough consideration. Namely, they claimed:

The probabilities are ... that general community consensus will include only certain stock resources, such as minerals, among the space resources which may be subjected to exclusive appropriation, and that the spatial-extension resources of the celestial bodies will be maintained as sharable resources, open to free access by all. ... [T]he great bulk of

³⁴ Loi du 20 juillet 2017 sur l'exploration et l'utilisation des ressources de l'espace, supra note 17, Art 1: "Les ressources de l'espace sont susceptibles d'appropriation".

³⁵ M.S. McDougal, H.D. Lasswell, I.A. Vlasic, *Law and Public Order in Space*, Yale University Press, New Haven 1964, p. 820.

space resources should be held open for inclusive enjoyment by all, and not made subject to exclusive acquisition.³⁶

Decades later, Ian Brownlie argued that human activity in space “can create sort of possessory title”, while emphasising that “the existing rules need development to cope with the practical problems of peaceful but competing uses and matters of jurisdiction”.³⁷ These views reflect the mainstream of legal research into the expected commercial exploitation of the natural resources of space. Within this mainstream, on the one hand, the vagueness of existing international law and the need for its development in this area is claimed, while on the other hand, the need for a thorough justification of rights to the natural resources of celestial bodies is expressed.

In view of the vagueness of international law, even an alternative in the form of private law is proposed, in the light of which, as advocates of economic analysis of law maintain, there is little difficulty in assigning property rights to the natural resources of space.³⁸ Such a position is, of course, based on the assumption of a different legal status of the natural resources of celestial bodies from that of celestial bodies themselves, whose prohibition of appropriation is not questioned. However, this approach does not seem sufficiently justified. This is because it is States that are responsible for the activities in space of all entities under their jurisdiction. Since it is questionable whether States themselves have exclusive rights in rem to the natural resources of celestial bodies, it is even less likely that such rights can be enjoyed by private entities under their jurisdiction. In other words, this generates problems concerning the legal justification of the *erga omnes* effectiveness of private entities’ property rights to the natural resources of outer space. It is difficult to look for such justification in private law; it is more difficult, in any case, than in international law. Under existing international space law, private entities have no autonomous subjective status therein. In this law, which was and still is a state-centric regulation, the activities of private entities are attributable to States, States are obliged to supervise the activities of private entities and it is States that bear responsibility for these activities (Article VI of the Outer Space Treaty). Consequently, the activity of private entities in outer space that violates the prohibition of appropriation calls into question the compliance of actions in outer space of a particular State with international law (Article II in connection with Article III of the Outer Space Treaty). In view of

³⁶ Ibid, pp. 869, 871.

³⁷ I. Brownlie, *Principles of Public International Law*, 7th ed., OUP, Oxford 2008, p. 257. See also J. Crawford, *Brownlie’s Principles...*, p. 333.

³⁸ See A.W. Salter, *The Other Space Race: Some Law and Economics of Celestial Resource Appropriation*, Georgia Journal of International and Comparative Law 2018, vol. 47, no. 1, pp. 14–16. Salter claims that this will not have the “deleterious effects” for humankind.

the private sector's exploration activities in outer space, which are noticeable nowadays, and due to the state-centric origin and framework of space law, the need for private entities to participate in the development of law on the exploitation of the natural resources of space should be emphasised once again.³⁹

Regardless of whether activities in outer space will be carried out by States, international organisations or private entities, a key issue will be the relationship between the two principles of space law: the freedom to explore and use outer space (Article I of the Outer Space Treaty) and the prohibition of its appropriation (Article II of the Outer Space Treaty). In particular, it seems important to draw a line between this freedom and "appropriation by use" of outer space by acquiring rights to natural resources obtained as a result of their commercial exploration and exploitation.⁴⁰ In particular, we are faced at this point with the problem of whether the absence of an explicit prohibition on commercial mining activities in space is a sufficient legal basis for undertaking and carrying out such activities. Doubts arise as to whether commercial exploration and exploitation activities will not lead to the acquisition of exclusive rights within celestial bodies. Thus, whether this activity will comply not only with the prohibition of appropriation, but also with the *ratio* of freedom of exploration and use of outer space, which, as "the province of mankind", is supposed to serve the "benefits and interests of all countries". This shows how interdependent the two principles are; they are even destined to be co-interpreted.

It is not only extraction that raises legal issues. Space mining, in fact, consists of three main phases/segments: the exploration segment, the extraction segment and the exploitation segment.⁴¹ Each of these phases has its own specific, although interdependent, problems. Let us identify the most important ones. With regard to the exploration segment, law, in principle, establishes in this respect the freedom of States and entities under their jurisdiction. The problem arises when samples of the space natural resources collected during its exploration will be used for commercial purposes and not for public scientific goals. Can such use of space materials be reconciled with the benefits and interests of all countries? The extraction phase, which is not necessarily performed for commercial purposes, raises even more problems, since extraction activities lead by their very nature to the acquisition, at least to some extent, of an exclusionary right within the part of the celestial body on which the extraction activity is carried out. Doubts therefore arise as to whether, through 'appropriation by use', the prohibition of appropriation of outer space will not be violated. The exploitation phase, namely the

³⁹ See supra note 26.

⁴⁰ Cf. R.S. Jakhu, J.N. Pelton, Y.O. Mankata Nyampong, *Space Mining and Its Regulation...*, p. 125.

⁴¹ R.J. Lee, *Law and Regulation...*, pp. 10–11.

processing and disposal of natural resources, is no less problematic. Such activity would have to be anchored in rights in rem over resources, particularly property rights. It therefore also relates to the issue of appropriation of celestial bodies. The granting of such rights by particular States and/or private entities under their jurisdiction while declaring that the rights to the natural resources of celestial bodies do not violate the non-appropriation principle is, in any case, incompatible with Lachs' view presented above. Let us recall that according to it the prohibition of appropriation is absolute and "applies to outer space as a whole".⁴² An overview of these issues confirms the great uncertainty regarding the rights and obligations of entities involved in extraterrestrial mining. On the one hand, this may discourage private entities from such activities⁴³ and, on the other hand, destabilise peaceful relations in outer space and lead to another "space race".⁴⁴

Let us return to the basic legal issue: does the absence of an explicit prohibition on the exploitation of the natural resources of celestial bodies imply the legitimacy of such activities?⁴⁵ It seems there are three possible answers to this question. An affirmative answer would mean that the space natural resources are not in a legal vacuum and their exploitation could be carried out on the basis of the *first come, first served* rule legitimised by the law. A negative answer, based on the absolute nature of the prohibition of appropriation, would also favour the placement of this issue within the framework of existing law. This position would opt *nolens volens* for the need to establish an international regime similar to that relating to the "Area" under UNCLOS. Without such a regime, individual/unilateral exploration activities would be illegal. Until such a regime is established, the exploitation of the natural resources of celestial bodies would therefore not have sufficient legal justification. The third answer is to opt for no legal regulation of the issue, that is, for a "legal vacuum" in which the natural resources of space would currently remain. Legal regulation would appear if, after the emergence of the relevant practice, the rules of customary law were developed, or, alternatively, through the conclusion of a universal or quasi-universal international agreement by States. The very fact that these several options have been put forward demonstrates the ambiguity of international law in this respect. To put it somewhat more cautiously, at present there is only the basis of this law in the form of

⁴² See supra note 30.

⁴³ Countering this was one of the key reasons why the US Congress passed 2015 US's Space Resource Exploration and Utilization Act. See *ibid*, § 51302 (a). However, this regulation is still considered insufficient in the US. See e.g. S. Trepczynski, *New Space Activities Expose a Potential Legal Vacuum*, *Journal of Space Law* 2015–2016, vol. 40, no. 1–2, p. 214.

⁴⁴ Cf. F. Tronchetti, *Legal Aspects...*, p. 812.

⁴⁵ The negative answer to this question is given, e.g., by Jinyuan Su, *Legality...*, p. 996.

the undisputed principles of space law: the individual freedom of all States to explore and use outer space, taking into account the benefits and interests of all countries, the prohibition of the appropriation of outer space and celestial bodies, the conduct of activities in outer space in accordance with international law and for peaceful purposes, and the conduct of activities there on the basis of equality between States and the coordination of cooperation between them.

It seems that a clear legal regime defining more precisely the rights and obligations of legal entities in space will not be established without the development of customary law. Its new rules, however, can only be created once the relevant exploitation practice has begun. The new rules of customary law will be formed on the basis of already existing customs, including primarily those within which the principles of space law referred to above and so far unquestioned by States exist. It will, therefore, not be entirely new customary law. This more recent law may consist of both rules clarifying and supplementing already existing rules of customary law and rules modifying them. In any event, turns in the interpretation of existing customary law are possible. Now the 'first interpretative turn' is put forward with regard to the introduction of an exception to the prohibition of appropriation in the form of acquisition of some kind of property rights to natural resources taken for scientific purposes. At the same time, its second turn is anticipated with respect to the *in situ* acquisition of natural resources of celestial bodies.⁴⁶ This issue will probably prove to be a major one, since the exploitation process will involve, as has already been mentioned, certain exclusive rights, which is currently being called into question from the point of view of the non-appropriation principle.⁴⁷

⁴⁶ A.D. Pershing, *Interpreting the Outer Space Treaty's Non-Appropriation Principle...*, pp. 157–166. Cf. F. von der Dunk, *Asteroid Mining: International and National Legal Aspects*, Michigan State International Law Review 2017, vol. 26, p. 83; T. Gangale, *The Legality of Mining...*, pp. 209–210.

⁴⁷ The US Supreme Court in the *Nemitz* case rejected the appropriation of some celestial bodies through the acquisition of their resources *in situ* due to the non-appropriation principle (*Nemitz v. NASA*, 126 Fed. Appx. 343 (2005)). Prior to the US Supreme Court decision, the District Court for the District of Nevada gave its judgment in the case (*Nemitz v. United States*, Decision on motion to dismiss, ILDC 1986 (US 2004), 26 April 2004, United States; Nevada; District Court for the District of Nevada [D Nev]). The issue of claim arose on the landing of NASA's spacecraft on 12th February 2001 on asteroid 433 "EROS". In this case, Nemitz (the appellant) claimed his property rights on asteroid 433 "EROS". The appellant claimed that his ownership of the asteroid had been based on his registration on the Archimedes Institute Website and the filing of the California Uniform Commercial Code security interest in which he named himself both as creditor and debtor. Nemitz claimed that the activity of NASA infringed his private property rights and thus, he should have been compensated for the same. He also claimed that according to the Outer Space Treaty he was not restricted to own any celestial body and so the applicability of this treaty is of no means.

The legal evaluation of practices shaping a new customary space law should take into account not only the principles of space law but also the principle of good faith. It seems that this principle allows us to go beyond the controversy about the legality of activities that are not directly governed by treaty law. Generally, there are three approaches to such activities based on different legal requirements, as Gerald Fitzmaurice put it.⁴⁸ First, the requirement of action in positive conformity with permissive rules of international law. Second, the requirement of action not actually contrary to international law, which follows from the *Lotus* judgment. And third, the requirement of action in good faith, generally consistent with international law, and characterized by avoidance of any abuse of rights. There are different presumptions following from them. According to the first approach, there is a presumption of illegality unless the contrary can be established. According to the second, a presumption of legality unless the contrary is established. According to the third approach, however, there is no presumption, either of legality or illegality.⁴⁹ Therefore, the approach based on the principle of good faith offers an opportunity to go beyond the *Lotus* controversy. Moreover, this principle seems to promote legal certainty and support completeness of the international space law. With regard to the exploitation of space resources, this requires consideration of whether in the light of the principles of non-appropriation and the exploration and use of outer space for the benefit and in the interests of all States, it will be a *bona fide* activity.

V. Conclusions

The comments made on the legal issues concerning space resource mining activities lead to the following conclusions:

- 1) the existing principles and rules of international law do not provide clear answers to all questions concerning the legality of exploration and exploitation activities in outer space, conducted especially for commercial purposes;
- 2) the principles of space law themselves, as confirmed by the Outer Space Treaty, do not provide such answers, as they were established in the absence of any practice in the use of outer space for purposes other than scientific purposes;

But the District Court did not take into account the Outer Space Treaty. It was held that neither the failure of United States to ratify the Moon Agreement nor the US' ratification of the Outer Space Treaty created any rights to appropriate private property rights on asteroids. The Court, rejecting the claims in the case, rather stated that no person has natural right over any property.

⁴⁸ See G. Fitzmaurice, *The General Principles of International Law Considered from the Standpoint of the Rule of Law*, Recueil des Cours 1957, vol. 92, p. 51.

⁴⁹ Ibid.

- 3) in particular, it is problematic whether the prohibition of appropriation of outer space and celestial bodies, which is undisputed by States, also extends to their natural resources; an affirmative answer to this question is based on granting celestial bodies and their natural resources the same legal status; however, this is disputed by the national legislation of some States, such as the USA and Luxembourg;
- 4) an issue of property rights to the space natural resources is accompanied by uncertainty under international space law;
- 5) this uncertainty is increased by doubts on the completeness of international space law;
- 6) the uncertainty of international space law could be reduced by protecting its completeness through systemic integration of international law; the basis of such an interpretation of the principles of international space law would be an obligation, unquestioned by States, to carry out all space activities in accordance with international law and for States to be responsible for activities in outer space by private entities under their jurisdiction; the problem in this respect, however, is the uncertainty of the rules of existing international space law concerning the legal status of the natural resources of celestial bodies and, consequently, the assessment of whether a particular activity relating to them results in a breach of the non-appropriation principle;
- 7) it also seems crucial for the completeness of space law to address the issue of the legitimacy in the international legal order of the so-called *Lotus* doctrine, namely States' freedom of action in the absence of explicit prohibition rules;
- 8) the recognition as legally legitimate of the actions of States in the absence of explicit prohibition rules raises another problem, namely, the problem of the impact of the *Lotus* doctrine on legal certainty in outer space: whether the interpretative directive "whatever is not prohibited is legal" (or at least not illegal) strengthens legal certainty, weakens it, or is it perhaps neutral with respect to it?;
- 9) it seems that, while the *Lotus* doctrine ensures the completeness of international law, it serves only to a limited extent the certainty of that law;
- 10) consideration must, therefore, be given as to whether legal certainty in relation to the exploitation of the natural resources of celestial bodies is not fostered more by an assessment of its legality based on the indication of a rule allowing the action;
- 11) legality of the exploration and use of space resources should be also investigated under the principle of good faith, which supports both completeness and certainty of space law;

- 12) legal certainty as regards the exploration and exploitation of the space natural resources would be best achieved by a treaty-based solution, namely the adoption by States of a universal or semi-universal treaty based on customary law developed on the basis of exploitation practice in outer space;
- 13) however, in the light of the experience of the lack of practical implementation of the 'international régime' of Article 11 of the Moon Agreement and the national legislation of several States active in outer space questioning this regime, it does not seem possible in the near future.

Abstract

The paper discusses the main legal issues related to the commercial exploitation of space natural resources in the light of (un)certainly and (in)completeness of international space law. The author claims that without general international law it is not possible for a clear legal framework to be shaped within which the conduct of space resource exploitation activities would be opposable and effective *erga omnes*. The uncertainty regarding law on the exploitation of space resources arises precisely from the difficulty of identifying the formal sources of general international law in this respect. The author argues that the analysis of legal issues related to the exploitation of the space natural resources supports the key importance of customary law in this regard and the secondary importance of treaty law. Moreover, the principle of good faith matters as it offers an opportunity to go beyond the *Lotus* controversy as well as it promotes legal certainty and supports completeness of international space law.

Key words: space law, outer space, space mining, legal certainty, completeness of law, customary international law

Brak tłumaczenia tytułu na język polski Streszczenie

Artykuł omawia główne problemy prawne dotyczące eksploatacji zasobów naturalnych przestrzeni kosmicznej, związane z (nie) pewnością i (nie) zupełnością międzynarodowego prawa kosmicznego. Stwierdzono w nim, że prawne uzasadnienie legalności takiej działalności nie będzie skuteczne i przeciwstawialne *erga omnes*, jeśli nie zostanie oparte na *general international law*. Niepewność prawa dotyczącego eksploatacji zasobów naturalnych przestrzeni kosmicznej wynika w dużej mierze z kontrowersji dotyczących źródeł formalnych tego prawa. Opowiadam się za kluczowym znaczeniem zwyczajów w międzynarodowym prawie kosmicznym, bez których, moim zdaniem, nie ukształtuje się zupełne i względnie jasne prawo pozwalające na rozstrzygnięcie kontrowersji prawnych dotyczących *space mining*. Spore znaczenie ma tu również zasada dobrej wiary, ponieważ ocena w jej świetle działań

podmiotów aktywnych w przestrzeni kosmicznej wydaje się wspierać pewność i zupełność prawa kosmicznego.

Słowa kluczowe: prawo kosmiczne, przestrzeń kosmiczna, górnictwo kosmiczne, pewność prawa, zupełność prawa, międzynarodowe prawo zwyczajowe