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LEGAL ASPECTS OF SPACE EXPLOITATION

Abstract: This essay introduces the current legal setting in the field of exploitation of space resources, the acquisition of which *de facto* determines the possibility of carrying out distant space missions by man. The present paper also points to non-governmental initiatives by the space sector that vocalize what the space sector expects from international legislation. The article also points to the analogies of space to extraterritorial sea areas where the concept of the Common Heritage of Mankind has been implemented, which may be an answer to the question of how to peacefully and effectively manage space resources.

Keywords: space exploitation, space resources, Common Heritage of Mankind, principles of space law.

1. INTRODUCTION

The current technological developments and space research indicate that the exploitation of resources in space will become a necessity in the near future. It is believed that the management of natural resources in outer space is one of the challenges facing the international community in the 21st century[1]. This is mainly due to the need to obtain potential energy sources in order to produce rocket fuel necessary for carrying out closer and further human missions in space. Thus, the search for valuable strategic resources is a necessary step towards the further conquest of space in the spirit of the principles set out in the 1967 Outer Space Treaty[2]

[1] L. Łukaszuk, *Współpraca i rywalizacja w przestrzeni kosmicznej. Prawo-Polityka-Gospodarka*, publ. TNOiK, Toruń 2012, p. 280.

[2] *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies*, opened for signature in the United States, the United Kingdom, and the Soviet Union on 27 January 1967, entering into force on 10 October 1967. https://treaties.unoda.org/t/outer_space (13.03.2021).

and in the 1979 Moon Agreement[3], including the principles of freedom of research and use of space, the principle of non-appropriation of outer space, the principle of the prohibition of the militarization of space, or the principle of the Common Heritage of Mankind[4].

Contrary to popular opinion, in the next century the strategic resources in space will not be gold or platinum[5], or the so-called rare earth metals, including scandium and europium. The geopolitical game in terms of the priority of extraction will concern water, carbon dioxide, helium[6] and oxygen – resources commonly available on the surface of the Earth, and in space occurring, among others, in the resources of regolith (which is the top layer of celestial bodies) and in the deposits of ice or minerals of celestial bodies. The reason for this is that the water resources – apart from the obvious fact of ensuring the possibility of human survival in space – potentially allow the acquisition of liquid hydrogen as a rocket fuel, obtained in the process of electrolysis[7]. Also, carbon dioxide (present, among others on Mars) in combination with hydrogen allows for the acquisition of methane as another potential source of rocket fuel. In turn, the helium isotope 3He can be used in the process of nuclear fusion, potentially allowing for obtaining clean energy in large quantities[8].

There is no doubt that during the implementation of distant space missions (e.g. to Mars) it will not be possible to take a sufficient amount of fuel to safely return to Earth, because if it were technically possible, from an economic point of view, the cost of such a mission would be too high – even on a global

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3 *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies*, opened for signature on 18 December, 1979.

4 Z. Brodecki [ed.], *Świątynia w kosmicznej wiosce. Bezpieczeństwo przyszłych pokoleń w erze sztucznej inteligencji*, wyd. EuroPrawo, Warszawa 2021, s. 76. Also: K. Lankosz, *Eksploracja i eksploatacja kosmosu. Czy Helium 3 zmieni status prawny przestrzeni kosmicznej?* (w:) E. Fonkowicz [ed.], Prawo międzynarodowe – teraźniejszość, perspektywy, dylematy. Księga Jubileuszowa Profesora Zdzisława Galickiego, wyd. WoltersKluwer, Warszawa 2013, p. 369.

5 Estimates show that selected asteroids orbiting close to Earth have platinum and gold deposits in excess of the amount that has been mined on Earth so far. See: M. Rojewska, *Kosmiczna gorączka złota* (in:) „Kosmos 2017", nr 3/2017, p. 46.

6 It is interesting to note that Poland is one of the six helium producing countries in the world. See: M. Duszczyk, *PGNiG umacnia pozycję głównego producenta helu* (in:) Dziennik Gazeta Prawna, nr 36 (3174) – 21.02.2012, p. A12.

7 M. Hofmannand, F. Bergamasco, *Space resources activities from the perspective of sustainability: legal aspects*, publ. Cambridge University Press, Cambridge 2020, https://www.cambridge.org/core (09.01.2021), p. 2.

8 Despite the fact that the current technology does not yet allow for extensive energy extraction in this process. See: K. Lankosz, *Eksploracja i eksploatacja kosmosu. Czy Helium 3 zmieni status prawny przestrzeni kosmicznej?* (w:) E. Fonkowicz [ed.], Prawo międzynarodowe – teraźniejszość, perspektywy, dylematy. Księga Jubileuszowa Profesora Zdzisława Galickiego, wyd. WoltersKluwer, Warszawa 2013. p. 370.

scale[9]. According to experts, the solution to this problem will be the development of fuel production technology that uses resources available in space. The concept of using space resources in space is abbreviated as ISRU (In situ resource utilization)[10]. For this reason, the search for strategic resources will have to focus mainly on the aforementioned regolith of planets and asteroids as well as ice deposits occurring e.g. on Mars. Therefore, the use of resources available in extraterrestrial space will be necessary if humanity wants to create opportunities for further space exploration[11].

2. LEGAL FRAMEWORK

The time preceding the stage of exploitation of space resources should make the international community reflect on the specification of coherent principles, rules of conduct and social mechanisms that will guarantee humanity peaceful coexistence in the extraterrestrial space, including the exploitation of natural resources. So far, only the framework rules for the use of outer space have been regulated, which, although they are the foundation of the international legal regime of outer space[12], there is a lack of clarity as to the particular problems resulting from the increasingly intense presence of humans in space. This gives rise to more and more ambiguities, and in the era of increased interest in space also by private entities, it is easy to predict disputes emerging with increasing dynamics at the international level.

Pursuant to Art. I of the 1967 Outer Space Treaty, outer space is free for research and use, including free access to all areas of the celestial bodies. The treaty also indicates that space exploration is to be conducted in the interest of all countries as the "province of all mankind"[13]. It is pointed out that the principle of

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9 See: B. Malinowski, *Projekty pozyskiwania naturalnych surowców w kosmosie* (in:) M. Polkowska [ed.], *Współczesne trendy w polityce bezpieczeństwa kosmicznego*, publ. EuroPrawo, Warszawa 2020, p. 95-97.

10 See: Ch. B. Dreyer [ed.], *A new experimental capability for the study of regolith surface physical properties to support science, space exploration, and in situ resource utilization (ISRU)*, publ. Review of Scientific Instruments 89, 064502 2018 (https://doi.org/10.1063/1.5023112 – 10.01.2021).

11 https://weneedmore.space/jak-stworzyc-paliwo-na-marsie/ (10.01.2021). See also: B. Malinowski, *Projekty pozyskiwania naturalnych surowców w kosmosie* (in:) M. Polkowska [ed.], *Współczesne trendy w polityce bezpieczeństwa kosmicznego*, publ. EuroPrawo, Warszawa 2020, p. 96.

12 K. Lankosz, *Eksploracja i eksploatacja kosmosu. Czy Helium 3 zmieni status prawny przestrzeni kosmicznej?* (w:) E. Fonkowicz [ed.], Prawo międzynarodowe – teraźniejszość, perspektywy, dylematy. Księga Jubileuszowa Profesora Zdzisława Galickiego, wyd. WoltersKluwer, Warszawa 2013. p. 369.

13 M. Smirnoff, *Legal Studies on Celestial Bodies*, Journal of Air Law Commerce 1961-1962, vol. 28, p. 290.

the freedom of the Outer Space outlined in this way is something more than an ordinary general clause. It is a milestone for further development of the principles of using outer space and the resources therein, no less important than the work of Hugo Grotius entitled "*Mare liberum*" from 1609[14] for the subsequent development of the international law of the sea, which is now one of the most important factors determining the development of space law[15]. The principle of freedom – which is also characteristic of the law of the sea – is coupled with the principle of the prohibition of the appropriation of outer space as defined in Art. II of the Outer Space Treaty, which forbids the establishment of property rights in celestial bodies. This rule covers the Moon and other celestial bodies and indicates their non-appropriateness by states and the prohibition of declaring the sovereignty of celestial bodies by other entities.

The principle of freedom and the principle of the prohibition of the appropriation of outer space, however, raise many doubts in contemporary reality[16]. First, the Outer Space Treaty did not anticipate that in the 21st century private entities would also take an active part in space exploration[17]. This fact is used by the United States, which unequivocally argues that in its current form, the prohibition of the appropriation of celestial bodies and their resources applies only to states, and not to private entities participating in the conquest of space[18]. Secondly, it is worth pointing to the issue of the exploitation of space resources, which is regulated only with regard to scientific research, at the level of general norms contained in the Outer Space Treaty[19] and in the Moon Agreement[20],

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14 See: J.B. Scott, *Introductory note* (in:) H. Grotius, *The Freedom of the Seas*, publ. Oxford University Press, New York 1916, p. VI.

15 An example of the impact of the law of the sea on the development of space law may be the status of the Area understood as extraterritorial seabed and subterranean seabed outside the jurisdiction of coastal states, which, in accordance with Art. 136 of the UN Convention on the Law of the Sea is the Common Heritage of Mankind.

16 This is also reflected in the fact that only some countries signed or ratified the 1979 Moon Agreement. See: R. Lee, *Law and Regulation of Commercial Mining of Minerals in Outer Space*, publ. Springer – Dordrecht, New York 2012, p. 184.

17 Z. Brodecki [ed.], *Świątynia w kosmicznej wiosce. Bezpieczeństwo przyszłych pokoleń w erze sztucznej inteligencji*, wyd. EuroPrawo, Warszawa 2021, p. 77. However, it is worth pointing out that the first satellite sent into space by the private sector was Telstar-1 sent to Earth orbit by ATT in 1962. See: B. Malinowski, *Projekty pozyskiwania naturalnych surowców w kosmosie* (in:) M. Polkowska [ed.], *Współczesne trendy w polityce bezpieczeństwa kosmicznego*, publ. EuroPrawo, Warszawa 2020, p. 93.

18 S. Gorove, *Interpreting Article II of the Outer Space Treaty* (in:) Fordham Law Review 1968, vol. 37, No. 3, p. 351.

19 The Outer Space Treaty in Art. IV states: "*The exploration and use of the moon shall be the province of all mankind and shall be carried out for the benefit and in the interests of all countries* [...]".

20 See: K. Lankosz, *Eksploracja i eksploatacja kosmosu. Czy Helium 3 zmieni status prawny przestrzeni kosmicznej?* (w:) E. Fonkowicz [ed.], Prawo międzynarodowe – teraźniejszość, perspektywy, dylematy. Księga Jubileuszowa Profesora Zdzisława Galickiego, wyd. Wolters-Kluwer, Warszawa 2013. p. 373.

in the absence of similar regulations on commercial activities in the same scope[21].

The exploration and exploitation of extraterrestrial resources for scientific purposes seems to be widely accepted as consistent with international law[22], while the lack of any standards relating to the commercial exploration and exploitation of space resources seems more and more problematic[23]. As a result, some states engaged in space activities began to "supplement" the international legal framework of space mining through their own acts of domestic law. Among such activities, the legislation of the United States, Luxembourg and the United Arab Emirates should be mentioned[24].

In 2015, the United States passed the Act on ensuring competition in the area of launching objects into outer space – *de facto* supporting American entities in the commercial exploitation of space resources (US Commercial Space Launch Competitiveness Act)[25]. This act in § 51303 provides that "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"[26]. Moreover, in 2020, President Trump's administration issued an executive order to encourage international support for public

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21 Art. 6 sec. 2 of the Moon Agreement indicates that "[...] *the States Parties shall have the right to collect on and remove from the moon samples of its mineral and other substances. Such samples shall remain at the disposal of those States Parties which caused them to be collected and may be used by them for scientific purposes. States Parties shall have regard to the desirability of making a portion of such samples available to other interested States Parties and the international scientific community for scientific investigation. States Parties may in the course of scientific investigations also use mineral and other substances of the moon in quantities appropriate for the support of their missions*".

22 B. Skardzińska, *Górnictwo kosmiczne – prawo i perspektywy* (in:) K. Myszona-Kostrzewa, E. Mreńca, P.B. Zientarski [ed.], *Prawne aspekty działalności kosmicznej*, publ. Kancelaria Senatu, Warszawa 2019, p. 176.

23 See: F. Tronchetti, *Legal aspects of space resource utilization* (in:) F. van der Dunk, F. Tronchetti [ed.] *Handbook of space law*, Northampton 2015, p. 777. Also: Z. Galicki, *Status prawny kosmosu* (w:) A. Wasilkowski [ed.], *Działalność kosmiczna w świetle prawa międzynarodowego*, publ. Ossolineum, Wrocław-Warszawa-Kraków 1991, p. 15. Also: B. Malinowski, *Projekty pozyskiwania naturalnych surowców w kosmosie* (in:) M. Polkowska [ed.], *Współczesne trendy w polityce bezpieczeństwa kosmicznego*, publ. EuroPrawo, Warszawa 2020, p. 97.

24 S. Freeland, *Common herritage, not common law: How international law will regulate proposals to exploit space resources* (in:) Questions of International Law 2017, vol. 35, p. 20.

25 M. Polkowska, *Współczesne problemy zagospodarowania przestrzeni kosmicznej: warunki prawne, współpraca i konkurencja* (in:) M. Polkowska [ed.], *Współczesne trendy w polityce bezpieczeństwa kosmicznego*, publ. EuroPrawo, Warszawa 2020, p. 40.

26 See: *US Commercial Space Launch Competitiveness Act* 2015, § 51303. This law stipulates, however, that the United States does not grant itself any jurisdiction or sovereignty over any celestial body.

and commercial sourcing of resources from Outer Space[27]. This regulation also expresses the position that the United States, faced with doubts about the Moon Agreement, does not perceive space as a world heritage ("the United States does not view it as a global commons").

On the other hand, Luxembourg, despite the fact that it is still not a major tycoon of the space sector, has been intensifying projects supporting the space business since the beginning of the 21st century, creating favorable conditions for the development of this industry and cooperating with other countries and international organizations, such as the United Nations Office for Outer Space Affairs (UNOSA). The result of this activity was the establishment of the European Space Resources Innovation Center (ESRIC)[28], as well as the extensive legislative activities of Luxembourg[29]. In 2017, the Luxembourg legislation adopted the law on the exploration and use of space resources (*Loi du 20 juillet 2017 sur l'exploration et l'utilisation des ressources de l'espace*)[30], which allows for the acquisition of space resources by entities registered in Luxembourg "without violating international law"[31]. The United Arab Emirates (in agreement with Luxembourg in 2017[32]) are also developing the space industry very dynamically[33], which results in intensive legislative measures regulating the activities of private entities in space.

The above-mentioned legislative activities of the United States and Luxembourg have met with wide criticism in the doctrine[34], as well as in the forum of The Committee on the Peaceful Uses of Outer Space (COPUOS). The reason for the aforementioned criticism is the possible appropriation of mineral resources mined on the moon and other celestial bodies, which may lead to competition between space mission integrators and, as a result, pose a threat to both ecological and military security. It can be pointed out that such practices may be an expression of a tendency to assume the primacy of domestic law over international

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27 Full text: https://trumpwhitehouse.archives.gov/presidential-actions/executive-order-encouraging-international-support-recovery-use-space-resources/ (15.09.2021).

28 See: https://www.esric.lu (05.08.2021).

29 M. Polkowska, *Współczesne problemy zagospodarowania przestrzeni kosmicznej: warunki prawne, współpraca i konkurencja* (in:) M. Polkowska [ed.], *Współczesne trendy w polityce bezpieczeństwa kosmicznego*, publ. EuroPrawo, Warszawa 2020, p. 40.

30 The text of the Luxembourg law is available at: http://legilux.public.lu/eli/etat/leg/loi/2017/07/20/a674/jo (5.02.2021).

31 See: B. Skardzińska, *Górnictwo kosmiczne – prawo i perspektywy* (in:) K. Myszona-Kostrzewa, E. Mreńca, P.B. Zientarski [ed.], *Prawne aspekty działalności kosmicznej*, publ. Kancelaria Senatu, Warszawa 2019, p. 174-175.

32 See: https://space-agency.public.lu/dam-assets/press-release/2017/2017-10-10-press-release-mou-space.pdf (25.04.2021).

33 The United Arab Emirates launched its first astronaut into space in 2019.

34 See: M. Hofmannand, F. Bergamasco, *Space resources activities from the perspective of sustainability: legal aspects*, publ. Cambridge University Press, Cambridge 2020, https://www.cambridge.org/core (09.01.2021), p. 2.

law, including in the aspect of the principles of using space resources[35], and this would in turn require a fundamental redefinition of public international law[36].

It is worth noting that pursuant to Article 1 of the Outer Space Treaty, mining activities carried out for peaceful purposes and for the good and interest of all states (e.g. for scientific purposes) are permitted. Therefore, some countries and other entities conducting space activities will certainly argue that all activities in space will have a peaceful, scientific value and in the interest of all countries, and more broadly – for the good of the human mankind. Even if in reality it will pursue only particular goals. This undoubtedly heralds a dispute over space resources, which in turn forecasts the emergence of international jurisprudence and arbitration in this area[37].

Already now it is possible to indicate the arbitration institutions competent for the settlement of disputes arising from the use of outer space. These include the International Court of Air and Space Arbitration[38], the Permanent Court of Arbitration in The Hague[39] and the Court for Private Dispute in Space – established in 2021 in Dubai[40]. However, as it seems at this stage, the creation of space arbitration tribunals is only temporary (or even cyclical), which may be aimed primarily at gaining publicity regarding the ambitious plans for the conquest of space by subsequent countries joining the „race" for the status of integrator of space missions. It seems that the international community specifies the expectations regarding the establishment of the International Court of Space Law, or the creation of an additional chamber in the International Court of Justice in The Hague, as judicial organs operating under the aegis of the United Nations and thus having greater persuasive power[41].

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35 Z. Brodecki [ed.], *Świątynia w kosmicznej wiosce. Bezpieczeństwo przyszłych pokoleń w erze sztucznej inteligencji*, wyd. EuroPrawo, Warszawa 2021, p. 83.

36 See: K. Lankosz, *Eksploracja i eksploatacja kosmosu. Czy Helium 3 zmieni status prawny przestrzeni kosmicznej?* (w:) E. Fonkowicz [ed.], Prawo międzynarodowe – teraźniejszość, perspektywy, dylematy. Księga Jubileuszowa Profesora Zdzisława Galickiego, wyd. Wolters-Kluwer, Warszawa 2013. p. 369-375.

37 Z. Brodecki [ed.], *Świątynia w kosmicznej wiosce. Bezpieczeństwo przyszłych pokoleń w erze sztucznej inteligencji*, wyd. EuroPrawo, Warszawa 2021, p. 76.

38 *International Court of Air and Space Arbitration* was established in 1994 by the *Société Française de Droit Aérien et Spatial*. See: Carson W. Bennett, Houston, *We Have an Arbitration: International Arbitration's Role in Resolving Commercial Aerospace Disputes in Resolving Commercial Aerospace Disputes* (in:) Pepperdine Dispute Resolution Law Journal, Volume 19 Issue 1 Article 2, p. 11 -13.

39 In 2011, the Administrative Council of the Permanent Court of Arbitration in The Hague adopted Optional Rules for Arbitration of Disputes Relating to Outer Space Activities. See: K. Michałowska, *Rozstrzyganie sporów związanych z działalnością kosmiczną* (in:) K. Myszora-Kostrzewa, *Kosmos w prawie i polityce, prawo i polityka w kosmosie*, Warszawa 2017, p. 90-92.

40 https://www.timesofisrael.com/dubai-creates-space-court-for-out-of-this-world-disputes/ (25.05.2021)

41 See: Z. Brodecki [ed.], *Świątynia w kosmicznej wiosce. Bezpieczeństwo przyszłych pokoleń w erze sztucznej inteligencji*, wyd. EuroPrawo, Warszawa 2021, p. 82.

3. NON-GOVERNMENTAL INITIATIVES

In the meantime, bottom-up initiatives are emerging that can generate a persuasive potential for the entire international community in aspect of developing consistent principles and rules for the exploitation of space resources. Undoubtedly, this includes an interesting project created as part of the "Hague International Space Resources Governance Working Group", which was created at a symposium organised in 2019 by the Luxembourg Space Agency in order to promote international cooperation between states and other entities of international law (consortia and private entities) in terms of the exploration and exploitation of outer space. As a result of this group's efforts, a document was developed under the name "Building Blocks for the Development of an International Framework on Space Resource Activities"[42]. The main goal of this project is to create the right conditions for inspiring the development of space mining, which would take into account the interests of the entire international community and, more broadly, all of humanity[43]. As indicated in the document, space resources are understood to mean „an extractable and/or recoverable abiotic resource *in situ* in outer space". In this approach, resources include minerals and volatile materials (gases), including water, but this concept does not include orbits of satellites, the range of radio waves and solar energy[44].

The subjective scope of the Building Blocks in question includes countries, international organisations and non-governmental entities that are more and more boldly involved in commercial space projects. In turn, taking into account the territorial scope, the provisions of Building Blocks include mining activity on celestial bodies (planets, moons and asteroids) in the Solar System[45]. It seems that the territorial limitations resulting from the discussed document result rather from the regulatory realism of the creators of Building Blocks, the lack of which could cause the destructive phenomenon of creeping claims of states and private entities against the areas outside the Solar System, which would be unattainable for humans in the coming years. Therefore, the legal status of space resources outside the Solar System remains beyond consideration in the near term as to the possible principles of their use.

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42 See: Building Blocks for the Development of an International Framework on Space International Space Resources Resource Activities, https://www.universiteitleiden.nl/binaries/content/assets/rechtsgeleerdheid/instituut-voor-publiekrecht/lucht–en-ruimterecht/space-resources/revised-building-blocks-following-the-meeting-of-april-2019.pdf (28.04.2021).

43 Building Blocks ..., p. 1. By such definition of goals, it is possible to deduce the convergence of the intentions of the authors of the document with the institution of the Common Heritage of Humankind, included, *inter alia*, in the Moon Agreement of 1979, which can also be regarded as an element of practice necessary for the formation of an international custom relating to the international status of outer space.

44 Building Blocks…, p. 2, note 2.

45 See: Building Blocks…, p. 2, section 3.1. and 3.2.

Building Blocks proposes 17 principles that should be followed by the international community when developing internationally binding rules for the exploitation of space resources[46]. These include:

1. The principle of coherence of the international framework and activities with international law;
2. The principle of the gradual development of law in the field of the exploitation of space resources;
3. The principle of promoting national and international coherence in legislative activities related to the use of space resources;
4. The principle of sustainable development;
5. The principle of counteracting disputes related to the exploitation of resources;
6. The principle of safe utilization of waste from space mining;
7. The principle of sustainable, rational and efficient use of space resources;
8. The principle of the use of sustainable technologies;
9. The principle of legal certainty and predictability in relation to mining operators;
10. The principle of taking into account the needs of developing countries;
11. The principle of taking into account the needs of science;
12. Principle of taking into account the contribution of pioneer space mining operators;
13. The principle of using space resources solely for peaceful purposes;
14. The principle of using space resources in the interests of all states and humankind;
15. The principle of consultation in accordance with Art. IX of the Outer Space Treaty in the event of a possible threat arising from the exploitation of space resources;
16. The principle of not disrupting other space activities by exploiting resources;
17. The principle of international cooperation in the field of the exploitation of space resources in accordance with international law.

Importantly, Building Blocks formulate in point 4.3a the principle that "Space resources shall be used exclusively for peaceful purposes". Moreover, further provisions say that "Space resource activities shall be carried out for the benefit and in the interests of all countries and humankind irrespective of their degree of economic and scientific development"[47]. These provisions lead to reflection on their similarity to the institution of the Common Heritage of Humankind from the UNCLOS Convention[48], as well as the identical mechanism formulated by the

[46] Building Blocks…, p. 2-3, note 4.

[47] See: Building Blocks…, p. 3, note 4.3b).

[48] United Nations Convention on the Law of the Sea (UNCLOS) – signed on 10 December, 1982. See: M. Nyka, *International Seabed Authority and environmental deep-sea stewardship – prin-*

Moon Agreement of 1979. Pursuant to Art. 136 of the UNCLOS Convention "The Area and its resources are the common heritage of mankind", which means that the seabed of seas and oceans outside state jurisdiction has extraterritorial and unappropriated status, is subject to international supervision, may be used only for peaceful purposes, and benefits from exploitation of its resources are shared with the international community[49].

4. THE CONCEPT OF THE COMMON HERITAGE OF MANKIND

The concept of the common heritage of mankind is considered to be part of the third generation of human rights of a collective nature[50]. It is also widely developed in the law of the sea, and its technical beginning came from the proposal of the representative of Malta in 1967 at the UN forum[51]. The mechanism of the common heritage of mankind has been functioning for several decades in the United Nations Convention on the Law of the Sea (UNCLOS), where it is indicated that the common heritage of mankind is to ensure fair rules for the exploitation of marine resources, in order to benefit the entire international community, in particular for developing countries (Art. 155.2 UNCLOS). As indicated in European literature, the construction of the common heritage of mankind consists of five elements[52]:

1. territorial element – consisting in the recognition that the seabed is not subject to appropriation;
2. research element – consisting in the freedom of scientific research;
3. ecological element – consisting in preserving the fauna and flora of the oceans;
4. exploitation element – consisting in the use of natural resources in the interest of the entire international community;
5. military element – the use of the seabed solely for peaceful purposes.

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ciples governing the protection and use of seabed resources (in:) Maritime Law, vol. XXXIX, Gdańsk 2020, p. 12-14.

49 See: M. White, *The Common Heritage of Mankind: An Assessment*, publ. Case Western Reserve Journal of International Law, Issue 3, 1982, p. 535-537. Also: F. Tronchetti, *Legal aspects of space resource utilization* (in:) F. van der Dunk, F. Tronchetti [ed.] *Handbook of space law*, Northampton 2015, p. 790.

50 J.E. Noyes, *The Common Heritage of Mankind: Past, Present, and Future* (in:) Denver Journal of International Law Policy, Volume 40, Number 1, 40th Anniversary Edition, Article 24, 2020, p. 458.

51 M. Nyka, *International Seabed Authority and environmental deep-sea stewardship – principles governing the protection and use of seabed resources* (in:) Maritime Law, vol. XXXIX, Gdańsk 2020, p. 12.

52 E. Riedel, *Die Menschenrechte der dritten Dimension als Strategie zur Verwirklichung der politischen und sozialen Menschenreichte*, (Translation: Jerzy Zajadło in:) Ruch Prawniczy, Ekonomiczny i Socjologiczny, Rok LII – zeszyt 3-4, Warszawa 1990, p. 122.

The construction of the common heritage of mankind also affects other extraterritorial areas, including of course Outer Space and its natural resources[53], as evidenced by the 1979 Moon Agreement[54], the practice of states, or even the aforementioned Building Blocks created as part of the Hague International Space Resources Governance Working Group[55]. The roots of this concept go back to the doctrine of *Mare liberum* (Hugo Grotius) and later thoughts that indicate the need for international management of natural resources[56]. However, during the design work on the Moon Agreement, there were discrepancies in positions regarding the principles of the exploitation of space resources, which, by the way, was an obstacle to the wider recognition of the norms of the Moon Agreement[57]. The international community has achieved full consensus only in the aspect of the exploitation of space resources for scientific purposes, which was reflected in Art. 6.2 The Moon Agreement. As for the commercial rules for the exploitation of space resources, during the negotiations on the content of the Moon Agreement (primarily at the United Nations Committee on the Peaceful Uses of Outer Space – COPUOS forum), representatives of states pointed to arguments that appear to this day.

As an example, the representative of Belgium, negotiating the content of the Moon Agreement, described the issue of the status of cosmic natural resources as still "philosophical", and the French delegate indicated that the law requires precisely defined concepts, and in terms of the exploitation of space resources, we are dealing with a still unknown field of human activity[58]. Meanwhile, the United States, through its factual actions, from the very beginning showed in the international sphere the recognition of the possibility of acquiring the right of ownership to celestial bodies or their component parts (e.g. resour-

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53 *Ibidem*, p. 122-123.

54 Z. Brodecki, K. Malinowska, M. Polkowska, *Nowa cywilizacja kosmiczna. Satelity w służbie Ziemi*, publ. EuroPrawo, Warszawa 2019, p. 246.

55 However, there are also opposing positions in the literature suggesting that the institution of the common heritage of mankind raises a lot of controversy and has a more political intentions. See: K. Lankosz, *Eksploracja i eksploatacja kosmosu. Czy Helium 3 zmieni status prawny przestrzeni kosmicznej?* (w:) E. Fonkowicz [ed.], Prawo międzynarodowe – teraźniejszość, perspektywy, dylematy. Księga Jubileuszowa Profesora Zdzisława Galickiego, wyd. WoltersKluwer, Warszawa 2013. p. 373-374. Also: A. Wyrozumska, *Ewolucja statusu prawnego Antarktyki a państwa trzecie*, Łódź 1995, p. 66-68; J. Stańczyk, *Pojęcie wspólnego dziedzictwa ludzkości w prawie międzynarodowym* (in:) Państwo i Prawo 1985, z. 9, p. 55-76.

56 M. Dragun-Gertner, *Realizacja idei wspólnego dziedzictwa ludzkości w działalności regulacyjnej ISBA* (in:) C. Mik, K. Marciniak [ed.] *Konwencja NZ o prawie morza z 1982 r. W piętnastą rocznicę wejścia w życie*, Warszawa 2009, p. 276.

57 By the end of July 2021, only 22 countries had signed or ratified the Moon Agreement. See: https://treaties.un.org/pages/ViewDetails.aspx?src=TREATYmtdsg_no=XXIV-2chapter=24-clang=_en (31.07.2021).

58 UN doc. A/AC.105/C.2/SR.204, p. 95. See: A. Górbiel, *Międzynarodowe Prawo Kosmiczne*, Warszawa 1985, p. 138.

ces)[59]. After all, the most effective lobby represented a group of developing countries, demanding a treaty regulation of the legal regime for space resources and adopting the so-called the Argentinean formula of 1970[60], stipulating that space resources constitute the common heritage of all mankind. It was argued that the construction of the rules for the exploitation of resources should be based on the international regime, which was to ensure a fair distribution of the benefits of the exploitation of space resources also among countries not directly participating in a particular space mission[61]. Ultimately, during the design work on the contract, the Argentinean formula prevailed, stipulating that "The moon and its natural resources are the common heritage of mankind [...]"[62].

After several years of negotiations, the concept of the common heritage of mankind was successfully introduced into the Moon Agreement, and the solutions adopted include the 5 components mentioned, creating the mechanism of the common heritage of mankind known from the United Nations Convention on the Law of the Sea (UNCLOS): in Art. 3 of the Moon Agreement there is a political and military element, in Art. 6 research, in Art. 7 ecological element. The territorial element can be found in Art. 11.1 and 11.2, and in addition in Art. 11.3-7, one can find exploitation elements that make the possibility of extracting natural resources from the Moon and other celestial bodies dependent on the creation of a regime at the international level regulating their exploitation and use[63]. This regime – in accordance with Art. 11.7 of the Moon Agreement – is to pursue the following goals[64]:

a) The orderly and safe development of the natural resources of the moon;
b) The rational management of those resources;
c) The expansion of opportunities in the use of those resources;
d) An equitable sharing by all States Parties in the benefits derived from those resources, whereby the interests and needs of the developing countries, as well as the efforts of those countries which have contributed either directly or indirectly to the exploration of the moon, shall be given special consideration.

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59 See: Z. Brodecki [ed.], *Świątynia w kosmicznej wiosce. Bezpieczeństwo przyszłych pokoleń w erze sztucznej inteligencji*, wyd. EuroPrawo, Warszawa 2021, s. 77.

60 https://legal.un.org/avl/ha/agasmocb/agasmocb.html (02.08.2021). In 1970 Argentina presented a draft agreement on the principles governing activities in the use of the natural resources of the moon and other celestial bodies.

61 See: A. Górbiel, *Międzynarodowe Prawo Kosmiczne*, Warszawa 1985, p. 138.

62 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (1979), Art. 11. See: K. Lankosz, *Eksploracja i eksploatacja kosmosu. Czy Helium 3 zmieni status prawny przestrzeni kosmicznej?* (w:) E. Fonkowicz [ed.], Prawo międzynarodowe – teraźniejszość, perspektywy, dylematy. Księga Jubileuszowa Profesora Zdzisława Galickiego, wyd. WoltersKluwer, Warszawa 2013. p. 373.

63 See: B. Skardzińska, *Górnictwo kosmiczne – prawo i perspektywy* (in:) K. Myszona-Kostrzewa, E. Mreńca, P.B. Zientarski [ed.], *Prawne aspekty działalności kosmicznej*, publ. Kancelaria Senatu, Warszawa 2019, p. 173.

64 See: Z. Brodecki, K. Malinowska, M. Polkowska, *Nowa cywilizacja kosmiczna. Satelity w służbie Ziemi*, publ. EuroPrawo, Warszawa 2019, p. 247.

However, as mentioned earlier, already during the preparatory work on the Moon Agreement, divergent positions of states emerged, related to the principles of exploitation of resources and the interpretation of the concept of "common heritage of mankind", which for many scientists to this day is amorphous and is sometimes interpreted differently in doctrine of public international law. Part of the literature, referring to international legal documents and the practice of states, indicates that the common heritage of mankind has the value of a principle, sometimes even *ius cogens*. On the other hand, some authors deny the legal nature of the institution of the common heritage of humanity, arguing that this mechanism is undefined and at best expresses certain political intentions on the international forum, and the Moon Agreement, which has been ratified only by a dozen or so countries, does not resolve these controversies[65].

In the world literature, one can also find a moderate view[66] that, despite numerous doubts related to the institution of the common heritage of mankind in space, high hopes can be pinned on the practice of applying this concept to the seas on the basis of the United Nations Convention on the Law of the Sea (UNCLOS), mainly through the International Seabed Authority (ISA) as the only international organisation mandated to control and regulate seabed activities in the international seabed area (the Area) for the benefit of mankind as a whole[67]. It is worth adding that the concept of the common heritage of mankind also appears in the UNSESCO Convention (Convention Concerning the Protection of the World Cultural and Natural Heritage), as well as in the preamble to the Antarctic Treaty of 1959, which refers to the progress and interest of all mankind, in the context of the peaceful use of the area and the freedom of research in Antarctica[68].

5. SUMMARY

As already mentioned, the extraction of natural resources from space in the near future will become a necessity for human presence in space. The legislative activities of the United States, Luxembourg and the United Arab Emirates have

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65 K. Lankosz, *Eksploracja i eksploatacja kosmosu. Czy Helium 3 zmieni status prawny przestrzeni kosmicznej?* (w:) E. Fonkowicz [ed.], Prawo międzynarodowe – teraźniejszość, perspektywy, dylematy. Księga Jubileuszowa Profesora Zdzisława Galickiego, wyd. WoltersKluwer, Warszawa 2013. p. 373.

66 E. Riedel, *Die Menschenrechte der dritten Dimension als Strategie zur Verwirklichung der politischen und sozialen Menschenreichte*, (Translation: Jerzy Zajadło in:) Ruch Prawniczy, Ekonomiczny i Socjologiczny, Rok LII – zeszyt 3-4, Warszawa 1990, p. 123-124.

67 UN Document: Contribution of the International Seabed Authority to the background note the General Assembly through its resolution 73/292 (https://www.un.org/sites/un2.un.org/files/isa.pdf – 15.08.2021).

68 Preamble to the Antarctic Treaty of 1959: „Recognizing that it is in the interest of all mankind that Antarctica shall continue forever to be used exclusively for peaceful purposes and shall not become the scene or object of international discord".

definitely gone beyond the discussion phase at the international level and are an expression of active interest in acquiring space resources, beside to the ongoing polemics about the status of commercial space exploitation under international law. It should be emphasized here, however, that the wide and enthusiastic adoption by the international community of the Outer Space Treaty in 1967 (129 signatory states, including 104 ratifications) made it possible to recognise the principles developed therein as norms of customary law in relation to states that did not sign the Treaty[69].

These principles include: the principle of non-appropriation of outer space (Article II of the Outer Space Treaty), the principle of the peaceful use of outer space (Article IV), the principle of mutual assistance (Article V) and the principle of state's responsibility for space activities (Articles VI and VII). Thus, these principles – as a source of law specified in Art. 38 of the Statute of the International Court of Justice (called there "the general principles of law recognized by civilized nations") – have also become binding for states that have not been bound by the Outer Space Treaty[70]. In turn, NASA under the "Artemis"[71] program argues that the extraction and use of space resources is fully acceptable under Art. II, VI and XI Outer Space Treaty[72].

This discrepancy between the activities of selected countries and international law is related to the lack of precise normative regulations at the international level, or the lack of their acceptance – as in the case of the Moon Agreement. The topic of legal loopholes is extremely rare in the literature on space law, and they even encourage actions in the spirit of the freedom of the cosmos, according to the idea of *Astra Liberum*. On the opposite side, however, is the interest of the commonalty. This naturally must create tensions between the divergent interests of individual consortia and states – and the global community[73].

Currently, on the basis of article I-IX of the Outer Space Treaty, it is possible to reconstruct such freedoms as: freedom of movement in outer space, freedom of research, freedom to construct installations for non-military purposes, freedom to

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69 M. Hofmannand, F. Bergamasco, *Space resources activities from the perspective of sustainability: legal aspects*, publ. Cambridge University Press, Cambridge 2020, https://www.cambridge.org/core (09.01.2021), p. 2.

70 See: B. Skardzińska, *Górnictwo kosmiczne – prawo i perspektywy* (in:) K. Myszona-Kostrzewa, E. Mreńca, P.B. Zientarski [ed.], *Prawne aspekty działalności kosmicznej*, publ. Kancelaria Senatu, Warszawa 2019, p. 170.

71 The Artemis program is implemented by the USA and serves the purpose of manned exploration of the Moon and other celestial bodies. See: https://aerospace.org/sites/default/files/2020-07/NSpC%20New%20Era%20for%20Space%2023Jul20.pdf (17.09.2021).

72 B. Malinowski, *Projekty pozyskiwania naturalnych surowców w kosmosie* (in:) M. Polkowska [ed.], *Współczesne trendy w polityce bezpieczeństwa kosmicznego*, publ. EuroPrawo, Warszawa 2020, p. 99.

73 L. Łukaszuk, *Współpraca i rywalizacja w przestrzeni kosmicznej. Prawo-Polityka-Gospodarka*, publ. TNOiK, Toruń 2012, p. 100.

extract resources (only for scientific purposes)[74]. The limitations of the above freedoms are in turn: prohibition of the appropriation of space along with celestial bodies (Art. II of the Outer Space Treaty), environmental protection (natural condition of outer space – Art. IX of the Outer Space Treaty), competition between entities exploring space (the need to indicate the limits of freedom that may violate the broadly understood freedom of other participants in commercial space exploration – Art. IX of the Outer Space Treaty)[75].

The strong position of the United States regarding the fact that the prohibition of space appropriation does not apply to private entities is to some extent hampered by the proposals of countries such as Belgium and Greece, which believe that without appropriate international legal regulations and international supervision, the exploitation of space resources will lead to the destruction of balance between states in outer space, which is a precondition for the peaceful coexistence of nations in space[76].

So where to look for detailed rules regarding the use of space resources? The answers should be sought on the oceans and their bottoms, which are also rich in natural resources and, like Open Space, have an extraterritorial character. The seabed outside the national jurisdiction belongs to the Common Heritage of Mankind, which means that this area cannot be appropriated, it should be used only for peaceful purposes, and the extraction of natural resources may only take place under the supervision of the International Seabed Authority (ISA), operating under the aegis of the United Nations. Therefore, it is difficult to ignore these analogies when looking for system solutions for the principles of the exploitation of space resources. Looking at the sea, you can see the horizon line, where the sea meets the sky, which prompts you to reflect on the formula: *per mare ad astra*.

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[74] Art. I Outer Space Treaty: „The exploration and use of outer space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries".

[75] Also see: R. Wolfrum, *The Principle of the Common Herritage of Mankind* (in:) *Zeitschrift für ausländisches öffentliches Recht und Völkerrecht* 1983, vol. 43, p. 316.

[76] M. Hofmannand, F. Bergamasco, *Space resources activities from the perspective of sustainability: legal aspects*, publ. Cambridge University Press, Cambridge 2020, https://www.cambridge.org/core (09.10.2021), p. 2.

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