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Integrating outer space as a global commons with private property rights to outer space resources

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Inspired by the US government's denial that outer space is a global commons, and the heated discussion in China regarding property rights in outer space resources, this article looks at this controversial term: "global commons". It finds that this term was mostly adopted as a political, rather than legal, term. As a result of the over-emphasis on the implications of global commons on the property rights to outer space resources, states that plan to develop private space mining may avoid calling outer space a global commons. This article argues that this response may not be necessary. It then examines the real purpose of the global commons discourse by analogizing the tragedy of commons and thus puts forward the suggestion to adopt the non-exclusive use standard to govern the activities of space resource extraction by private parties. This solution will allow countries to continue to view outer space as a global commons while liberalizing private parties' activities in outer space resource development and extraction. Moreover, China's initiative of the global community of shared future possesses the potential to serve as the overarching concept to govern its future outer space activities, including space mining.

KEYWORDS

global commons, outer space resources, property rights, non-exclusive use, license conditions

1 Controversy over the concept of global commons in the outer space domain

After the Trump Administration confirmed that they do not view outer space as a global commons,[1] the discussion of the nature of outer space and its resources redrew the attention of the international society. A main consideration behind the resistance of the U.S. against the concept of "global commons" in outer space is that this notion (Goehring, 2020) may restrict the freedom of exploration and extraction of space resources, particularly by its private parties. Aligning with the Office of Space Commerce, the U.S. government had a concern that this concept may constrain free enterprise by limiting their activities of "recovery and use of space resources". (Office of Space Commerce, 2020). In fact, the support of commercial exploration of, and access to, space resources had been an important

1 Exec. Order No. 13,914, 85 FR 20381 (2020) (the U.S.), s 1.

agenda in the Obama Administration as reflected in the U.S. Commercial Space Launch Competitiveness Act, which was enacted in 2015.[2] However, the U.S. still saw outer space as a part of the global commons during the Obama Administration.[3] The Trump government seems to have reversed the standing point of its previous Obama Administration and pushed the interests of American citizens in relation to outer space resources to a more central position. This shift of standpoint appears to imply the volatility of the political decisions in the U.S.

In contrast, the EU considers outer space as a global commons. (Pepijn and Bergsen and others, 2022). The divergence in the interpretation of outer space can be a deep-rooted challenge for cooperation between the U.S. and the EU.[4] The policy of the U.S., with a feature of "America First", will influence their normative behavior in outer space and intensify rivalry.[5]

In alignment with the EU, China consistently holds that outer space is a global commons. The Ministry of Foreign Affairs of the People's Republic of China ("MOFA") reiterated this statement in its regular press conferences. However, it is interesting to note that this concept was translated differently in previous regular MOFA press conferences. ("Global commons" is written as "global commons" in Chinese, 2020).

If one analyzes the 2015 Commercial Space Launch Competitiveness Act and the 2020 Executive Order of the U.S. as a whole, an important implication appears that they see global commons contradictory to the property rights of private parties to outer space resources. Truly, commercial space companies need to safeguard by law the benefits that they will obtain from outer space. Otherwise, they will be disincentivized for investments in space or developing outer space activities.[6] The New Space era increasingly relies on the contribution of non-state entities in unveiling more unknowns and benefiting from more resources from space. (McClintock et al., 2021). Private actors will not be motivated to explore outer space if their interests are not protected on a legal level. Given the fact that space technology has great potential to improve the welfare of humans, we still heavily rely on private actors to make developments in outer space. Accordingly, the lack of legal protection for their outer space activities may slow down the improvement of the welfare of life on Earth.

I have structured this article as follows. In Part 2, I explain global commons through the tragedy of commons. Part 3 proposes that outer space resource extraction should ensure non-exclusive use rather than putting the focus on the property rights of these resources. In Part 4, I introduce the initiative of a global community of shared future that China may adopt in the future to address issues regarding outer space resources. Part 5 suggests using license conditions to implememt the non-exclusive standard. The conclusion reached is that outer space as a global commons and the notion of private property rights are not mutually exclusive. Global commons is a term focused on avoiding the tragedy of commons on a global level, with the sustainability development goal in a central place. I suggest that the standard of non-exclusive use standard should be used to govern the extraction of outer space resources.

2 Translating global commons by the tragedy of commons

While it makes sense that to offer legal protection to private actors for their outer space activities, the U.S., followed by Luxembourg[7] and several other states, legitimized private property rights to outer space resources, is it a necessary step to deny outer space as global commons? I suggest that recognizing outer space as a global commons does not necessarily carry any implications with respect to property rights in resources extracted from that commons. In other words, even if one state entitles its nationals to the rights to resources explored from outer space, it can still accept outer space as a global commons. My arguments are as follows.

First, global commons had not been strictly used as a legal term. Equally put, this notion does not indicate any legal obligations regarding the property rights to resources extracted from outer space should the outer space be acknowledged as a global commons. This concept does not exist in any of the five legally binding space law instruments.[8] This fact appears to indicate that this is not a legal concept, at least in the space law domain, in a hard-law sense. The missing wording "global commons" in the five legal instruments also seems to indicate that the position of the U.S. is "consistent with applicable law" as they stated in the same paragraph of the Executive Order where they spelled out the denial of outer space as a global commons.

On the national level, this concept was mostly adopted in policies, diplomatic statements, and other political documents, as implied by the practice in China and the U.S. As Guoyu Wang argued, the word "commons" originated from economics. But as a theoretical basis of global governance, this concept comes from the discipline of international relations. (Wang, 2019). As the international community enriched this concept by placing the meaning of "common governance", "sharing", "tolerance", "generation quality", and "sustainability" under this overarching term, there lacks a commonly accepted and precise

2 This Act amended Title 51 of the United States Codes by adding the Chapter 513. This Chapter includes Section 51302 (commercial exploration and commercial recovery), which clearly sets out the aim to "facilitate commercial exploration for and commercial recovery of space resources by United States citizens".

3 Department of Defense, 'Sustaining U.S. Global Leadership: Priorities for 21st Century Defense' (2012) vol 1, 3; Joint Chiefs of Staff, 'Joint Operating Environment 2035: The Joint Force in a Contested and Disordered World' (2016) 30. This report viewed outer space as a global commons, which is "available to all but owned by none."

4 Pepijn Bergsen and others, 'China and the Transatlantic Relationship' (Chatham House 2022) 17 https://policycommons.net/artifacts/2473274/china-and-thetransatlantic-relationship/3495294/ (Accessed February 9, 2024).

5 ibid 19.

6 Commission on the Implementation of United States Space Exploration Policy, *Journey to Inspire, Innovate, and Discover* (2004) 19; Kenya Bousedra, 'Downstream Space Activities in the New Space Era: Paradigm Shift and Evaluation Challenges' (2023) 64 Space Policy 1, 9.

7 Article 1: "Space resources are capable of being owned." Law of 2017 on the Exploration and Use of Space Resources, Luxembourg (Loi du 20 juillet 2017 sur l'exploration et l'utilisation des ressources de l'espace).

8 These are the Outer Space Treaty (1967), the Rescue and Return Agreement (1968), the Liability Convention (1972), the Registration Convention (1975), and the Moon Agreement (1979).

understanding of this concept, particularly on the legal level.[9] The discussions on the meaning of global commons had been made even more unclear as this concept was confused with similar notions like "the common heritage of mankind".[10] Therefore, the global commons should not be understood as a clearly defined legal term. It does not mean any restrictions on the property rights obtained by private actors in space.

Second, one can interpret global commons by analogizing g "the tragedy of the commons", which indicates that if individuals have access to a public resource, namely, the commons, in their interests only, the resources will be finally depleted. (Spiliakos, 2019). There are two necessary conditions for the tragedy of the commons to take place: access to the commons and the lack of effective governing measures, for instance, a set of rules of conduct, to prohibit exploitation. (Feeny and and others, 1990). As Hardin put it, "the only way we can preserve and nurture other and more precious freedoms is by relinquishing the freedom to breed . . . " and "it is the role of education to reveal all the necessity of abandoning the freedom to breed[11]."

Global commons can be reasonably translated as to avoid the tragedy of commons on a global scale. Specifically, the lack of mechanisms against resource depletion will put global commons in the doom of the tragedy of commons. (Erin A Clancy, 1997). Being aware of the implications of the tragedy that can happen to the herding commons, one can similarly construe the core of global commons that the tragedy does happen in the fields with open access to parties globally.[12] Global commons thus can be translated as a designed concept aimed at ensuring that the different parties globally, states or non-state parties, develop and recover space resources in a sustainable way.

The analogy of the tragedy of commons sheds light on the global commons, offering us a new angle to view the nature of global commons as a concept that does not have to be associated with any requirements regarding outer space property rights. As long as effective governance that restrains parties from depleting the resources is in place, one can be assured that the nature of outer space as a global commons is respected.

3 Shifting from the focus on property rights to the standard of non-exclusive use

As previously mentioned, the controversy over the legitimacy of entitling private actors property rights, particularly the ownership, of resources extracted from outer space is largely due to the fear that states as traditional powers and private actors as new players will exploit the outer space by competing to claim as much as possible the property rights to outer space resources.[13] This is a reasonable concern if one bears in mind the cardinal Article I of the Outer Space Treaty, which calls for outer space exploration for the benefit and interests of all countries and humankind.[14] Prima facie, the privatization of space resources seems noncompliant with the spirit of this rule.

While concerns regarding entitling private actors to the rights to outer space resources remains reasonable, such entitlement might be an inevitable trend in the future. As discussed, the exploration of outer space increasingly relies on private actors and they thus require to be secured for the interests obtained from their space adventure. Ricky Lee also wisely observed that "the development of space resources would also increase the need for additional infrastructure in the Earth orbit or the surface of the Moon, in turn increasing the demand for mineral resources from space. This need for the development of resource exploitation in outer space appears [. . .] to be only a matter of time." (Lee, 2012) As we cannot deny the trend of space resource extraction, it seems impossible to forbid the extraction of outer space resources and accordingly the use of these resources, for example, space mining, if 1 day the technology will reach that far to enable us to harvest the "crops" in space.

According to my opinion, under international law, the extraction of, and claim for, rights to space resources is not forbidden. Article II of the Outer Space Treaty only sets out that "outer space, including the Moon and other celestial bodies, is not

9 Wang, G. (2019). Comparative analysis of the legal characters of outer space and cyberspace, and sovereign legal relationship. Law Rev., 145–147.

10 ibid. One should note that "the common heritage of mankind", unlike the notion of "global commons", is entrenched in Article 11 of the Moon Agreement. The unsuccessful subscription of the agreement, according to the number of its contracting parties, implies that the concept of "the common heritage of mankind" is also not widely accepted by states. The fact that Australia, a party to the Moon Agreement, later became a party to the Artemis Accords, showed a tendency to stay clear from the "common heritage of mankind" notion, which they used to embrace. Ajey Lele, 'India Joins the Artemis Accords' (*The Space Review*, 26 June 2023) <https://www.thespacereview.com/article/4610/1> accessed 19 November 2023.

11 Garrett Hardin, 'The Tragedy of the Commons' (1968) 162 Science 1243 at 1248.

12 Some authors also understood global commons through the lens of the tragedy of the commons. Erin A. Clancy used the mixed phrase "the tragedy of the global commons" to argue that "the tragedy of the commons occurring is not lessened when dealing on a global scale". ibid. When discussing the application of the doctrine of *res communis* to outer space, Joan Eltman argued that a loophole inherent to it is that nations may deplete the resources when no external mechanism can force them to accept external costs. Two types of external costs are resource degradation cost and resource depletion cost. Joan Eltmen, 'A Peace Zone on the High Seas: Managing the Commons for Equitable Use' (1993) 5(2) International Legal Perspectives 47, 64.

13 Pepijn Bergsen and others, 'China and the Transatlantic Relationship' (Chatham House 2022) 17 at 17 https://policycommons.net/artifacts/2473274/china-and-the-transatlanticrelationship/3495294/ (Accessed February 9, 2024).

14 Article I stipulates that "the exploration and use of outer space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind."

subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means." As space resources, are not outer space, the Moon, and other celestial bodies *per se*, where these resources come from, the Outer Space Treaty does not prohibit the extraction of outer space resources.

In China, another set of heated debates over space resources arise: over which types of resources can private parties claim rights and which types of property rights can they claim. Some arguments from Chinese space-law scholars can be summarized as follows: (1) Private actors should be entitled to all types of rights to outer space resources, including ownership. (Li, 2017). (2) Private actors can be given "the right to use" and "the right to profits" from outer space resources but not the right to ownership. (Zhao and Jiang, 2018). (3) In certain situations, private actors can take possession of movable property; they cannot take possession of immovable property in any case. (Zhang, 2012). (4) The non-appropriation principle applies to the claim of ownership of outer space resources while the extraction of such resources without a large scale and for scientific research should be considered as an exception to the application of the non-appropriation principle. (Liao, 2018). In my perspective, thanks to the rapid progress in China's outer space exploration, these deliberations on the legitimacy of space resource extraction are important references in reshaping the future international law regime of space resources.

This article holds the opinion that the divergent opinions listed above reflect different understandings of the definition of the controversial "global commons", which were discussed with a focus on its implications on the ownership of the commons and the resources therefrom. The difficulty in reaching a consensus on this topic illustrates that the emphasis on property rights can hardly help us find a solution to the discussed questions. One reason responsible for this ineffective communication is that the dialogues are based on the concept of global commons, which as previously argued must not be seen as a strictly defined legal term and different interpretations of this term make this term even more confusing. Thus, the dialogue is based on varied understandings of this term and some of them might be incorrect. Also, even though all the listed arguments have their standings, some of the discussions may deviate from practice. For example, in response to the second opinion, it may not be always possible to distinguish the rights to profits from the right to ownership because the rights to profits may be performed as the trade of certain resources. In my view, the action of trading is in essence the exercise of the ownership right. As such, the dichotomy adopted to draw a line between the right of ownership and other types of rights to space resources has its internal deficiency as many cases are situated in the grey area.

If we change the focus from property rights to the non-exclusive effect of resource extraction activities in outer space, the question seems much easier. Global commons, as discussed, aims at avoiding the tragedy of commons on a global level, but this term does not imply the denial of the entitlement of property rights to outer space resources to both national and private parties. The standard of non-exclusive use can serve as a substitute for the traditional approach, which puts the focus on property rights when it comes to the debate on the boundary of private actors' freedom in utilizing space resources. (Steffen, 2022). Non-exclusion requires that the extraction of outer space resources must not impede the activities of exploration, development, and extraction of resources by other parties. Its implications can be understood from two perspectives: time and space. The space perspective means that the extraction of space resources must not restrict free access to the same commons by other parties at the same time. The time perspective denotes that outer space resource extraction by one party must not impede similar actions by other parties in the future. For instance, a space mining company cannot defend itself by not having restricted other parties from extracting the resources at the same time if the company's activity will lead to a result that makes it impossible for other potential companies to extract the space resources in the future.

Notably, the non-exclusive use standard on the time level is pertinent to the global commons nature of outer space because it responds directly to the sustainability concern as the core of the tragedy of the commons. The requirement of sustainable development of the commons can safeguard the outer space commons by restraining parties from depleting the resources in their own interests. Although many new ideas regarding space mining technology developed over the past 20 years, there is still a long way to go to be able to do scale space mining. (Jakhu et al., 2017). It is very likely that at the infancy of the space-mining industry, few companies have the capability to do so.[15] As such, it is easy for these companies to justify that they have met the non-exclusive use standard in terms of their space level even if no other companies do not conduct space mining due to their lack of ability. However, these forerunner companies may have depleted the resources or have made the outer space environment no longer suitable for future space mining, leading to the occurrence of the tragedy of commons. The standard of non-exclusive use on the time level thus serves as a workable solution to prevent these companies from excluding the opportunities of outer space resource extraction by other parties in future generations.

One may question whether the anti-depletion logic can be reconciled with the trading logic. In other words, whether an authorized investment that aims for profit can be at the same time subject to non-exclusive use restrictions. My opinion remains that it can be a feasible solution in the special space-mining context in the early stage. First, *de facto* competition may be absent at the initial stage of space mining due to the fact that few companies possess the capital and technology to enter this industry. In consequence, a situation that is similar to monopoly will occur, making certain restrictions on how they develop and recover space-related resources necessary. Second, current discussions on the legitimacy of space resource extraction are diverse. As a middle way to reconcile both types of opinions, i.e., to allow space mining and to forbid it, permission with a conservative non-exclusive restriction serves as a proactive means to space mining in a global commons setting. The non-exclusive right of space resource extraction does not mean the lack of guarantee for obtaining the resources in order to make profits. Rather, it focuses on the sustainable recovery and use of space resources. The significance of the sustainability goal has been

15 A key reason is the high capital threshold of the industry. Olaf Steffen, 'Explore to Exploit: A Data-Centred Approach to Space Mining Regulation' (2022) 59 Space Policy.

globally acknowledged.[16] The non-exclusive restriction can be understood as a description with some implementation implications of the sustainability requirement in the space resource extraction context. There are various approaches and extents to implement the non-exclusive use standard, depending on the will of the authority. For example, a space company can conduct space-mining business with the cooperation of a non space-faring nation with the view to advancing their space capacity-building. Third, in practice, some states authorize non-exclusive mining licenses.[17] An analogical look at this example sheds light on the proposed non-exclusive use standard of space resource extraction.

4 A potential substitutive approach of China to addressing the outer space

In September and October 2023, the Chinese government published two white papers entitled "A Global Community of Shared Future: China's Proposals and Actions" (The State Council Information Office of the People's Republic of China, 2023b) and "The Belt and Road Initiative: A Key Pillar of the Global Community of Shared Future" (The State Council Information Office of the People's Republic of China, 2023a). Both white papers highlighted the establishment of a global community of shared future ("人类命运共同体" in Chinese), which "bears in mind the wellbeing of all humanity".[18] The two documents also viewed outer space as a new Frontier to be governed under the initiative of the global community of shared future.[19] As a contemporarily fundamental diplomatic policy, this concept was entrenched in the preamble of the Constitution of the People's Republic of China as amended in 2018.[20] This article observes that similar to other political initiatives, the global community of shared future remains an open-ended and inclusive idea and thus needs to be deliberately implemented in law and regulations.

That said, I still believe that this initiative resonates with the essential pursuit of the global commons, namely, all humans, regardless of their nationality should cooperate to survive the "immense and unprecedented crises" to enable the "sustainable development of human civilization" and finally to build a beautiful future for all.[21] There is a precautionary logic behind this initiative: if one reads between the lines of both white papers—all states and humans must make efforts to cooperate to avoid disasters that may deprive us of a safe homeland. This proactive notion is a reiteration of global commons. I proposed previously to use the standard of non-exclusive use for governing private actors' activities in space resource extraction. The "global community of shared future" initiative can serve as a general framework compatible with this standard. China can situate more specific laws and regulations under this overarching framework. As a current trend of thought in global governance, this initiative has drawn the attention of both the government sector and space law academia in China. It possesses the potential to evolve into China's future approach to structuring the legal and policy framework on outer space resources.[22]

16 For example, the UN set up 17 sustainability development goals (SDGs) to address a wide range of global challenges and guide efforts toward a more sustainable, equitable, and resilient future. United Nations, 'The 17 Goals' <https://sdgs.un.org/goals> accessed 26 January 2024.

17 In Namibia, one type of mining license is a non-exclusive and non-renewable prospecting license for a 12-month duration. Alec Crawford, Jessica Mooney and Harmony Musiyarira, 'IGF Mining Policy Framework Assessment: Namibia' 13. Thailand also has three types of non-exclusive, non-renewable, and non-transferable mining licenses. Chandler MHM Limited-Nuanporn Wechsuwanarux and others, 'In Brief: Mining Rights and Title in Thailand' (*Lexology*, 20 May 2022) <https://www.lexology.com/library/detail.aspx?g=2583dc1a-8fea-4b11-8b49-bfa966ec8caf> accessed 25 January 2024. In Malawi, the Mines and Minerals (Non-Exclusive Prospecting Licence) Regulations set out specific provisions regarding the non-exclusive and non-transferable mining license. UN Environment Programme, 'Mines and Minerals (Non-Exclusive Prospecting Licence) Regulations (Cap. 61:01)' <https://leap.unep.org/en/countries/mw/national-legislation/mines-and-minerals-non-exclusive-prospecting-licence-regulations> accessed 25 January 2024.

18 The State Council Information Office of the People's Republic of China, 'Full Text: A Global Community of Shared Future: China's Proposals and Actions' (26 September 2023) http://www.scio.gov.cn/zfbps/zfbps_2279/202309/t20230926_771260.html (Accessed November 23, 2023).

19 Ibid, 4; The State Council Information Office of the People's Republic of China, 'The Belt and Road Initiative: A Key Pillar of the Global Community of Shared Future' (10 October 2023). http://www.scio.gov.cn/zfbps/zfbps_2279/202310/t20231010_773734.html (Accessed November 23, 2023).

20 In the preamble, the 2018 Amendments to the Constitution of the People's Republic of China added the wording "and promoting the building of a community with a shared future for mankind" right after "in developing diplomatic relations and economic and cultural exchanges with other countries." Amendment 32 of the 2018 Amendments to the Constitution of the People's Republic of China. See the English version at Pkulaw, 'Amendments to the Constitution of the People's Republic of China' (2018) <https://www.pkulaw.com/en_law/520e1c95bc3e633bbdfb.html?flag=english> accessed 23 November 2023.

21 The State Council Information Office of the People's Republic of China, 'Full Text: A Global Community of Shared Future: China's Proposals and Actions' (26 September 2023) preface http://www.scio.gov.cn/zfbps/zfbps_2279/202309/t20230926_771260.html (Accessed November 23, 2023).

22 Many projects focused on the "global community of shared future" initiative emerged in academia after its introduction. See, for example, Zhao Xiaochun, 'In Pursuit of a Community of Shared Future: China's Global Activism in Perspective' (2018) 4 China Quarterly of International Strategic Studies 23. These also include space law studies, for example, Fengna Xu and Jinyuan Su, 'Shaping "a Community of Shared Future for Mankind": New Elements of General Assembly Resolution 72/250 on Further Practical Measures for the PAROS' (2018) 44 Space Policy 57. Some Chinese high-profile politicians also published articles in relation to this initiative, for example, Yang Jiechi, 'Working for a Community with a Shared Future for Mankind by Promoting International Cooperation and Multilateralism' (2019) 75 China International Studies 5.

5 Implementation of the non-exclusive use standard

The non-exclusive use standard can be incorporated as a license condition in the licenses that are authorized by the national regulatory agencies to private parties. This solution is underpinned by Article VI of the Outer Space Treaty, which sets out that state parties are responsible for space activities conducted by non-governmental agencies via "authorization" and "continuing supervision".[23] The licensing regime is a widely adopted approach to perform such authorization and continuing supervision. It is thus feasible to incorporate this standard as a license condition issued by the regulator to corporations that take part in space resource extraction.[24]

The regulatory agency can mandate in a license condition that private actors must not impede the use in the same region, or on the same celestial body, in outer space at the same time by other parties. Nor can it deprive other parties of the opportunities to conduct similar resource extraction activities in the future by depleting these resources or conducting outer space activities in a damageable way. In practice, the designation of license conditions can be more innovative to require the licensed private actors to submit a demonstration report, proving why the outer space resource extraction plan will not exclude or impede the development of outer space by other parties in a similar way.

Individual countries, or their national space agencies or other designated governmental agencies, have the power to issue licenses. Thus, the power to impose license conditions, in the context of global commons, with a view to sustainability belongs to each country and their respective space agency or other governmental agencies with the delegated power. One might ask whether the Committee on the Peaceful (COPUOS) within the United Nations system, a specialized committee at the global level dedicated to addressing the challenges and opportunities presented by activities in space, has the power to issue licenses and impose license conditions for non-exclusive use purposes.

While COPUOS plays a crucial role in promoting international cooperation and the development of guidelines for space activities, it does not have the authority to issue licenses to space companies. The reason can be found on the level of the Outer Space Treaty. The licensing regime serves as a manner for states to implement the obligatory provision of Article VI of the Outer Space Treaty, specifically, state parties' obligations to authorize and continuously supervise their private parties' outer space activities. Accordingly, only states have the obligation, or the power, to scrutinize private parties that they have control over. COPUOS or other similar international organizations are not legitimately authorized to assume the obligation of issuing licenses.

Truly, the authorization of space resource extraction is a matter of profound international concern. In terms of this fact, intergovernmental organizations with a special focus on the global governance of outer space, particularly COPUOS, seem to be an appropriate agency to decide whether or not to allow outer space resource extraction activities by private parties. However, if it does so, there might be a concern of violating Article VI of the Outer Space Treaty because it is not each individual state party who has made such decisions. Thus, this article argues that it is premature within the current legal framework to authorize COPUOS the power to issue licenses and impose licensing conditions.

That said, COPUOS can contribute to the making of guidelines with agreed specific licensing standards that individual countries can adopt when licensing and imposing conditions on their private parties. The number of members of COPUOS continuously increased from 18 in 1958 to 102 in 2022.[25] This wide representation implies that guidelines and licensing standards, which are widely agreed upon by COPUOS's members, can reflect their interests. It would thus lessen the difficulty in national implementation. COPUOS has experience in making guidelines with a view to promoting sustainability in space exploration. In 2018, COPUOS adopted the "Guiding Principles for the Long-Term Sustainability of Outer Space Activities". While not legally binding, these guidelines provide a set of principles aimed at ensuring the sustainable use of outer space and minimizing the creation of space debris[26].

While it is beyond the scope of this short article to showcase all possible approaches to implementing the non-exclusive use standard, the following thoughts may offer some inspiration for regulators. First, private space corporations, which apply for a license to conduct resource extraction can be encouraged or required to provide a cooperation plan or sign with the regulatory agency a memorandum of understanding (MOU).[27] These documents show their plans to recover and extract space resources with parties from other non-space faring nations by

23 Article VI reads "States Parties to the Treaty 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 the provisions set forth in the present Treaty. The activities of non-governmental entities in outer space, including the Moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty."

24 In practice, the licensing regime has been used by the regulatory agencies to impose obligations to the licensed private space companies. In the U.S., persons, who operate private remote sensing systems, in or outside of the U.S., must obtain a license from the National Oceanic and Atmospheric Administration (NOAA). A general license condition as stipulated in the Code of Federal Regulations requires that the licensees "upon request, offer to the government of any country (including the United States) unenhanced data collected by the system concerning the territory under the jurisdiction of such government without delay and on reasonable terms and conditions, unless doing so would be prohibited by law or license conditions." 15 C.F.R. § 960.8(c) (2020).

25 United Nations Office for Outer Space Affairs, 'Committee on the Peaceful Uses of Outer Space: Membership Evolution' <https://www.unoosa.org/oosa/en/ourwork/copuos/members/evolution.html> accessed 17 January 2024.

26 Committee on the Peaceful Uses of Outer Space, 'Guidelines for the Long-Term Sustainability of Outer Space Activities' (27 June 2018) <https://www.unoosa.org/res/oosadoc/data/documents/2018/aac_1052018crp/aac_1052018crp_20_0_html/AC105_2018_CRP20E.pdf> accessed 10 February 2024.

27 This is not an obligation under international law. However, the government can choose to mandate this suggestion in the licensing regime.

offering them help to build their space capacity. This solution can be availed by the licensee companies to prove their compliance with the non-exclusive use standard. It also serves as a practice to follow the "common interest of all mankind" spirit from the Outer Space Treaty.[28] Second, in addition to the use of licenses, public-private partnership (PPP, or private-participation) has gained popularity for introducing non-governmental entities and persons to industries that were previously reserved for state parties only.[29] During the participation process, both the government and the private sector usually sign a concession agreement. In the U.S., such partnership agreements have been widely used between NASA and the Department of Defense, and the private sector for service for various science research, space development, data-sharing, and other types of space missions and programs.[30] The non-exclusive standard can also be incorporated as a clause in the concession agreement.[31]

6 Conclusion

The global commons concept has been long interwoven with the debate of the legitimacy and the extent of private actors' rights to space resources. The U.S. adopted an approach that the recognition of outer space as a global commons contradicts such property rights. Chinese international law and space law scholars had arguments regarding whether or not, and to what extent, private parties can obtain outer space resources. This article does not see mutual exclusiveness between outer space as a global commons and private property rights to outer space resources.[32] Rather than denying the legitimacy of such property rights, I suggest that global commons can be understood as a term focused on avoiding the tragedy of commons on a global level, which puts the goal of sustainability development in a central place. This article thus proposes using the non-exclusive use standard to govern the extraction of outer space resources by private actors while continuing to view outer space as a global commons. The time and space spheres of this standard allow it to address the sustainability concern of the tragedy of commons effectively, which means that this standard serves as an alternative to the increasingly confusing debate on the legitimacy, the scope, and the types of property rights to be entitled to private actors within the global commons framework. China's initiative of the global community of shared future, albeit broad and in its infancy, reflects a precautionary philosophy and thus resonates with the spirit of the global commons. This initiative has the potential to be adopted as China's "next-gen" approach to address space mining as the localization of the global commons theory. Among other implementation channels, the non-exclusive standard may simply be incorporated as a license condition.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

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28 See the preamble and Article I of the Outer Space Treaty.

29 Moon J Kim, 'Toward Coherence: A Space Sector Public-Private Partnership Typology' (2023) 64 Space Policy 1, 2.

30 ibid

31 This condition originates from the Principles Relating to Remote Sensing of the Earth from Outer Space adopted by the United Nations Generally Assembly in 1986, in which Principle XII sets out that "as soon as the primary data and the processed data concerning the territory under its jurisdiction are produced, the sensed State shall have access to them on a non-discriminatory basis and on reasonable cost terms [. . .]".

32 Hence, the U.S. licensing regime for private remote sensing operations is a responsive, flexible, and binding tool to shift external soft rules to internal hard laws.

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