

# From Chuquicamata to Nereus: A Contribution of Chilean Legislation to International Laws on Space Mining

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## Abstract

Since space exploration became a tangible reality to humankind, we have been able to launch space objects to the outermost atmospheric layers of Earth, and beyond. At this point, it is only natural that humans are driven to break the next frontier and seek other space activities such as space mining. In this context, countries like Chile, due to its geographical advantages, have positioned themselves as leading experts in mining, constantly searching for innovation, resolving challenges and becoming forefront leaders in this sector. Therefore, the purpose of this paper is to analyze the potential of Chilean legislation to contribute to international laws on space mining. From Chuquicamata, the largest copper open pit mine in the world, Chile and other nations will be able to test, develop, export and expand on mining technology from Earth to space, in a legal framework made from and for developing and developed nations.

## Abbreviations

CM: Chilean Mining Code

CC: Chilean Civil Code

CPR: Chilean Constitution

LC: Chilean Reserved Copper Law

LEO: Low Earth Orbit

LOCM: Chilean Constitutional Organic Law on Mining Concessions

## 1. Introduction

Almost as a mantra, economists have stated that resources are scarce, while our necessities are infinite. When it comes to natural resources, we may find that our Earth's crust holds minerals that exist in very low concentrations, and even a smaller quantity of them are available for our exploration, exploitation and use. However, as the technical and financial obstacles

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around space mining begin to fade, and the feasibility of space mining starts to materialize, the interest of the private and public sector on this activity increasingly manifests.<sup>1</sup>

Nonetheless, the extensive discussion on the exploitation of natural resources on the moon and other celestial bodies, continues to rattle the legal community.<sup>2</sup> As it stands today, the existing international laws on space resources offer a great deal of uncertainty and discussion among the doctrine and the general public,<sup>3</sup> especially with regards to the possibility of commercial use of these resources.

To this end, and through this paper, we seek to determine the *status quo* of the international space mining laws, and analyze how the Chilean national mining laws can contribute to the creation of a new legal regime on space mining activities, from the perspective of a developing nation, experts in mining Earth's natural resources, home of the biggest open pit mine in the world.

## 2. International space law

### 2.1. Context

Outer Space Law is perhaps the most recent legal branch of Public International Law. Given the special characteristics of the environment in which it operates, States and jurists have created and applied innovative solutions to the growing regulatory needs in this area of the law. Nonetheless, as new actors in space began to plan, develop and execute multiple activities in Space, International treaties became less attractive for States, concluding with one of the lowest ratified treaties in Public International Space Law: the Moon Agreement.

As private actors driven mainly by the obvious benefits of space technology and the reduction of barriers to participation, began to flourish, we have experienced a large increase in technological innovations, lower costs and greater access to the services and facilities offered by satellites and space activities in general. However, at a legal, policy and regulatory level, the growth and development of new agreements and rules related to the upcoming space activities has not grown at the same rhythm, and space resources and mining is not an exception.

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1 M. Wall, Trump signs executive order to support moon mining, tap asteroid resources. 06 April 2020, <https://www.space.com/trump-moon-mining-space-resources-executive-order.html>, (last accessed 11.09.22).

2 M. Hanlon, Lunar mining and Moon land claims fall into a gray area of international law, but negotiations are underway to avoid conflict and damage to spacecraft. 23 August 2022, <https://theconversation-com.cdn.ampproject.org/c/s/theconversation.com/amp/lunar-mining-and-moon-land-claims-fall-into-a-gray-area-of-international-law-but-negotiations-are-underway-to-avoid-conflict-and-damage-to-spacecraft-188426>, (last accessed 11.09.22).

3 J. Foust, White House looks for international support for space resource rights. 06 April 2020, <https://spacenews.com/white-house-looks-for-international-support-for-space-resource-rights/>, (last accessed 11.09.22).

With an increase in national legislations that encourage private space activities in the United States, Luxembourg, and the United Arab Emirates, among others, an important part of the international community is concerned with the “normative weakness” of the international space law, advocating for immediate regulation of fundamental issues for this branch of law, with detailed technical standards and binding force.<sup>4</sup>

## **2.2. Space resources**

With the conclusion of the Apollo program in 1972, the interest on the Moon and other celestial bodies nearly disappeared. However, at the beginning of this century, this reality started to change, and the exploration of the Moon, Mars and other celestial bodies was ignited once more. With the launch of Artemis 1 taking place in the coming days,<sup>5</sup> the world once more began to dream of establishing colonies in our natural satellite, and the red planet just seems to be around the corner.

Governments and private entities have had their eyes on space resources for some time now. At the rate that space technology has been developing in the last years, at an almost vertiginous level, we are closing the gap in the technological and economic issues that stand between the space mining reality and where we stand now.<sup>6</sup> As we continue to exhaust resources on Earth, but at the same time protect natural reserves in our planet, with an ever-growing population, space resources seem to be the unquestionable and only solution to our infinite needs and limited resources challenge, making space mining a viable option.

Notwithstanding the foregoing, the fact that the financial and technological viability of space mining activities are improving, the international community has yet to agree on the terms and legality under which these activities will develop.

### **2.2.1. The Outer Space Treaty**

On the 10th of October of 1967, the Outer Space Treaty became what will be later known as the *carta magna* of the international space law. The main idea behind this treaty is the peaceful use of outer space, and to achieve this goal, one of the most important principles contained in various articles in this document, is the non-appropriative nature of outer space.

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4 C. Gutiérrez Espada, La crisis del derecho del espacio, un desafío para el derecho internacional del nuevo siglo, Anuario Español de Derecho Internacional, Vol 13 (1997) 177-212.

5 J. Carter, New Artemis I Launch Dates: NASA Reveals Two New Possible Slots For Shorter Moon Mission. 10 September 2022, <https://www.forbes.com/sites/jamiecartereurope/2022/09/10/new-artemis-i-launch-dates-nasa-reveals-two-new-possible-slots-for-shorter-moon-mission/?sh=4bcbc0ff6213>, (last accessed 11.09.22).

6 M. Wall, Asteroid Mining May Be a Reality by 2025. 11 August 2015, <https://www.space.com/30213-asteroid-mining-planetary-resources-2025.html>, (last accessed 11.09.22).

As per Article II, “Outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of occupation, or by any other means”. At the dawn of the space era, humanity had decided to prohibit any appropriation, domain and sovereignty over outer space. Nonetheless, Article I states “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.”<sup>7</sup> Hence, from the conjunct analysis of the provisions of Article I and II of the Outer Space Treaty, States parties to the treaty have the right to freely explore and peacefully use outer space, regardless of the advancement of the states parties’ technology, without the authorization from other entities or states, and unable to claim sovereignty or domain over it, giving it the legal status of *res communis omnium*.<sup>8</sup>

Unfortunately, by the time the Outer Space Treaty’s text was adopted and eventually ratified by a great number of countries in the world, the text fails to provide certainty in the legal status of space mining activities and the domain of space resources. As the doctrine is also not unanimous in this matter,<sup>9</sup> the legal realm of space mining continues to be uncertain and unclear. Considering the extension and scope of this paper is not to determine the interpretation and international implications of the Outer Space Treaty, we will not continue to further analyze this matter, and shall state that it is clear that Article I and II of this treaty does not provide unanimous solutions for the determination of the legal status of space resources and mining activities.

### **2.2.2. The Moon Agreement**

If we analyze the development of space mining over time, from very early on, there has been interest on scientific research and exploration, in which natural resources are extracted from celestial bodies, with the aim of scientifically studying its chemical and physical composition.<sup>10</sup> Nonetheless,

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7 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, <https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introouterspacetreaty.html>, (last accessed 11.09.22).

8 F. Tronchetti, Legal aspects of space resource utilization, in: F. von der Dunk, F. Tronchetti (Eds.), *Handbook of Space Law*, Edgar Elgar Publishing, 2015, pp. 769-814.

9 F. Tronchetti, The Non-Appropriation Principle as a Structural Norm of International Law: A New Way of Interpreting Article II of the Outer Space Treaty, *Walter Kluwar*, vol. 3 (2008) 277-305.

10 M. Marcano Guevara, *Minería Espacial y Necesidad de Reforma del Corpus Iuris Spatialis*. <http://cedaeonline.com.ar/2021/06/16/mineria-espacial-y-necesidad-de-reform-corpus-iuris-spatialis/>, (last accessed 11.09.22).

with the advancement of technology and improvement on financial feasibility in space mining, the scenario has changed.

The Moon Agreement is perhaps one of the most controversial of the space treaties. With a significant small number of ratifying state parties, and provisions that involve high stakes in the appropriation of the resources, such as the concept of “common heritage of mankind”, rather than detailing and unifying the rules of space mining and resources, it created bigger uncertainties.<sup>11</sup>

Even though Article 11 paragraph 2 of the Moon Agreement reiterates and mirrors the principle of non-appropriation of the moon and celestial bodies in the Outer Space Treaty, paragraph 1 clearly affirms “The Moon and its natural resources are the common heritage of mankind, which finds its expression in the provisions of this Agreement, in particular in paragraph 5 of this article.”<sup>12</sup> The later concept of “common heritage of mankind”, will then become one of the most controversial and debated provisions in International Space Law. No unanimous interpretation exists, which added to the fact that a few countries have ratified this agreement, resulting in great legal uncertainty on the legal status of space mining and resources.

From a scientific point of view, when Article 6 of the Moon Agreement states that “When carrying out scientific research in accordance with the provisions of this Agreement, the States Parties shall have the right to collect and extract samples of its minerals and other substances from the Moon. These samples shall remain at the disposal of the States Parties that have collected them and they may use them for scientific purposes.”<sup>13</sup> In our view, this seems reasonable, since the parties involved in the extraction of the resources shall be entitled to their use in scientific research. Nonetheless, when Article 6 adds “States Parties shall take into account the desirability of making part of these samples available to other interested States Parties and to the international scientific community for scientific research”<sup>14</sup>, hints of the “common heritage of mankind” concept flourish once more, leaving us completely uncertain on what does “take into account the desirability” of other State Parties mean. What is the course of action that shall be taken when another State Party or the international scientific community express interest?

As previously demonstrated, even at a scientific and research level, the provisions of the Moon Agreement continue to be unclear, and do not offer solutions to the aforementioned questions, or scenarios such as the following: when extraction of water from the dark side of the Moon for rocket fuel conversion becomes feasible, will fall under Article 6’s “State Parties may in

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11 F. Tronchetti, Legal aspects of space resource utilization.

12 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, <https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/intromoon-agreement.html>, (last accessed 11.09.22).

13 Idem.

14 Idem.

the course of scientific investigation also use mineral and other substances of the moon in quantities appropriate for the support of their mission”?<sup>15</sup> When does the mining of space resources stop being in support of the scientific mission and becomes a commercial mission? What if the missions are combined? What if the mission is commercial but considered to be in benefit of humanity, like the new missions from Space for Humanity?<sup>16</sup>

Even though we recognize the good intentions and ethics behind the concept of “common heritage of humankind” of the non-appropriative nature of celestial bodies, their surface, subsurface, and natural resources, especially for developing nations, we fear that the provisions in this treaty may jeopardize the general peace and universality pursued by International Space Law, and therefore, propose some ideas from the Chilean legislation, which may assist in the future determination of international laws of space resources.

### **3. Chilean legislation**

#### **3.1. Context**

As mentioned in section 2.2.2, Chile is one of the few State Parties to the Moon Agreement, and therefore, under international law, is considered to be legally binded by its provisions and principles, since after ratifying the treaty, it becomes part of our national laws.

The fact that Chile is a State Party to the Moon Agreement is not surprising, since the principle of “common heritage of mankind” may also be found in other national laws, such as Article 585 CC, which mirrors the general principles of space law, stating “The things that nature has made common to all men, such as the high seas, are not subject to domain, and no nation, corporation or individual has the right to appropriate them. Its use and enjoyment are determined between individuals of a nation by its laws, and between different nations by international law.”<sup>17</sup>

Moreover, Article 19 number 23 of the CPR “Ensures all people [...] The freedom to acquire ownership of all kinds of goods, except those that nature has made common to all men or that must belong to the entire Nation, declared by the law, notwithstanding other provisions prescribed in this Constitution.”<sup>18</sup>

Therefore, it seems that the spirit of the CPR and CC, pillars of the Chilean legal system, is to consider the Moon and other celestial bodies as goods that are outside of human commerce and domain, since “nature has made [them]

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15 Idem.

16 Space for Humanity, <https://spaceforhumanity.org/our-work> , (last accessed 11.09.22).

17 Chilean Civil Code. <https://www.bcn.cl/leychile/navegar?idNorma=172986&idParte=8717776>, (last accessed 11.09.22).

18 Constitution of the Republic of Chile, <https://www.bcn.cl/leychile/navegar?idNorma=242302>, (last accessed 11.09.22).

common to all men.”<sup>19</sup> For this reason, and in the same manner as the Outer Space Treaty, the Moon and other celestial bodies are not susceptible to be acquired through occupation, since their acquisition would be prohibited by International Law (Article 606 CC),<sup>20</sup> nor by prescription (Article 2.498 CC),<sup>21</sup> since it requires that the acquired objects are part of the “human commerce” (which excludes goods that are “common heritage of mankind”).<sup>22</sup>

Although at this stage it may seem clear that Chile, as a State Party to the Moon Agreement, favors the understanding of the Moon and other celestial bodies as “common heritage of mankind”, and therefore, limiting commercial space resources activities, we believe that there are other provisions in the legislation which could contribute in the way the international community can further the creation and agreement on international laws on space mining, facilitating the development of these activities.

### **3.2. Chilean mining law contribution**

#### **3.2.1. Property of the mines**

During the 1980s, Chile experienced a series of changes in its legal system and politics. From a financial and economics point of view, the country became a commercial hub in the Latin-American region, and the different systems in place managed to attract foreign investment and guarantee the stability of private property, and the mining industry was no exception.<sup>23</sup>

As prescribed by Article 19 number 24 CPR, The Constitution ensures all people “The right to property in its various forms over all kinds of tangible or incorporeal property. Only the law can establish the way to acquire the property, to use, enjoy and dispose of it and the limitations and obligations that derive from its social function. This includes whatever is required by the general interests of the Nation, national security, utility and public health, and the conservation of the environmental heritage. No one can, in any case, be deprived of their property, of the property on which it falls or of any of the attributes or essential faculties of the domain, except by virtue of a general or special law that authorizes the expropriation for reasons of public utility or interest. national, qualified by the legislator.”<sup>24</sup>

Notwithstanding the general principle of freedom of private property in Chile, when referring to mines and other natural resources, Article 19 number 24 CPR restricts the property rights over them. Since copper and

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19 Chilean Civil Code.

20 Idem.

21 Idem.

22 H. Corral, Superluna, Derecho y Academia, El Blog de Hernán Corral. 20 November 2016, <https://corraltalciani.wordpress.com/tag/propiedad-de-la-luna/> , (last accessed 11.09.22).

23 Constitution of the Republic of Chile.

24 Idem.

other natural resources are one of the most important sources of income of the country, the regulation surrounding mining activities are of national interest and importance. To this end, “The State [of Chile] has [the] absolute, exclusive, inalienable and imprescriptible control over all mines, including covaderas, metalliferous sands, salt flats, coal and hydrocarbon deposits and other fossil substances, with the exception of surface clays, notwithstanding the property of natural or legal persons on the land in whose entrails they are located. The surface properties will be subject to the obligations and limitations that the law indicates to facilitate the exploration, exploitation and benefit of the aforementioned mines.”<sup>25</sup>

Nonetheless, considering the technological and financial limitations of managing, exploring, and exploiting all the mines and natural resources in the country by the State only, is that Article 19 number 24 CPR grants the rights to concessions, where “The law shall determine which of the substances referred to in the preceding paragraph, except for liquid or gaseous hydrocarbons, may be the object of exploration or exploitation concessions.”<sup>26</sup> So, even though the mines and its resources belong to the State of Chile, the scientific and commercial exploration and exploitation activities, are allowed by private entities, including foreign companies.

### **3.2.2. Mine concessions**

Concessions are not a strange to space activities. Likewise, the allocation of orbits and spectrum resources of the geostationary slots (frequencies for satellite communications in the International Telecommunication Union), are granted considering equitable and fair access (Article 44(3) of the International Telecommunication Union).<sup>27</sup>

To ensure the equitable access, an *a posteriori* method is in place: the operator is given a temporary right to use the aforementioned orbital slots, which by no means grant ownership rights over them.<sup>28</sup>

Even though there are limitations to an *a posteriori* method, for the purpose of comparison in the scope of this paper, an *a priori* method would eventually be more harmful for the proposed concession model, since a State receiving an orbital slot (or a mining concession) that is not technologically or financially capable of making use of out, would potentially leave other States (and therefore slots and frequencies) unused, defeating all purposes to the proposed model.

#### **3.2.2.1. Nature of mine concessions**

Even though the CPR is the cornerstone of the Chilean legal system, the CM completes the legal framework related to mining and extraction activities.

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25 Idem.

26 Idem.

27 F. Tronchetti, Legal aspects of space resource utilization.

28 Idem.



The CM categorizes concessions in two groups: exploration (which are filed through petitions), and exploitation (which are filed as statements). The procedure and exercise of rights will differ between these two types of concessions, due to the objective they pursue. Additionally, licenses granted and its rates, determined in the CM, also differ between these types of concessions. Therefore, an exploitation concession and an exploration concession will differ in the maximum duration period granted, the annual license cost, size, among others.<sup>29</sup>

Moreover, exploration concessions are granted to further research in different areas of STEM, and since they require a series of technical work, examining the land, opening it, establishing easements, which gives them preference for later exploitation, as they discovered and invested in the site.

Notwithstanding the difference between these types of concessions, in both cases and according to Articles 113 and 116 CM,<sup>30</sup> once the requirements established by law have been met, exclusive rights to explore and exploit - in the case of exploitation concessions - and to freely carry out test pits and other exploration tasks - in the case of exploration concessions -, and, where appropriate, to own the natural resources extracted within its limits.

Therefore, in both types of concessions, the rights granted are limited to the use of the mines and does not grant or establish any kind of private property or domain over the mines, since the State of Chile is the sole owner of all the mines in the country.<sup>31</sup> The concession then, is the instrument that confers the right, not the right itself.<sup>32</sup> Once the minerals and elements mined are extracted by the concessionaire, these fall under the concept of concessionable substances, and hence are property of the concessionaire.

The CM categorizes two types of concessions, exploration, and exploitation. These have different legal requirements and obligations to comply with, and different rights. Nonetheless, regardless of their nature, concessionaries are do not have domain over the mines, since the subsurface of the Chilean territory and its mines, belong to the State. However, the Chilean legal system grants the exploration concessionaries priority for the exploitation of the researched mines, and for exploitation concessions, the law grants domain over the extracted resources, promoting legal certainty and commercial feasibility in the mining activities in the country.

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29 A. Vergara Blanco, *Sobre los derechos mineros en Chile*, tesis doctoral intitulada *Reconstrucción histórica y dogmática del derecho minero*. Pamplona, (1988), 848.

30 *Idem*.

31 Constitution of the Republic of Chile.

32 A. Vergara Blanco, *Esquema del procedimiento concesional minero chileno*, tesis doctoral intitulada *Reconstrucción histórica y dogmática del derecho minero*. Pamplona, (1988), 848.

### 3.2.2.2. **Process of acquisition and termination of mine concessions**

In the case of Chilean mining concessions, as prescribed by Article 19 number 24 CPR, concessions “will always be constituted by a court resolution, and will have the duration, rights and obligations that the organic constitutional law expresses. The mining concession obliges the owner to develop the necessary activity to satisfy the public interest that justifies its granting. Its protection regime will be established by the aforementioned law, which will directly or indirectly facilitate the compliance of the obligations set forth, and will contemplate causes of expiration in case of non-compliance or simple extinction of the domain over the concession.”<sup>33</sup>

As in the case of geostationary slots allocations, the States inform the Radiocommunications Bureau its intention to assign specific frequencies, which is crossed checked with the Master International Frequencies Register,<sup>34</sup> Chile has a somehow similar authority in place for mining concessions (with additional competences and power). In Chile, the competent authority to grant are the autonomous and independent courts of justice. The common element which is relevant to the proposal in this paper, is that both authorities act as non-political entities, independent from any executive power, which facilitates a fair system of distribution of the geostationary slots, and mining concessions in Chile.

As to the process of mining concessions acquisitions in Chile, the LOCM establishes most of the strategic definitions of mining policy, stipulating the non-discrimination of the mining concession application process, declaring that any person may acquire them,<sup>35</sup> notwithstanding the exceptions listed in the CM referred to fraudulent behavior.<sup>36</sup>

Additionally, “The controversies that occur regarding the expiration or extinction of the domain over the concession will be resolved by” the Chilean Courts of Justice,<sup>37</sup> as well as general controversies that can take place.

Last, but not least, a relevant element of the Chilean regulations in the acquisition and termination of concessions is the existence of an official Mine Registrar. The Mine Registrar will not only register the active concessions granted, but also shall provide information on the areas where concessions can take place and set the technical characteristics that mining plans and records should hold, to be able to be registered.

Having an autonomous and independent authority to grant concessions and resolve any controversies arising to their acquisition and extinction (among

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33 Constitution of the Republic of Chile.

34 F. Tronchetti, Legal aspects of space resource utilization.

35 Chilean Constitutional Organic Law on Mining Concessions. <https://www.bcn.cl/leychile/navegar?idNorma=29522&idParte=>, (last accessed 11.09.22).

36 Chilean Mining Code. <https://www.bcn.cl/leychile/navegar?idNorma=29668&idVersion=2014-10-10&idParte=8681010>, (last accessed 11.09.22).

37 Constitution of the Republic of Chile.

others), as well as a Mine Registrar, provides legal certainty for candidates and holders of concessions.

### **3.2.3. Chilean Reserved Copper Law**

Along with the other legislative changes that Chile experienced during the 1980s, what is known as the “Reserved Copper Law” was introduced. As previously mentioned, the exploration, exploitation and export of copper is one of the main sources of income for the country.

The LC originally was created to financially support the armed forces in Chile. Through a tax of 10% of the revenue of the exploitation of copper mines to concessionaries, other areas of the government would be financed (in this case, defense).<sup>38</sup>

In 2010, Chile experienced one of the most devastating earthquakes in history, an almost four minute long 8.8 Richter event, with a consecutive tsunami, that would cause massive destruction across the country. As a recovery strategy, the government decided to allocate the 10% revenue from the LC for 2010 and 2011, into the reconstruction of the country.

In 2019, after eight years in the Senate, the LC was finally modified, and the 10% revenue tax was no longer allocated to finance the armed forces, but for the next nine years, would go directly to the government to subsidize other needs. As of year ten, it should decrease 2,5% per year, until reaching 0%, bringing the law to an end.

What is interesting about this law, is the fact that while mining concessions began to exist, so did this 10% tax, destined to benefit other areas of the government, and eventually, the Chilean community. In this point, we do not want to focus on what was being financed or subsidized by the taxes, but on the fact that a system is in place, to tax 10% of the revenue of the mining activities, which later serve for a greater good for the community.

In our view, this model would bring closer together the interests between developed and developing nations, which tend to be in opposite ends of the space mining debate.<sup>39</sup> If extended to a global level, the international community could be benefited from the exploitation of space resources by higher developed nations in the space sector and help the developing nations with their own space programs, or other needs, which would in a way “benefit all mankind”, bringing closer together the interest of nations rather than positions on the space mining matters.

## **4. Conclusions**

Today, both in International Space Law and Chilean Law, the Moon and other celestial bodies are not susceptible of appropriation or domain.

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38 Chilean Copper Law <https://www.diariooficial.interior.gob.cl/publicaciones/2016/12/22/41639/01/1155260.pdf>, (last accessed 11.09.22).

39 F. Tronchetti, Legal aspects of space resource utilization.

However, with the vertiginous advancement of technology and the financial feasibility of space mining, as humanity, we will need international laws or regulations that preserve the peaceful use of outer space.

When considering the Chilean model on mining concessions, we propose to understand the surface of the Moon and other celestial bodies as the international high seas, or the geostationary slots, and the space resources as the fish found in international waters, or the geostationary frequencies. In this way, concessions would allow commercial activities to take place, without discriminating among nations, continuing to guarantee free and equal access to space.

In order to provide legal certainty and good faith in the process of acquisition of mining concessions, as in Chile, we would recommend having an autonomous and independent authority which can grant, publicly register, terminate and resolve controversies in mining concessions in outer space.

Moreover, regardless of the exploration or exploitation nature of concessions, concessionaries do not have domain over the mines, since the subsurface of the Chilean territory and its mines, belong to the State. However, the Chilean legal system grants the exploration concessionaries priority for the exploitation of the researched mines, and for exploitation concessions, the law grants domain over the extracted resources, promoting legal certainty and commercial feasibility in the mining activities in the country. This could be an interesting model for the international space community, since we would preserve the non-appropriation of space, but incentivize the public and private sector to continue to invest in space, including academic research and furthering the knowledge of the universe.

Finally, with regards to the application of a system similar to the 10% revenue tax of the LC, we can bring closer together the interest of developing and developed nations, preserving the principles of freedom of access, peaceful uses, and non-appropriation of outer space, while benefiting humankind as a whole. This system, could very well complement the proposed space mining infrastructure, including non-discriminatory concession rights (which can be divided into exploration and exploitation concessions), an independent and autonomous international authority that grants, registers, monitor, and terminates concessions, as well as an entity that resolves controversies arising from the execution of rights, compliance of obligations and constitution/termination of the mining concessions.

We believe it is of vital importance to seek for an alternative (sooner rather than later) that balances the conflicting interests between nations, that encourages scientific research that can be achieved through new technologies in order to extract resources, while respecting and preserving the basic principles of space law. It is our mission as a generation to set the pillars of space mining and especially for the peaceful uses of outer space.