



## Legal Myths Regarding the Space Private Property Debate

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### Abstract

This paper investigates the legal myths of space ownership and whether private property can be applied to outer space territories. I will look at how asteroid mining can be regarded as a legal act performed by both government and private entity in the near future. As odd as space ownership might sound at present, future space settlements will function based on basic values that promote land and resource ownership.

Each person has purposes and according to the level of priority, he/she has choices to make in order to reach his/her needs and wants. It is obvious that in a world where life is limited and goods used to reach our goals are rare, we usually choose present goods rather than future benefits. It has been proven by social studies that living in an environment where property rights are unclear, such as at present for outer space, man tends to prefer to manifest his actions for a present benefit rather than a future satisfaction because property is a universal value of doing good or bad and respecting such rules goes beyond national borders and time constraints. Property law in all nations is relative and can significantly force people to change frequently personal plans and actions, as per each new legislative mandate, the ethics of property is universal and immutable, with a strong connection to our life since it influences what we are and how we see ourselves in society.

The concern over Asteroidal ownership arises out of different ethical and legal treatment they receive. Ethically, compared to the Moon property, which, in many ways, is a more sensitive issue due to the Moon's cultural, religious and aesthetic values (worshipped by some and environmentally problematic close to Earth orbit), asteroids don't pose urgent ethical dilemmas since they can't be easily degraded by human industrial operations. Additionally, conflicting legal issues (such as various definitions of space property rights and multiple interpretations of space treaties) make viable the prospect of Asteroidal property because there is no emotional attachment felt towards these celestial bodies and, if law in place, prospectors are already willing to open the future door of space mining.

This abstract describes seven legal myths regarding the space private property debate that permeates the thinking of many scholars. These myths can lead to serious misinterpretations of the role private entities have in outer space. By examining and dispelling each myth, correct conclusions can be drawn from different kinds of international principles and related planetary data associated with asteroids.

## Introduction

It is difficult to pick up any current newspaper or modern scientific journal without finding a report of some newly discovered idea on how we are to own and share outer space. All around the world, scholars rightfully question the existing legal theories regarding space ownership and also the various public opinions they find during their research. Additionally, they often wonder what the implications of their conclusions are. Thus some

think that certain international principles inherited from the Antarctic and Sea Treaties ought to be changed.

The goal of this abstract is to respond to this question. Whether we take ethical and legal ideas fully or in part have no bearing on what principle should work in space. In particular, what we know about the Earth has no bearing on how to act on asteroids because human abilities in space are

different<sup>1</sup> (reduced muscle strength and diminished bone density due to low gravity, impaired vision due to solar flares and increased blood pressure inside the head caused by the blood flowing into the head and not towards the feet, shrinking heart as hearts don't have to work as hard to pump blood around the body, brain fatigue and various cancers such as of breast, thyroid, colon and lung, due to cosmic radiation which is different in quality than the terrestrial one, insomnia and trying to re-orient the body's balance system, expanded spine) and thus, the idea of health, efficiency and absolute end to which humans are moving is different in space<sup>2</sup>. Evidence suggests that the environment can make a powerful difference on how we survive on various planets such as Mars.<sup>3</sup>

From the standpoint of ethics, private property debate is an unnecessary detour. The rest of this abstract will be devoted to elaborating upon this argument based on similar issues related to space citizenship policy.

This abstract is organized in terms of seven myths many people believe about space private property. Considering these myths, we realize why ownership

debate has been and continues to be a red herring – a distraction from issues that truly are important in our modern society. These include the protection of our fragile terrestrial environment and the deployment of responsible space activities that reduce space debris, and tracking of dangerous asteroids that could collide with Earth.

There are a number of proposed legal mechanisms that can either lead to or prevent asteroid mining. However, since the OST system is not complete regarding space property, there is always room for intervention. The only issue is whether we know how to intervene effectively for an 'equal sharing' of space between all nations. However, I don't believe that developed countries should be stop in their pursuit of asteroid mining based on the claim that there is a direct connection between them and space debris.<sup>4</sup> Non space-faring countries are also connected to such damage. Due to the increased necessity for Rare Earth Resources - RERs (i.e. China's increased demand for RERs as its population is more willing to have an increased lifestyle), an alliance between developed and underdeveloped nations needs to take place if asteroid mining is to become a reality.

The question of owning space resources is a valid one whether we live on Earth or in space. To say that we ought to do something to amend the OST principles as they are 'soft law'<sup>5</sup> because the private

<sup>1</sup> What Happens to Our Bodies in Space, Double Helix, No 5, CSIRO Australia, pp. 37, Jan 2016 and Cucinotta, Francis A. & Durante, Marco, Cancer Risk from Exposure to Galactic Rays: Implications for Space Exploration by Human Beings, pp 431-434, <http://oncology.thelancet.com>, Vol. 7, May 2006 claims neither shielding, radio-protective drugs, nor complex investigations guided by molecular and genetic research on carcinogenesis and degenerative diseases can reduce the space uncertainties and the asteroid mining risks. In their opinion, these approaches only underlie our basic understanding of biological processes and of disruption of human activities by space radiation.

<sup>2</sup> 'A moral rule is a statement of a condition of social welfare' Mackenzie, John S., Manual of Ethics, 4<sup>th</sup> Edition, University Tutorial Press, London, pp 240-241, 1904 and Preston, Noel, Jan 2014 – Understanding Ethics, Chap. 1 The Ethical Challenge,<sup>3rd</sup> Edition, The Federation Press, Leichhardt, N.S.W., Australia, page 7-15 about the human absolute end or the ideals of life adjusting to the environment/surroundings, our ability to choose amongst values

<sup>3</sup> Zubrin, Robert & Wagner, Richard, 2011 – The Case for Mars: The Plan to Settle the Red Planet and Why We Must, Free Press, New York, London, Toronto and Sydney

<sup>4</sup> Andrade, Elias, The Dilemma of Space Debris Treated at the United Nations, Master Thesis

[http://www.academia.edu/4653977/MASTER\\_THESIS\\_The\\_Dilemma\\_of\\_Space\\_Debris\\_Treated\\_at\\_the\\_United\\_Nations](http://www.academia.edu/4653977/MASTER_THESIS_The_Dilemma_of_Space_Debris_Treated_at_the_United_Nations)

<sup>5</sup> Lee, Ricky J. & Freeland, Steven, The Crystallisation of General Assembly Space Declaration into Customary International Law, Proceedings of the Colloquium on the Law of Outer Space no 46, pp 122, 2004 and Freeland, Steven, Up, Up and... Back The Emergence of Space Tourism and Its Impact on the International Law of Outer

property is needed if we are to mine asteroids is an incorrect assumption. We have to firstly admit that these principles are not just some specific guidelines, but generally fundamental and of direct importance with respect to space industry, as already proven by history<sup>6</sup>. Secondly, if we ask ourselves if asteroid mining is actually ethical, we find that it is due to the huge commercial potential of these celestial bodies. Thus, different human behavior has proven that we can draw false conclusions if we base our actions based only on law and disregard ethical considerations.

My goal is to explore myths that have evolved regarding the issues surrounding debates about private property in space on various kinds of differences. I will not seek to take any particular position regarding private property, but rather try to encourage readers to withhold judgment in the face of reports regarding owning asteroids. Without an understanding of what the results of such ownership truly mean, false conclusions about space policies can be drawn. At the same time, our children's future can be compromised by our ignorance of what space ownership truly means.

### **Myth 1: Ownership Is a Fixed Value for a Particular Nation or a Given Private Entity**

In the first stages of mining, there will be no

guarantee that the space miners will follow international law while on asteroids. Therefore, ethics will be considered more frequently than space property law humans will agree upon. For instance, in history, colonists' tendency to follow their own morality had always a greater value than the civil or customary law of the colonizing power they were subjected to.<sup>7</sup>

Ownership depends on many factors, but the most important one is a variation of environment (e.g. United Nations - U.N. refugees' camps set up for a short while or for longer terms depending on needs). If they were no variations in environments, ownership would be perfect because there would be no other source of variation for human needs and wants. Due to the fact that space varies greatly than terrestrial habitat, ownership is likely to be different and thus imperfect. For example, ownership in each country varies: e.g. the percentage of citizens owning their homes in Australia and Europe is different than that in Japan and India where most people don't own the land. In the future, more highly complex attributes of space property (i.e. the use of an asteroid core, the capturing of helium from very close-by moons, extracting underground Asteroidal water) will tend to be more debated than relevant, simpler property characteristics such as asteroid ratio for each state, trespassing or illegal orbit parking.

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Space, Chicago Journal of International Law, Vol. 6, No. 1, pp. 5, 2005

<sup>6</sup> For instance, the help in outer space - provided by a different state than that of the launching vehicle - sustains this idea of OST principles as fundamental for space exploration / industry, since they represent the customary international law for many situations, including the future asteroid mining conflicts solved through the International Court of Justice (I.C.J.) by allowing shielding against hostile radiation, by excluding other entities to participate in mining asteroids and by solving asteroidal claims –all forms of protection against international crime.

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<sup>7</sup> In the New Caledonia, the exiled criminals followed their own code of ethics with disregard of French legal system which was used for the genocide of both French and African colonised people. One might argue that these people didn't own their huts and land, but even when they were finally allowed to own the East coast of the island (very few survivors), they still followed their own ethical standards regarding private ownership: i.e. while fishing and planting, which varied greatly from the French law. Another example is the Henry Parkes' lobbying for the creation of Australia as a federation, for the Australian women's vote and for compulsory and free education in late 19<sup>th</sup> century. As many of the Crown's subjects, he followed universal ethical principles of equality and freedom during his fight for legal changes.

Thus, I think ownership is a hypothetical trait when it comes to arguing it as a necessary reason for space mining because, if we assume that future colonists will experience at times rapid environmental change (similar to how Eastern Europe did following the fall of communism), then property variation will increase between the same or various groups of people owning an Near Earth Asteroid (NEA) or a particular family of asteroids.

### **Myth 2: Asteroid Ownership Is Tantamount To Being Able To Modify Property Such As Destroying an Asteroid**

At present, the value of space ownership is relevant only according to given circumstances (e.g. benefiting from using helium - He<sub>3</sub> found on Asteroidal regolith), it does not and cannot address all traits of property, such as its modifiability. Although this aspect of ownership – the destruction of asteroids - has its correlation with Pacific Ocean nuclear research tested, when a couple of islands were destroyed (e.g. Kili Island)<sup>8</sup>, asteroid ownership does not necessarily include the destruction of that asteroid due to a possible domino effect it might cause.

Destroying an asteroid is a puzzled property effect. At present there are various reasons for these celestial bodies to be destroyed, but future cultural changes might affect our thinking about how we see these as property. In my opinion, only after multiple

complex experiments and in situ substantial studies, asteroid ownership could support their destruction - performed far from Earth orbit and in accordance with set-up exceptions (not NEAs for instance due to their proximity to our planet) and characteristics of Asteroidal families or conglomerations.

The juridical regime of asteroids/ their ownership should be decided based on Asteroidal orbits. In my opinion, the closest planet should always gain jurisdiction unless decided otherwise by the international space community.

Therefore, unlike Main Asteroid Belt and Kuiper Belt asteroids, NEAs will be under the OST juridical regime due to their proximity to Earth and thus, their destruction by their will be illegal. I consider vast space distances extremely important for the ratification of new regulations which could eventually allow the alteration of selected asteroids, but ownership should never equal destruction. In this sense, in history, we have many examples of conquered, colonial or national land unethically destroyed<sup>9</sup>.

Thus, in my opinion, destroying small asteroids should be allowed after a careful consideration of possible fossil presence and alien life (similar to the ethical terrestrial mining) and for colonists' benefits only (following same ethical principles such as direct benefits for the community), rather than for a quick pick of 'doomed asteroids' and an urgent profit by earthlings.

### **Myth 3: Asteroid Ownership Depends On States'**

<sup>8</sup> [https://en.wikipedia.org/wiki/Nuclear\\_testing\\_at\\_Bikini\\_Atoll\\_tests\\_done\\_by\\_U.S.A.](https://en.wikipedia.org/wiki/Nuclear_testing_at_Bikini_Atoll_tests_done_by_U.S.A.), in the Marshall Islands, between 1946 and 1958 and <https://en.wikipedia.org/wiki/Moruroa> - about the vast destruction of the Moruroa and Fangataufa Islands of Tuamotu Archipelago, in the South Pacific, by French nuclear tests, in 1966

<sup>9</sup> Two examples in this sense are: destroyed fauna and flora in Galapagos Islands by the Spanish conquistadors and the Romanian government's modern-era actions of sacrificing the Southern Romanian villages, in order to save its capital Bucharest from devastation, during the Danube floods of Europe, in 2006.

### **Budgets, Population Ratio or Land Percentage**

Those who seek to contest the 1969 Outer Space Treaty (OST), thus opposing the non-ownership of asteroids propose asteroid ownership by states in accordance with unethical ways of ownership: i.e. divide asteroids as per nations' land proportion, in accordance with nations' population ratio or as per states' proven success in exploration due to strong budgets such as the U.S.A.'s or the E.U.'s.

Somehow, in my opinion, finding exact percentages coordinated to terrestrial or imaginary rules in order to divide the immensity and the complexity of outer space seems to go beyond ethics or logic, thus being pure nonsense in both practical and scientific terms of reasoning.

Hickman and Dolman were the first to offer the solution of claiming sovereignty on an asteroid in proportion to a country's share of the terrestrial land surface<sup>10</sup>. This state-centered solution requires withdrawing from the OST although it doesn't abandon the common heritage of mankind principle because it vests rights to all states by virtue of their territory and not their contribution or investment. Given the variety of asteroids and the quality of their resources, allocation upon arrival doesn't solve the problem of ethical distribution of Asteroidal property rights, since states with small territories are massively disadvantaged. Another problem with this myth is that the outer space resources can't be all divided by territorial surface distinctions, as we do on Earth. Asteroids have as the most valuable land

portion their core which will be impossible to be divided fairly between mining parties because of the varying quality of celestial territory and the great risk of rapid disintegration for asteroids. Several asteroid mining risks which include: *disintegration* due to various mining activities planned to reach the Asteroidal core; *unknown profit* until commercialization of several asteroids begins, *unknown distribution of underground, ground and atmosphere resources* (stretching differently than plots of terrestrial regolith<sup>11</sup> or extracting resources drained from a well located under the neighbor's land) make this myth disincentive, similar to the common heritage of mankind.<sup>12</sup>

This myth supports developing countries since rich nations might buy asteroids from non-faring states, but the cost of purchasing additional Asteroidal territory could be high and thus yielding not enough gains for small developed (states such as Japan) to invest.

### **Myth 4: Ownership Effects Can Be Generalized Between Populations**

In my view, one of the worst offenses that have been committed by space investigators of property is that of generalizing the effects of space ownership designed for both developed and under-developed states based on the 'equal sharing' and the 'common heritage of mankind' principles stated in the OST. Two such generalized effects are the benefits of asteroid mining which has been suggested it will

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<sup>10</sup> Hickman, John and Dolman, Everett, Resurrecting the Space Age: A State-Centred Commentary on the Outer Space Regime, COMP. Strategy No1, pp. 2, 2002 - i.e. Japan, Malaysia, Thailand, Israel who will need to buy out asteroidal land from non-space faring states like

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Sudan, Canada, USA and Russia who could ask for high prices for an asteroid that might have no profit

<sup>11</sup> article Rocket Fuel for Mars' Atmosphere, Membrane & Separation Tech. News, No. 22, 1 Jan. 2004

<sup>12</sup> Landry, Benjamin David, A Tragedy of Anticommons: the Economic Inefficiencies of Space Law, Journal of International Law, Vol. 38, Issue 2, pp. 546 [www.ir.alw.net.fordham.edu](http://www.ir.alw.net.fordham.edu) as read on 14/08/15

benefit each space mining nation's population<sup>13</sup> and the global mistrust resulted from this 'economic game changer' of developed nations<sup>14</sup>. Due to fraud, corruption, national security or political and strategic interests, sometimes, these profits will neither be used fairly, nor for the benefit of that state's citizens, thus depending from state to state. It is realistic to believe that asteroid profits, if invested wisely (i.e. used for space colonization), will benefit a nation's future and that, on the contrary, if managed inappropriately, they will ruin that particular space mining nation's economy and ability to explore. The results are similar with the justifiable, profitable use or the neglect and abuse of terrestrial property, where the effects of ownership are scarcely the same since they vary as per regions and continents due to multiple factors.

A valid illustration of the impossibility of under-developed nations owning an asteroid is their disadvantage in claiming effective space colonization due to lack of resources such as power, human capability and space agencies. The already active pursuit of ownership by developed states will have different effects from the passive 'Asteroidal inheritance' conducted by the under-developed nations because of the different elements of ownership: the way/source of acquiring property, the various qualities of Asteroidal property and the multiple applications for such property (i.e. terrestrial profits, gathering of exploration data and space colonization benefits). All these ownership

factors will influence investors although at times they will work in opposition, not in tandem.

### **Myth 5: Individual Ownership Is the Only Concept to Be Used For Using or Bringing Back Space Minerals**

When discussing the unequivocal importance of private property studies, scientists usually state that this type of research provides evidence of the presence or absence of traits of real space ownership. For example, they talk about *the positive rights* (such as the right of possession, the right of use, the right of moving rocks/regolith, of mining Platinum Group Metals and RERs or of capturing helium, the right of shifting equipment or of bringing in more/recalling personnel) or about *the negative rights* (such as the right of protecting the property against trespassers, the right of keeping others away from a certain orbit, the right of stopping other companies from opening mining pits if by doing so their Asteroidal portion shifts or disintegrates). This statement is absolutely correct. It should be noted private property is not the only form of law that could be used to obtain such minerals. The law of wars and the laws of nature can be also considered.

Let us assume that at present, a company A has decided to colonize Mars despite the fact that there is no law to allow ownership of this planet or of parts of it. If another private entity takes the same step, a conflict will surely arise. Due to the harsh Martian environment and specific characteristics of space property (eg. the quantity of water is more beneficial than the vastness of land), new laws will emerge that will define the attributes of space private property.

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<sup>13</sup> Oduntan, Gbenga, Asteroid Mining Act is Dangerous and Potentially Illegal, University of Kent, as read on 06/12/15 on [www.theconversation.com/who-owns-space-asteroid-mining-act-is-dangerous-and-potentially-illegal-51073](http://www.theconversation.com/who-owns-space-asteroid-mining-act-is-dangerous-and-potentially-illegal-51073)

<sup>14</sup> The International Academy of Astronautics quoted by Messier, Doug, Report Finds Lots of Valuable Mineral Resources in Space, 18/07/15, as read on 07/12/15 on [www.thespacereview.com/](http://www.thespacereview.com/)

An important implication of these facts is that private ownership is not tantamount to the ability to use Asteroidal resources in space. Mining RERs could be highly influenced by space location and have little or no ownership. The reason is that mining depends on the existence of various precious minerals needed for space survival. If there would be no individual needs, there is no mining.

Regardless of the environment in which one lives, humans will have the right to use nature for their own survival. It is not meaningful to speak of terrestrial private ownership due to various differences in individual needs and societal statuses. The effects of private property in space, in my opinion, are at best indirect and will always be connected to survival: owning an asteroid will help their owners to have better chances of finding water and of mining minerals for shielding against radiation.

#### **Myth 6: A Mining Act on an Asteroid Can Allow Private Ownership, Thus State Ownership**

The right to maintain a facility in a given space location - connected or not to other space station(s) or planet(s) by elevators/carriers, will be in time more important/valuable than the right to own chunks of space because without access it will be impossible to exploit the Asteroidal mineral deposits, making thus the terrestrial theory of possession (as nine tenths ownership claimed by Gregory W. Nimitz when asking for parking fees for NASA's orbiter on 433 Eros) is a non sequitur / invalid argument<sup>15</sup>. Wasser and Jobes<sup>16</sup> suggest that

'actual occupation and use' of an asteroid would allow property on parts of entire asteroid to be claimed (e.g. Gregory Nimitz case) especially if there is a registration of such property rights in accordance with international custom law or without since 'law follows the actions of people' as per Nimitz' quote. I agree that mere possession of property (without 'use'/conduct of any work/exploitation of minerals) doesn't grant the possessor rights of ownership, but due to variety of asteroids and no rule for acquiring them, this theory is impossible to be applied ethically since property includes multiple rights and responsibilities: 1) the protection of *intellectual property rights* before the establishment of mines on asteroids (i.e. patents, copyrights, trademarks, industrial designs protected by national laws only at present, which need to be granted in order to encourage the development of future technologies and creativity in general) and 2) space objects which, at present, are not treated as territory by international organizations. Before clarification of the OST international regime happens, multinational activities can't grant ownership because private property doesn't accrue merely by reason of possession. I also disagree with some views<sup>17</sup> that a state would gain sovereignty over an asteroid by extension after the citizen of this state of origin would have manifested his intent to

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<sup>16</sup> Wasser, Alan & Jobes, Douglas, Space Settlements, Property rights and International law: Could a Lunar Settlement Claim the Lunar Real estate It Needs to Survive?, 73 J. Air L. & COM., No. 37, pp. 59, 2008 & Cherian, Jijo George & Abraham Job, Concept of Private Property in Space – An Analysis, Journal of International Commercial Law and Technology, Vol. 2, Issue 4, , pp. 215-216, 2007

<sup>17</sup> Supra Note 16, pp 570; Thomas, Jonathan, Privatisation of Space Ventures: Proposing a Proven Regulatory Theory for Future Extraterrestrial Appropriation, International Law & Management Review, No. 1, pp. 191-200, 2005 and Adolph, John, The Recent Boom in private Space Development and the Necessity of an International Framework Embracing Private Property Rights To Encourage Investment, International Law No. 40, pp. 961 & 964, 2006

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<sup>15</sup> Dodirina, Catherine, Who Owns Outer Space? As read on 12 May 2015 on [www.eandt.theiet.org/magazine/2010/11/who-owns-outer-space.cfm](http://www.eandt.theiet.org/magazine/2010/11/who-owns-outer-space.cfm)

own title of an asteroid through actual possession acts, because of problems such as dual citizenship.

Similar to terrestrial actions performed on land, high sea or atmosphere, which doesn't grant ownership over that territory for the investor, asteroid mining doesn't equal ownership since private property is not clearly stated in the OST.

**Myth 7: Ownership Effects Depend on the National Legislation of the Country Owning that Particular Asteroid and Thus for an Ethical Space Ownership the I.S.S. Policy is needed to be Applied for Asteroid Mining**

Outer space environment is extremely harsh and unless humans cooperate in outer space, space exploration, mining included, will not happen<sup>18</sup>. In my opinion national mining legislation will not apply in space (i.e. the U.S. May 2015 Bill) because such regulations are against the OST, thus possibly causing international conflicts, and also because space mining premises vary terrestrial conditions: eg lack of water and of nearby refining stations.

Sattler proposes the legal model of the Intergovernmental Agreement (IGA)<sup>19</sup>, a treaty amongst the USA, Russia, the 11 members of the European Space Agency, Japan and Canada, for the purpose of establishing a long-time international framework among multiple states and private

entities<sup>20</sup> which provides international cooperation on the ISS inhabited so far by 215 individuals from a total of 14 countries<sup>21</sup>. This space property rights regime uses NASA acting as the coordinator and the International Court of Justice (ICJ) or the World Trade Organization (WTO) as the authority for settling Asteroidal disputes. Although she talks about declaring exclusive economic zones in space, the method of allocating property is not clear and the problem with this theory is that the IGA is only for a short term which is incompatible with an Asteroidal property regime needing a solid long-term base of allocating property rights. Additionally, NASA, as a national organization, will not be able to genuinely promote the interests of other space agencies.

Another similar view mirrors legal actions in the form of international agreements signed at different stages of our space exploration. In this sense, a great example of international space cooperation is the coming together of the NASA, the European Space Agency (ESA) and the Italian Space Agency (ISA) in the effort of probing Saturn and its moons during the 2004 Cassini-Huygens mission<sup>22</sup>. Other examples of space cooperation include legal precedents like the 'embarrassing taxi service' offered by Russia to the U.S. astronauts<sup>23</sup>, which, at

<sup>18</sup> 'We care all Earthlings after all.' Ramussen, Jourdan, Not Going Gently, or Alone, Into that Good Night: Why Nations Should Enter into an International Space Convention for the Furthering of Cooperation in Space Exploration, Michigan State University College of Law, pp. 24, Spring 2015, as read on [www.msu.edu/king/2015-2015/Ramussen.pdf](http://www.msu.edu/king/2015-2015/Ramussen.pdf)

<sup>19</sup> Sattler, Rosanna, Transporting a legal System for Property Rights: From the Earth to the Stars, CHI. Journal of International Law No 6, Issue 23, pp. 28-29, 2005

<sup>20</sup> [www.state.gov/documents/organization/107383.pdf](http://www.state.gov/documents/organization/107383.pdf) the European states of the ESA at the time of signing the IGA were Belgium, Denmark, France, Germany, Italy, the Netherlands, Spain, Sweden, Switzerland and the United Kingdom of Great Britain

<sup>21</sup> [www.nasa.gov/mission\\_pages/station/main/onthestation/facts\\_and\\_figures.html](http://www.nasa.gov/mission_pages/station/main/onthestation/facts_and_figures.html) & [www.nasa.gov/mission\\_pages/station/structure/elements/partners.html](http://www.nasa.gov/mission_pages/station/structure/elements/partners.html)

<sup>22</sup> [nasa.gov/mission\\_pages/cooperation/index.html](http://nasa.gov/mission_pages/cooperation/index.html) and Taylor Redd, Nola Titan: Facts About Saturn's Largest Moon on [www.space.com](http://www.space.com) Titan is one of Saturn's moons, significant for space exploration since it is believed to have stable liquids, albeit in form of methane, on its surface

<sup>23</sup> Thompson, Curtiss, NASA Picks Boeing, Space X to Transport Astronauts to International Space Station, penny4NASA, Sep 2014, [www.penny4nasa.org](http://www.penny4nasa.org)



present, remains the only way to get people on ISS, the usage of Kourou in the French Guyana by the ESA and the Indian's launch of satellites for Japan and France –these legal acts are similar to asteroid mining which I will discuss below. Rasmussen sees cooperation the only option for enhancing scientific, technological, commercial use of space and especially for helping non space-faring states to get involved into important space missions such as asteroid mining<sup>24</sup>. He proposes the International Space Convention for the creation of a new international space agency: the International Aeronautics and Space Agency (IASA) - an international organism with multiple roles such as: raising funds for new space missions, legalizing unconventional juridical methods such as the crowd funding<sup>25</sup> and solving space dispute resolutions. Due to the fact that parties could include anyone theoretically – meaning *nations*, just like paying U.N. members willing to voluntarily pay an yearly contribution and *private organizations* committed to funding more space research<sup>26</sup>, under the current international law, this solution would accelerate the space exploration.

Although it would be beneficial for developing countries to accede to asteroid mining through the ethical means of IASA funding all missions, this regime will not solve the private ownership problem because Rasmussen doesn't talk about how this IASA would divide space property. It is a valid point that this way the space-faring countries will pay the

developing countries' contribution, without being forced into sharing their profits<sup>27</sup> as per the Moon Treaty, and that the IASA will be similar to the Antarctic Treaty Consultative Meeting, since it will coordinate projects in common areas and have the capacity to fund its own space missions and enable developed states 'to finally make the leap into the *spacefaring community*'<sup>28</sup>. However, we already have two major organisms for advancing space cooperation: U.N. Office for Outer Space Affairs (UNOOSA) and the U.N. Committee on the Peaceful Uses of Outer Space (COPUOS).

### Discussion

The ethical idea of property can't be changed easily with another convention – our modern society would become an absurdity and on long term, even the international cooperation would be impossible or aggressive at best<sup>29</sup>. Private property is essential for shaping personal qualities and collective moral standards and thus adopting the appropriate legislation will enable space ownership's decisive impact on our progression as specie and will surely favors the reduce space crime and deviant behaviors on asteroids.

The principal idea of this abstract is that ownership has no implication for the asteroid mining because **mining is legal action** such as use of a celestial body, access to a planet or removal of rocks (precedents of such legal action have been set –see above note 24). If nations are going to compete for

<sup>24</sup> Supra Note 22

<sup>25</sup> 7,000 people from around the world raised over \$1 million for Lunar Mission One – a probe to be sent to the South Pole of the Moon to study lunar soil and to set a moon base- Dickerson, Kelly, Private Moon-Drilling Mission Raises Over \$1 million via Crowdfunding, Dec. 2014, on www.space.com

<sup>26</sup> Supra Note 22, pp. 25

<sup>27</sup> Supra Note 16, pp. 27 section 1 (a) of this new space convention states two ethical principles: equal veto distribution for all states through the IASA's board – consisted of one official delegate from each nation and the declaration of asteroid reservations through its extensive coordination and planning of space mission.

<sup>28</sup> Supra Note 22, pp. 28

<sup>29</sup> Supra Note 1

minerals, then they will encourage private entities to space mine (governments will ‘shop around’). Many private companies (especially multinational corporations) will possibly seek registration in a country where incentives for space mining are higher and with fewer taxes in order to feel legally secure and make a higher profit. Therefore, **setting up an Asteroid Treaty** will be beneficial for international stability and lasting partnerships between countries, but it won’t provide a fair access to Asteroidal resources to all private entities despite an asteroid registry to record all future asteroid mining activities and probably to establish Asteroidal preserved areas - developed for environmental research or for conservation purposes. Thus, for a fair access to space resources, mining should be done based on a space citizenship and a colony registration since multiple governments and diverse private entities will have to work together for such a complex operation like asteroid mining.

At present, ownership has all to do with commercialization of Asteroidal minerals and volatiles. Until colonists set camp on neighboring planets such as Mars, space ownership doesn’t exist and these mining rights will be just an extension of terrestrial property rights – under an international regime already in place through the ethical principles of the OST.

Instead of new principles<sup>30</sup> and new international organisms<sup>31</sup>, a legal clarification is needed to allow space property because, at present, the international community’s priority is not funding (although it is cheaper for all states to participate in common

missions), nor solving space disputes<sup>32</sup>, but the present private property gaps of the non-sovereignty legal regime governing the outer space. In my opinion, asteroid mining is currently ready to take off without any support from NASA or future IASA. Understanding the power of ownership is the best intervention we can make before an international asteroid treaty based on same ethical principles that the OST was ratified upon.

1) The myths regarding space ownership can lead to the false conclusion that we have the right to own space. Granting private property has no bearing on human thinking skills, motivation to space mine and space actions, as some researchers might think. In the future, in my opinion, people mine space bodies anyway –with or without a property lease or title, as huge profits are involved. Ownership should be understood in terms of the substantial good that could come out of asteroid mining. If asteroid mining can result in massive gains for us and for future generations, then we have to master this process and the environmental factors involved since one big mistake would be enough to wipe all Earth civilization.

2) Debating different systems of law (i.e. civil law, common law, a mixture of both, space international law only, Antarctica and high sea laws parallels) don’t necessarily justify space mining. The ethical reasons, which in general are strongly canalised on multiple and much complex attributes such as motives and needs (right and wrong), need to be negotiated effectively between all countries since the

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<sup>30</sup> Supra Note 9

<sup>31</sup> Supra Note 22

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<sup>32</sup> Rasmussen claims an ICJ is not efficient as ITLOS – 23 cases since 1997 against 161 since 1947, or a rate of 2.36 to 1.35 – Supra Note 22, pp. 31-32 However, his comparison is irrelevant since these adjudicatory bodies govern different aspects of international law and I space disputes will become a consequence of legal gaps regarding property and thus, not a cause, in my opinion.

ethics are more relevant than law in the first stages of space mining.

3) Private companies' status is important even for communist countries such as China because without incentives from one nation's government and support from the public, space mining will not happen due to multiple risks. As an example it will be impossible to colonize Mars without the direct help of various type of agencies which bring intellectual capital and funds. However, unless they help set up a human Mars or Moon colonization program, I believe their private ownership over Asteroidal RERs is unethical because it could interfere with alien life or cultural significance such as that given to the Moon.

4) Apart from the legal policy, the ethical principles (already stated in the OST) and the economic, the technical and the scientific regulations need also to be considered before asteroid mining even starts. A state legislation doesn't confer the right to space mine for several reasons:

- the international public opinion could be against this adventure;
- the OST principles imply the sharing principles between nations;
- the environmental risks such space activities have and the late terrestrial response.

There could be two solutions to the ownership jurisdiction problem: 1) granting asteroids, I.S.S., comets, planets a separate legal status - impractical due to their limitation of space and time or 2) intergalactic jurisdiction - too soon to talk about it, in my opinion, set up by future space colonists themselves to legalize transfer of intellectual

property between settlements and private entities such as customers or partners in a mining project. A better option would be the U.N. Asteroid Registry to protect both private property and inventions made on asteroids or on space objects since bilateral and multilateral agreements between states<sup>33</sup>. Thus, for security and economic reasons, Asteroidal property legal protection must be granted by U.N. through an Asteroid Treaty, in various forms and methods/channels which will intrinsically allow Asteroidal ownership:

- use of RERs and Platinum Metals;
- collecting data on certain asteroids for environmental / scientific reasons.
- transfer of regolith /data / technology/ RERs ;
- restriction of sale of asteroid mines / of export of RERs / data / technology /equipment such as launch vehicles, mining robots, extraction equipment; and
- Prohibition of mining in certain parts or on certain asteroids.

I see no current obstacles in U.N. declaring state sovereignty on asteroids in MAB or KB for various states desiring to invest in asteroid mining for two reasons: these zones have an enormous amount of asteroids, so that each state can declare ownership and because such ownership can be granted in accordance with the OST principles which support humanity's progress and space exploration. An effective possession will not be done according to terrestrial legal theories, which, most of the time, require continually symbolic mining activities to indicate a legitimate authority over parts or entire asteroids – impossible thing in space, where simple

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<sup>33</sup> such as on Earth – e.g. the Paris Convention for the Protection of Intellectual Property 1978

actions are unpredictable and where serious accidents tend to scrape off space projects for very long periods of time<sup>34</sup>.

One clarification of space possession would be declaring asteroid ownership in supporting a space colony and not a particular nation because the involvement in space industry increases each year: a) the days of the U.S.A. and Russia as the only space players have ended and private companies such as Deep Industries and Planetary Resources companies<sup>35</sup> are a great example that what we needed for the creation of space industry / ownership is a dedicated team of same or various nations to dare and mine, thus not necessarily a new international entity, and b) satellites and cubesats can't be anymore launched by nations or private entities with no consideration for ethical issues due to increased international pressure to limit space debris. In my opinion, a private entity operating on the asteroid will be able to own it (without the extension that its state of origin would have sovereignty over that outer space body since it would be against the OST) due to such involvement, possibly detailed in a future Asteroid Treaty, but neither based on domestic laws of mining operations for occupied asteroids, nor on regulations of a regulatory body for pristine or abandoned asteroids<sup>36</sup>.

To determine ethically which entities could mine, harvest, drill, manufacture and operate in space,

same international law (based on universal ethical principles) needs to be followed and not national regimes. This condition of future colonies will promote outer space development and it will be in line with the OST principles. It will also maximize short-term gains at the expense of sustainability, from the environmental standpoint since fees, taxes paid to governments will not apply prior launch and mining if these companies will interact and support colonists.<sup>37</sup> As on Earth, a space colony will probably have: permanent population, defined territory (an entire planet or a part of it and asteroids), government and capacity to enter into relations with other terrestrial and future outer-space colonies/states. Although powerful and critical incentives are required to establish a space colony in *rescommunis* (as per the OST, not *res nullius* as per Landry's claims), I am not as pessimistic and I believe that, at present, these traditional factors are met: a permanent population is possible in outer-space<sup>38</sup> and a Mars Constitution would be necessary because a space colony would not come under the sovereignty of a parent state<sup>39</sup> due to immense distance and possibly very little support from Earth.

Thus, despite the OST's common heritage of mankind principle and its denial of state sovereignty in space, future space colonies will own asteroids

<sup>34</sup> Macauley, Molly K., *Flying in the Face of Uncertainty: Human Risk in Space Activities*, Chicago Journal of International Law, Vol. 6, No.1, pp 146, 2005 as read on 03/12/15 on [http://heinonline.org/HOL?page?handle=hein.journals/cjil6&div=6&\\_sent=18&collection=journals](http://heinonline.org/HOL?page?handle=hein.journals/cjil6&div=6&_sent=18&collection=journals)

<sup>35</sup> created in 2012 and 2013 <http://deepindustries.com/mission/> and <http://planetaryresources.com>, read 23/04/15

<sup>36</sup> Solutions proposed by Landry, Supra Note 16

<sup>37</sup> This already happens in high seas and Antarctica due to their comprehensive legal regimes – Supra Note 16, pp 569 Landry who talks from another point of view regarding granting exclusive rights against others by an International Regulatory Body

<sup>38</sup> The reasons for this are man's ability to travel in outer-space as early as the 19<sup>th</sup> century (during Sherlock Holmes' time of gas propulsion, suggested by Buzz Aldrin- Sydney Conference Nov 2015), the two years-frame time possibility of resupplying a Mars colony simply by terrestrial and Martian orbit benefits and the vivid interaction between private and public entities as seen in Antarctica and in high seas.

<sup>39</sup> As classified by the U.N. Charter art 79 & 81 for non-self-governing terrestrial colonies. I disagree with Landry who thinks a Mars Constitution is not needed, but I won't debate here my reasoning since it is not the purpose of this paper.

based not on the above legal conditions of establishing a colony, but on the ethical reasons of survival (seen as the next stage for human evolution), of doing good deeds and of challenging our abilities<sup>40</sup> – strongly encouraged by the OST principles.

The claim that neither state, nor private company are willing to bear the cost of space commercialization because of the risks<sup>41</sup> and of the OST prohibition on space land and space resource appropriation<sup>42</sup> is not true since entrepreneurs are not always driven by returns when investing in new capabilities (e.g. communist research in the Cold Era when economic profits had not much weight). Restrictions placed on sovereign nations to own asteroids, as per the OST, don't extend to individuals through their citizenship because once settled in outer space they gain a new citizenship which is to be detailed with its rights and obligations, which are expected to be much different than those of terrestrial citizenship(s) owned by that person. However, government agencies and non-government companies will not be able to own Asteroidal land unless registered by the space colony with jurisdiction over that particular asteroid.

### Conclusion

Recognizing some kind of property rights and paving way for private entities has been anticipated for decades and an apt scenario for this purpose is the amendment of OST under the auspices of U.N. - an independent international authority able to monitor such mining activities and safeguard various

interests (i.e. those of developing countries unable to space mine yet). The principle of sovereignty over portions of outer space such as asteroids cannot be applied unless all states are unanimous in amending the OST through the Asteroid Treaty which, I believe, will put to application the practical ethical regime of resource distribution facilitated by the application of OST principles and will deal with future disputes resolution such as property violation (i.e. trespassing, intruder occupation, removal of machinery and/or personnel, digging actions for shifting ground or getting to the asteroid's core, since the Asteroidal core has the most valuable resources). In order to make certain that the peace prevails, a law of recognizing private property should be in place a priori before settlers and prospectors arrive and mine space resources a posteriori. For instance such a future treaty will not contradict the existing international space regime because instead of granting mining rights, a state will only recognize these rights as per an Asteroid Treaty which will define an adequate legal framework for the exploration and use of these space bodies<sup>43</sup>. However such treaty will not be enough for a democratic system of sharing resources since a legal international system allowing private ownership over Asteroidal minerals (the Asteroid Treaty) will not stop nations competing for Asteroidal resources. Nevertheless, it will be a beginning of an ethical commercialization of outer

<sup>40</sup> Zubrin, Robert & Wagner, Richard, *The Case for Mars*, Chapter 9 *Terraforming Mars*, Touchstone, Rockefeller Centre, N.Y., 1997 and Murphy, Guy, *Mars: A Survival Guide*, ABC Books, 2010

<sup>41</sup> Supra Note 38 pp. 131 Macauley proposes managing risk by substituting robots for humans

<sup>42</sup> Supra Note 19

<sup>43</sup> Based on the current legislation, a state can't confer a property title for an asteroid, but it can recognise such title especially if the space settlement supported by such mining endeavour will have multinational origin. A terrestrial parallel is the case of the Spitzbergen Islands off the Norwegian coast. Although this archipelago is under Norway's sovereignty since 1920 treaty (ratified by nine nations), the previous nations occupying parts of this land had '*equal freedom of access, commerce, mining and fishing*' Ederington, L. Benjamin, *Property as a Natural Institution: The Separation of Property from Sovereignty in International Law*, *Am. U. Int'l L. Rev.*, No. 13, pp. 284-288, 2012.

space desperately needed and already happening in the I.S.S. at short scale.

Satisfying Asteroidal possession needs is required mostly for economical terrestrial needs: i.e. for the commercialization of space RER used in innovations such as alternative energy sources, food synthesis and for the improvement of human standard of living and also for future colonization purposes. At present, Asteroidal mining activities could enact as legal acts in space since they will be coordinated by an ethical, well-recognized international organism (the U.N., of course) which has all the legal means to provide a legal framework for the legal protection of asteroid property. However, U.N. will not act as a police authority<sup>44</sup>, since such complex administration will not exist until a space colony will elect its own form of government. Until such future time, U.N. remains the best international regulatory agency / juridical authority to monitor and regulate the space mining industry avoiding space legal myths regarding Asteroidal ownership.

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<sup>44</sup> Supra Note 21b – as considered by some space lawyers like Thomas, J.

