

A CELESTIAL BODY IS A CELESTIAL BODY IS A CELESTIAL BODY...

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"Give me a lever long enough and a fulcrum on which to place it, and I shall move the world" - *Archimedes*

Abstract

The progress in the robotic exploration of asteroids, coupled with the intention of an entrepreneur to declare ownership of an asteroid following effective possession, stress the need for an appropriate legal definition of the term "celestial body".

This paper discusses whether [some] asteroids and comets are "celestial bodies", immovable land-like territorial extensions that cannot be appropriated under present regulations - or floating movable things, orebodies *ferrae naturae* capable of being captured and reduced into private ownership. Several theories are examined, such as the employment of the spatialist and functionalist approaches, or the use of the criterion of actual movability from orbit by human action.

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The present paper weighs the different advantages and disadvantages of each of the above schools of thought, and attempts new approaches based on original findings, such as the analogy between the legal status of asteroids and icebergs.

1. Introduction

The Outer Space Treaty contains in article II a fundamental principle, outlawing the national appropriation by any means of outer space and celestial bodies. Strict as it may be in this prohibition, the Treaty fails however to define the precise object of its application. This silence has prompted two disputes in the specialised academic circles: the legal definition of outer space, and the legal definition of a celestial body.

While the question "how tall is the sky" has been brought to practice on the occasion of the Bogota Declaration, the inquiry into the legal concept of a celestial body has been, until now, a Byzantine

debate, unsubstantiated by any actual need. However, the intention of the US entrepreneur JIM BENSON to appropriate an asteroid by means of effective possession¹ makes it an emerging issue of interpretation and application of the *Corpus Juris Spatialis*.

In advocating private property rights in outer space, some authors claim that the Outer Space Treaty outlaws only the national appropriation of celestial bodies. I have shown elsewhere that this is not the case, private appropriation being in fact denied the safeguarding shield of state protection². However, a different approach could prove more successful, that would make reference not to the contents of property rights, but to their object. According to this approach, private appropriation of [some] asteroids and comets would be allowed not because celestial bodies can be privately appropriated, but because [some] asteroids and comets escape the non-appropriation principle, being in fact not celestial bodies in the legal sense.

Claims of ownership over asteroids have already been made, such as ORBDEV's claim over Eros followed by an invoice to NASA for a parking/storage fee³, and RICHARD TAYLOR's claim over all the named asteroids⁴ modelled on Dennis Hope's 'Lunar Embassy'⁵. The triviality of extraterrestrial property claims unsubstantiated by any *corpus* is analysed in another paper of mine⁶. However, while challenging the private applicability of the non-appropriation principle, these claims do not dispute that they are directed at celestial bodies.

I would join other scholars in considering that some extraterrestrial resources are not, legally speaking, celestial bodies.

2. The Concept of "Res" in Outer Space

The concept of "things" is a very vague and heterogeneous notion. While general law employs terms as "goods" and "real estate" as species of "things", *corpus juris spatialis* uses special categories that have very ambiguous legal definitions ("space objects") or no legal definitions at all ("celestial bodies").

What is legally a "thing" in outer space? The universe is populated by astronomical objects that present an extreme variety, from black holes to quasars to nebulae to planets, comets, etc. Are all of these objects of rights - in other words, are they, things?

In defining what is legally a thing, I would apply the theory of reasonable man. Recently, astronomers have discovered the farthest space objects, quasars more than 10 billion light years away. These may be objects in the astronomical sense; I would however kindly submit that they are not objects in the legal sense. Neither should nebulae, black holes, stars other than our Sun, or extrasolar planets, be considered as falling under the sway of *corpus juris spatialis*. While the Outer Space Treaty does not impose itself any territorial limits, it would be unreasonable to extend terrestrial law to the scale of the Universe. The Moon Treaty, despite its poor record of ratification, does contain a reasonable limit, its provisions applying "... to other celestial bodies within the solar system, other than the Earth...⁷". It is thus submitted that the legal notion of "thing" does not have any validity beyond our solar

system. Everything in the solar system is legally a thing: the planets, asteroids, comets, meteors, orbits, etc; beyond the limit of our solar system there is, legally, nothing.

This is already a generous limit - the solar system does not finish with Pluto, but continues with the billions of comets orbiting the Sun in the Kuiper Belt which begins just beyond the orbit of Neptune, and the trillion of other comets located in the Oort Cloud that extends as much as a light-year from the Sun⁸. In fact, every bit of dust that is in the gravitational hold of the Sun counts as part of the Solar System, so the outermost of such dust may reach half way to the nearest star⁹.

3. Territorial Resources vs. Material Resources, Immovables vs. Movables

The legal treatment applicable to various classes of things is fundamentally different, material extensions having a separate legal dimension from territorial extensions, and movables from immovables. As agreed by BURN and CHESHIRE, “[I]and and goods are and must ever be on a different plane¹⁰”.

In considering a question of a proprietary or a possessory nature, the first task of a court is to decide whether the *res litigiosa* is a movable or an immovable¹¹. Depending on this distinction is the legal system that will be applied to the case. It is a generally accepted principle of Private International Law that, while the *lex situs* - the law of the country where the thing is situated - regulates the legal regime of the rights over immovables¹², its importance is diminished regarding the rights over movables; in this second instance, the *lex domicilii* has an important role to play

according to the principle *mobilia sequuntur personam*¹³.

Determining what constitutes in law a celestial body is therefore central for the study of property rights in outer space. Pursuant to the non-appropriation principle of Article II of the OST, celestial bodies cannot be appropriated. In practice, should [some] asteroids and comets be considered celestial bodies, they would fall under this prohibition; per a contrario, if they are not celestial bodies, they may become the object of private property rights.

While the terms ‘land’ and ‘goods’ are not used in space law, there exist nevertheless legal categories that can be categorized as spatial extensions and others that are material extensions; therefore, there are legal categories regulated by *lex situs* and legal categories regulated by *lex domicilii*.

Land is a spatial extension. Should one take away the substance of the land, the spatial value still remains. One cannot consume land; it may, at worst, make it unsuitable for use, but it cannot properly destroy it. While outside the legal profession landed ownership seems a flat concept, in fact landowners do not own surfaces; they own conical entities that may be *x* metres long, *y* metres wide, and about 6378 kilometres deep – the radius of Earth from the surface to its centre¹⁴ and some kilometres high, represented by the height of the atmosphere.

Celestial bodies proper, orbits, points in space and outer space proper are spatial extensions. Outer space and orbits are purely spatial extensions, as they do not have any material existence. Unlike incorporeal things of relevance in space law such as intellectual property rights and the

frequency spectrum, they do exist in three dimensions and, in the absence of the non-appropriation principle, they could be brought under the sway of national territorial jurisdiction. Such was the case with the geostationary orbit, that was declared in the Bogota Declaration to be part of the national territory of several equatorial States. Celestial bodies, outer space and its sub-categories (orbits and point positions) have characteristics analogous to the municipal category of immovables.

Other extensions in outer space have characteristics analogous to the municipal category of movables. Such is the case, for instance, with space objects that are regulated by the municipal *lex domicilii* that in space law has also a special dimension, *lex loci registrationis*. Unlike territorial extensions, national jurisdiction is not prohibited regarding material extensions located in the extraterrestrial realms.

[Some] asteroids and comets could be viewed not as landed extension, but as movables. According to SIMPSON, land has two “special characteristics which distinguish it from all other commodities known to commerce”, namely – “it is immovable, and so it cannot be physically transferred from one person to another”, and “it is everlasting ... [t]he owner of land ... [cannot] in its legal sense, destroy it; his power is limited to the enjoyment or disposition of rights in or over it¹⁵”. [Some] asteroids and comets, however, do not have these characteristics; with the appropriate technology, they could be moved; and they can be destroyed, i.e. consumed in their totality. Thus, they may qualify as movables.

4. The Different Approaches in Defining Celestial Bodies

While there is still a number of authors that do not differentiate between natural bodies in outer space and thus include the asteroids and comets under the sway of the non-appropriation principle, some other authors do differentiate between celestial entities, perceiving movable / material ones as different from immovable / spatial ones. Several theories of defining what is a celestial body and what is not have appeared. It is to be noted that the names of the theories are not the ones given by the authors. In the quest for a solution to another unresolved space law problem – the definition of outer space as opposed to Earth’s atmosphere -, two main schools of thought have formed, namely the spatialist and the functionalist one. The cognate delimitation of the territorial sea from the high seas has also been subject to a sequence of approaches. It has started with the control approach, the cannon-shot rule stating that the place where the power of the arms ends is the same as the place where the national territory ends - *terrae potestas finitur ubi finitur armorum vis*; or *ubi vis ibi jus* – where there is [en]force[ment], there is law. While at that time the range of a cannon shot was about three miles, the approach turned into a spatialist one, the breadth of the territorial sea being generally regarded as three miles even if the cannons were soon able to shoot further away. A revision of the distance did occur in some countries that extended their territorial sea at 12 miles. Nowadays, an exact delimitation between a national sea and an international sea cannot be spatially drawn, being in fact functionalist as it

depends on the activities occurring, e.g. fishing, navigation, law enforcement, etc.

From this it can be seen that each approach has its own merits and served its purpose at its time.

5. The Spatialist Approach

In the cognate quest for a definition of outer space as opposed to airspace, a “spatialist” school of thought has been formed, seeking to discover a spatial limit where the atmosphere would legally end and the outer space would legally begin. According to this, “air law and space law would cover the space above the Earth’s surface split into two slices by different legal regimes as the legal status of territorial sea differs from that of the free open space¹⁶.” Applied to the present topic, a spatialist approach would define celestial bodies as objects over a certain size, while objects under that size would not be celestial bodies. The practical problem is to quantify that size, and to reach a consensus over that. It is far from a simple quest, falling under the spell of the “sorites paradox”. Basically, some concepts are vague, lacking sharp boundaries; such is the case for a heap (*σπορος* in Greek), as discovered by the philosopher EUBULIDES. In HYDE’s words -

“Would you describe a single grain of wheat as a heap? No. Would you describe two grains of wheat as a heap? No. ... You must admit the presence of a heap sooner or later, so where do you draw the line?¹⁷”

In our case, if we accept that the Moon is a celestial body and, on the other hand, a piece of dust floating in space is not, where does one draw the line between celestial

bodies and space dust? At what dimension a “stone in space” ceases to be legally movable, and becomes legally immovable?

Difficult as it is, lawyers have the ability to find the mythical “straw that broke camel’s back”. Where there is no natural boundary or one cannot discover it, law can set a conventional boundary. Such is the case with the legal age – while virtually as [im]mature as a day ago, a person that just turned 18 has different rights and responsibilities than before. The legal age is not a completely arbitrary creation, and while it varies from a jurisdiction to another the differences are not very significant. However, formulating a legal limit between outer space and air space is subject to many avatars – in a 1964 monograph GAL lists 49 spatialist proposals, ranging from 12 km to 38400 km and *ad infinitum*¹⁸. Thus, while a legal limit can break the sorites paradox, the practical problems are to suggest a limit that shouldn’t be arbitrary, and to find a consensus over that limit.

The analogous experience of setting a spatial boundary between the territorial sea and the high seas is interesting insofar as it has evolved from a control approach that at a certain time extended to three miles. Even if the reach of possible control has expanded, the conventional spatial limit remained. Thus, should initially a control approach be applied and should it be possible thus to move asteroids as big as 100 metres long, this may then impose itself as a spatialist limit even if later on the technique would permit the displacement of bigger asteroids.

Unlike the case for the delimitation of airspace from outer space, the supporters of the spatialist school did not come with 49 different proposals as illustrated *supra*.

They mainly came with questions formulated in a spatialist manner.

Thus, FASAN inquires whether a meteorite, following its natural orbit in outer space, is a celestial body or not: -

“If it has got a diameter of few meters, is it then still permissible to “use” outer space by catching this meteorite and bringing it down to earth? And if not, what about a sole pebble with two centimetres of diameter or what about a few particles of dust? And if such an exemplary meteorite would be “appropriable”, what then about an asteroid of the same size moving within the asteroid belt between Mars and Jupiter and, sometimes, even coming much nearer to Earth?¹⁹”

BROOKS agrees with the supposition that “micrometeoroids in space, usually no bigger than a grain of sand, are subject to appropriation by the finder...²⁰”, but he admits that “[s]ome difficulty may be encountered as one moves toward objects of larger sizes. Is a medium sized asteroid a celestial body or a floating mineral resource?²¹”. He accepts that “[n]o legal impediment would seem to stand in the way of appropriating the entirety of an asteroid, though for policy reasons a state may deem this as inadvisable²².”

SZTUCKI considers asteroids as being celestial bodies in the legal sense, but not the meteorites that are -

“celestial bodies in the astronomical sense but certainly cannot be subjected to legal regime envisaged for celestial bodies and e.g. excluded from appropriation. There is, however, an essential difference between meteorites and asteroids. Freedom of exploration and use of outer space, naturally, presupposes taking

samples of meteorites, etc., which because of the unaccountable number of meteorites and no fixed trajectory, does not impair possibilities of other states to do exactly the same²³.”

Regarding dimensions, SZTUCKI writes that “the smallest asteroid known yet as some 0.3 km. in diameter²⁴.”

ZHUKOV considers as celestial bodies in the OST legal sense the “planets and their natural satellites, asteroids, and large meteorites”, but excludes “micrometeorites, smaller meteorites, and comets”, the latter presenting “more grounds for their referring directly to outer space²⁵.”

WILLIAMS finds useful a definition that has been embraced at the First Colloquium on the Progress in Cosmic Exploration and its Consequences upon Humanity, held in Buenos Aires in 1966, viewing a meteoroid as “a solid object moving in outer space, of considerably smaller proportions than an asteroid but considerably larger than an atom or molecule²⁶.” This is in fact a definition adopted by the IAU Commission 22 in 1961²⁷. The problem of vagueness remains – how much is “considerably smaller” and “considerably larger”?

A spatialist flavour follows from the text of the Outer Space Treaty, that in Article I provides for the “free access to all areas of celestial bodies.” From this results that one cannot consider a small space rock as a celestial body insofar as it is not viewed primarily as an area permitting landing on it.

The spatialist approach has its merits insofar as it distinguishes between small objects – that are not celestial bodies – and big objects, that are celestial bodies. However, the problem still remains to agree on how small is small.

6. The Control Approach

The effective control approach has been used in the law of the sea as the "cannon shot rule", and GAL cites examples of its applicability also as one of the criteria of delimiting air space from outer space²⁸. In a slightly modified form, the control approach would distinguish between immovables – celestial bodies – and movables in outer space literally, according to the actual ability of moving them. It is an approach that stands on very logical arguments, proven elsewhere. Thus, according to REID, "[t]raditionally, movable property is described as being property which either moves by itself or which can be moved by others", quoting BELL: "Whatever moves, or is capable of being moved from place to place without injury or change of nature in itself, or in the subject with which is connected, is movable²⁹."

While comfortable at first sight, REID admits that, rather than a definition, this is in fact a description, as "some movable property is so substantial that in practice is never moved, while, as STAIR points out, the fact that soil is capable of being dug up and moved, or that 'the sea...hath its agitation by ebbing and flowing' does not prevent both from being classified as heritable³⁰". In the same time, law came with the fiction of immovables by destination, i.e., things that physically move or can be displaced but that are regarded by law as being immovables.

While the fiction of immovables by destination pertains to municipal law, and while the range of immovables by destination is different in each system of municipal law, it cannot be applied to outer space except by means of international

treaty. Thus, in outer space there can exist only movables or immovables by nature.

The recourse to natural law when positive law is silent is highly reasonable; immovables would be "things that do not move", while movables would be "things that move". Nevertheless, natural law may prove tricky in this case. When extended at the cosmic scale of space law, everything moves by itself – thing admitted as early as ancient Greece, where *παντα ρει* - everything flows. SMITH and ZAIBERT agree - "[t]he distinction between movables and immovables is itself vague; there are, strictly speaking, no immovable objects³¹". This is especially true in the extraterrestrial context. Land is the immovable *par excellence*, but it orbits the Sun at 18.5 miles/second, while the entire Solar System orbits the center of the Milky Way at 140 miles/second³². So, in deciding what is movable or immovable in outer space, the criteria of movability by itself cannot be applied, otherwise everything in outer space would be movable.

This is where the second thesis of the movability comes into service, namely the classification as movable of the property that can be moved through human intervention. According to the control approach, it is movable what it can actually be moved, and immovable what it cannot be moved. By the action of actually moving it, one makes it appropriable. Change occurs in the moment of actual movement. Property would install when moved.

While not proper authoritative, the most relevant legal definition of celestial bodies follows a control approach. Most of the scholars that have studied the problem of defining celestial bodies belong to the control school. In the 1960's, the members

of Working Group III of the International Institute of Space Law concerning the legal status of celestial bodies came with a definition considering celestial bodies in the legal sense as “natural objects in outer space ... which cannot be artificially moved from their natural orbits³³”

It is indeed envisageable that asteroids can be moved in the near future, and law should deal with this. Nevertheless, it is not yet the time to regulate projects that, if not impossible, hold nevertheless of the domain of the very distant future; thus are the fantastic ideas of FREEMAN DYSON to build a sphere around the Sun from all the materials contained in the planets. And in 2001 his idea has been reiterated by US scientists that consider mankind will soon have the ability to move the 5.972 sextillion tonnes Earth into a new orbit, the planetary manoeuvre being envisaged to more than double the time life can survive on our planet. They envisage repositioning the Earth to maintain a benign global climate by using a large asteroid through the gravitational sling shot technique. This would counter the fact that in the next billion years the Sun will increase its brightness and if the Earth stays in its present orbit it will be fried and all life eliminated – by moving it to a more distant orbit this would help³⁴. The idea of moving the Earth is not so new - ARCHIMEDES is said to have offered to move the Earth with levers if given a place to stand.

As with any theory, the control approach is not accepted by everybody. In July 1980, testifying in front of the US Senate, NASA General Counsel HOSENBALL expressed his view that if an asteroid were moved into Earth orbit for exploitation, it would still be a celestial body within the meaning of that

term, and would not change its character by moving into orbit around the Earth³⁵.

However, there is merit in considering that the process of actually moving an asteroid/comet would qualify as extraction, the body in cause ceasing to be a resource "in place" and thus by-passing even the general prohibition in article 11.3 of the Moon Treaty.

7. The Functionalist Approach

According to the functionalist approach in the delimitation of airspace from outer space, space law “can not be associated with a limited space, but only with the character of the activity under regulation³⁶”. Functional approaches exist in other areas of municipal law, that classify some movables by nature as legally immovable. In our field, a functional approach would differentiate between objects used in their spatial dimension – these being deemed as celestial bodies - or in their material dimension, these being movable orebodies; or, if used for navigation, they would be space objects. A functional approach would take into account the actual use of the asteroid – i.e. for building of a base, for exploitation of resources, or for navigation.

8. The "Space Object" Approach

As seen *supra*, some daring scientists would envisage using asteroids as interplanetary / interstellar vehicles; the legal classification of such objects as space vehicles would be supported by a functional approach. A spatialist approach would certainly be unsuitable in differentiating between space objects and celestial bodies, given that some natural bodies in space

would be smaller than the intended Solar Power Satellites, planned to reach 10 km x 5 km each in surface.

FASAN envisages the use of natural Celestial Bodies as 'space objects', and examines the case when an asteroid, by way of human intervention, is reformed, used as a shell for a space station, losing its natural appearance, together with its legal status of 'celestial body' by becoming a manmade structure, i.e. legally a space object³⁷. This so-called "Asteroid Base" would then have to be registered internationally with the Secretary General of the United Nations³⁸.

Another case can be put forward where [some] asteroids, even if not proper used as space objects, would be considered so instead of celestial bodies. While BENSON reckons that there is no appropriate body to which he could make his asteroidal claim, the only possible option being to make the claim to the public³⁹, should small asteroids be considered space objects they could be claimed by way of registration in the national registry of space objects referred to by Article VIII of the Outer Space Treaty: -

"A State Party to the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object"

These provisions have been detailed in the 1975 Convention on Registration of Objects Launched into Outer Space, that defines the term "State of Registry" as "a launching State on whose registry a space object is carried...⁴⁰" and provides both for a national and international registration of space objects. An international Registry is maintained by the UN General Secretary "in which the information furnished in accordance with article IV shall be recorded"⁴¹; Article IV requires each State

of Registry to furnish to the UN General-Secretary information concerning each space object carried on its registry, namely name of launching State or States, an appropriate designator of the space object or its registration number, date and territory or location of launch, basic orbital parameters, including nodal period, inclination, apogee, perigee, and general function of the space object.

The Registration Convention is very liberal insofar as it gives the State of registry concerned the freedom to determine "[t]he contents of each registry and the conditions under which it is maintained⁴²". This may be interpreted as entitling a State to register small asteroids as space objects on its registry.

Should a launching State refuse the request of a private entity to register a small asteroid as a space object, a way of lawfully cheating this provision would be to borrow from the maritime law the institution of "flags of convenience" and to find a State willing to assume the position of launching State and to register the small asteroid. The Registration Convention provides for the situation when there are two or more launching States, according to Article II.2 these needing to "jointly determine which one of them shall register the object". A conflict could thus arise between an unwilling actual launching State, and a willing "convenience" State.

Of course, the status of launching state would come with its privileges and responsibilities, one of the latter being its international liability as provided by several Space treaties. In the light of this international liability, the registration of small asteroids as space objects and their private ownership would be in fact of

benefit to the possible victims of accidents provoked by small asteroids.

9. The Iceberg Analogy

Interesting consequences would result from using the legal status of icebergs as a paradigm for the legal classification of comets and asteroids. In fact, comets have been often described as “dirty snowballs” and the “icebergs of space”. Indeed, Comet Wirtanen is a ball of rock and ice just 600 metres across, that, if gently landed on an Earth ocean, might be legally considered an iceberg. It is to be noted that icebergs have as well a rather unclear legal status, though their small-scale exploitation has already begun. While I intend to analyse in a more substantial piece of work the analogy between icebergs and comets, it suffice for now to say that, like asteroids and comets, icebergs have a spatial dimension but are used mainly in their material dimension, as a floating mineral resource. While article 89 of the UN Convention on the Law of the Sea prohibits the national appropriation of the high seas, I have no knowledge of States having protested appropriation of icebergs. In the same time, I have no knowledge of a formal declaration of ownership over icebergs by the entities using them in their material extension; the principle of extraction seems to apply, given that icebergs have been appropriated either in their entirety and displaced from their initial location, or parts of them have been moved away without, at my knowledge, claims being laid for the exclusion of others from the exploitation of that particular iceberg.

10. Conclusion

The issue of defining celestial bodies is extremely intricate, and there is no absolute answer to be given *ex cathedra*. The present author has only attempted to present the existing theories and some new approaches, but at the end of the day only practice will decide whether [some] asteroids are places or movables.

Notes

The hyperlinks have been last accessed on 24/09/01

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⁶ POP, VIRGILIU (2001), The Men who Sold the Moon: Science Fiction or Legal Nonsense?, 17 *Space Policy* 195.

⁷ Article 1.1.

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¹¹ NORTH, P.M. (1979), Cheshire and North Private International Law, 10th Edition, Butterworths, London, p.483.

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⁴¹ Art. III.1.

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