Chasing Ghost Spaceships: Law of Salvage as Applied to Space Debris

Olavo de O. Bittencourt Neto[*]

High above, throughout the sky, a constellation of marooned space objects circulate in orbit around the Earth. Of different sizes and natures, those wandering vessels, not so much abandoned as disregarded, rest in a state of limbo, waiting for their fate: be it to crash into another space object, to continuously fragment themselves into smaller parts, or to finally re-enter our planet's atmosphere.

Since the number of space debris continues to grow, creating dangers to space activities and astronauts alike, the international community should seriously start to consider alternatives to authorize and legalize orbital cleaning up initiatives, whether conducted by the respective Launching States or not. In that sense, the Law of Salvage, as regulated by Maritime and Admiralty Law, is capable of suggesting an interesting analogy to Space Law, specifically as far as environmental salvage is concerned.

Contemporary law of marine salvage states that rescuers who voluntarily assist ships in distress at sea should be rewarded, being entitled to a gratification commeasured with the value of the property saved. According tothe 1989 International Convention on Salvage, the traditional principle of "no cure no pay" regarding salvage efforts, which provides that those services do not deserve compensation unless the property is saved, shall be reinterpretedin case of relevant damage to the environment. Indeed, in those extreme situations, expenses undertaken by salvors to prevent a substantial damage of that nature are to be recovered by the owner, irrespective of the success of the rescuing enterprise.

Despite the unavoidable particularities of the space activities and the outer space environment, such legal principle couldarguably be embraced by Space Law. Considering the international relevance of the current space debris situation, the study of the legal regime applicable to marine salvage may effectively prove to be invaluable to *de legeferenda* perspectives for future Space Law regulation on that regard.

[*] Professor Doctor, Catholic University of Santos (Brazil), olavo.bittencourt@usp.br.

I. "Ghost Spaceships"

When one examines the growing population of space debris in Earth's orbit, it is possible to realise a striking reality: several uncontrolled space objects have been forsaken, left dangerously travelling without command of the appropriate State.[1]

Somehow, one may even remark that space debris, especially those of relative sizes and proportions, seem to sail across the ocean of outer space as ghost spaceships, "*surely doomed to hover continually upon the brink of eternity*", if I may use the words of Edgar Allan POE in his classic tale *MS. Found in a Bottle*, which follows the final hours of a star-crossed mariner stranded in a haunted vessel lost at sea.[2]

Nevertheless, those wandering vessels cannot be properly considered *res derelicta* since, more often than not, their jurisdiction is legally and continuously safeguarded against third parties, due to their strategic importance.[3]

I. Ph. DIEDERIKS-VERSCHOOR addresses the most relevant question in this subject matter: when can an object be regarded as space debris? "*Current opinion in international organizations tends to assume that an object is debris when all the fuel has been used up and the object can no longer be controlled.*"[4]

Consequently, there seems to be a relevant connection between control of a space object and its nature as debris. Irrespective of the applicable national jurisdiction, whenever, for instance, an artificial satellite loses any form of manoeuvrability or command, it becomes an international concern, due to its potential impact to the environment.

In accordance with recent studies, the number of space debris in orbit is growing at an alarming pace, arguably reaching the level of a considerable environmental problem.[5]

In view of the current situation, Heiner KLINKRAD affirmed that "*space debris is a problem of the Earth environment with global dimensions, to which all space faring nations have contributed during half a century of space activities. As the space debris environment progressively evolved, it became evident that understanding its causes and controlling its sources is a prerequisite to ensure space flight also in the future.*"[6]

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1 "*Space activity from mankind generated a great deal of orbital debris, i.e., man-made objects and their fragments launched to outer space, inactive nowadays and not serving any useful purpose*" N. N. Siminov. *Space Debris: Hazard Evaluation and Mitigation.* London: Taylor & Francis, 2002. p. IX.

2 Edgar Allan Poe. "MS. Found in a Bottle", *in*: *Great Tales and Poems of Edgar Allan Poe*. New York: Pocket Books, 2007. p. 223.

3 Francis Lyall and Paul Larsen.*Space Law: A Treatise.* Farnham: Ashgate, 2009. p. 310.

4 I. H. Ph. Diederiks-Verschoor. *An Introduction to International Law*.2nded. The Hague: Kluwer, 1999. p. 131.

5 José Monserrat Filho. *Direito e Política na Era Espacial.* Rio de Janeiro: Vieira & Lent, 2007. p. 93/94.

6 Heiner Klinkrad. *Space Debris: Models and Risk Analysis.* Berlin: Springer, 2006. p. 311.

The possibility of a cascade effect, in accordance with the often-referred "Kessler Syndrome",[7] has evolved into a real threat to the use and exploration of outer space. In an alarming recently published work, Joseph N. PELTON explained:

> "*Twenty-five years ago the cascade effect of debris crashing into other orbital objects produced a modest amount of new debris elements* (…). *Today this cascade effect is the largest source of new debris elements as the number of micro-debris elements that are less than 1 mm in size has climbed into the millions.*"[8]

To confront such challenging situation, rather global in scope, the study of marine salvage, more specifically regarding environmental dangers, is hereby recommended, in order to envision alternatives for future regulation, as far as Space Law is concerned.

II. Marine Environmental Salvage

Marine salvage's international regulation has evolved based on ancient practices and fundamental principles, constructed through the synergy of old customs and uses. Robert FORCE clarifies that the Law of Salvage originated to preserve property and promote commerce. [9]

In a nutshell, marine salvage comprehends the right of compensation that a salvor of imperiled property on navigable waters or any other waters has, in relation to the owner of said property.[10]

As explained by Thomas J. SCHOENBAUM, "*the law of marine salvage developed in response to important social policies, to encourage efforts to save property from destruction and to discourage embezzlement by salvors.*"[11]

Considering the applicable regulation, marine salvage is primarily focused on property recovery, which, whenever successful, grants a right to a reward.

Some fundamental elements to marine salvage require proper acknowledgement. First of all, there must be a reasonable peril to property, representing a risk of loss, destruction or deterioration. Second, the salvage effort must be voluntary. Third, the enterprise must be successful to justify an award to the salvor.[12]

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7 Heiner Klinkrad. *Space Debris: Models and Risk Analysis*. Berlin: Springer, 2006. p. 2.

8 Joseph N. Pelton. *Space Debris and other Threats from Outer Space*.New York: Springer, 2013. p. 19.

9 Robert Force. *Admiralty and Maritime Law*.Washington: Beard Books, 2007. p. 466.

10 William I. Milwee. *Modern Marine Salvage*.Centreville: Cornell Maritime Press, 1996.

11 Thomas J. Schoenbaum. *Admiralty and Maritime Law*.5th edition. St. Paul: West, 2012. p. 839/840.

12 Thomas J. Schoenbaum. *Admiralty and Maritime Law*.5th edition. St. Paul: West, 2012. p. 841.

Indeed, in accordance with the ancient "*no cure, no pay*" principle, a salvage award is only applicable when the property in question is effectively saved.[13]

An important aspect of marine salvage is that it cannot be forced upon the owner of the property in peril. Thus, the salvor shall seek his prior authorization, whether expressly of implicitly. Such requirement is nevertheless inapplicable if the vessel is considered derelict or, in other words, abandoned by the owner, master and crew. Besides, as indicated by Thomas J. SCHOENBAUM after reviewing applicable jurisprudence, "*a specific request for or express acceptance of salvage services is not always essential. It is sufficient if, under the circumstances, any prudent man would have accepted it.*"[14]

In additional to such classic regime, once consuetudinary by nature, the International Convention on Salvage of 1989 introduced the concept of environmental salvage, subjected to a particular set of rules.

The new international salvage regime introduced by the 1989 Convention, which replaced the 1910 Brussels Salvage Convention, reflected the contemporary concern over environmental protection of the marine ecosystem.[15]

Indeed, as explained by Geoffrey BRICE, "*salvage is traditionally concerned with the saving and preservation of property in peril at sea. However, it is not only the owner of such property who may benefit from a salvage service. It is often to the benefit of other persons and to the public at large that salvage services are successfully undertaken and completed.*"[16]

The 1989 Convention reflected the "Montreal Compromise" of 1981, a work conducted by the Comité Maritime International (CMI) months after the *Amoco Cadiz* disaster, which produced a draft convention on private law principles on salvage, together with a report. Both documents were thoroughly reviewed and finally approved at a CMI conference held in Montreal during 1981.[17]

The concept of salvage operation has been defined quite broadly by the 1989 Convention as "*any act or activity undertaken to assist a vessel or any other property in danger in navigable waters or any other waters whatsoever*" (Ch. 1, Art. 1(a)).

On the other hand, damage to the environment is defined by Art. 1(d) as "*substantial physical damage to human health or to marine life or resources in coastal or inland waters or areas adjacent thereto, caused by pollution,*

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13 William Tetley. *International Maritime and Admiralty Law*.Montreal: Éditions Y. Blais, 2002. p. 326.

14 Thomas J. Schoenbaum. *Admiralty and Maritime Law*.5th edition. St. Paul: West, 2012. p. 844.

15 AlekaMandaraka-Sheppard. *Modern Admiralty Law*.Volume II.3rd edition. New York: Routledge, 2013. p. 652.

16 Geoffrey Brice. *Brice on Maritime Law of Salvage*.5th edition. London: Sweet & Maxwell, 2011. p. 397.

17 AlekaMandaraka-Sheppard. *Modern Admiralty Law*.Volume II.3rd edition. New York: Routledge, 2013. p. 486.

contamination, fire, explosion or similar accidents." Therefore, only substantial physical damage is covered by this provision, which narrows its applicability.
Articles 6 clarifies the voluntary nature of the salvage regulated thereon, by providing that "*this Convention shall apply to any salvage operations save to the extent that a contract otherwise provides expressly or by implication.*"
Robert J. SCHOENBAUM indicates that the 1989 Convention reflected the emerging environmental concern in a number of ways:

> "*First, the Convention codifies the idea that there are overriding environmental obligations in marine salvage (Article 1). Second, all parties involved in salvage operations are required to exercise due care to prevent or minimize damage to the environment (Article 8). Third, it is recognized that coastal states have the right to supervise salvage operations; there are rules requiring cooperation between salvor and public authorities to ensure the successful completion of salvage operations (Articles 5 and 9). Fourth, although the principle of 'no cure-no pay' is preserved (Article 12) as well as freedom of contract (Article 6), the stated criteria for successful salvage include 'the skill and efforts of the salvors in preventing or minimizing damage to the environment', and there is a right to 'special compensation' if this criterion is met even if the vessel is lost (Article 14).*"[18]

Indeed, according to the 1989 Convention, the referred principle of "*no cure no pay*", regarding salvage efforts, shall be reinterpreted in case of relevant damage to the environment. Indeed, in those extreme situations, expenses undertaken by salvors to prevent a substantial damage of that nature are to be compensated by the owner, irrespective of the success of the rescuing enterprise.
As explained by Gérardine M. Goh ESCOLAR, "*in some cases the wreckage may constitute a block or hazard in harbours or other waterways, or become a nuisance to normal shipping traffic. In such cases the owner can be charged to remove the wreck or assume the expenses accrued if it were removed by public authorities.*"[19]
The Law of Salvage and, more specifically, the environmental salvage regime provided by the 1989 Convention, represent an interesting body of rules that may, in due time, be observed by Space Law. The space debris situation is rapidly evolving, requiring proactive measures by the international community, going beyond the mere space debris' mitigation procedures, irrespective of their legitimate relevance.

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[18] Thomas J. Schoenbaum. *Admiralty and Maritime Law*.5th edition. St. Paul: West, 2012. p. 839/840.

[19] Gérardine M. Goh Escolar, "The View from the Oriels of the Stars: The Legal Obligation to Mitigate and Remediate Space Debris in Earth Orbit". *In*: Sagar S. P. Singamsetty (ed.). *Contemporary Issues and Future Challenges in Air and Space Law*. Utrecht: Air and Space Law Books, 2011. p. 380.

In the near future, the effective removal from orbit of dangerous space debris by third parties may develop into a general practice, if not an outright necessity, being performed to guarantee a safe and regular space traffic management.
As informed by Tanja MASSON-ZWAAN, space debris remediation constitutes the next step for dealing effectively with the problem at hand:

> "*Calculations indicate that if 5 large objects are removed each year, the cascading effect predicted by Kessler could be halted. To reverse the trend, 10 large objects need to be removed each year. Hence, 'active debris removal' (ADR) is the next step, and several technical solutions are on the drawing board of public and private entities. They include nets, harpoons, tethers and more* (...)."[20]

Environmental preoccupations will certainly play a big role in justifying those endeavors, which, on the long run, may eventually prove to be quite profitable. However, a serious legal obstacle needs to be addressed for active debris removal to become a reality: the eventual denial, by the State with jurisdiction, of any effort to remove, from orbit, space debris registered on its behalf, irrespective of factual condition or situation. Nonetheless, should such a rejection be considered legitimate under international law or just an example of abuse of rights by the appropriate State?

III. Jurisdiction Regarding Space Objects

The growing environmental problem represented by space debris must be dealt with considering the applicable principles of international law. Thus, one must devote special attention to the jurisdictional link connecting any space object and its appropriate state, irrespective of continuance of maneuverability or command.
It must be stressed that space debris can seldom be considered "space junk"; indeed, the intrinsic value of a space object is often barely affected by the end of its useful life. There are many other factors involved in this equation, ranging from very different strategic standpoints. That is why national jurisdiction over a space object is so important to Space Law.
The concept of jurisdiction in international law may often be misleading to the practitioner. As advised by Michael AKEHURST, that term must be used with extreme caution, since "*it sounds impressively technical, and yet many people think they have a vague idea of what it means; there is therefore a temptation to use the word without stopping to ask what it means. In fact, it can have a large number of different meanings*".[21]

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[20] Tanja Masson-Zwaan. "Space Junk and the Law".*In: Leiden Law Blog*. Posted May 28, 2013.<http://leidenlawblog.nl/articles/space-junk-and-the-law>, accessed on September 7, 2014.

[21] Peter Malanczuk. *Akehurst's Modern Introduction to International Law*. 7th edition. New York: Routledge, 1997. p. 109.

Reference is made to Mark W. JANIS, who defines jurisdiction as the legal power or competence of a State to exercise legal functions.[22]

Jurisdiction may be put in a prism, in order to revel its three different capacities: legislative or prescriptive jurisdiction, representing the authority of States to make laws; executive or administrative jurisdiction, that is, the power of States to apply their laws; and, finally, judicial or adjudicatory jurisdiction, reflecting the power to bring parties to court and to render binding legal decisions.

Any discussion of application of fundamental perspectives of the Law of Salvage to space debris must, necessarily, deal with the problem of jurisdiction over space objects; therefore, careful consideration must be dedicated to applicable international norms.

In accordance with the Space Treaty, Article VIII, States on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, irrespective of its *locus*, i.e., whether while in outer space or after their return to Earth. Likewise, one should notice that component parts of space objects are also subjected to this legal regime.[23]

The jurisdiction, referred to in Article VIII, is, as explained by Bin CHENG, quasi-territorial by nature rather than personal in character, since "*it applies to not only the spacecraft but also any personal on board, irrespective to their nationality*".[24]

As explained by Marietta BENKO and Kai-Uwe SCHROGL, jurisdiction and controlof a space object are established prior to their launch and are always related to States – consequently, not to private entities.[25]

Thus, in accordance to applicable treaty law, jurisdiction over a space object is provided by its registration. Relevant issues may arise whenever a space object has not been registered, nationally nor internationally, as well as in case of modification of ownership of a satellite in orbit. Nevertheless, as a rule, jurisdiction requires enrolment in the appropriate national register. It seems clear that exceptional circumstances shall require extensive or

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22 Mark W. Janis. *An Introduction to International Law*.2nd edition. Aspen: Aspen Law and Business, 1993. P. 322.

23 "*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, and over any personnel thereof, while in outer space or on a celestial body. Ownership of objects launched into outer space, including objects landed or constructed on a celestial body, and of their component parts, is not affected by their presence in outer space or on a celestial body or by their return to the Earth. Such objects or component parts found beyond the limits of the State Party to the Treaty on whose registry they are carried shall be returned to that State Party, which shall, upon request, furnish identifying data prior to their return.*"

24 Bin Cheng. *Studies in International Space Law*.Oxford: Claredon Press, 1997.p. 231.

25 Marietta Benko and Kai-UweSchrogl (eds.). *Space Law:Current Problems and Perspectives for Future Regulation.* Utrecht: Eleven, 2005. p. 125.

analogical interpretation of the Space Treaty in order to identify legal solutions.[26]

A word of caution is offered by Gbenga ODUNTAN who, while confirming that the concepts of jurisdiction and possession are central to discussions regarding application of jurisdiction and control in outer space, acknowledges that "*it is important that lawyers and writers on this subject come to an agreement that contemporary space law as expressed in the treaties gives very limited, if any, scope for the application of these concepts in relation to outer space based resources.*"[27]

Still, one must bear in mind that jurisdiction over a space object is not affected if and when it eventually becomes space debris. That is a key provision of Space Law current international regime, and cannot be neglected.

IV. Abuse of Rights

Any attempt to regulate salvage operations regarding dangerous space debris may have to face the opposition of the State with jurisdiction over the object in question. Nevertheless, an unjustifiable obstruction of an active cleaning initiative by the appropriate State may constitute, as a matter of fact and law, an abuse of rights.

Every nation has the right of access to outer space, in accordance with International Law. For instance, as provided by the Space Treaty, of 1967, "*outer space, including the moon and other celestial bodies, shall be free for exploration and use by all States without discrimination of any kind, on a basis of equality and in accordance with international law, and there shall be free access to all areas of celestial bodies*" (Article I).

Therefore, irrespective of geopolitical considerations and substantive inequalities, outer space must always be considered the province of mankind and, therefore, shall remain open for use and exploration by all States.[28]

This legal prerogative, nevertheless, implies a necessary limitation: while exercising its right of access to outer space, no State shall deny to others the possibility of doing the same. In accordance with Helmut P. AUST, "*the*

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[26] Nicolas Mateesco Matte. *Aerospace Law*.Toronto: The Carswell Company Limited, 1977. p. 175/184.

[27] GbengaOduntan. *Sovereignty and Jurisdiction in Airspace and Outer Space*.New York: Routledge, 2012.p. 188.

[28] NandasiriJasentulyiana explained the importance of the provision that outer space constitutes the province of mankind: "*The* [Space] *treaty was* (…) *one of the first multilateral treaties in which the centuries-old international law concept of sovereignty of States gave way to the modern concept of internationalization of the Global Commons. The 'province of mankind' principle, though controversial, became the watch- word for international relations thereafter, especially in the fields of space law and law of the seas.*" *Perspectives in International Law*. The Hague: Kluwer, 1995. p. 360.

principle of abuse of rights is an important aspect of the international rule as it is directed against arbitrariness in the exercise of sovereign powers of States."[29]

The prohibition of abuse of rights, a fundamental tenet of International Law, is clearly applicable to Space Law, since Article III of the Space Treaty provides that "*States Parties to the Treaty shall carry on activities in the exploration and use of outer space, including the moon and other celestial bodies, in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international co-operation and understanding.*"

Accordingly, abuse of rights during use and exploration of outer space, a global common, is tantamount to produce international responsibility.[30]

As far as International Law is concerned, Rudolf L. BINDSCHEDLER and Rudolf BERNHARDT clarify that "*the abuse of rights refers to a State exercising a right either in a way which result, for example, from the unconsidered use of a shared natural resource* (…). *Here, the States sharing the same natural resource suffer a reduction in their enjoinment of the resource to which they are entitled.*"[31]

One cannot overlook the importance of the abuse of rights doctrine, since it represents a manifestation of good faith in international relations. In the words of Tuomas KUOKKANEN, "*a State is bound to exercise its international rights in good faith. A failure to do so constitute an abuse of rights.*"[32]

The reasoning is quite elementary: outer space is open for use and exploration by all States, which are international responsible for their national space activities, both governmental and non-governmental. Whenever space debris represents relevant danger to the environment, the State of jurisdiction should produce its best efforts to avoid damaging third parties. Failure to do so arguably represents an example of abuse of rights.

There is a necessary connection between the referred concept of province of mankind and environmental protection for Gérardine M. Goh ESCOLAR, who defends that the "'*province of mankind' principle can be reasonably*

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[29] Helmut P. Aust. *Complicity and the Law of State Responsibility*.Cambridge: Cambridge University Press, 2011. p. 76.

[30] In a recent study, Scott Jasper and Scott Moreland affirmed that national security and economic prosperity depend on safeguarding the global commons, which are domains or areas that no State controls but on which all relies, comprising maritime, air, space and cyber domains. *Conflict and Cooperation in the Global Commons: a Comprehensive Approach for International Security*. Georgetown: Georgetown University Press, 2012. p. 21.

[31] Rudolf L. Bindschedler and Rudolf Bernhardt.*Encyclopaedia of Public International Law*, Vol. 7.North-Holland, 1984.p. 1.

[32] TuomasKuokkanen. *International Law and the Environment*. The Hague: Kluwer, 2002. p. 59-60.

seen to include the protection of the outer space environment, including the mitigation and remediation of space debris".[33]
As a result, the unjustified denial of third parties' active removal initiatives of dangerous space debris may also represent an abuse of rights by the appropriate State.

V. Concluding Remarks

Similar problems may benefit from similar solutions. The adoption of an analogical approach of marine salvage regulation to space activities may prove itself if not simply straightforward, at least reasonable in scope.
One must not take for granted the fundamental differences between the outer space and the marine environments. Their natural properties are obviously diverse, starting from the fact that, while the latter reflects a site inside our planet, the former represents a place outside it, with all the unavoidable consequences extensively denounced by science.
Nevertheless, progress in law benefits from comparative studies. That is the reason why it is hereby suggested that, through proper international regulation, the legal regime of environmental salvage provided by Maritime and Admiralty Law, in accordance with the International Convention on Salvage of 1989, could be applied to Space Law, as long as necessary adaptations are considered to adjust said rules to the outer space environment.
Therefore, active debris removal of dangerous, non-functional space objects, remaining in the orbit around the Earth without possibility of maneuver or command, would *a priori* be allowed, irrespective of express authorization by the State who enjoys jurisdiction over the referred space object, in order to answer a relevant environmental concern.
Such provision should be seriously considered by the international community in general, including both spacefaring and non-spacefaring nations, in order to secure freedom of use and exploration of outer space, as solemnly provided by the Space Treaty.

[33] Gérardine M. Goh Escolar. "The View from the Oriels of the Stars: the Legal Obligation to Mitigate and Remediate Space Debris in Earth Orbit", *in:* Sagar S. P. Singamsetty (ed.). *Contemporary Issues and Future Challenges in Air and Space Law*. Utrecht: Air and Space Law Books, 2011. P. 361.