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International Responsibility vis-à-vis natural near-Earth objects (NEOs) and their possible implications

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Introduction

The Scientific and Technical Subcommittee of Copuos has been addressing this topic for some time now and the moment appears ripe to embark in the analysis of NEOs from a legal angle. The subject, currently in a somewhat stormy infancy, calls for a permanent interdisciplinary approach.

This paper is a first step in the legal approach to some of the major aspects involved in the presence of natural near-earth objects, their characteristics, implications and threats, in light of the Outer Space Treaties, the UN Principles and UNGA Resolutions and Declarations on Outer Space, and other rules of international law which might be applicable. Emphasis will be given to issues of international responsibility and liability, having in mind the dangers the presence of these objects may entail to mankind. The duties of countries having the necessary means to deflect or destroy NEOs which pose a serious risk to planet Earth and its resources will be the object of special treatment.

On the private level this question was recently brought up on the occasion of the 73rd Conference of the International Law Association held in Rio de Janeiro, (17-21 August 2008[1]) as a possible new topic on its agenda.

Stating the problem : man-made objects and natural space objects

(a) man-made objects

Different reactions are perceived from the legal standpoint in these initial stages. Part of the doctrine view the question as a subchapter of space debris, except that, on general lines, the latter term is applied to man-made objects and collisions in outer space between active satellites and otherwise inactive or abandoned satellites which originate small particles -referred to as 'second generation debris'. These particles travel at enormous speeds and their impact on an active satellite may have untold consequences. Figures are alarming: there are tens of thousands of these particles currently orbiting the Earth.

The question is aggravated by the existence of minute particles which, in the state-of-the-art, cannot be detected from Earth. Indeed this is a technical limitation which, as technology advances, should gradually be overcome.

In this field an important landmark are the 'United Nations Guidelines on Space Debris Mitigation' elaborated in the framework of the Scientific and Technical Subcommittee of Copuos (hereinafter the 'STSC') and adopted by a UN General Assembly Resolution in December 2007[2].

The seven guidelines considered -and subsequently adopted- by the STSC for the launch, mission and disposal phases of spacecraft and launch vehicle orbital stages are as follows:

1. to limit debris released during normal operations;
2. to minimise the potential for break-ups during operational phases;
3. to limit the probability of accidental collision in orbit;
4. to avoid intentional destruction and other harmful activities;
5. to minimise potential for post-mission break-ups resulting from stored energy;
6. to limit the long-term presence of spacecraft and launch vehicle orbital stages in the low-Earth orbit (LEO) region after the end of their mission;
7. to limit the long term interference of spacecraft and launch vehicle orbital stages with the geosynchronous Earth orbit (GEO) region after the end of their mission.

The fact that the Guidelines have reached the status of 'UN Guidelines on Space Debris Mitigation', plus the response given by a number of states concerning domestic measures taken in accordance with those Guidelines, was a powerful indication that the topic would be finally included on the agenda of the Legal Subcommittee of Copuos (hereinafter the 'LSC'). In fact, the latest development is that a single item for discussion entitled 'General exchange of information on national mechanisms relating to space debris mitigation measures' was included in the Report of the LSC for consideration at its 48th Session in 2009 [3].

In the private field, one of the first instruments of the kind is possibly the *ILA Instrument on the Protection of the Environment from Damage caused by Space Debris (hereinafter the 'ILA Instrument on Space Debris' or the 'Buenos Aires International Instrument on Space Debris')*, adopted in 1994 at the 66th Conference of this institution and which is kept under permanent review by its Space Law Committee[4].

(b) natural near-earth space objects (NEOs)

From the above considerations it follows that, from a legal viewpoint, NEOs are objects of an entirely different nature to space debris. They come under the general category of celestial bodies. In accordance with Article II of the 1967 Outer Space Treaty (hereinafter the '1967 OST') they are not subject to national appropriation by claim of sovereignty, by means of use or occupation or by any other means.

This provision should be read together with Article I of the OST establishing that the exploration and use of outer space,

including the moon *and other celestial bodies*[5] shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and *shall be the province of mankind*[6].

The Article of reference further adds that outer space, the moon and *other celestial bodies*[7], 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*. Finally this Article states that there shall be freedom of scientific investigation in outer space, including the moon and *other celestial bodies*[8], and that states shall facilitate and encourage international cooperation in such investigation.

In this light, and without getting involved in the corresponding provisions of the 1979 Moon Agreement -many of which are not part of customary international law today- added to the fact that very few states have ratified this Agreement, it is clear -pursuant to the afore-mentioned Articles- that all states have a right to explore and carry out research concerning NEOs with the objective of anticipating risks and threats of collision with planet Earth.

By way of example, mention should be made of the announcement by NASA earlier this year concerning a 250-metre-length asteroid travelling at 33,000 km an hour which, according to NASA's latest radar information, would be coming very close to the Earth on 29 January 2008. As oberved by NASA, this is the closest ever an asteroid has been to date. And no asteroid or object of the kind will get closer to Earth before, at least, the end of next century[9].

Even though, in this particular instance, the possibility of collision was discarded, this may not always be the case. However so, the exploration and further research carried out by NASA in this field to enable this institution to make the above-mentioned announcement was undoubtedly lawful under the 1967 OST and consistent with international law. NASA, it is clear, met the requirements of the OST laid down in Articles I, II and III[10]. Moreover, it may be fairly assumed that it observed the provisions of Article IX of this Treaty as well, inasmuch as it had no reason to believe that the activity in question would cause harmful contamination or adverse changes in the environment of the Earth.

Yet it may be wondered whether, had NASA predicted -as a result of its exploration and research activities- a possibility of collision, could this governmental body, or any other state, group of states or international intergovernmental agency be held responsible for not avoiding an imminent catastrophe?

Let us assume further that NASA and/or other governmental bodies involved had the necessary technology to deflect the threatening object and, in so doing, had caused some damage to planet Earth. What would the legal consequences be? Indeed there are no specific rules on this issue.

Hence the conclusion that questions of responsibility and liability and their many intricacies should be carefully sorted out when addressing NEOs from the legal angle.

In addition to the duty of international cooperation underlying the UN Space

Treaties, Principles and UNGA Resolutions relating to Outer Space, and the ILA International Instrument embodying rules which may be seen as part of customary international law, this situation, viewed from a legal standpoint, calls for further precision. A slight step forward may be perceived in the 'Declaration'[11].

As Castillo Argañarás holds[12], point 4 of the Declaration is a sound basis for the duty to provide technology to deflect NEOs when stating that *international cooperation should be conducted in the modes that are considered most effective and appropriate by the countries concerned, including, inter alia, governmental and non-governmental; commercial and non-commercial; global, multilateral, regional or bilateral; and international cooperation among countries in all levels of development.*

At first sight, the situation is remindful of the 1968 Astronauts Agreement - hereinafter also referred to as the 'Rescue and Return Agreement'- where the obligations enshrined are essentially humanitarian. In fact, in its Preamble this Agreement calls for the rendering of all possible assistance to astronauts in the event of accident, distress or emergency landing, and the prompt and safe return of astronauts, and the return of objects launched into outer space. Later on in this text a reference to 'sentiments of humanity' may be found.

In like manner, the need to deflect NEOs which constitute a serious risk of collision with planet Earth may be viewed as based on humanitarian reasons. However, unlike the case of the Rescue and Return Agreement, it is the whole of mankind which would be here at risk.

Unlike the 1972 Liability Convention, it must borne in mind that we are dealing with natural -and not man-made- objects which, consequently, are not subject to registration nor do they come under the provisions of this Convention. This makes matters somewhat more complex.

As indicated earlier, NEOs cannot be subjected to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means, as Article II of the OST clearly provides. NEOs are celestial boodies and - doubtless- the province of mankind. Their presence in the vicinity of planet Earth is a threat to the whole of mankind. And, as in the case of space debris, there are currently tens of thousands of NEOs from which a small number may imply a considerable threat of collision with the Earth in the present century[13]. Such the situation today.

Interesting, for its implications, is the Safeguard Survey Programme established by the US Congress and put into practice by NASA in recent years. The figures released are telling. As Schweickart indicates, in the past eight years 4,600 NEOs have been discovered of which 713 are greater than 1 km diameter. The new directive from the US Congress to NASA anticipates the discovery of 400,000 NEOs of which approximately 40,000 will go beyond the 140 metre diameter goal[14].

The question has clear international dimensions and calls for a strict interdisciplinary approach. It is well-known that the precise data provided by science and technology becomes essential where the building up of realistic legal proposals is concerned. In this context the legal implications of NEOs is no exception.

In the search for viable suggestions and interdisciplinary approaches to NEOs a look at the recent work of the STSC on the matter becomes pertinent. In the first place, this Subcommittee has agreed on a definition -which may perhaps be seen as a non-exhaustive description- of NEOs which appears extremely useful as a working tool.

NEOs, as noted by that body, are asteroids and comets with orbits that could cross the orbit of planet Earth. The STSC also considered that the interest in asteroids was largely due to their scientific value as remnant debris from the inner solar system formation process, the possibility of their collision with the Earth and potentially devastating consequences, and their possesion of a wide range of natural resources[15].

The STSC noted that early detection and precision tracking were the most effective mechanisms for the management of threats posed by near-Earth objects. In that regard, the STSC noted with satisfaction that a number of international teams in various countries were currently searching for, investigating and cataloguing NEOs[16].

UNGA Resolution 62/217 (22 December 2007) reconvened its Working Group on NEOs which started work on 18 February 2008 with Richard Croucher (UK) as its Chairman[17]. This Working Group considered that the task accomplished in the intersessional period had resulted in important contributions to international cooperation in that area.

One of the main objectives of this Group is to review policies and procedures related to the handling of the NEO threat at the international level and consider drafting international procedures for handling this threat[18]. At the end of the 45th Session of the STSC, and on the basis of the multi-year plan[19] reviewed by the Working Group, it was recommended that the STSC continued to consider NEOs in acordance with a new multi-year plan (2009-2011)[20].

This workplan should be followed closely when elaborating general guidelines or codes of conduct addressing the legal aspects of NEOs so that the ensuing proposals are consistent with the international context of our time.

Finally it may be observed that contributions from the doctrine to the legal aspects of NEOs have been sparse so far. Nevertheless the subject seems to be gaining momentum in recent months as an increasing number of institutions are becoming gradually aware of the dimensions of this challenge and listing the topic on their agendas for discussion.

Perceptions, suggestions and conclusions on the legal aspects of NEOs

1. The general opinion within the STSC seems to be moving towards the drafting of some guidelines on the subject and, as perceived by the present writer, in a manner similar to that followed when addressing space debris mitigation.

2. Should that pattern be continued it would not be unreasonable to anticipate the possibility of adoption of guidelines on NEOs by the STSC in a not too distant future to be followed -as recent precedents are indicating- by the adoption of a set 'UN Guidelines on NEOs' leading, in

turn, to the inclusion of the topic on the agenda of the LSC for discussion of its legal aspects.

3. Any possible guidelines proposed on the legal sides of NEOs should be general enough to survive the times and follow a strict interdisciplinary approach. In other words, law should keep pace with scientific and technological developments.

4. A number of provisions enshrined in the UN Space Treaties and related instruments are clearly applicable to NEOs, as observed at the outset. Customary international law is slowly growing as well. International cooperation -seen as a 'general obligation to cooperate' and a *conditio sine qua non* for an activity in outer space to be lawful- is at the very root of the protection of mankind from risks implied by NEOs. On these bases, and in light of the threat posed by NEOs to planet Earth, some new law should also be developed.

5. In this context, pride of place should be given to issues of international responsibility of states and international organisations for failing to take quick action in case of serious threats. Similarly, rules on liability for damage caused in the course of deflecting operations should be considered. To this end it is important to have in mind the humanitarian sides of the questions involved and the need to strike an appropriate balance between all converging interests with a view to protecting mankind from a nowadays rather unmanageable menace.

6. Effective dispute settlement mechanisms are, in this field, essential. They should be sufficiently agile to operate promptly when faced with an imminent risk of collision.

7. Some thought should be given to the possibility of setting up a Fund to meet the costs of deflection operations and compensation for damage arising therefrom. Therefore, the duties incumbent on states and international organisations having the proper technology for deflection or mitigation ought to be carefully analysed.

8. Suggestions point at the need to draw up a Protocol to supplement and give a more precise meaning to the duties stemming from the UN Space Treaties, Principles and UNGA Resolutions, as well as from customary international law applicable in this field.

9. In these initial stages, it would be helpful to think in terms of an international instrument the nature of which -binding or non-binding- could be decided later. The ILA International Instrument on Space Debris appears useful for this purpose as certain duties of states embodied in that Instrument would be applicable to NEOs as well.

10. Many of the duties relating to space debris are part of customary international law today, and should be included in any future Guidelines for NEOs, *inter alia,* the obligations to prevent, to inform and exchange information, to consult and hold consultations, and to negotiate in good faith[21] concerning problems involving the presence of NEOs entailing serious threats of collision with planet Earth.

11. Much further research is required in view of the uncertainty surrounding the exact position and orbit of NEOs, which may take several years to be tracked. In this context one of the most crucial points is the decision-making process to establish at what point to go ahead -if at all- with deflection operations and the most appropriate moment therefor.

12. The above-mentioned question remains outstanding. It is a major problem and a real obstacle for advancing on the preparation of any international instrument or guidelines on the matter. It will be looked at by the STSC during its 2009 session in February 2009 on the basis of studies presently underway by an interdisciplinary group of experts.

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[1] The *ILA Report of the Rio Conference,* in book format, should be expected for early 2009. In the meantime, the 2008 *Report of the Space Law Committee* may be found on the ILA website www.ila-hq, clicking on "Committees" and then "Space Law".

[2] UNGA Resolution 62/217 of 21 December 2007.

[3] Report of the LSC on its 47th Session, Doc. A/Ac.105/917, p.24, paragraph 151, item 10.

[4] See *Report of the 66th Conference of the International Law Association* (Buenos Aires), Space Law Committee, pp.305-324. At the ILA 73rd Conference (Rio de Janeiro 17-21 August 2008) it was agreed to continue reviewing this topic in light of the adoption of the *'UN Guidelines on Space Debris Mitigation'* and its inclusion on the agenda of the Legal Subcommittee of Copuos for discussion in 2009.

[5] Italics of the author.

[6] Italics of the author.

[7] Italics of the author.

[8] Italics of the author.

[9] See La Nación, Buenos Aires, 29 January 2008, p.10. The asteroid would be coming as close as 538 000 Km, i.e one third further away from the distance between the Earth and the Moon.

[10] Article III of the 1967 OST 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 cooperation and understanding (italics of the author).

[11] UNGA Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries (1996), Official Records of the General Assembly, Fifty-first Session, Supplement N° 20 (A/51/20).

[12] Castillo Argañarás, L.F., *'Natural Near-Earth Objects and the International Law of Outer Space'*, paper submitted to the 51st Colloquium of the IISL (Glasgow 2008). Manuscript by courtesy of the author.

[13] Russell L. Schweickart, *Eilene M. Galloway Symposium on Critical Issues in Space Law,* 49th Colloquium on the Law of Outer Space, Valencia 2-6 October 2006, pp. 574-579.

[14] Schweickart, Russell L., *op.cit.loc.cit supra,* pp.574-575.

[15] Doc. A/AC.105/911, at p. 27. Paragraph 159.

[16] Ibid., paragraph 160.

[17] It should be noted that the British National Space Centre (BNSC) participates actively in research on NEOs and is a recognised leader in the field. As observed by Castillo Argañarás, Richard Tremayne-Smith (UK) was the initial chair of the UN Working Group on NEOs. Various UK universities such as Queen's (Belfast), Southampton, Glasgow and the Open University are currently conducting important research programmes on different aspects of the matter

with encouraging results. See Castillo Argañarás, L.F., *'Natural Near-Earth Objects and the International Law of Outer Space'*, op.cit. in note 12 *supra*.

[18] Doc. A/AC.1105/911, pp.42-43, Annex III *on 'Report of the Working Group on Near-Earth Objects'*.

[19] Doc. A/AC.105/C.1/2008/CRP.12.

[20] Doc. A/AC.105/911, p.43, paragraph 11, Annex III.

[21] See the *ILA Instrument on Space Debris* (66th Conference, Buenos Aires 1994), articles III, IV, VI and VII. See also op.cit. note 4 *supra*.