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Briefing Paper 1

Planetary Defence: Legal and Policy Issues

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Background:

30 June has been designated by the United Nations as 'Asteroid Day' as a way of raising awareness of the potential benefits that asteroids can have for humanity as well as the dangers that they potentially pose. The date is the anniversary of the 1908 Tunguska impact in Eastern Russia, which spectacularly highlighted the potential danger posed by asteroids.[2] There are approximately 18000 known Near Earth Objects (NEOs) some of which are categorized as Potentially Hazardous Asteroids (PHAs) meaning they will have a close encounter with Earth predicted between now and 2100. Close is defined as close enough to present a real danger of impact. There are approximately 2000 PHAs known as of 2018.[3] Orbital parameters not constant, NEOs can move over time due to gravitational influence of other solar system bodies. The hazard from NEO impacts are what is known as 'high impact, low probability events.' This means that the risk individually is quite low (one-in-one-million of anyone dying within one year) which is equivalent to the risk of dying in a plane crash and greater than the risk of dying in a tornado but when it does happen the potential consequences are quite significant. The 1908 impact had the energy 1000 times greater than the Hiroshima bomb,[4] had it occurred four hours and fifty two minutes later it would have hit St. Petersburg killing and injuring hundreds of thousands instead of just the 20 injuries it caused.[5] This is a persistent threat on June 27, 2019, the asteroid 2008 KV2 passed "close" to the Earth, at a distance of about 6.7 million kilometres.[6]

However, it is not all doom and gloom, NEOs "are the most easily reachable bodies within the entire solar system," and they are good sources of raw materials, particularly water but also iron, nickel, cobalt and platinum.[7] Furthermore, it is potentially possible to move an asteroid that poses a threat so that it misses Earth or even 'mine' it out of existence and put the resources acquired to productive use.[8]

Recognising the threat posed by Near-Earth Objects the UN established Action Team 14 on Near Earth-Objects. The action team provided recommendations which led to GA Res 68/75.

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[1]Thanks Anne-Sophie Martin, Brandon Robertson, Christopher Newman and Lauren Napier for your comments
[2]https://asteroidday.org/about/
[3]http://www.unoosa.org/documents/pdf/smpag/st_space_073E.pdf
[4]M. Di Martino, A. Carbognani, G. De Sanctis, V Zappala and R. Somma, *The Asteroid Hazard: Evaluating and Avoiding the Threat of Asteroid Impacts* (1st edn., European Space Agency 2009), 190-215
[5]John S. Lewis, *Rain of Iron and Ice: The Very Real Threat of Comet and Asteroid Bombardment* (Helix Books: 1997), 54
[6]https://www.livescience.com/65783-june-asteroid-zip-by-earth.html
[7]M. Di Martino, A. Carbognani, G. De Sanctis, V Zappala and R. Somma, *The Asteroid Hazard: Evaluating and Avoiding the Threat of Asteroid Impacts* (1st edn., European Space Agency 2009), 195
[8]John S. Lewis, *Rain of Iron and Ice: The Very Real Threat of Comet and Asteroid Bombardment* (Helix Books: 1997), 213-218

This eventually led to the creation of the International Asteroid Warning Network (IAWN) and the Space Mission Planning Advisory Group (SMPAG) in 2014. These two bodies "represent important mechanisms at the global level for strengthening coordination in the area of planetary defence."[9]

Planetary defence, as the term suggests is an international issue and one that requires coordination between the various countries on Earth. Therefore, it makes sense that the UN takes a leadership role in such efforts. As the final report says:

> the NEO hazard should be recognized as a global issue that could be addressed effectively only through international cooperation and coordination. Thus, the United Nations had an important role to play in the process of developing the necessary policy.[10]

The final report lays out a series of recommendations for the sharing of data and planning for dealing with a potential impact scenario. These recommendations were endorsed by the UN General Assembly,[11] which, as mentioned, resulted in the establishment of IWAN and SMPAG. The UN Office for Outer Space Affairs (UNOOSA) serves as secretariat for SMPAG.[12] Finally, SMPAG does have a working group identifying legal issues but they have yet to report.[13]

Legal and Policy Issues:

While there will undoubtably be a host of legal and policy issues surrounding the processes and procedures for sharing data as well as coordinating and implementing a response to a NEO threat, there are several issues presented by the existing body of space law to potential mitigation strategies. These are the non-appropriation principle, nuclear weapons and liability.

Non-Appropriation: The non-appropriation principle is one of the cardinal principles of the law of outer space. It is codified in Article II of the Outer Space Treaty[14] and says that Outer Space, the Moon and any other Celestial Bodies are not capable of being appropriated. There are those who have asserted that moving an asteroid would constitute appropriation[15], and destruction is the ultimate form of appropriation.[16] Therefore, actions taken by States to divert or destroy a PHA could be argued to constitute appropriation of that celestial body.

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[9] http://www.unoosa.org/documents/pdf/smpag/st_space_073E.pdf page 12
[10] UN Doc A/AC.105/C.1/L.330 para 39
[11] UN Doc A/RES/68/75 para 8
[12] UN Doc A/RES/71/90 para 9
[13] A/AC.105/C.1/L.329 para 44(j) - https://www.cosmos.esa.int/web/smpag/documents-and-presentations
[14] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies (adopted 27 January 1967, entered into force 10 October 1967) 610 UNTS 205 (Outer Space Treaty/OST)
[15] "If an Asteroid Heads for Earth: Taking the Hit" *The Economist* (August 2015); Virgiliu Pop (2001) 'A Celestial Body is a Celestial Body is a Celestial Body...' *52nd IAF Congress*, Toulouse, France, 1-5 October
[16] Ernst Fasan, 'Asteroids and Other Celestial Bodies - Some Legal Differences' (1998) 26 J. Space L. 33, 39

Nuclear Weapons: The Partial Test Ban Treaty[17] prohibits nuclear explosions in outer space. This means that setting off a nuclear explosion to divert or destroy a PHA would be a violation of this treaty.

Liability: According to Article VII of the Outer Space Treaty the launching state is liable for damage caused by 'its' 'space object' to objects on the Earth, in the air or in outer space. This is expanded by the Liability Convention[18]. Article II of that treaty declares that the launching state is absolutely liable for damage caused by one of 'its' 'space objects' on the surface of the Earth or to an aircraft in flight. Article III says that liability for damaged caused in outer space shall be assessed on the basis of fault. This is relevant for planetary defence because actions taken by States either through their armed forces, their space agencies or even private entities could result in them being liable for damages caused, and the fear of incurring such liability could dissuade action.

Recommendations:

Moving or destroying an asteroid for the purposes of planetary defence does not constitute appropriation, there is an element of intent involved in appropriation which is lacking here.

Use of nuclear explosive devices for purposes such as planetary defence should be permissible within reason; if these weapons of mass destruction can actually be put to a good use then they should be. However, it is of course important to recognize the importance of non-proliferation and disarmament efforts, planetary defence should not be an excuse or cover for the development or maintenance of stockpiles of nuclear weapons. Particularly as use of nuclear explosions may not be the best method. Furthermore, there needs to be an awareness of the dangers of a similar potential for the development of 'space weapons' under the cover of planetary defence measures.

The international community should clarify the liability rules, on proposal for doing so would be by incorporating a 'good faith' clause specifically for planetary defence to limit the potential liability for States who take reasonable and responsible action, as always it remains right that negligence should incur liability for damage caused. A process for this could be implemented via SMPAG and/or the UN Security Council. A UNCOPUOS recommendation for such a measure would also be desirable.

Finally, humanity has the ability to prevent a devastating NEO impact event, space law should enable not impede such efforts, urgent action by UNCOPUOS and the international community is needed.

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[17]Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water (adopted 5 August 1963, entered into force 10 October 1963) 480 UNTS 43 (Partial Test Ban Treaty/PTBT)

[18]Convention on International Liability for Damage Caused by Space Objects (adopted 29 March 1972, entered into force 1 September 1972) 961 UNTS 187 (Liability Convention)