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## IS A SPECIAL LEGAL REGIME FOR PLANETARY DEFENCE MEASURES NECESSARY?

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### Introduction

The potential impact of a sufficiently large asteroid or other Near Earth Object on the planet Earth could inflict massive destruction and cause planet-wide disaster, such as fire-storms, tsunamis and/or an impact winter (comparable to the so-called “nuclear winter” feared to be caused by nuclear warfare).

There is no immediate threat or a great likelihood of a disastrous collision of the planet Earth with an asteroid, but the risk that such a collision might happen in the future is present and there is a potential need to take possible defensive measures into account.

Several different defence measures are therefore being discussed for such a case. Amongst other options, one such possible defensive measure could be to detonate a nuclear warhead on, above or slightly beneath the surface of the asteroid, in order to deflect and/or destroy that celestial body threatening the planet Earth (see also: <http://qz.com/274242/the-us-is-keeping-nuclear-weapons-around-for-planetary-defense/> - last accessed 2015-03-27). This method – the nuclear option – may be the only one, especially when there is little warning time and therefore little time to prepare the counter-measures. Further, this is virtually the only option which can be realized in reasonable time using mainly existing and proven technology.

As time for preparation could be critical, the idea has been floated to preposition nuclear warhead carrying missiles in outer space

There are however certain reservations in international law against nuclear warheads in outer space. While the 1967 Outer Space Treaty forbids to station nuclear weapons or other weapons of mass destruction in Earth orbit, on the Moon or other celestial bodies or otherwise in outer space, the Partial Test Ban Treaty and the Comprehensive Nuclear Test Ban treaty prohibit nuclear explosions in outer space.

### Questions with regard to planetary defence techniques

But certain questions arise: To destroy or deflect an asteroid does not constitute a weapons test (see: Rinner et al., *Space Law Essentials*, p.52). Neither is the deflection necessarily military use, although it may be carried out by the military. Another question is, whether humankind’s interest in saving the planet might outweigh the negative implications of getting in conflict with certain provisions of space law.

Nuclear planetary defence within the current framework of space law

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If we were to engage an asteroid on a collision course with Earth using nuclear warheads, how would this fit into the current framework of space law?

Art I Outer Space Treaty states that space activities are to be undertaken for the benefit and in the interest of all countries. A planetary defence mission is to save the Earth from a potential disaster. Both the purpose and the positive outcome of such a mission are without doubt for the benefit and in the interest of all countries (see: Diederiks-Verschoor/Kopal, *An Introduction to Space Law*, p.24f).

Art II OST deals with the non-appropriation of outer space, including the Moon and other celestial bodies. Appropriation is the act of obtaining property of something (see Köbler, *Juristisches Wörterbuch*, München 2005, p. 18). We are not talking about laying claim to an asteroid. The aim would be to either destroy the asteroid or to divert its course from Earth in order to spare Earth from a possible collision.

Art IV OST explicitly prohibits to station nuclear weapons or other weapons of mass destruction in orbit around the Earth, to install them on celestial bodies or station them in outer space in any other manner (see Schrogl/Neumann in: *CoCoSI*<sup>1</sup>, 2009, p. 79).

The approaching asteroid is being engaged with a spacecraft carrying a nuclear war-head. But is said nuclear warhead actually a weapon? An explosive does not necessarily constitute a weapon. They can be and are used for numerous peaceful purposes, such as i.a. mining or construction of tunnels or similar undertakings. The warhead is neither directed against people nor against any manned or man-made structure or installation. It is deployed to counter a threat emanating from a natural phenomenon that could cause disaster on the planet Earth.

According to Art VI OST States Parties to the OST shall bear international responsibility for their activities in outer space. The planetary defence mission might be a multi-national effort. It is very unlikely that a spacecraft carrying a nuclear warhead would be deployed by a private entity. It can therefore be assumed that the mission is carried out by one or more government agencies of the states involved. Those states which are participating in the mission bear responsibility.

Art VII OST contains rules on liability for damage caused by a space object. The states involved in a planetary defence mission may be held liable for damages caused by the spacecraft or by parts thereof. Not only the state that has actually launched the spacecraft can be held liable but virtually any state that has been involved in the launch or procurement of the launch; or from whose territory or facility the object has been launched (see: Soucek, *Space Law Essentials*, p.31). Liability requires a damage caused by a space object. The main problem in this context is the question of the victim. An asteroid or other NEO is a natural occurrence. It has no “owner”. Even if we assume the asteroid to be part of the common heritage of mankind, who would be the benefactor of any indemnification paid? Further, the supposed damage could hardly be assessed. It would depend on the effect the explosion had on the asteroid. Has it been destroyed? Has it been broken up in several pieces? Has it only been diverted, while the explosion had certain effects on the asteroid’s surface? The asteroid is not to be considered a space object – it is a celestial body.

Art IX OST obliges the States Parties to use and explore outer space in a way that is “guided by the principle of cooperation and mutual assistance”. Further, their activities should be conducted with due regard to the common interests of all other States Parties to the OST. A planetary defence is conducted as cooperation between international partners. To save Earth from disaster is in the interest of all States on the planet. The nuclear explosion may cause radioactive contamination of the asteroid, but it is a planetary defence mission, not a mission to “explore” the asteroid. The applicability of Art IX OST is questionable; moreover, a trade-off between a contamination of the asteroid and a catastrophe on Earth would certainly support the permissibility of the mission.

(see Schrogl/Neumann in: *CoCoSI*<sup>1</sup>, 2009, p. 79)

The Liability Convention has further ramifications on this matter. According to Art III LIAB, when a damage occurs elsewhere than on the surface of Earth to a space object of another launching State or to persons or property on board such an object, a launching State is only to be held liable when at fault (see: Soucek, *Space Law Essentials*, p.33). The proof of fault may be very difficult. If there is no fault proven, no compensation for damage elsewhere than on the surface of Earth can be sought under the Liability Convention. The avoidance of any damage on the surface of Earth would be the primary reason for any planetary defence undertaking, so if the mission were successful no damage would occur.

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However, if an asteroid were destroyed or diverted this might cause some damage to other space objects, caused by debris or by the asteroid on its new trajectory. This damage could be attributed to the planetary defence operation. But as mentioned before the proof of fault is very difficult. In order to establish fault, one will have to make reference to existing “best practises” and to general standards of care (see: Soucek, Space Law Essentials, p.33). The argument that it is a small prize for saving the planet might come up.

Any qualifying damage has to be caused by the space object (see: Soucek, Space Law Essentials, p.33). It might happen that damage is not caused by the nuclear warhead carrying spacecraft or by the nuclear explosion itself. As mentioned above, the damage may be caused by debris from the asteroid or by the asteroid after it has altered its trajectory. An asteroid is not to be considered a space object. It is a celestial body. There is a certain degree of unclarity, whether any collision may be attributed to the nuclear explosion and in so far be considered caused by a space object.

(see: Diederiks-Verschoor/Kopal, An Introduction to Space Law, p.24ff)

Art 3 of the Moon Agreement forbids to put nuclear weapons on a trajectory around or to a celestial body or to use such nuclear weapons on or in said celestial body. But the Moon Treaty has only been ratified by 16 states. Among these states, Pakistan is the only nuclear power. The treaty is therefore less relevant for the international community.

All other nuclear powers and virtually all major space-faring states have so far not ratified the treaty and have indicated no intention to do so in the foreseeable future.

Art I §1 lit a PTBT forbids nuclear test explosions in outer space. An operational asteroid intercept mission – be it to deflect or to destroy the object – is not a test but an operational engagement.

Art I CTBT forbids all nuclear explosions in space. The treaty has, however, not entered into force yet and is unlikely to do so any time soon.

So far it is indicated, that the existing legal provisions allow or at least do not forbid the employment of nuclear warheads for planetary defence purposes. In so far it seems that a special legal regime for nuclear planetary defence is not necessary. Nonetheless, certain points remain where additional clarification could be useful. Think of, for example, the definition of weapons of mass destruction or the definition of Earth orbit. Other questions may concern liability.

Arguments for a special legal regime:

- Although, as stated above, the existing legal provisions allow for nuclear planetary defence measures, some areas of unclarity remain, especially concerning the definition of nuclear weapons, the terms “placing in orbit”, “installing on celestial bodies and “stationing in outer space”.
- Clearly defined legal provisions on that matter might facilitate planning and execution of planetary defence missions.
- Political support for nuclear planetary defence measures might be more easily generated, as they would be explicitly allowed by international law.
- A certain consensus over key aspects of planetary defence could be found well before a situation arises where respective measures have to be taken.
- Some scepticism in the general public could be countered with the same argument.

Arguments against a special legal regime:

- Too many regulations might hinder space activities.
- Although a higher degree of legal clarity can be helpful, there is a certain risk that some important aspects could still be overlooked.
- It could be very difficult to find consensus on several matters, especially those involving nuclear warheads. The questions of costs and liability could also be stumbling blocks for consensus.

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- The public opinion holds great reservations against the development and deployment of nuclear warheads.
- It might be nearly impossible to deal with the question of command and control over the nuclear warheads at times when no planet-threatening crisis is imminent.

### Conclusion

At first glance, special legal regime for planetary defence employing nuclear weapons seems reasonable. Although the existing provisions of space law are sufficient to allow for effective planetary defence measures (or are at least not prohibiting them), it seems desirable to clarify several matters where questions of planetary defence are not explicitly dealt with.

On the other hand, there is always a certain danger that regulations go too far and hinder the effective mitigation of the problems they intend to address, especially when dealing with such a highly sensitive issue as nuclear warheads. Further, an international agreement on development and possible deployment of nuclear warheads (even for planetary defence) might provoke such negative reactions in the public opinion that might either lead to the agreement failing to be adopted in the onset or making the effective implementation of the agreement's provisions difficult or even impossible.

A special legal regime for nuclear planetary defence seems reasonable, but is not necessary under current space law regulations and, hopefully, those bearing responsibility will act accordingly, should the situation ever arise.

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