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## SPACE SECURITY AND SPACE SAFETY: TWO CONCEPTS TO BE DISTINGUISHED

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**ABSTRACT:** *This paper proposes to distinguish between space security and space safety, similar to the distinction used in aviation. Therefore, space security should cover aspects of space weaponisation and the prevention of an arms race in outer space, as foreseen in the UN Conferences of Disarmament. Conversely, technical aspects, like the mitigation of space debris should be addressed as space safety. The Chinese anti-satellite test of 2007 has shown that space weapons and the generation of space debris are linked. As another example serves the legal and policy analysis of the U.S. missile strike against the disabled 'USA 193' military satellite in 2008. The legal analysis of such cases needs to keep space security and space safety apart.*

### I. LINGUISTICS

Linguistically, the terms of security and safety are blurred. In the English everyday use, the two terms are often used synonymously. In some languages, like German and Spanish, there is no distinction at all, so that the same word is used for both meanings.<sup>1</sup> However, this paper is not about linguistics, but about the distinction of two concepts: security and safety as distinct concepts to be applied to the legal regime in outer space.

In recent policy publications, two key players in space activities, the US and the European Union use the terms *security* and *safety* not in a synonymous, but in a distinct

manner, albeit without a formal definition:

In the new Space Policy of the US of 28 July 2010<sup>2</sup> the term *security* is often used in the context of national or homeland security. In contrast thereto, *safety* appears mostly in connection with nuclear safety or also as public safety.

A European example is the draft Code of Conduct for outer space of December 2008 by the Council of the European Union,<sup>3</sup> which addresses both, safety and security of outer space activities. While it does not define either term, the content of the document touches upon both aspects, disarmament in outer space, as a matter of security, and the prevention and

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reduction of space debris, as a matter of safety.

However, other legal policy documents and scientific literature of the last years seem to use the term *space security* apparently in a broader sense to cover both, security and safety aspects, for example in definitions like a *secure and sustainable access to, and use of, space and freedom from space-based threats*.<sup>4</sup>

A brief look into the Outer Space Treaty (OST),<sup>5</sup> as authoritative source, does not support such an overarching broad concept of space security. The OST refers to *security* only in one instance, namely in Art. III:

*States Parties ... shall carry on activities in the exploration and use of outer space ... in the interest of maintaining international peace and security ... .*

Other core concepts of the OST relate to security aspects, without specifically using this term, e.g. in case of the prohibition of weapons of mass destruction in space and the principle of peaceful uses of outer space.<sup>6</sup>

The term of maintaining *international peace and security* in the OST is identical to the language in Art. 1 (1) of the UN Charter<sup>7</sup> and is thus to be understood in exactly the same manner as in the UN Charter. International peace and security relates to political stability and the prevention of international (armed) conflicts by diplomatic and other peaceful means.

## II. DISTINCTIVE CONCEPTS

This paper aims at distinguishing between the concepts of space security on one hand and space safety on the other. It is acknowledged that the common use of language does not draw a sharp distinction. But a clear distinction of these two concepts promise merits at the conceptual level for a legal analysis of recent space incidents and the underlying State practice.

### 1. Space Security

For the purpose of this paper, *security* is understood as a means of protection against man-made threats. Within this meaning, security encompasses the threats of crime, terrorism and hostile human acts directly or indirectly affecting the physical integrity of the public and individuals. As understood in the context of this paper, security entails also international security, i.e. the protection of peace and international stability in the relationship among States.

Based on this definition of *security*, the term of *space security* can be defined as the protection of humans and property on Earth and in outer space, of the (earth and outer space) natural environment and of space activities against man-made threats. So far, common crimes, terrorism and piracy have not yet reached outer space. Under the umbrella of this concept of space security fall also the military uses of outer space and their deliberate or accidental effects against humans, property and the natural environment on Earth and in outer space and against space activities as such. From a regulatory perspective, space security covers all aspects related to the principle of peaceful uses of

outer space and the more special multilateral regimes including, but not limited to, the Nuclear Test Ban Treaty<sup>8</sup>, the ENMOD Convention<sup>9</sup> and, since 1981, the annual UN General Assembly resolutions regarding the Prevention of an Arms Race in Outer Space (PAROS)<sup>10</sup> in the context of the United Nations Conference on Disarmament.

## 2. Space Safety

For the purpose of this paper, *safety* is understood as a means of protection against technical failures and shortcomings. Technical safety relates to the design and quality of products and systems, and the applicable procedures, including human factors, for the use and maintenance of those products and systems. Technical safety is typically achieved by the establishment of technical rules, norms or standards and procedures for their compliance and verification.

Following this definition of *safety*, the concept of *space safety* can be defined as the protection against technical failures and shortcomings of space activities affecting humans, property and the natural environment on Earth and in outer space. The regulation of space safety is still in its infancy. As long as space activities were solely in the realm of governmental programs, there was no incentive to create (international) standards on technical safety for space activities. With the privatisation of many space activities, some States started to establish *national* standards, as part of national space legislation or their national licensing requirements, to comply with their responsibilities of supervision of national space activities under Art. VI OST. The UN Principles on Nuclear Power Sources of 1992<sup>11</sup> were an early milestone for

establishing *international safety* standards governing space activities. The obvious reason is the ultra-hazardous nature of radiological substances on humans and the biosphere. Another important set of international technical standards for space activities relate to the mitigation of space debris<sup>12</sup> as established by the Inter-Agency Space Debris Coordination Committee (IADC) and endorsed by UN General Assembly resolution.<sup>1314</sup>

## 3. Historic Roots - Comparative Analysis

The very limited number of existing international safety standards for outer space activities can be seen as the reason that up to now the term space safety has hardly been used. This is directly related to the purpose of the Outer Space Treaty. It was negotiated during the moon race and the Cold War, and its primary purpose was security, not safety. Peaceful purposes<sup>15</sup> and the maintenance of international peace and security<sup>16</sup> are key to the public order in outer space and embody the core values of (space) security.

In comparison, the Convention on International Aviation<sup>17</sup>, and its huge body of secondary legislation of Annexes to the Convention, has an emphasis on the safety, regularity and efficiency of air traffic<sup>18</sup>. Most of the Annexes are directly linked to safety. They define technical standards and recommended practices, which are the regulatory baseline for every safety culture. As an exception, and as clearly indicated by its title *Security*, Annex 17 to this Convention is not related to safety, but is intended as a safeguard for international civil aviation *against acts of unlawful interference*.<sup>19</sup> Thus within the framework of the Convention on International Aviation a clear dividing line is

drawn between safety pertaining to technical aspects and security relating to human-induced threats.

### III. APPLYING THE DISTINCTIVE CONCEPTS TO STATE PRACTICE

#### 1. The Chinese ASAT Test

The Chinese anti-satellite (ASAT) test in January 2007 marked a distinct turning point in the recent development of state practice.<sup>20</sup> When China destroyed its own disfunc weather satellite Feng Yun 1C in low earth orbit, it prompted two results:

- It abruptly ended a tacit moratorium on ASAT tests that had been obeyed for about 20 years<sup>21</sup> by space faring nations.
- It caused a huge cloud of space debris in the vulnerable and highly used low earth orbit consisting of about 150.000 pieces larger than 1 centimetres, many of which will stay in orbit for hundreds of years<sup>22</sup>.

These two results were caused by the same event. At the same time, both of these results undermine policy positions China had held and signalled to the international community:

- Regarding space security, for many years China had maintained a clear position during the UN Conference of Disarmament relating to PAROS and even had drafted a proposal, together with Russia, for an agreement prohibiting weapons in space and prohibiting the threat and use of force against space objects.<sup>23</sup>

- Regarding the generation of space debris, the China National Space Administration (CNSA), a public body, is member of the IADC and has participated in drafting the mitigation guidelines and thus supported relevant space safety measures.

#### 2. The US Missile Strike against 'USA 193'

The U.S. missile strike against the disabled military satellite 'USA 193' satellite in February 2008 was undertaken differently. This operation by the US forces was *de facto* an ASAT test, but officially coined as an act to prevent an uncontrolled explosion of a hydrazine tank on-board the military satellite 'USA 193', shortly before it would have naturally decayed in its very low orbit. The operation was carefully planned and the US gave international warnings for the relevant airspace and areas in the High Sea well in advance to avoid harm to innocent bystanders. The interceptive strike was executed in a way that only little space debris was created and soon later decayed in the earth's atmosphere.

The US missile strike against the 'USA 193' satellite was fully in line with US policy:

- Regarding space security, the US started to abstain from the PAROS resolutions since 1995, started to oppose them since 2006<sup>24</sup> and did not support the Russian-Chinese treaty proposal on an space weapons ban.<sup>25</sup>
- Regarding space safety, NASA is a member of the IADC and the US is one of the first nations having implemented space debris mitigation standards into national legislation.<sup>26</sup>

In order to better understand the legal effect of both operations by China and the US, the role of customary international law in contemporary space law needs to be highlighted.

### 3. The Role of Customary International Law

Customary international law is one of the classical sources of international and is recognized as such in Art. 38 (1) b of the Statute of the International Court of Justice (ICJ) and in the numerous cases of the ICJ.<sup>27</sup> Customary law comes into being when two constituting elements are evidently displayed: state practice, as objective element (*corpus*) and *opinio juris*, as subjective element (*animus*).

There is a complex inter-relation between these two elements. On one hand, state practice serves as evidence for the existence of an *opinio juris*, as a value commonly shared by States and complied with in expectation of reciprocal compliance by the other members of the international community. On the other, sustained and consistent state practice may create and form the subjective element of *opinio juris*. It is often a difficult exercise to find sufficient proof of a certain state practice of the required level of duration, consistency and participation to be able to deduct therefrom the underlying *opinio juris*.

Customary international law applies in many areas, which are not covered by treaties. One of these fields is space law.

After signature of the Moon Treaty in 1979, the UN Committee on the Peaceful Uses of Outer Space (COPUOS) has established only

legally non-binding principles, which all were subsequently adopted by the UN General Assembly. The PAROS resolutions of the UN General Assembly have the same non-binding legal status, as have the IADC space mitigation guidelines with UN General Assembly endorsement. But their formal nature as legally non-binding norms does not mean that these principles, resolutions and technical standards have no legal value. At this point, customary international law comes into play. All these mentioned norms relating to outer space may serve as seeds and crystallization points for emerging *opinio juris*. As Kelsen has rightly remarked, for the establishment of *opinio juris* States need to believe in the existence of a norm, which does not necessarily need to be a norm with legally binding effect.<sup>28</sup> Consequently, all States who follow legally non-binding norms and technical standards in the expectation that other States will do the same, establish a state practice. Provided this state practice meets a sufficient level of duration, consistency and participation, and supports the *opinio juris*, it will lead to customary international law.

### 4. The Effect on State Practice

Following the paradigm of this paper, the Chinese ASAT test and US missile strike affect state practice in a different way, depending whether we look at space security or space safety.

(a) Regarding space security, the two operations of China and the US were a show of force and contrary to about 20 years of state practice during which no ASAT test was conducted in outer space. Thus both states undertook acts indicating that in their opinion ASAT tests are considered a legitimate means

of ensuring their national security. In the case of the US, this state practice is in line with their national policy position they have taken in the years before the missile strike, but contrary to the consensus of the vast majority of states at the UN Conference of Disarmament on PAROS. The Chinese ASAT test has caused international irritation, because it contradicted not only the (almost complete) consensus on PAROS, but also China's own official position.

Despite these two distinctive unilateral acts, it must be emphasized that China and the US stand alone with these two operations. Other nations have not executed similar operations. In addition, the vast majority of states have been approving the annual PAROS resolutions through the UN General Assembly, which signify an *opinio juris* contrary to that practice.

Nevertheless, the overall effect on state practice and emerging customary law on the field of space security, specifically on ASAT tests, is grave for several reasons:

- The US and China are two main players in outer space and their combined conduct in outer space activities is not negligible.
- The US and China are permanent members of the UN Security Council and thus their legal and policy positions are significant, even if they stand in isolation.
- Given that only two space powers had undertaken ASAT tests in the past, the US and the then USSR, the revival of ASAT tests by two states, China and the US, can be considered as a substantial setback to the crystallizing state practice supporting an *opinio*

*juris* for an ASAT ban.

A final determination of the effects of both unilateral acts on international custom will depend on the policy positions China and the US will take at international fora, and if they will repeat such acts, or not. The state practice and the *opinio juris* of states is consistent and long lasting, except for two states.

(b) The effect on space safety is not so dim. The US planned and successfully executed the missile strike as to prevent a debris cloud. Together with its international warnings and announcements, this *modus operandi* can be interpreted as an attempt to establish State practice for the conduct of an ASAT test, albeit using a safety argument to justify a security driven act.

The US practice complies with the international positions on space safety, namely the space debris mitigation standards of the IADC, which are also re-confirmed by national US legislation.<sup>29</sup> The US operation had no detrimental effect on the emerging practice of space debris mitigation.

An evaluation of the Chinese conduct has differing nuances in terms of space safety. It is worth considering, if the unilateral ASAT test was not necessarily an act directed against space safety. The debris cloud was the result of an intentional act driven by Chinese national security. It can be argued that such a unilateral act, even though deliberate and being a serious threat to safety in the Low Earth Orbit, was not intended to interfere with space safety as such. This is nothing new. Often, acts of national security and military activities have (non intended) effects on the

safety of innocent by-standers, the public or the environment. An example is the Corfu Channel case,<sup>30</sup> which shows that the mining of a seaway as a security measure can be a hazard to the safety of international shipping. This is the nature of measures of national defence and security measures.

China has been supporting space safety initiatives like the IADC. It will have to show the international community that its commitment to space safety is unaffected. Based on these considerations, the impact of the Chinese ASAT test on the state practice regarding space safety is not as serious as on space security.

However, this does not imply that compliance with space debris mitigation measures during an ASAT test or orbital

missile strike raises the level of legitimacy of such acts. The vast majority of nations support the PAROS resolutions and have not undertaken ASAT tests.

Despite their non-binding nature, UN General Assembly resolutions on PAROS and the IADC technical standards are valuable seeds for the constantly growing consensus and *opinio juris* of states on subject matters, for which no treaty law could be established. State practice is the other important element for the creation of customary international law. For that purpose, state practice needs to be observed and analysed meticulously. And in this context, it is crucial not to mix considerations of space security and space safety.

- <sup>1</sup> In German *Sicherheit*, in Spanish *seguridad*.
- <sup>2</sup> National Space Policy of the United States of America, 28 June 2010.
- <sup>3</sup> Council of the European Union, 17175/08, 17 December 2008.
- <sup>4</sup> See e.g. the Introduction of Executive Summary, SPACESECURITY.ORG, 'Space Security 2008'.
- <sup>5</sup> Outer Space Treaty = Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, 27 January 1967, 18 U.S.T. 2410, T.I.A.S. 6347, 610 U.N.T.S. 205 (effective 10 October 1967).
- <sup>6</sup> Arts. IV, XI OST.
- <sup>7</sup> Charter of the United Nations of 26 June 1945, United Nations Conference on International Organization Documents, vol. XV (1945), pp. 335 et seq.
- <sup>8</sup> Treaty Banning Nuclear Weapons in the Atmosphere, in Outer Space and Under Water, 5 August 1963, 480 U.N.T.S. 43.
- <sup>9</sup> Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, 10 December 1976, 1108 U.N.T.S. 151.
- <sup>10</sup> Each year since 1981, the UN General Assembly has been passing a resolution on the prevention of an arms race in outer space (PAROS) starting with UNGA RES A/RES/36/97, part C, 9 Dec 1981. The resolutions are of similar content and call "upon all States, in particular those with major space capabilities, to contribute actively to the objective of the peaceful use of outer space and of the prevention of an arms race in outer space and to refrain from actions contrary to that objective and to the relevant existing treaties in the interest of maintaining international peace and security and promoting international cooperation."
- <sup>11</sup> The Principles Relevant to the Use of Nuclear Power Sources in Outer Space (UNGA Res. 47/68 of 14 December 1992).
- <sup>12</sup> IADC Space Debris Mitigation Guidelines, September 2007, IADC 02-01.
- <sup>13</sup> UNGA Res. 62/217.
- <sup>14</sup> Examples of other space safety related instruments are the Vienna Convention for the Protection of the Ozone Layer, 22 March 1985, and the Convention on early Notification of a Nuclear Accident, 26 September 1986.
- <sup>15</sup> See Preamble, Arts. IV, XI OST.
- <sup>16</sup> See Art. III OST.
- <sup>17</sup> Convention on International Civil Aviation, Chicago, 7 December 1944 (Chicago Convention), ICAO Doc. 7300.
- <sup>18</sup> See the Preamble and Art. 37 of the Convention on International Aviation.
- <sup>19</sup> See also Chapter 1 of Annex 17 to the Convention on International Aviation, which defines security as *a combination of measures and human material resources intended to safeguard civil aviation against acts of unlawful interference*.
- <sup>20</sup> For more details see Stefan A. Kaiser, 'Chinese Anti-Satellite Weapons: New Power Geometry – New Legal Policy?' Proceedings of the 52<sup>nd</sup> Colloquium on the Law of Outer Space (2007), IAC-07-E6.5.2.
- <sup>21</sup> Following the ASAT tests of the US and Russia up until the 1980's.
- <sup>22</sup> See Secure World Foundation, Factsheet on Chinese Anti Satellite (ASAT) Test, update 6 June 2008.
- <sup>23</sup> CD/1839, 23 February 2008; see also the conference report of the CD 2008, CD/1853, 9 September 2008; and the conference report 'Security in Space: The Next Generation' on behalf of UNIDIR, CD/1844, 23 June 2008.
- <sup>24</sup> In 2009, under the Obama administration, the US abstained again.
- <sup>25</sup> See CD/1847, 26 August 2008.
- <sup>26</sup> US Code of Federal Regulations, 47 CFR 25.283, Title 47.
- <sup>27</sup> For example the North Sea Continental Shelf Cases (Federal Republic of Germany v Denmark and The Netherlands), ICJ Rep 1969 3, reproduced in Harris, DJ, *Cases and Materials on International Law*, 6<sup>th</sup> edn. (Sweet and Maxwell, 2004), p. 24-35.
- <sup>28</sup> H. Kelsen, *Principles of International Law* (1952) p. 307
- <sup>29</sup> From a theoretical viewpoint it is debatable if the endorsement of the IADC space debris mitigation guidelines by national regulations constitutes evidence of opinio juris or of state practice.
- <sup>30</sup> Corfu Channel Case (UK v Albania) (Merits), ICJ Rep 1949 4, reproduced in Dixon M. & McCorquodale R., *Cases and Materials on International Law*, 4<sup>th</sup> edn. (Oxford, 2003), p. 411.