Rules on Safety Zones in International Law Applicable to Space Activities

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Abstract

This article studies necessarily conditions to establish reasonable safety zones in outer space. Studies, proposals, an international agreement and precedents in other fields of international law are considered for that purpose. The conclusions include: safety zones should be established for the safety and sustainability of space and restrictions pertaining to safety zones should be equally imposed to all stakeholders; safety zones could be lawfully established when they constitute an essential part of a certain space activity which is in accordance with international law. Elements for a reasonable safety zone also seem to include the implementation of TCBM and the operation in a restricted manner by a State having established one. Appropriateness test should be met in addition to the legality test.

1. Introduction

Currently, there exist no safety zones as the area to exclude or restrict free activities by other actors in outer space, although they have been studied, proposed and recommended over past decades. Now that new space activities such as In-Space Servicing, Assembly, and Manufacturing (ISAM) and space resources mining are starting, it is likely that some kinds of safety zones would be needed to avoid harmful interference with other space activities. Therefore, this article studies necessarily conditions to establish safety zones in outer space. Survey includes failed studies, on-going efforts and an international non-legally binding agreement, as well as existing safety zones in international law of the sea and air law. This would lead to clarify some conditions to establish safety zones in outer space both from the legality and appropriateness.

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2. Studies, Proposals and an Agreement on "Safety Zones" in Outer Space

2.1. Examples of Studies during the Cold War Era

During the Cold War era, the two superpowers, the United States (US) and the USSR competed each other for the operation of various military satellites and the development of anti-satellite (ASAT) capabilities. As military satellites played an essential role for their nuclear strategies and other military operations as well as served as a central tool for national technical means of verification, each country studied possible means to protect its satellites against threats from the other side's ASAT capability. This brought about ideas of safety and security zones to better protect national military satellites. For instance, the US Office of Technology Assessment (OTA) made a report in 1985 in response to the request by the Congress: it concluded that satellites would be safer if "keep-out zones" could be established either by an agreement or unilaterally to defend against unauthorized intrusion of foreign spacecraft. The report added that the right to use force to defend a keep-out zone remained to be determined.[1] As ASAT weapons of the USSR were not direct-ascent ballistic missiles, but co-orbital weapons,[2] seemingly, the idea of keep-out zones could be effective to protect US military spacecraft.[3]

Another example was the self-defense zones (SDZ) proposed by the US Department of Defense (DoD) in the early 1980s. The basic purpose of the SDZ was to set a sufficient distance between one country's important military spacecraft and a foreign and potentially antagonistic spacecraft to avoid a surprise attack. Different from an idea of the keep-out zones by the OTA, the proposed SDZ planned to use force against a satellite entering there to defend its own spacecraft. The idea of possible use of force within the designated SDZ seemed to be problematic vis-à-vis non-appropriation principle provided in Article II of the Outer Space Treaty (OST).[4] As no country may exercise territorial jurisdiction in outer space, there would be no legal basis to resort to use of force as a countermeasure when a Soviet space object enters a SDZ, unless a bilateral treaty allows to do so. Even in that case, truly setting up a SDZ would be next to impossible due to the high probability to affect space activities of the third States. Thus, it was recommended that SDZ would be

1 Ted Adam Newsome, *The Legality of Safety and Security Zones in Outer Space: A Look to Other Domains and Past Proposals*, LL.M. Thesis (Institute of Air and Space Law, McGill University, 2016), pp. 16-17.

2 Brian Weeden, *Through a Glass, Darkly: Chinese, American and Russian Anti-satellite Testing in Space* (2014), available at: <https://swfound.org/media/167224/through_a_glass_darkly_march2014.pdf>, pp. 29-33.

3 Newsome, *supra* note 1, p. 18.

4 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; 610 UNTS 205 [OST].

made by a multilateral agreement.[5] The Soviet scholars proposed similar safety and security zones.[6]
No such studies went to the negotiation phase. It seems to show the difficulty in setting safety/security zones for purely national security purposes of one or small number of countries in terms of the lawfulness in international space law.

2.2. Keep-Out Zone Proposals in the CD

Conference on Disarmament (CD)[7] was established as the only authentic forum to negotiate multilateral disarmament issues. An *ad hoc* Committee on the Prevention of an Arms Race in Outer Space (PAROS), set up in the CD from 1985 to 1994, was tasked with inviting proposals and future initiatives contributing to PAROS.[8] One of often tabled proposals in PAROS was the keep-out zones (KOZ) as a confidence building measures (CBM). KOZ was proposed in 1987,[9] 1989,[10] 1990,[11] 1991,[12] and 1992.[13] The common element of such KOZ proposals was that it was made as a zone to keep a certain distance from each other's spacecraft to avoid misconception, misunderstanding and miscalculation as well as to gain time to detect and react ASAT attacks.[14] However, despite the continued trend to pursue CBM and later, transparency and confidence building measures (TCBM),[15] KOZ concept has not been proposed since mid-1990s. The possibility that any KOZ might be the violation of non-appropriation principle of the OST[16] may have made it a less preferred choice as long as other measures evidently in conformity with international space law could ensure the same degree of security.
In fact, the KOZ was not referred to in the final report of the second Group of Governmental Experts (GGE) on TCBM in Outer Space Activities

5 Newsome, *supra* note1, pp. 18-20.
6 *Ibid.*, pp. 20-21.
7 Committee on Disarmament (CD) established in 1979 was renamed as Conference on Disarmament (CD) in 1984.
8 See, e.g., A/RES/39/59 (12 December 1984); DC/641 (26 August 1985), para. 6.
9 CD/786 (24 August 1987).
10 CD/905, CD/OS/WP.28 (21 March 1989), pp. 21-22; CD/956 (4 September 1989), paras. 44-45.
11 CD/1039 (30 August 1990), para. 47.
12 CD/1092, CD/OS/WP.46 (1 August 1991), p. 4; CD/1105 (23 August 1991), para. 54; CD/1111 (4 September 1991), para. 54.
13 CD/1165 (12 August 1992), para. 24.
14 See, *supra* notes 9-13.
15 A/RES/60/66 (6 January 2006); A/RES/61/75 (18 December 2006); A/RES/62/43 (8 January 2008). The concept of the TCBM was first introduced in the First Committee of the UNGA in 2005.
16 OST, *supra* note 4, Art. II.

submitted to the UN Secretary-General (UNSG) in 2013.[17] This report recommended more benign TCBM such as: i) information exchange of basic orbital parameters of space objects and notification of planned spacecraft launches;[18] ii) notifications of high-risk re-entry events, controlled or uncontrolled, emergency situations and intentional orbital break-ups;[19] and voluntary familiarization visits of launching sites.[20] Outside the UN, the International Code of Conduct against Ballistic Missile Proliferation, widely known as "Hague Code of Conduct" (HCOC)[21] recommended similar TCBM to the 2013 GGE Report including pre-launch notifications,[22] notifications of the preceding year's real launches of space launch vehicles;[23] and the invitation of international observers to the launch site of Subscribing States to enhance security in space launch activities.[24]

A lesson learned from the experiences in the CD as well as efforts to enhance space security within and outside the UN seems to be that the concept of KOZ was not preferred for the purposes of national security concerns even if that would be equally applicable to all States. But for other purposes, KOZ might be welcomed in international society. The next section will study such possibilities.

2.3. Safety Zones in Space Traffic Management

In 2006, the International Academy of Astronautics (IAA) published the Comic Study on Space Traffic Management (IAA/STM Report). This remains one of the most important study reports of the field of space traffic management (STM), [25] while international society has not necessarily taken steps mentioned in this Report. The IAA/STM Report, evaluating the safety of space activities from the purely technical aspects, pointed out that the current "[n]o systematic zoning (restriction of certain activities in certain regions) in-orbit operations was an urgent issue to be addressed."[26] The idea of "zones" mentioned here was different from that of KOZ in the CD. It focused on the aspect of specific rules applicable only to specific zones/regions in space, noting the different congestion levels in various orbits. The IAA/STM Report urged to add further zone-based rules in addition to

17 A/RES/65/68 (13 January 2011), para. 2; A/CONF.220/1 (27 July 2012), para. 6; A/68/189 (29 July 2013).
18 A/68/189, *supra* note 17, paras. 39-41.
19 *Ibid.*, paras. 42-45.
20 *Ibid.*, paras. 46-47.
21 HCOC was established in 2002. The text of the HCOC is available at: <https://www.hcoc.at/what-is-hcoc/text-of-the-hcoc.html>.
22 HCOC, *Ibid.*, 4 a) iii).
23 *Ibid.*, 4 a) ii).
24 *Ibid.*
25 Corinne Contant-Jurgens, Peter Lála & Kai-Uwe Schrogl (eds.), *Cosmic Study on Space Traffic Management* (IAA, 2006).
26 *Ibid.*, pp. 13, 75.

already-existent coordination schemes by the International Telecommunication Union (ITU) concerning frequencies and positioning of the geostationary orbit (GEO) as a "limited de-facto "zoning" efforts".[27] Recommended zone-based rules were: i) the restriction of placing certain types of spacecraft into certain orbits such as extremely low orbits and escape trajectories to avoid interference with other space activities; ii) the imposition of strengthened environmental protection rules (e.g. end-of-the use space debris disposal measures) in heavily-used orbits; iii) the application of different debris restriction measures depending on the orbital situations (e.g. less strict measures in less used orbits); and iv) the encouragement of the use of different orbits instead of already congested ones when technically possible. It was stated that, for example, navigation satellites could effectively operate in various orbits.[28]

The idea of different rules for different "zoning" was further clarified in the 2018 IAA/STM Report.[29] It mentioned strengthened and more concrete debris mitigation rules in certain "protected orbital regions".[30] The 2018 IAA/STM Report did not specify future safety zones for space resources recovery, but noted that advanced STM as a TCBM was needed for the future space resources activities.[31]

Both IAA/STM Reports have been appreciated in the space community as a valuable input for the global sustainable use of space for the present and future generations, despite the fact that they contained the ideas of the restrictions of the freedom of use of some orbits. Lessons learned from these reports would be that the restriction of free use of some orbits could be tolerated and even welcomed if purposes are not just national security for some countries but for the safety and sustainability of space for all stakeholders and the restriction would be equally imposed to all stakeholders.

2.4. Space Resource Activity and the Safety Zones: the Hague Working Group

The Hague International Space Resources Governance Working Group (Hague Working Group) was established in 2015 to assess the need for a regulatory framework applicable for space resource activities for the searching, recovery and the extraction, etc. of space resources. The Hague Working Group was a track 1.5 dialogue as most members and observers participated in their own capacity.[32] It had four meetings from April 2016 to

27 *Ibid.*, p. 69.
28 *Ibid.*, pp. 69-70.
29 Kai-Uwe Schrogl (ed.), *Space Traffic Management: Towards a Roadmap for Implementation* (IAA, 2018).
30 *Ibid.*, pp. 92-93.
31 *Ibid.*, pp. 96- 97.
32 <https://www.universiteitleiden.nl/en/law/institute-of-public-law/institute-of-air-space-law/the-hague-space-resources-governance-working-group>.

September 2017, when the draft "Building Blocks for the Development of an International Framework on Space Resource Activities" (Building Blocks)[33] was adopted, which was opened for the public comments until 15 October 2018. Another four meetings were held from April 2018 to November 2019, when the Building Blocks was formally adopted. Among 20 Building Blocks, the eleventh Block is reserved for "technical standards for, prior review of, and safety zones around space resource activities"[34] to mitigate the inherent risks of space resource activities. 11.3 of the Building Blocks specifically states on the setting up of a safety zone:

> [t]aking into account the principle of non-appropriation under Article II OST, the international framework should permit States and international organizations responsible for space resource activities to establish a safety zone, or other area-based safety measure, around an area identified for a space resource activity as necessary to assure safety and to avoid any harmful interference with that space resource activity. Such safety measure shall not impede the free access, in accordance with international law, to any area of outer space by personnel, vehicles and equipment of another operator. In accordance with the area-based safety measure, a State or international organization may restrict access for a limited period of time, provided that timely public notice has been given setting out the reasons for such restriction.

It is explained that a safety zones or other area-based safety measure can be created when the nominal operations of a certain space resource activity or an anomalous event would reasonably cause harmful interference with other actors' space activities. Safety zones should be established for the safety of an activity and persons, equipment and the operation in outer space. [35]
The legal basis of the safety zone is Article IX of the OST. As the obligation of the avoidance of harmful interference with other States' activities is not explicitly stated in Article IX, it is sometimes stated that imposing this obligation on States would go beyond the exact obligation of Article IX.[36] Yet, a prevalent interpretation is that at least best efforts obligation has been established to avoid harmful interference with other space activities and the

33 *Ibid.*
34 The text of the Building Blocks is available at: <https://www.universiteitleiden.nl/binaries/content/assets/rechtsgeleerdheid/instituut-voor-publiekrecht/lucht--en-ruimterecht/space-resources/final-bb.pdf>.
35 Olavo de O. Bittencourt Neto, Mahulena Hofmann, Tanja Masson-Zwaan and Dimitra Stefoudi (eds.), *Building Blocks for the Development of an International Framework for the Governance of Space Resource Activities: A Commentary* (Eleven, 2020), pp. 65-67.
36 *Ibid.*, p. 64.

obligation of the information provision stated in Article XI of the OST shall be fully implemented for fulfilling best efforts obligation. In fact, one of the five principles determined by the Technical Panel of the Hague Working Group states: "[t]he entity establishing, maintaining, or terminating a safety zone shall be able to publicly provide the basis for the zone to the extent practicable without violating national export control laws or the confidentiality of commercial information and/or intellectual property."[37] The purposes of safety zones in the Hague Building Blocks are not only for the safety and sustainability of space activities. They also include commercial and even national security interests of operators. Therefore, it seems imperative for operators to fully fulfill obligations under international space law and duly carry out various TCBM, including especially those adopted or endorsed in the UN to pass the appropriateness test, let alone the legality test.

2.5. Civil Exploration and Use of the Moon and Safety Zones: the Artemis Accords

The Artemis Accords, adopted on 13 October 2020 among like-minded States, is the first multilateral instrument of international importance containing provisions of a "safety zone" to be set on the Moon, Mars, comets or asteroids.[38] Although this is a non-legally binding political instrument, the Artemis Accords is significant as the base of a large-scale multilateral Moon exploration program (human and robotics) by more than 20 countries.[39] A "safety zone" is understood as the area wherein the notification and coordination of activities under the Accords will be implemented to avoid harmful interference between the Signatories and any relevant actor.[40] This would be needed when nominal operations of a certain space activity, be it scientific discovery or technology demonstration, or be it the extraction and utilization of space resources, would be reasonably expected to cause harmful interference with other actors' space activities.[41] Signatories would "use their experience under the Accords to contribute to multilateral efforts to further develop international practices, criteria, and rules applicable to the definition and determination of safety zones and harmful interference."[42] For the first time, the concept of the "safety zone" in outer space may be developed into a subject-matter of the serious legal discussion and/or negotiation for the wider parts of international society.

37 *Ibid.*, p. 67.
38 *The Artemis Accords: Principles for Cooperation in the Civil Exploration and Use of the Moon, Mars, Comets, and Asteroids for Peaceful Purposes* (13 October 2020). The text of the Artemis Accords is available at: <https://www.nasa.gov/specials/artemis-accords/img/Artemis-Accords-signed-13Oct2020.pdf>.
39 As of December 2022, 23 States signed the Artemis Accords.
40 The Artemis Accords, *supra* note 38, Sec. 11 (7).
41 *Ibid.*, Sec. 11 (7) chapeau & (11).
42 *Ibid.*, Sec. 11 (6).

The size and scope of safety zones as well as the methods and processes of notice and coordination to set safety zones would be determined in the future depending on the nature of the operations and the environment in which the said operations would be conducted.[43] Thus, a case-by-case consultation between the relevant actor and Signatory is expected. To decide the size and scope of each safety zone, a commonly accepted scientific and engineering principles should be respected.[44] It is clearly provided in the Accords that any safety zone is temporal. The change of the nature of an operation would lead to the change of the scope and size of a safety zone, and ultimately the temporarily set safety zone will have to be closed.[45]

The legal basis of a safety zone is the principle of due regard and harmful interference set forth in Article IX of the OST.[46] Information provision to the UNSG and other international stakeholders is a key to set, maintain, alter, and ultimately end a safety zone.[47] The purposes of a safety zone seem not only for the safety of operations, but also for various intertwined interests, e.g., scientific, commercial, and sometimes even national security interests of participating actors and Signatories. As a specific safety zone cannot benefit all States and actors equally, Signatories shall pass the legality test in setting, maintaining, altering and ending a safety zone through the ensured implementation of international law. The commitment by Signatories to non-legally binding UN instruments would also be relevant from the appropriateness test point of view. In fact, the Artemis Accords specifically mentions the latest and resourceful COPUOS Guidelines for the Long-term Sustainability in Outer Space Activities endorsed in 2019.[48]

3. Precedents of Safety Zones in International Law

3.1. UNCLOS and Safety Zones

The most clear and express example of a safety zone is found in the UN Convention on the Law of the Sea (UNCLOS)[49] adopted in 1982. The UNCLOS provides that a coastal State shall have the exclusive right to construct and to authorize and regulate the construction, operation and use of artificial islands, installations and structures (hereinafter "artificial islands, etc.") in the exclusive economic zone (EEZ)[50] and the continental shelf with

43 *Ibid.*, Sec. 11 (7) (a).
44 *Ibid.* Sec. 11 (7) (b).
45 *Ibid.*, Sec. 11 (7) (c).
46 *Ibid.* Sec.11 (1)(3)(4)(5) (9) & (10).
47 *Ibid.*, Sec. 11 (7) (d).
48 *Ibid.*, Section 11 (2); A/74/20 (2019), Annex II (pp. 50-69).
49 United Nations Convention on the Law of the Sea, 10 December 1982, 1833 UNTS 3 [UNCLOS].
50 *Ibid.*, Art. 60(1). The permissible reasons to construct installations and structures are more restricted than to construct artificial islands. *Ibid.*, Art. 56 (1)(a).

the obligation of due notice and maintaining a permanent means of giving warning of their presence.[51] A coastal State shall have exclusive jurisdiction over artificial islands, etc.[52] and may establish reasonable safety zones around artificial islands, etc. in the EEZ and on the continental shelf for ensuring the safety for navigation and its artificial islands, etc.[53] The conditions to establish safety zones include: i) reasonable size for the nature and function of a specific artificial island, etc. and definitely not exceeding "a distance of 500 metres around them, measured from each point of their outer edge, except as authorized by generally accepted international standards or as recommended by the competent international organization";[54] and ii) due notice of the extent of safety zones.[55] Further, artificial islands, etc. and "the safety zones around them may not be established where interference may be caused to the use of recognized sea lanes essential to international navigation".[56] Navigation is the priority in such cases.[57] Under such restrictions, "all ships must respect these safety zones and shall comply with generally accepted international standards regarding navigation in the vicinity of artificial islands, installations and structures and safety zones."[58] These provisions indicate that the balance between the navigation by all States and the safety of artificial islands, etc. has to be carefully maintained.[59]

That EEZ is not a territory of a coastal State but a *sui generis* area, where a coastal State has sovereign rights on natural resources and some other economic activities as well as jurisdiction on specific conducts including the establishment and use of artificial islands, etc.[60] This is an example that a country may be given some rights in the area not a territory of any States. Beyond the EEZ, "[s]afety zones of a reasonable breadth not exceeding a distance of 500 metres may be created around scientific research installations in accordance with the relevant provisions of" the UNCLOS.[61] This is interpreted as a right accorded to any State Party to the UNCLOS as long as

51 *Ibid.*, Art. 60 (3). The rights and obligations regarding safety zones around artificial islands, etc. in the EEZ *mutatis mutandis* apply to those on the continental shelf. *Ibid.*, Art. 80.
52 *Ibid.*, Art. 60 (2).
53 *Ibid.*, Arts. 60 & 80.
54 *Ibid.*, Art. 60 (5).
55 *Ibid.*
56 *Ibid.*, Art. 60 (7); see also, *ibid.*, Art. 261.
57 Satya N. Nandan and Shabtai Rosenne (eds.), *United Nations Convention on the Law of the Sea 1982: A Commentary*, vol. 2 (Martinus Nijhoff, 1993), p. 587.
58 UNCLOS, *supra* note 49, Art. 60(6).
59 No mention is made of fishing, which could be incompatible with the safety of artificial islands, etc. specified in Art. 60. It is presumed that Art. 62 (4) gives a strong authority to a coastal State to regulate foreign fishing ships. Nandan and Rosenne, *supra* note 57, p. 586.
60 UNCLOS, *supra* note 49, Art. 56 (1).
61 *Ibid.*, Art. 260.

it observes regulations of the UNCLOS, despite the scope of entitled States is not specified in Article 260 thereof.[62] Safety zones around scientific research installations on the high seas may be a useful reference for outer space counterparts due to the similar legal status of both areas.

3.2. Zones Established Relating to Military Activities on the High Seas

Freedom of the high seas traditionally includes military activities such as a military exercise and weapons testing,[63] which has not changed in principle under the UNCLOS.[64] Test areas, warning areas, warning zones, etc. set up for military activities on the high seas request that ships shall not enter such areas/zones during times of peace.[65] Other activities of the freedom of the high seas would inevitably be restricted if such zones are established, despite the fact that military use is not given priority than other uses. Therefore, test areas, warning areas/zones can be put only for the reasonable size and duration and it is said that a State establishes such an area/zone cannot seize or remove a ship intending to enter there without the approval of its flag State.[66] Nor can the State use force against a ship trying to access the warning areas/zones. Warning areas/zones are set to protect its military activity from the outside threats and to protect the safety of another ship enjoying the freedom of the high seas. Due regard to corresponding interests of other ships shall be paid on a case-by-case operation.

There are several zones named as security and exclusionary zones, maritime identification zones, maritime exclusion zones, war zones, and barred areas which will be established during an armed conflict. While these examples would surely be useful considering a case of space armed conflict,[67] as this article treats just safety or security zones in the peace time, rights and obligations of States to set such zones/areas would not be mentioned.

62 Alexander Proelss, *The United Nations Law of the Sea Convention: A Commentary* (Nomos Verlagsgesellschaft mbH & Co. KG, 2017), pp. 1742-1743.

63 Convention on the High Seas, 29 April 1958, 450 UNTS 11, Art. 2(2).

64 UNCLOS, *supra* note 49, Art. 87(1).

65 See, e.g., US Department of State, Central Files, 711.5611/2–2256 (The Fukuryu Maru), 22 February 1956. The difference of the warning area and the warning zone is that the latter is made by ship commanders so as to give them sufficient time and distance from potential threats in exercising military operations. Newsome, *supra* note 1, pp. 29-33.

66 Newsome, *supra* note 1, p. 31.

67 See, e.g., Matthew Stubbs, "The Legality of Keep-Out, Operational and Safety Zones in Outer Space", in Cassandra Steer and Matthew Hersch (eds.), *War and Peace in Outer Space: Law, Policy, and Ethics* (Oxford Univ. Press, 2021), pp. 202-222.

3.3. Air Defense Identification Zones

An air defense identification zone (ADIZ) is "a defined zone of airspace within which civil aircraft are required to identify themselves."[68] ADIZ is established above the EEZ and high seas of a coastal State by its unilateral declaration, which requires a foreign aircraft bound for its territorial airspace to identify itself, file of flight plans and to provide periodic position reports. However, in general, the coastal State has no right to require a foreign aircraft to follow its ADIZ procedures unless the foreign aircraft intends to enter national airspace.[69]

The Legal basis of ADIZ is arguably customary international law. The necessity of ADIZ came to be recognized due to the growing capabilities of aircraft reducing time for coastal States to react an identified threat. ADIZ is therefore thought as a device to strike a balance between the freedom of air over the EEZ and high seas and national security of coastal States.[70] The establishment and operation of ADIZ seems to show that safety zones for protecting national security can be tolerated if: the zone is adjacent to the national territory; it is of utmost importance to maintain national security; and it is operated in a highly restricted manner.

4. Conclusion

Analysis of the concepts of safety zones in outer space found in studies, proposals, a non-legally binding multilateral agreement as well as precedents of different fields of international law, has led to the following preliminary conclusions.

(1) Safety zones are permissible only when their establishment and operation are fully in accordance with international space law including the principle of non-appropriation and the rule of avoidance of harmful interference under the OST. Meeting such legality test would not be necessarily easy especially when the purpose of a safety zone is to enhance national security of small number of States. Thus, to ensure a space activity free from threats and harmful interference from other actors, strengthened TCBM and universally applicable STM would be chosen as more preferred alternatives as long as they would bring about the same degree of security. Detailed STM would make ASAT attacks more

68 J. Ashley Roach, "Air Defense Identification Zones", in Rüdiger Wolfrum, et al (eds.), *The Max Planck Encyclopedia of Public International Law*, vol.1 (Oxford Univ. Press, 2012), p. 231.

69 *Ibid.*, p. 232. China requires a foreign aircraft to follow ADIZ procedures even if it does not intend to enter Chinese airspace. Newsome, *supra* note 1, pp. 45-48.

70 Roach, *supra* note 68, p. 233.

difficult, and safety zones just for national security concerns might be dispensed with by the development of the STM.
(2) Safety zones may be welcomed if their purposes are not just national security for some countries but for the safety and sustainability of outer space and restrictions pertaining to safety zones would be equally imposed to all stakeholders.
(3) Safety zones could be lawfully established when they constitute an essential part of a certain space activity which is in accordance with international law. There are two important elements to be met. One is a lawful space activity and the other is a nature of the activity that can be fully implemented only with the existence of safety zones. Space resource activities seem to be included in this category.
(4) Elements for a reasonable safety zone seem to include the implementation of TCBM (e.g. appropriate notification systems) and the operation in a restricted manner by a State having established one to strike a due balance among incompatible rights of many actors for that zone.
(5) Appropriateness test should be met in addition to the legality test. For that purpose, the ensured implementation of non-legally binding UN instruments would be of great importance.