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# THE PROBLEM OF THE PREVENTION OF WEAPONISATION OF OUTER SPACE

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# Introduction

*It's human nature to stretch, to go, to see, to understand.*
*Exploration is not a choice, really; it's an imperative.*

Michael Collins, Apollo 11 astronaut.[1]

More than fifty years have been since the humans set activity in outer space. It all started in a difficult period of confrontation and competition between the U.S. and the USSR, and although not intended, it brought humanity many benefits. First launched satellites were meant to measure the capabilities of technology in the orbit of the planet. With the essential knowledge they provided, they "contributed [to] critical knowledge and capabilities for developing satellite telecommunications, global positioning, and advances in weather forecasting"[2] among others. Still today, we benefit daily from the scientific and technological progress made due to outer space exploration. But benefits came along with costs. Space became the new frontier of confrontation during the cold war. It saw a crude technological race between the Americans and the Soviets, which ultimately made space a delicate environment. Still, although being crucial, less attention was paid to creating rules in outer space. In the late years of the 20th century, space was militarised and used with military applications, raising the stakes of the different space actors. This situation led to the current one, where space is increasingly becoming a concern for many. Issues like weaponisation of outer space, debris generation and its impact, cooperation amongst spacefaring states, ambitions, interests, military capabilities, and the right to use and access space are growing concerns within outer space discourse. Space has provided us with significant advance, but in the current situation, outer space could head towards conflict.

**The aim** of this thesis is to address the chances of adopting rules, preventing the further weaponisation of outer space, and answering why legally binding rules have not been created outer space yet.

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[1] "Smithsonian National Air and Space Museum."
[2] "Benefits Stemming from Space Exploration." P. 1.

To address the aim, we developed a **research question** consisting of two parts:

- *What are the chances to establish rules that would prevent further weaponisation of outer space?*
- *Why the international community has not reached any clear legally binding agreement no despite its agreed more strict rules are needed?*

The main **methodology** to answer the research question will consist of description, comparison, and analysis. To this effect, the research will be structured as follows.

- **The first chapter** is devoted to the description and analysis of the origins of lack of definitions within the OST treaty as well as the definition of the loopholes paying attention to the actual situation.
- **The second chapter** is devoted to the description and comparison of national doctrinal approaches towards space, interests in outer space, threat perception, and opportunities in space. The comparisons will be focused on four selected countries: the U.S., Russia, China, and India.
- **The third chapter** is devoted to the description and analysis of the prospects of cooperation in building regulatory measures in space between the selected countries.

Weaponisation of outer space is not a new topic on the agenda of arms control and disarmament. Indeed since the late 2000s, this topic has been gaining more relevance among different scholars. The issues covered concerning outer space by researchers are mainly focused on the weaponisation of outer space. We should mention certain diversity, as there are no researches that combine technological approach, policy approach, and cooperative approach. To this extent, we can say that studies dealing with space can be divided into different groups.

The first group consists of **general researches** about the topic of weaponisation. These researches contain more general information about the process of militarisation and weaponisation of outer space. In this case, we have to underline the work of Lieutenant-Colonel Kowal, who gives an overview of the issue from a purely military perspective. Here he points the importance

of certain military events, such as the 2007 Chinese military ASAT test, the first country conducting such a test like this since the end of the cold war[3].

Continuing with the **military affairs** in outer space, many researchers are focusing on an Arms Race in outer space[4]. The researches covering this topic, are mainly devoted to clarifying the possible triggers for a space arms race, and they specially focus efforts on finding ways of preventing this from happening.

Turning to other researches, we should mention the many papers devoted to analysing the **cooperation in outer space**. This group of documents is mainly conformed by American scholars, but also Indian scholars and some Russian contributors. These authors vary on their analysis, but there is a strong focus from American scholars towards a possible collision with China. That is why we have articles in this group completely devoted to the cooperation between China and the U.S. in space matters. One example of this could be Kenneth Blazejewski's "space weaponisation and US-China relations"[5]. In the case of Indian academics, we could mention Lele as a major contributor to the global discourse around outer space.

Another extensively mentioned topic is **international security** and **strategic stability**. These issues are derived from spacefaring state's activities in outer space. The researches centred in security matters especially highlight the problems of a possible arms race in the space[6,7] and the geopolitical consequences this would have in the security equilibrium in the Earth, examples of such researches can be found in work by Porras, Silverstein, and Borrie and also Gasparini. They also point that the development of ASAT programmes by third countries could have a very negative impact on the gradual measures for trust-building and compliance that arise for preventing outer space weaponisation. One of the main ideas by many authors in this regard is the impossibility to verify and recognise the authority of specific hypothetical attack to a satellite (using ASAT weapons). This is a significant concern as Steinberg[8] mentions, as the idea is formulated both by American scholars and Russian ones too.

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[3] Kowal. P. 1—44.
[4] Koplow. P. 331—388.
[5] Blazejewski.
[6] Porras; Silverstein; Borrie. P. 1—44.
[7] Gasparini. "1991, Peaceful and Non-Peaceful Uses of Space—Problems of Definition for the Prevention of an Arms Race." P. 3—183.
[8] Steinberg. P. 248—267.

Other notable groups of papers are devoted to the analysis of **national doctrines** towards space and their possible effects in the space environment[9,10,11]. This group of researchers mainly comprises American and European academics, but also have notable Asian contributors. These researches are mostly produced and oriented towards academia and policy-makers. These researches stress the interests of different countries regarding the use of space, not only focusing on military goals but also on scientific and economic purposes, as it is the case with Jordan[12].

Finally, there are many pieces of research cantered on the **legal/regulatory aspects** of outer space approach. Here we should mention the work by Oduntant[13,14], which is dealing with legality and regulatory aspects of weaponising outer space have some connection with the researches dealing with cooperation. The discourse here is to try to encourage the possible main actors to reach legal agreements for the comprehensive use of the space. One of the main researches talking about legal aspects of outer space is Johannes M. Wolf[15], who is cited by some other authors as he describes how the deregulation of space has been the mainstay for its militarisation and probable weaponisation.

As we can observe, researches are evenly disseminated among six different groups. The studies focused on the general aspect of space weaponisation are the majority. The next group of researches consists of those focused in a space arms race, cooperation, and security issues, and the last group of researches covers policy strategies and legal/regulatory aspects of outer space weaponisation. This means that the researches are not only trying to focus on one single topic affecting the issue of outer space weaponisation but rather trying to have different approaches. This does not mean that the recalled researches conduct an overall study of the problem of weaponisation of outer space, rather specialise on some isolated aspects of it, without bringing them together for a better comprehension of this topic.

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9 Hitchens; Katz-Hyman; Lewis. P. 35—56.
10 Singh. P. 6—33.
11 Rajagopalan. "India's Changing Policy on Space Militarization: The Impact of China's ASAT Test." P. 355—372.
12 Jordan. P. 174.
13 Oduntan. "Sovereignty and Jurisdiction in Airspace and Outer Space; The never ending dispute: legal theories on the spatial demarcation boundary plane between airspace and outer space." P. 282—356.
14 Oduntan. "The Never Ending Dispute: Legal Theories on the Spatial Demarcation Boundary Plane between Airspace and Outer Space." P. 64—84.
15 Wolf. P. 7—41.

We also have to highlight that the topic for the cooperation between the U.S. and China is quite a relevant topic, specifically for American researchers[16]. Regarding this, the main ideas found around Chinese-American cooperation in outer space are both trust-building and transparency of space programmes, especially the Chinese space programme, as it seems that American scholars are preoccupied with China challenging the U.S. as the leading player in the space.

As we have seen, the discourse of academia is more or less independent from political opinions but not that much from historical events. We have to underline that even if weaponisation of outer space is the very actual topic, throughout the last 40 years, its importance has been varying, from being crucial, to a slight 'irrelevance' to its revival in the last decade. Therefore, we can say that this topic is highly determined by history, politics, and geopolitics altogether with the strategic interests of the key players.

We also have to highlight that the discourse around military use of space has been evolving in the last decades. The leading terminology changed from the 80s to the 2000s. In the 80s, when dealing with military issues in outer space, the main word used in the researches was “militarisation.” This was corresponding to the ideas of employing military technology in outer space, mainly regarding military use of satellites, and the use of military technology to help with warfare on the Earth as secondary assets. By the year 2000, space was already militarised, but not weaponised. Here many authors changed their discourse and their subject of study from militarisation to weaponisation. With the adoption of this new terminology, the scope of the issue changed too, as the primary mission for the researchers would now be the suitability of placing weapons in outer space, or how the objects already launched might be affected by weapons capable of targeting them.

Some other authors also associate arms control agenda (prevention of the weaponisation of outer space) and technological development, meaning that more technological progress does not mean that states are willing to create new rules. In this scenario, many are the authors who express that the states are trying to gain superiority in the space to establish rules, mainly beneficial for them. As we can see, the authors of these researches are more linked to educational entities and governments, and not many authors come from the military world. Here, we observe some gap in the

[16] Arvatov; Dvorkin. P. 4—33.

discourse as the opinion of the military is not as present as the opinions by scholars and bureaucrats.

Continuing with the authors, the majority of the researchers analysed have an average level of cross-quotations. We do not observe a leading researcher or paper taken as reference by the scholars to develop their papers. Instead, we have a diversity of approaches, with different quotes, underlining that for U.S. linked researchers, their quotations seem to avoid other non-American researchers, as they focus mainly on the role of the U.S. in outer space weaponisation. In the case of Russian, Chinese and Indian researches, the references to non-Russian/Chinese/Indian sources are higher than those in the American researchers. This can be understood as the discourse in non-American studies is more globally focused.

The conclusions of the literature review are the following. The first thing we should mention is that we observe several gaps in the discourse. First, we see how no authors are making a direct link between technological development (weapons technology) and the role of developing cooperation in outer space between the different involved actors. We have seen how these two topics are covered, but separately by many authors. The second gap would be regarding cross-quotations. As we have said, we observe how American scholars are more U.S. centred, meaning that their researches do not have a general picture of the issue, rather a biased one. They also make a particular emphasis in the cooperation with China but do not mention any other key actors, as could be the case of Russia, the EU, and India, but not only them, few authors take into consideration private military companies and their role in outer space weaponisation. The third gap we observe has already been mentioned, and it is the few weight of military researchers regarding this topic. Fourth and last, we do not see authors addressing the different concepts of Strategic Stability in outer space and how it correlates to the cooperative measures states are pursuing.

Regarding some other more general conclusions, we can say that the conducted research is mostly chronologically oriented, being affected by the political and geopolitical events, there is not leading researcher. However, instead, we have many different approaches and diversity of authors, even if the cross-quotations are not very high, we observe that some grade of citations is made between scholars with different scopes. We also have to highlight that the research topics regarding the prevention of outer space weaponisation can be divided into six different groups,

having all of the more or less the same distribution of papers, and therefore the same grade of relevance for the discourse around our topic.

As reviewed in the literature review, the discourse around outer space is focused on six different points. This thesis intends to give a more comprehensive understanding of outer space by combining them. This is an approach that has not appeared in the review of the existing research. In this order, not only is this thesis going to cover critical aspects as the loopholes in the OST, but it also will focus on which are the interests and intentions of the key players while addressing threats. We will try to give answers to some of the definitions lacked by OST, such as proposing an operational definition for the weaponisation of outer space. We will also focus on the risk perceptions in outer space. For doing this, we will have to recall the military and political interests of the spacefaring states and how states regard strategic stability in space. We will also focus on cooperation, as we are going to analyse, which are the prospects of cooperation in the short and long terms. We will not only cover the aspects of other authors analysed, but we will also bring them together to have a clearer picture of which is the state of arts in space now. By doing this, we will be able to have a look more comprehensively on outer space issues.

# Chapter 1. Key concepts for Outer Space

Outer space is vital for our day-to-day life. It helps us to guide ourselves in unknown places, but it is also essential for many appliances we do not think about daily. This importance creates interests among many states, as they recognise the space as a strategic field for the development of their capabilities and interests. Still, the terminology surrounding outer space is often vague and does not create the consensus it should, to address the problems it faces. Terms like militarisation and weaponisation are frequently switched, misunderstood, or simply not defined in a specific way.

The aim of this chapter is not only to try to clarify these terms but also to explain other gaps affecting vital terminologies, such as the difference between airspace and outer space, what can constitute a space weapon, what means the peaceful use of outer space and others. This vagueness in the definition or lack of consensus around these same definitions makes addressing the problem of weaponisation of outer space utterly tricky.

## 1.1. Definitions

### 1.1.1. The militarisation of outer space

The militarisation of outer space is one of the two main concepts surrounding the military use of outer space. Differently to weaponisation, the militarisation of outer space is an accepted term by the majority of scholars, military personnel, and other experts in space affairs. By militarisation, we understand the use of space in support of ground, sea, and air-based military operations. It also includes "developing assets to be based in space with supporting ground infrastructure for military use such as early warning, communications, command and control, monitoring (remote sensing), and national technical means (NTM) that can be used for verification, surveillance and intelligence purposes."[17] With this widely accepted definition, we can understand that the outer space is and has been militarised by many years already.

A clear example of the militarisation of outer space could be GPS technology. The GPS or Global Positioning System is a "multi-purpose satellite system developed by the U.S. Department of Defence in the early 1970s […] designed to provide all-weather real-time spatial coordinates

[17] Tripathi. P. 194.

[...]for use in navigation"[18]. The GPS, as part of dual-use technology, is one of the most successful examples of the militarisation of outer space and a clear reflection of its importance. As we can see, the militarisation of outer space not only has military uses, but it can also contribute to civilian purposes. The phenomena of dual-use technology are of vital relevance for our research and will be appropriately explained after, in the sub-chapter dealing with the weaponisation of outer space.

The roots of the term militarisation can be traced back to the late 1960s and 1970s. The launch of the first satellite in 1957 by the USSR started a revolution in military affairs in the outer space. With this new invention, no planes would be needed to spy the enemy's territory. Furthermore, it opened an era in which space became a reality with a variety of practical applications, especially for the military complexes. It is for this reason that a race in satellites started to incorporate the latest developed technology to get a strategic advantage over the enemy. The first orbit by the SPUTNIK marked the starting point of a new era, the space era.

Though very popular during the cold war period, the militarisation of outer space is a terminology that was widely used until the late 1990s and the start of the new millennia. The disuse of the term militarisation of outer space is due to space being already militarised, as we have seen in the case of GPS technology. Therefore, the development of the technology of satellites and in general space technology made authors focus on new terminologies, such as weaponisation (as a logical consequence of militarisation). Even if some authors continue to use militarisation as a synonym for weaponisation, the general trend explains how this specific term got out-of-fashion in today's discourse concerning space.

### 1.1.2. Weaponisation of outer space

Weaponisation of outer space is the term often used to replace 'militarisation'. Contrary to militarisation, weaponisation does not meet the consensus of the expert community, as some of the scholars stress that weaponisation is reality, whereas others deny it. These latter scholars state that weaponisation is instead a process for the near or mid-term future.

[18] Monmonier. P. 552.

In this chapter, we will differentiate between the conventional or mainstream approach of the concept 'weaponisation' and the proposed *operational definition* we shaped for this matter. After reviewing different interpretations of both the concept ‘ weaponisation of outer space’ and the word ‘weaponisation’, we conclude that we need to construct a new definition, as the existing definitions do not comprehensively cover the term. We could say that the definitions that currently exist give us a static picture of what weaponisation can be, and though pleasing, it is more recommendable to have a whole picture to comprehend this process more deeply. For this matter, we will first address the ordinary or standard definition. Then, we will define other vital elements that are now vaguely defined and have a particular relation to this concept. Following, we will present the operational definition we came along, trying to answer the central question of this chapter; Is space weaponised?

If we attend to the dictionary definition for the word ‘weaponise’, we will find a definition like the following, “(Weaponise is) to make it possible to use something to attack a person or group”[19] or “to make something suitable for use as a weapon.”[20] As we can see, these definitions are somehow vague. They do define what can weaponisation constitute, but they are open enough for different approaches to interpreting it. It is here where the problem starts, as without limiting this common term, it can be challenging to determine whether space is weaponised.

The expression ‘weaponisation of space’ defines the process resulting in the deployment of weapons in space, which may become a theatre of conflict through the use of threats aimed at destroying targets either in orbit or on the Earth’s surface. As already said, “the arming of space constitutes a destabilising factor for international relations”[21].

### 1.1.3. Discrepancies within the use of the existing terminology

Although by definition, space militarisation and space weaponisation are different concepts, they are sometimes used by some authors as synonyms for the explanation of the processes occurring in outer space. Similarly, the acceptance over the actual weaponisation of outer space is a very contested idea among the scholars and military personnel. on the one hand, we have plenty of scholars and experts that think that outer space is not weaponised. Space, as we know, today

[19] Cambridge dictionary.
[20] Oxford learner’s dictionaries.
[21] Association Aéronautique et Astronautique de France. P. 63.

does not hold any weapon that could proceed to physical harm of any kind down on Earth. Some eminent experts in outer space, like Mr Mueller, define weaponisation of outer space, as "a subset of space militarisation which includes the deployment of space weapons such as ballistic missile defense (BMD), ground and space−based anti-satellite weapons or space−to−Earth weapons (STEW)"[22]. Other authors, like Estabrooks, point out that, although space is heavily militarised, it is not yet weaponised. Space 'weaponisation' is generally understood to refer to weapons placement in orbit. Therefore, while satellites may be used for supporting aggressive measures, such as GPS navigation for fighter jets or precision-guided missile delivery, satellites themselves have no destructive capacity and their support of military operations would not be considered weaponisation[23]. Continuing with this same argumentation, Deblois says that, "an unambiguous definition of space weaponisation illuminates the fact that space is currently militarised but not weaponised"[24]. In this case, the author highlights the transition from militarisation to weaponisation, arguing that space is already militarised.

As we can see, there is somehow a consensus among the scholars and military personnel denying the weaponisation of outer space. These three examples, even if they look similar, have slight differences that mostly cover all the interpretations by the authors denying outer space weaponisation is something happening right now.

On the other hand, we have fewer authors than get out of the norm by stating that outer space is already weaponised. Platzgraff, one of these fewer authors that state that space is weaponised in existing terminology mentions, "the stationing of reconnaissance and communications systems in space represents the weaponisation of space even though such systems are indispensable to the conduct of operations on land or at sea here on Earth."[25] What is more, the author even says that space weaponisation does not have to start in space, rather on Earth, "what this shows is that the weaponisation of space need not take place in space, but instead from Earth as the Chinese demonstrated."[26] We could address this affirmative definition of outer space weaponisation as a new approach to this concept, as it does not constrict it only to the variable of the physi-

[22] Mueller. P. 377.
[23] Estabrooks.
[24] Deblois. P. 29.
[25] Platzgraff. P. 4.
[26] Ibid.

cal position of weapons, but also to the different elements of a weapon system, that might be in outer space.

Although second option experts are less in quantity, we can see how the discourse is evolving. This development has been in the form of a transition from "militarisation of outer space" to "weaponisation of outer space." We can see how the different publications, from the late 1990s to the 2010s, prefer the weaponisation approach to be reviewed rather than the militarisation one. Both terms are used as synonyms in many pieces of research, confusing the boundaries between the two and making the proper understanding of the topic more complicated. However, many authors focus their researches in the weaponisation process, due to the general assumption of a wholly militarised space, "Outer Space has been 'militarised' since the earliest communications satellites were launched into orbit."[27]

Delimitation of the space and the role of the Kàrmàn Line

When we face the definition or delimitation of outer space, we should remember that "there is no universally agreed precise legal, technical or political definition of either the boundaries separating airspace from outer space or of the term outer space itself"[28]. There is neither any international law defining where space starts. Some countries are avoiding regulatory regulation on this matter[29]. Here we can see how meeting criteria are complicated as many different agencies have contradictory definitions of the space (see the examples of FAI and NASA).

The Kàrmàn Line[30] is the imaginary boundary between the airspace and the outer space proposed by the Hungarian scientific Theodore Von Kàrmàn. This delimitation is agreed and used in many of the publications of the FAI[31]. Although this line is not universally agreed, it has been a comprehensive approach to standardise the distinction between the two. It has to be explained that this delimitation is not the byproduct of an arbitrary decision by Mr Kàrmàn, but a proper mathematic formula defines it. The Kàrmàn line, therefore, places the boundary between the space

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[27] Estabrooks.
[28] Oduntan. "Sovereignty and Jurisdiction in Airspace and Outer Space." P. 297.
[29] Oduntan. "The Never Ending Dispute: Legal Theories on the Spatial Demarcation Boundary Plane between Airspace and Outer Space."
[30] Voosen.
[31] Fédération Aéronautique Internationale

and the airspace in 100 km above the sea-level[32]. As pointed before, the main issue is that there are discrepancies in the adoption of the Kàrmàn line. For instance, such a vital space player as the U.S. has divergencies with the FAI. According to NASA and the U.S. military, the delimitation between space and airspace is not located 100 km high but rather at 50 miles above sea level[33] (80,467.2 m above sea level). We can see how two different agencies disagree on where outer space starts but, what do international agreements say? Such a critical treaty as OST[34,35] does not define where the space starts, mainly due to this fact, there are discrepancies among agencies. Two are the main problems with this lack of limitation. The variety of opinions in this regard is a hindrance to define the boundaries between outer space and airspace accurately. As we have seen before, FAI and NASA (but also the U.S. military) do not have agreed on universal border definition. The second problem in this lack of clarity is that this situation creates ambiguity in the technologies presumably of use in these heights. There is a fringe of <20 km in the low orbit of the planet in which some kind of small and light satellites coexist with certain planes.[36]

The problem here is that as there is no separating line, we cannot make universally binding treaties. We could raise the issue with OST here. The OST indeed mentions that outer space should be used for the benefit of humankind. However, as the OST does not directly address the delimitation issue, it leaves the ground widely open to different interpretations.

### 1.1.4. Peaceful use of outer space

The ‘peaceful use of ’outer space has always been an objective for the scientific academy. Nevertheless, it is seen as an obstacle by military and politicians, which recognise the vast potential

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[32] Sanz Fernández de Córdoba.

[33] “Where is space?”

[34] OST or Outer Space Treaty (official name: Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space) is an internationally binding treaty, signed on January 27th, 1967, entered into force on October 10th, 1967 in Moscow, Soviet Union. This treaty aims to set a specific legal basis and framework prohibiting the testing and deployment of any weaponry on outer space by the signing countries. It also has a goal to settle the so-called “peaceful use” of outer space for the general interest of the humankind. This treaty is not only restricted to outer space but also to all the celestial bodies (Especially addressing the moon as a place where military installations and weapon systems are strictly prohibited).

[35] “United Nations Treaties and Principles on Outer Space; text of treaties and principles governing the activities of States in the exploration and use of outer space.” P. 36.

[36] The X-15 flights were conducted in a time period comprehended from 1959 until 1968, performing 336 flights (125 of them aborted due to technical errors or bad weather). These research flights were a joint operation by the NASA and the USAF (United States Air Force). These test flights were conducted at records heights of 106,01-107,96km (for aeroplane). X-15 programme planes are the only ones ever to have surpassed the Kàrmàn line.

of exploring and exploiting the outer space, as the 2006 U.S. National Space Policy states, "in this new century, those who effectively utilise space will enjoy added prosperity and security and will hold a substantial advantage over those who do not."[37] As we can see, the seeming contradiction over 'peaceful use of 'outer space, emerges from the fact that the relevant agreements never precisely defined 'peaceful' and 'outer space' [still] other arms control treaties have successfully defined the term, peaceful-use[38]. We can observe how the impossibility in defining the meaning of 'peaceful use' has not been the norm amongst other international treaties, such as the Treaty of Tlatelolco in Latin America (banning Nuclear Weapons in this area) and also the BiologicalWeapons Convention[39] banning the development, stockpiling, acquisition retention, and production of biological weapons.

Therefore, the lack of definition of what 'peaceful-use' means a significant loophole that has been used by different actors to militarise the outer space. Also, the lack of concreteness of this term is the ground to a more significant discussion concerning the legal definition of the term weaponisation. Without a strict interpretation of peaceful use, there are no possible enforcement measures neither verification ones.

OST and the change in terminology

Article III of the OST defines the activities that can be carried in outer space by the different players in space and explains in this way how space should be maintained.

> "*States Parties to the Treaty shall carry on activities in the exploration and use of outer space, including the Moon and other celestial bodies, following international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international cooperation and understanding,"*[40]

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[37] Williams. P. 1.

[38] Gasparini. P. 12—14.

[39] The BWC or Biological Weapons Conventions is a treaty prohibiting the development, stockpiling, acquisition, retention, and production of biological agents (weapons), equipment and delivery vehicles for these weapons. The treaty does not ban the use of these types of weapons but embraces the 1925 Geneva Protocol prohibiting their use.

[40] "United Nations Treaties and Principles on Outer Space; text of treaties and principles governing the activities of States in the exploration and use of outer space." P. 4.

which means that space is not an area to deploy or use weapons to fulfill national interests. This 'peaceful use of 'outer space is one of the foundations of the OST treaty. However, there have been changes in the last years affecting this term that possibly could alter all the equilibrium around the outer space. The term peaceful-use has been an object of misinterpretation since it was introduced in the OST treaty. We can see the different approaches that this terminology has adopted, which curiously match with specific military interests of the states parties to OST.

> *"For some nations the term 'peaceful' has been interpreted as 'non-aggressive' rather than 'nonmilitary', meaning that all military uses were and are allowed and lawful as long as they remain 'non-aggressive' as permitted under Article 2 (4) of the United Nations Charter, which basically prohibits 'the threat or use of force."*[41]

The commonly accepted replacement of the term 'peaceful use' for a more ambiguous 'non-aggressive' introduced a variety of variables that would constrain much less the possible activities of the leading players in the outer space. This change in the understanding of the term implies a *de-facto* modification of OST treaty and its provisions, as the intended goal for the peaceful term in the OST was to guarantee the free access of all the humankind to space, while preventing the placement of weapons in space with the subsequent possible conflicts this could originate. There is also the last problem concerning this shift in the discourse. As peaceful is not well defined, it arises a problem of verification of the objects that are being launched to space. To finish with the issue of lack of definition and shift in the discourse, we could say that this change in the terminology, left an open ground for further weaponisation of outer space, which only responds to military and political interests around space and space assets.

In addition to the problem that the lack of definition creates, there is another issue with OST. As we will see later, the ASAT weapons systems are a significant danger for the assets in outer space, and indeed, the OST does not address them. The treaty does not tackle the growing concerns regarding space assets, about their vulnerability. We could further discuss why this ambiguity was set aside in such a treaty, but it is evident that the OST "it does not explicitly prohibit de-

[41] Wolf. P. 8.

liberate attacks on satellites or prevent ASAT weapons tests"[42] That poses risks to other space users.

### 1.1.5. Double use technology and its implications.

When we are talking about space weapons, we should pay attention to the infrastructure surrounding space assets. For instance, satellites depend on communication centres in the ground. Electronic attacks on data transmissions and destruction of ground stations supporting space-based systems are attacks against space systems[43]. Here we see how the problem of weaponisation of space is not easy to circumvent, as the line between them can be blurred very quickly.

#### 1.1.5.1. Satellites

Can satellites be considered as weapons? If we follow the classical definition of a weapon is, "an object used in fighting or war, such as a gun or a bomb, or something used against someone or something"[44], we could not consider a satellite as a weapon. However, this does not mean that a satellite cannot be regarded as part of a weapon system. With the introduction of satellite-guided navigation systems in the 1990s and the reliance on different kinds of satellites to maintain the network of communications, the assets in outer space became one of the highest priority assets in national military policies. In this regard, the disruption of some of these satellites could cause enormous damage to national military and civil infrastructure. There are different ways of using a satellite as a weapon, from the simplest one, changing the trajectory of the satellite to physically destroy an enemy's satellite, to inhibitors which would impede the normal function of other satellites.

#### 1.1.5.2. Dual-use technology

Many are the authors that stress the importance of satellites in our most common daily activities. Nevertheless, satellites do not only serve civilian purposes. Military applications of satellites are diverse and vital for the well-functioning of the national military complexes. Indeed, as for the U.S., the majority of the communications between the military are sent using satellite capabilities "over two-thirds of long-distance military communications are sent via communications

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[42] Grego. P. 3.
[43] Wolf. P. 5-12.
[44] "Cambridge Academic Dictionary."

satellites"[45]. Satellites also play a key role, as they constitute one of their most important roles, as early warning systems. It is worth mentioning that all the countries capable of launching satellites into the Earth's orbit are also capable of launching those same rockets but instead of containing satellites, filled with warheads intended at destroying some other country's space capabilities.[46]

1.1.5.3. ASATs and the ABM Treaty

"ASATs are any capabilities aimed at destroying or disabling space assets for any reason, whether military or civilian, offensive or defensive. They are generally sorted into two types: kinetic and non-kinetic"[47]. The Kinetic ASATs are the most rudimentary ones, as they need to strike an object to destroy it physically. Some examples of ASAT technology can be ballistic and anti-ballistic missiles, proximity detonations (both conventional and nuclear), and any other item launched (matching the trajectory of the targeted satellite). The meaning of Kinetic, therefore, is the physical destruction of satellites or other space objects. These devices can be categorised as Kinetic ASATs.

Contrary to the kinetic ASATs, non-kinetic ones use non-physical means for destroying satellites or space objects. The means used by non-kinetic ASATs vary from; blinding lasers to frequency jammers to cyberattacks. It has to be said that despite kinetic ASATs, non-kinetic ones can render space objects without causing any kind of space debris, as they would enable the object without physically touching it. It is also more challenging to detect non-kinetic attacks, as a flying missile is easier to be spotted than a cyberattack or a laser attack. We can see how a wide variety of weapons can be considered as ASATs, but the most commonly agreed threats to outer space assets are the Ballistic Missiles, as they can easily target and destroy unprotected satellites.

The ABM treaty[48] signed in 1972 had as one of its provisions the no interference in the national means of verification, as one of the main ways of verifying the compliance with the treaty itself. This is of importance for our subject as the national means of verification of the two signatory

[45] Brandt. P. 47.

[46] Sheeran. P. 174—180.

[47] "Towards ASAT Test Guidelines." P. 1.

[48] ABM Treaty, signed 1972. Entered into force October 3rd, 1972. The aim of the ABM Treaty (Treaty Between the United States of America and the Soviet Socialist republics on the Limitation of Anti-Ballistic Missile Systems) is to limit the anti-ballistic missile systems in order to reduce the risk of a nuclear between the U.S. and the Soviet Union. This treaty was terminated in June 2002, when the U.S. unilaterally decided to withdraw from it.

states were mainly based on recognition satellites[49]. This meant that the satellites were protected by the ABM Treaty, "While not explicitly mentioned, U.S. reconnaissance satellites were chief among these means of verification and Soviet acceptance of these terms was viewed as a tacit confirmation of the legitimacy of such satellites"[50]. This protection was rapidly extended to other satellites that were not directly intended to monitor the enemy's arsenals, due to the impossibility of affirming which satellite was a monitoring satellite (the duel use technology is difficult to verify). In this regard, there are many concerns that the U.S.'s withdrawal from the ABM treaty in 2002 and the fostering development of anti-ballistic missile systems are ground for the process of weaponisation of outer space. Hagen explains this by saying that, "Today, more than 170 dedicated military systems[…] are on Earth orbit."[51] As noted earlier, these actors are not alone in developing the building blocks for ASATs. India has also been testing a ballistic missile defence systems that could be used as the foundation for its own ABM/ASAT capabilities[52]. Indeed, since the unilateral withdrawal of the U.S. from this treaty, "there is no longer a treaty-prohibition against testing or deploying weapons in the space other than weapons of mass destruction."[53]

So as we have seen, a space weapon is a difficult concept to address. It is not difficult because the definition of space weapon is an abstract concept, but rather because many are the weapons systems that can be introduced in a broad definition, making this utterly useless for regulatory means. Therefore we will define space weapons as the weapons or weapon systems that not only are settled in the outer space but those who use some kind of space technology (guidance, early warning) for their functioning and also those who have as aim to destroy space assets in outer space.

## 1.2. Outer space weapons

When we talk about the possible weapon systems that could target assets in outer space, we tend to think into futuristic weapons able to knock down satellites efficiently. However, we have to highlight that ASAT technology is not anything new. The triggers of this technology are

[49] Grego. P. 3—4.
[50] Ibid., P. 3.
[51] Hagen, Shafran. P .43.
[52] "Defence Research and Development Organisation (DRDO), successfully conducts Interceptor Missile Test."
[53] Dean. P. 201.

the different ASAT programmes developed back in the late 50s and the decade of the 60s. There are cases in which ASAT systems have been tested with notable efficiency destroying or disrupting satellites in the orbit of the Earth. One example of an ASAT system is the Soviet Kinetic ASAT program (called I.S., later changed to IS-MU), which was tested in the late 70s. This weapon system consisted of an interceptor that had some explosives attached to it. The functioning of this device was indeed simple: a device was launched to the outer space, and would manually approach the target. Once near enough, it would detonate, and the debris or the explosion itself would damage or destroy the targeted satellite in a few seconds. This kinetic ASAT could operate in a while range of orbital altitude (150—1600km)[54] virtually targeting all space assets.

### 1.2.1. Old Satellites and Satellites intended as ASATS

As explained before, the kinetic ASATS are the most rudimental type of the different kinds of weapons systems targeting satellites. The function of the kinetic ASAT is to impact another body to alter the asset's normal functioning. For this purpose, old or malfunctioning satellites can be used. In this case, the only thing that should be done is to move the orbit of the old/malfunctioning/intended satellite to the same orbit of the targeted satellite. In the event of hours, the two satellites will collide, destroying both satellites. We have to highlight that there are near 50 countries with satellites in the orbit of the world, and the technology has become cheaper, so any of the countries possessing satellites could exercise this type of disruption (or attempted disruption).

### 1.2.2. Air launched kinetic ASAT

The air-launched kinetic ASAT is a device intended to destroy space assets, but differently to conventional ASATs, it is launched in the air (it might be a cruise missile) and ascends to the lower orbit of the Earth until the target is destroyed by kinetic action or until the fuel is exhausted.

[54] Grego. P. 11.

## 1.3. Weaponisation of outer space (operational definition)

This operational definition of weaponisation of outer space is not following the mainstream approach to it, as a static concept rather an evolving one. Therefore, we could define the weaponisation of outer space in this way.

The weaponisation of outer space is an active and evolving process, derived from the militarisation of outer space. This process has different stages: the first stage of the weaponisation, or *passive weaponisation*, is a process in which double-use technologies are used, along with militarisation, to implement weapons systems in the outer space. Some examples of this are non-kinetic ASATs, the STSSs[55] and the missile guidance satellites. The second stage of this process or *active weaponisation* is the comprehended settling of weapon systems in the outer space and its assets, such as the case of space-based lasers or the kinetic ASATs, devices intended to destroy vital space infrastructure.

So the explanation for these two stages of weaponisation would be the following. The first stage of weaponisation is the stage where infrastructure (satellites and other technologies) are used to guide and detect weapons that go through the outer space in their way to the target (ICBMs, ASATs, MIRVs, among others). The second stage of the operational definition of outer space is the one in which weapon systems are deployed in outer space. This could be the case of satellites carrying warheads to be deployed on the Earth's orbit, kinetic ASATs (satellites programmed to destroy other satellites physically) and lasers that could be based in the space, targeting other space assets. Where do reconnaissance and early warning satellites fit in our definition of concepts? There could certainly be some discussion regarding where reconnaissance and early warning satellites should fall, as for this research, they are both part of militarisation rather than weaponisation.

## 1.4. Conclusions

As we have seen in this chapter, it is not commonly agreed whether outer space is weaponised or not. However, to us, outer space is already weaponised. Indeed, space is in its first phase of weaponisation, the one we called *passive weaponisation*. We assert this as the outer space

[55] Space Tracking and Surveillance System

is already being used to guide weapons to targets, which effectively creates the guiding space infrastructure part of the weapon system. As we also have explained, the second stage of weaponisation would be the one in which weapons, as such, would be placed in outer space, targeting both space and inland objectives. From this definition, we can see the difference between the first stage of weaponisation and militarisation, as this last term responds to the use of space in support of ground, sea, and air-based military operations. The critical difference is that in our operational definition of the *passive weaponisation*, space assets are needed for weapon use. The differentiation is crucial to us, as by defining weaponisation, we can better understand where are the technological boundaries between militarisation and weaponisation. This is relevant to this thesis as it can help in a possible treaty building to avoid further weaponisation of outer space.

From this chapter, we also have extracted other definitions relevant to the weaponisation of the space. The first definition would be the boundary between the outer space and the airspace. This is an unaddressed topic by the OST, which substantially limits the understanding we have of outer space. The absence of this definition can lead to different understandings of where space starts and, therefore, could lead to confusion and the impossibility of agreeing on other concerns. As we have explained, the most logical definition for the virtual starting point of the space would be the one provided by the Hungarian scientific Theodore Von Kàrmàn, stabilising outer space at 100km above sea level. This effort in standardisation could lead to better understanding and more chances for cooperation between spacefaring states.

Definition for ASATs or Anti Satellite weapons can vary, and there is neither a single definition to address them. As we see it, this does not help to address the potential active weaponisation of outer space. Indeed, upon its proper definition, we can see different kinds of ASATs, starting from conventional ballistic missiles and anti-ballistic weapons, continuing with lasers and jamming devices, air-launched rockets, and also old satellites that could be guided to target specific objects in space. The lack of a proper definition here makes it truly difficult to address a possible limitation of such weapons. A shared common fact that these missing definitions bring is the impossibility to address a limitation of activities in space. This conducted to the situation when neither states parties to the OST, or experts can clearly define which actions are prohibited and

which are not. The limitation of activities needs consensus to be effective. Moreover, when dual-use technology is a challenging factor to verification once the device is launched into space.

Defining these concepts is a much-needed action to understand outer space better. This fact is even more critical if states want to prevent a possible arms race in outer space. If every space-faring state attaches to the definitions they have given themselves, there is a genuine chance an arms race could happen. We should remember that the OST treaty does not hold any kind of verification or fulfillment body that could prevent escalation from happening in space. In this regard, we could say that the OST treaty has been emptied from its original purpose, maintaining possible military conflict away from outer space. As we have seen in this chapter, the OST is a treaty created during the cold war times, when different states understood that an arms race could be a reality in outer space, that could quickly destabilise the already tense relations between blocks. The main principle that OST brought was that space would remain in the interest of all humankind. Space would be devoted to scientific research and more critical to peaceful use. This was an interesting principle, but it contained the main loophole, The treaty did not address what constituted 'peaceful use' and what did not, and this a critical gap. If back then, a definition was given to peaceful use, there would be a binding reference to which activities could be carried out. This loophole was widened with the decision by the U.S. of unilaterally twisting the principle. ‘Peaceful use’ evolved to a more ambiguous ‘non-aggressive’. The transition towards this ambiguous term (again without proper definition) was completed when other countries accepted it. This could have two reasons. First, the U.S. is the main actor in outer space, which allows it to settle the rules. Second, states saw on this change of terminology an advantage towards fulfilling interests in space. The consequence of this change in the ambiguity of which activities can be carried out in space and, at the same time, a dangerous precedent that could enhance passive weaponisation.

Adding to what we already said, we should mention the double use of space technology and the difficulties of its verification as a source of passive weaponisation of space. As we have said, the lack of OST verification and the almost impossibility of distinguishing the function of satellites leads us to think that these have been some of the essential sources for outer space *passive weaponisation*. Together with this, *passive weaponisation* has been fostered by the U.S.’s ABM

treaty withdrawal, which has allowed the proliferation of ASAT technology not only in the U.S. and Russia but also in other countries.

As we can see, there are several problems, some of them very acute that do not allow us to have comprehensive tools to avoid further weaponisation of the space. There is also a very relevant aspect that we have somehow reviewed. We observe an excessive politicisation of the outer space. Many are the countries that see the potential of space and space assets for their national interests. Therefore we see how it is in their interest to maintain *the status quo* as it is now, with vague definitions, empty treaties, and malleable concepts that would not tie the hands and wishes of the countries to act in space. This can be related to the ever-developing space technology. Understandably, an adequately formed OST treaty (or any other) could limit the use of future technologies that could be considered as game-changing in space. This is why we can say that the actual situation without definitions is deliberately carried to act as freely as possible.

# Chapter 2. Leading Actors in Outer Space

This second chapter will be devoted to analysing and understanding the main approaches of different countries in terms of their national interests in outer space. This chapter will also focus on how space is fitting within the military doctrines of the selected countries, whether they have a specially designated field for space or not. By analysing these different factors, we will be able to develop a comprehensive understanding of who are the leading players and what are their intentions in outer space.

The selected countries to be analysed are the following:

- The U.S.,
- Russian Federation,
- The People's Republic of China,
- India.

These countries are selected due to a variety of factors, such as their military capabilities, economic power, population, technological advantage, and evolution of space programs, as well as their role in shaping outer space environment and their willingness to exercise power on outer space.

## 2.1. The U.S.

Outer space has been an area of interest for the U.S. since the early years of the cold war. The space became especially relevant when the USSR launched in 1957 the SPUTNIK I and opened the era of a space race between the two superpowers. In 1982 under the Reagan administration, the U.S. developed a space branch within the USAF[56], the Air Force Space Command, with the future idea of the introduction of a space corps, but this approach was never taken into further developments and remained as part of the USAF. After the collapse of the USSR and the end of the cold war, the investments into expensive and seemingly useless programs, like the space ones, dramatically decreased[57,58]. In this subchapter, we will see how the U.S. military

[56] United States Air Force

[57] Partial to the thought that Americans had already gained the cold war, and therefore no other country would be able to contest their power.

[58] Fukuyama. P. 3—16.

has been adapting the space issue during the last two decades, and how this evolution has lead to a significant superiority in outer space. We will also try to forecast which are the intentions of the U.S. regarding outer space by looking to the military doctrine and also to the budgetary initiatives related to space from the DoD[59].

### 2.1.2. Strategic Goals, Doctrinal Approach and Organisational Structure

As we have headed before, when the cold war ended, the vacuum of power the Soviet Union let was not only in the military, political and economic sphere. In the space, only one of the two leading powers abided, the U.S. Space assets proved to bring significant advantage to the U.S. armed forces during the conflicts the nation faced since the end of the 1990s.

Under the Republican administration of George H.W. Bush, space regained relevance, with a proper and specific doctrinal approach to space by the U.S. military (also covering national and civilian interests of the U.S.). Due to the gaining relevance of the space and its assets, mainly satellites, for the well functioning of the military, it was determined to develop the doctrinal approach of *Space Superiority* for the U.S.

This doctrinal approach towards space is divided into two different categories, *Space Control* and *Space Force Application,* also called *Global Strike Operations.*

According to the Joint Chiefs of Staff space superiority means the following,

> *"space superiority is the degree of control in space of one force over any others that permits the conduct of its operations at a given time and place without prohibitive interference from terrestrial and space-based threats. The purpose and value of space superiority is to provide the freedom of action to apply space capabilities in the pursuit and defence of national security interests. The U.S. ability to capitalise on and protect space systems, and to counter enemy capabilities, contributes to U.S. space superiority."*[60]

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[59] Department of Defense
[60] "Space Operations." P. 17.

In the understanding of the Joint Chief of staff, in order to achieve '*Space Superiority*,' the U.S. should also pursue *Space Control* and *Space Force Application*. This is mainly focused on the use of military power to defend from possible attacks to critical infrastructure in space. '*Space control'* therefore is defined like, "freedom of action in space for friendly forces while, when directed, denying it to an adversary […] including the broad aspect of protection of U.S. and allied space systems and negation of enemy adversary space systems through offensive and defensive operations."[61] The practical application of '*Space control'* would be '*Space Force Application',* which is defined by the Joint Chief of Staff as, "employing a variety of measures to assure the use of space, attribute enemy attacks, and consistent with the right to self-defence, target threat space capabilities.[62] Therefore space force application operations (also sometimes termed Global Strike operations) consisting of attacks against terrestrial-based targets carried out by military weapons systems operating in or through space.[63]

As we can see, both of the concepts of the Joint Chief Staff's doctrinal approach are using the space as a battlefield in order to limit or forbid/deny the access of enemies to their assets in the space and to space itself. It also contemplates the use of space technologies (whether using space assets to conduct the attack or using space assets themselves as weapons) to infer damage upon the enemy. Both of these approaches unequivocally imply the *active weaponisation* of outer space. These concepts are fundamental, as they are the proof of a willingness to actively weaponise the outer space to ensure American predominance over other competing actors in the space, trough *Space Superiority.*

The truth is that the funding of the USAF space force did not allow to accomplish such complicated and expensive enterprises. During Bush and Obama administrations, documents like the Joint Chief of Staff were released, but their budgetary assignments, and therefore their relevance within the U.S. military was limited.

This situation has changed in recent years with the Trump administration. According to the DoD[64], the funding assigned for the doctrinal development of *Space Superiority* of the

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[61] "Space Operations." P. 28.
[62] Ibid.
[63] Hitchens T., Katz-Hyman M. and Lewis J. P. 44—48.
[64] "DOD Releases Fiscal Year 2021 Budget Proposal."

U.S. (developing technologies, instruction of personnel and other activities) has increased 2.5 times in the last four years, from 7 billion U.S. dollars in 2016 (last fiscal budget of DoD by Obama Administration) to 18 billion U.S. dollars (estimate for the 2021 fiscal budget of the DoD). It has to also correct that even if this is not the most significant assignment within the budget for the U.S. military, it is the one growing the most (in percentage). This 18 billion U.S. dollars represents a 2.55% of military expenditure for the year 2021, and it is ahead of other critical items such as the expenditures in cyberspace, 9.8 billion (1,38%), and land domain; 13 billion (1,84%).

Connected to the last point, in the year 2018, by presidential decree, the U.S. introduced the 6th branch to its army, the Space Force. Up until that year, the Space Force of the U.S. was framed within the U.S.F., being named Air Force Space Command or AFSC. The creation of a dedicated branch for space will not only foster the development of technologies for space and give much more independence from the USAF, but also is a tool for achieving the doctrinal approaches by the Joint Chief Staff. The U.S. president's action is an unequivocal signal for other players in the outer space, naming Russia and China, that the U.S. is willing, to demonstrate readiness in the outer space.

Regarding the commercial aspect of outer space, if we have a look at the National Space Policy of the U.S., there is a strong emphasis on the development of the private outer space industry, capable of providing the necessary data to costumer and individuals. It is in the interest of the U.S. and its companies to retain and increment its predominance in outer space commercial activities. For this purpose, the National Space Policy highlights the freedom of access and the freedom of use as key concepts. These are vital for the development of a competitive and efficient space commercial industry. Any disruption of access to space will seem like an inevitable threat to the future of the assets and also for the viability of the industry.

This commercial use of the space, although not new, has gained momentum in the last years, due to the relevance of the data provided by different companies to the final users, may they be individuals or States. In the case of small states, there is a more relevant issue here. These small countries may not have enough money to acquire their space assets. Therefore they rely on the services and data that these private companies provide them. These companies provide

data that can be used in a wide variety of activities, from agriculture, trough mainly military use, among others.

Therefore, the development and the well being of these industries are crucial for the U.S., as it grants national companies a competitive advantage among other (foreigner) similar companies. This sector becomes consequently strategic in national security terms for the U.S.

### 2.1.3. Threats

According to the Joint Chief of Staff, one of the most crucial problems for U.S.'s *Space Superiority* is the development of counter-space technology and capabilities by other competitors. One of the main preoccupations for the U.S. is the high vulnerability that space assets are subject to. Indeed, the "potential adversaries [of the U.S.] are developing and proliferating anti-satellite capabilities."[65] This fact is especially worrying as "foreign competitors are integrating advanced space and counter-space technologies into warfighting strategies to challenge U.S. superiority and position themselves as space powers,"[66] in this case, the main concern is over the development of ASAT technology as counter-space capability.

These statements denote the fear of losing advantage in the space, which sees competence as a threat to its national interests.

Other threats for the U.S. linked to space are the retention of skilled personnel. This is a constant threat, as the U.S. is willing to maintain its dominance over the space, and therefore will need a technological advantage. "This technological supremacy cannot be achieved without the necessary retention of specialists and technicians in the fields related to space, astrophysics, engineers and similarly skilled people"[67] as they are essential for space superiority, as contemplated in the U.S. doctrine. In relation, the U.S. military is particularly concerned about the dispersion of particular space and counter space technologies. Also, the democratisation of space technologies faces a possible threat to U.S. commercial superiority in the space. Cheaper technologies mean

[65] NASIC. P. 1.
[66] Ibid.
[67] Ibid., P. 2—9.

more accessibility to technologies for weaker or smaller countries, therefore eroding the U.S. position in the space as the primary provider of data for these same small and poorer countries.[68]

Another threat perception concerning space is related to access to space. This means that the U.S. should be able to self-sustained and reliable access to space trough launching sites, such as the one in '*Cape Canaveral'*. These sites are of crucial importance for the U.S. as relying upon third countries could erode the supremacy of the U.S. in the power space.

The U.S. is at the same time interested in the transparency measures in outer space, as this will ensure the U.S. and potential adversaries, fewer misunderstandings, and a better understanding of which are the intentions of other players in the space. In this regard, the U.S. is especially interested in attracting the Chinese part to a specific agreement in order of them to be more transparent with their national policy for space, "(the) United States will consider proposals and concepts for arms control measures if they are equitable, effectively verifiable and enhance the national security of the U.S. and its allies."[69] If we recall int his last quotation, we will see how there is a special mention to the adequate verification of any arms control measures. The biggest problem for this is, as stated in the previous chapter, the difficulty in the verification in a possible arms control regime in the outer space, mainly due to two reasons. First, there are technical difficulties for verification in outer space. The second is the already mentioned problem of dual-use in the technologies for outer space.

The conclusions from the analysis of the U.S. doctrinal approach towards space are several. First, the U.S. sees itself as the leading power in outer space, and its doctrine reflects these ambitions. Second, the U.S. is willing to use the means this position grants to maintain the current *status-quo*. The U.S. has created its space branch within the U.S. armed forces, which is a signal for other players of the relevance that the American politicians/military are posing in outer space. Apart from military issues, the U.S. is also focusing on the commercial development of the space. In this regard, we have seen how the U.S. is ready to defend its assets (and understandably the private American assets) present in the space. The defence of space assets is very much the reflection of ambitious American strategic goals in space. Adding to the American strategic

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[68] Ibid., P. 2—12.
[69] "National Space Policy of the United States of America." P. 7.

goals in space, we should mention the willingness to develop space industry,"[70] access to space[71], and protect the national assets in space[72]. The explained American approach towards space can be a source of conflict in the future, as could lead to active weaponisation of outer space. We will cover this issue in the next chapter when referring to the OST amending.

## 2.2. Russia

Back in the early days of the space race, the USSR was a leader in space technology, but with the dissolution of the Soviet Union, the space industry in Russia fell into stagnation and struggled to maintain its prestige and competitiveness towards American space power. The previous competition with the American space program could not be maintained due mainly to budgetary constrictions, and as a consequence, Russia adopted a secondary role in the space. The situation has evolved with a resurgent Russia in space affairs. The 90s stagnation was partially amended due to the structural reforms introduced in the space industry in the 2000s. With these reforms, more state involvement was introduced, shifting the industry from market-based structure to state control regime, "space and defence industries reoriented production away from export markets towards national armed forces."[73] The reasons for this shift can be understood if we pay attention to Moscow's perceptions of space. As we will analyse later on, Russia is concerned about the U.S.s' plans in the space.

Indeed the origins of Russian concerns are to found home rather than abroad. One of the first tests to the Russian space capabilities was the armed conflict in Georgia in 2008. This invasion could have seen strategic planning and accomplishment as an easy task—Russia, a significant military power, against a small country with limited military power. Still, the conflict did not occur as planned, as the Russian military had many problems for securing and achieving war goals. There were several lessons regarding Russian assets in the space, as well as their utilisation and readiness during combat. Nevertheless, before we mention them, we should first pay attention to the state of the art of the Russian outer space military complex in the outer space in the first decade of the 2000s.

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[70] Ibid., 3—14
[71] Ibid.
[72] Ibid.
[73] Jackson. P.10.

The Soviet Union made an immense effort to develop the space industry, mainly focused on the military. However, after the end of the Soviet Union, emerging Russia saw how these costly space programs were not suitable for maintenance as the budgetary concerns were rising due to the economic crisis. It also has to be said that there was not too much interest in maintaining expensive space programs[74] in the early years of the newborn Russian Federation. They were indeed a source of international prestige and national proudness, but the priorities of the new state were in other fields. This led to significant stripping of power in the space and the deterioration of the already existing Soviet assets in the space.

With the new millennia and a new presidential administration, space interest resurged strongly. With this new wave of relevance, essential programs for modernisation were launched, aimed at reducing dependence on western technology and encouraging the development of technology that would allow Russia to exercise national interests more effectively. One of the most known initiatives was the GLONASS[75] project. Although not new, as it was an inheritance from the Soviet period, the assets of this geo-positioning system were not in the best conditions, due to years of infra-spending. As would later prove, this system would play a crucial role in the development of events in possible conflicts between Russia and any other state/non-state actors.

Although the ambition for modernisation and development of the space assets by Russia were profound, the lack of funding was one of the main burdens to the proper acquisition and well functioning of the space systems.

As said, one of the first tests to the Russian space capabilities was the armed conflict in Georgia in the year 2008. This is due to the Russian military having problems securing and achieving war goals. The most dramatic of the consequences of the inadequate functioning of Russian space assets started during the first stages of the conflict when the space assets did not respond as expected. The main burdens with the space assets, such as communication satellites, targeting systems, and intelligence systems, were their malfunctioning or underperformance. The outcome

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[74] Moltz. P. 71—73.

[75] *Глобальная навигационная спутниковая система (ГЛОНАСС)*, or Global Navigation Satellite System is a geo-localisation system to the US's GPS. It is the second biggest satellite positioning system, after the GPS, and its origins come back to the times of the cold war. The USSR launched these satellites in the early 1980s. There are currently 24 satellites orbiting the Earth as for the year 2020. It is the most expensive program of the Russian space agency ROSKOSMOS, using a third of its allocated budget yearly.

of these malfunctions, as J. Jackson mentions, was the partial failure of the command and control system and the impossibility to use the communication systems, "the war in Georgia highlighted the limits of Russia's military capabilities, and the failure of its command and control system." [76]

This happened due to two factors. First, the space-based intelligence systems did not offer reliable and updated information about what was happening in the front line and how the resources had to be managed. The second factor was the incapability for using the existing satellite-based communication facilities.[77] These two factors created a complicated situation for the armed forces. The author, at the same time, highlights the consequences of the malfunctioning assets mentioned. Russian troops faced a flagrant lack of situational awareness in the battleground, which was translated to the command of the army. J. Jackson also mentions the satellite targeting system as one of the space systems that failed in the task. According to her, the satellite system did not operate, reducing the Russian army's advantage compared to the Georgian army[78]. This was a big red flag for the Russian army, that suddenly realised that it was not as prepared as thought and realised the relevance that outer space and its assets could have in the future conflicts.

### 2.2.1. Strategic Goals, Doctrinal Approach and Organisational Structure

With the feedback from the 2008 conflict and with the different events conditioning the relations of Russia with other countries, the Russian Federation's military decided to pay more considerable attention to space in the following military doctrinal papers. If we pay attention to the latest military doctrine of the Russian Federation, namely the ones published in 2010 and 2014, we can see how space pays a relevance within military forces. In these documents, there is no explicit doctrinal approach towards outer space. It is mentioned (space) as a critical area for fostering national interests and a possible place for warfighting in the near future. Russian military doctrine pays special attention to something called *securitisation of outer space.*[79] This term used by the Russian military is a coincidence. S*ecuritisation* of outer space is understood as the ability by the Russian military forces to use the space assets, freely access space and the ability to exer-

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[76]Jackson. P. 11.
[77] Kanet. P. 284.
[78] Jackson. P. 11—12.
[79] Ibid., P. 6—9.

cise interests without interference, altogether with possible counter-space operations. Here we can see a direct response to a possible space access denial from the U.S. towards Russia. Russia understands the vital role of space assets, and in order not to be deprived of access to such vital assets, the Russian response to American space doctrine is the *space securitisation.* This doctrinal approach of space *securitisation* confronts a challenge, as even if it mentions space as relevant for the military, it does not formulate proper action plans, contrary to what U.S. military doctrine does. This gap must be covered in the sense of how to securitise the outer space to counterbalance American plans properly.

Russian military doctrine does mention the threats of the weaponisation of outer space. Indeed, there are two main concerns for the Russian military directly linked to the weaponisation of outer space. The first concern is the vulnerability of the Russian nuclear arsenal to a possible attack from a weapon system placed in outer space. The second threat mentioned in the doctrinal approach towards space is the threat of the U.S.'s increasing capabilities in precision-guided conventional weapons, which could disrupt the state's command and control capabilities, "deployment of strategic missile defences (the intention to place weapons in space) and the deployment of strategic conventional precision weapons as key military dangers to Russia."[80]

There are some other differences between the Russian military approach towards outer space and the American approach. Recalling American doctrine, the U.S. decided to create a different organisational structure for the space forces, disassociating it from the USAF. In the Russian case, we observe how, after the 2015 reform, the Russian Federation's air forces merged with the space forces. This can be explained by how the strategic concept between space and airspace is understood. In the case of the Russian military, there is no proper distinction between them. Indeed the Russian military uses a precise term, *Aerospace*, which can be misleading. This can be the consequence of a different understanding of the role of the space within the military doctrines, but what shows that the organisational structure of Russia's space forces is not as compartmentalised as in the American. This can be a sign of underdevelopment in space plans and the result of Russia's willingness to differentiate from American organisational structure.

[80] Jackson. P. 8.

As mentioned before, the Russian military doctrine mentions the relevance of being independent of the West regarding space. This means developing its technology and capabilities, which is one of Russia's strategic goals concerning space. The Russian space industry is a bit different from the American one.

As we remember from the previous pages of this chapter, the American space industry is divided into military and commercial activities, and private companies develop the majority. Therefore the role of the State or the state ownership is very much limited. In the case of the Russian Federation, this is different. The Russian federation back in 2014 decided to empower ROSKOSMOS[81], the Russian namesake of NASA. In this case, ROSKOSMOS is the main driving force of the Russian space industry, meaning that almost all the industry related to space is state-owned in Russia. This decision to gather the majority of the space industry under state control can be understood from the perspective of a Russian State willing to recover its relevance. This kind of concentration allows a more vertical approach to the fulfilment of the national interest. Although the interest of the Kremlin in the space is noteworthy, the assigned budget of ROSKOSMOS for the year 2019 has been relatively low, 176 billion Rubles, or 2.77 billion U.S. dollars, compared to what other countries spend in the civilian space programme. As the space industry depends on budgetary remittance in order to carry its duties, a possible reduction in the assigned resources to ROSKOSMOS would inevitably limit the power Russia can exercise in the outer space.

According to the 2016 foreign policy concept[82], Russia should focus on the creation of an alternative to U.S. commercial space industry, as the benefits of creating one's commercial space industry are not only for the sake of economic profit but also could help to achieve independence from western technology, becoming Russia an alternative to the U.S. space industry. The problem here is that the state ownership of the primary industries concerning space considerably constrains the capability of Russian companies to develop themselves. This is mainly due to what we have mentioned before, the availability of resources coming from the State.

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[81] *Государственная корпорация по космической деятельности* (ROSKOSMOS State Corporation for Space Activities) or Russian space agency is a state corporation in charge of the space flights and other activities related to space in Russia.

[82] "Foreign Policy Concept of the Russian Federation."

Therefore we can see how Russia and the Russian military are interested in the space in the development of space and counter-space technologies not to fall behind Americans. At the same time, the Russian military is quite ambitious with the relevance of the space within the armed forces. ROSKOSMOS and the state control over the space industry can be a double-sided coin, that can help achieve political interests in the space but prevent the industry from developing if compared to Americans.

### 2.2.2. Threats

Russian threat perception radically differs from the American one. As Russia does not possess space superiority, we can see how the concerns and threats that Russia sees in space weaponisation are much more existential than reflected by the Americans, although some of the concerns are shared. There are three interconnected concerns in this regard. The first concern relates to strategic stability. In this regard, military staff in the Russian Federation, altogether with the Kremlin, have more than once stated that "any action undermining Strategic Stability will inevitably result in counter-measures."[83] Many are the mentions of strategic stability being weaponisation of outer space one of the sources of destabilisation. The second concern relates to the unilateral acts carried by the U.S. and the American doctrine towards space. Russian policymakers see this doctrine as aggressive and threatening, and as a source of Arms race and weaponisation of outer space. In this way, Russians perceive that the U.S. is not paying attention to the consequences of its doctrinal approach, "(the U.S.) ignores the broader problem that other countries feel deeply threatened by […] plans for military space dominance in the context of its overall attitude toward security policy."[84] It is also mentioned that threatened states could aggressively react to the American unilateralism "they could react asymmetrically against US space assets if less drastic measures fail to satisfy their concerns."[85] This threat perception is related to American preeminence in space and to the perceived vulnerability of being attacked from outer space, targeting the Russian Federation's nuclear capabilities. The third concern is related to possible attacks from space-based weapons to Russian command and control systems on Earth. In this regard, the Russian military and politicians point to unilateral acts from the U.S. as the origin of these concerns.

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[83] "Russia's Foreign Affairs Minister's speech at Munich Security Conference."
[84] Gallagher. P. 23.
[85] Ibis. P. 24.

It is often mentioned the decision by the American authorities to withdraw from the ABM Treaty in the year 2002 and the posterior development of the American Ballistic Missile System. For the Russian authorities, this is the main threat, as they see this step as, "[Russia] perceive(s) as an opening door for space-based weapons integrated BDM architecture."[86] The claims from Russia in this regard are that the break of the ABM treaty was itself an action," the termination of the ABM treaty meant the elimination of the only prohibition on space-based weapons agreed upon"[87]. It should also be mentioned, that this action by the U.S. granted the Russian military the excuse to develop its own space and counter space infrastructure and capabilities to counter-balance American actions. We can see how the Russian *'securitisation'* of the space is a direct consequence of the American actions (at least what is concerned with Russia's doctrinal approach to the outer space). Therefore we can understand that to preserve the balance of power, Russia must respond to U.S. actions in the space trying to limit U.S. technical superiority by focusing on counter-space activities [88].

Other threat perceptions mentioned by the Russian military are the ASAT tests by both; China (in 2007) and the U.S. (in 2008). According to Russian statements, these actions do not only worsen the strategic stability environment in outer space but also prepare the space for its active weaponisation. Also, the dependence of specific Russian space industries from western technology is seen as a risky vulnerability. In the event of a conflict with any western country, Russia could see how its space capabilities would be compromised or even inoperative. Another threat, shared with the Americans, is the access to space, via spaceports. In the case of the Russian Federation, there is a lease agreement until 2050 with Kazakhstan, the Baikonur cosmodrome[89]. Russia possesses other spaceports, but due to their locations (in the northern part of the country and east Siberia) they are not as useful as the one in the neighbouring country. In this respect, Russia is trying to solve the threat of not being able to access the space by constructing a cosmodrome nearby Moscow, which will allow having secured access to space for its military and civilian space missions.

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[86] Kanet. P. 289.

[87] Jackson. P. 16.

[88] Zhang.

[89] The Baikonur Cosmodrome *(Космодром «Байконур»)* is a spaceport located in the southern part of Kazakhstan. Built during the times of the USSR, the Baikonur Cosmodrome has been used by the Soviet/Russian Space agency altogether with the ISS operations. Currently is one of the spaceports used for launching astronauts to the ISS.

### 2.2.3. Opportunities

Space does not only pose a threat to the Russian Federation. There are some fields in which Russia could see opportunities concerning outer space. There are two specific mentions in this regard, the commercial use of the space, and a more political aspect, the role of space in shaping public image as a superpower.

Regarding the commercial use of space, Russia's efforts to develop its infrastructure and space assets with the intention of not being dependent on western technology can help Russia to settle itself as an alternative in the market of such demanded technology. Posing an alternative could have beneficial outcomes for Russia. The development and export of these technologies could strengthen Russia and its position within the international space industry, providing earnings from exports. Moreover, this could undermine the U.S.'s predominance in commercial space activities.

The second opportunity could be used as a tool to recover the status of space power. It is crucial for Russia to show it is capable of reaching space and using its influence, not only to exercise national interest but also to condition the development of space. Therefore, we can observe how Russia's ability to have space infrastructure contributes to national pride and provides Russia with a sense of international prestige, which is a possible source of legitimisation in space.

### 2.2.4. Cooperation

Although we will pay more attention to cooperation in the next chapter, we should also mention Russia's diplomatic efforts in this chapter. Diplomacy can, to some extent, help in the doctrinal approach of Russia in the space. Since the early 2000s, with China and the European Union, Russia has tried to agree on the use of space and the limitation of an arms race in the space. Even if the Russian activity within the UN and the CoD has been significant, the results of Russia have not been successful. The reason for this is the opposition of the U.S. to many of the Russian initiatives, "The United States has rejected […] negotiations on the grounds that there is no need for new measures to prevent an arms race in space because there is no arms race in space."[90] By accomplishing these diplomatic initiatives, Russia is legitimating itself as a leading player in the

[90] Gallagher. P. 22.

space.[91] Together with China, Russia has been trying to introduce arms control measures into the agenda for outer space (with PAROS). However, these attempts have failed, as Lavrov mentions, "The United States remains practically the only side that refuses to launch discussions on the initiative introduced by Russia and China at the Conference on Disarmament and Prevention of an Arms Race in Outer Space."[92] The opposition from the Americans to Russo-Chinese efforts has been that there is no need for arms-control measures as there are yet no weapons in outer space, "[…] the development of a treaty is 'a long-term issue, it is premature to begin negotiations before there is a real threat of launching weapons into space, and it is generally impractical to establish a legally binding ban."[93]

## 2.3. China

The Chinese case concerning space is quite different from the previous approaches analysed. Before starting the analysis of the PRC's position regarding outer space and its weaponisation, we should mention that contrary to the U.S. and Russia. There is no official position of the Chinese government or military regarding space. No known position can be regarded due to the lack of transparency within the Chinese military, the lack of first hand English sources, and the lack of an official released military doctrine of the People's Liberation Army of China. Americans are focusing their attention on the expanding space activities of China. In this analysis, we will clarify which can be the Chinese goals, doctrine and threat perception towards space and its weaponisation.

### 2.3.1. Strategic Goals, Doctrinal Approach and Organisational Structure

As stated before, there is no official policy addressing the real possibility that space does become weaponised,[94] and it is unknown whether the Chinese military has a specific doctrine toward space. This is the consequence of a very distinct strategic culture, which is not as formalised as its western counterparts, which means that it is not clear. However, there is a way to overcome this issue. Usually, if we look more aside and try to read between the lines, we could see how

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[91] Jackson. P. 17.
[92] "US refuses to discuss Russian-Chinese idea against militarisation of space: Lavrov."
[93] Bhaya.
[94] Kulacki. P. 1—2.

there are some underlying trends in the published white papers by Chinese academics and the five years plans published by the Chinese authorities.

In this regard, we should mention the role of economic development within the Chinese space programme and its military applications. Many are the authors that argue that the development of the Chinese space programme can not be compared to the development of the Chinese nuclear weapons programme. While the nuclear weapons programme in China was developed under constant threat of using nuclear weapons, mainly from the U.S. (China was threatened with the use of nuclear weapons over 40 times[95]), the development of the Chinese space programme has occurred in a period of relative calm and stability. This triggered the civilian and commercial focus on the development of the space programme. The priorities of China have been directed in this direction, without forgetting about military applications of space.

According to Chinese authorities, one of the main focuses of their space programme is the massive development of satellite programmes.[96] As stated in 2010 FYP, or national policy, for the next five years, there is particular stress in achieving superiority in space development. The goal of this policy is to achieve superiority in the number and quantity of satellites developed and launched. The ultimate goal for China is to dominate this type of technology in the Asia-Pacific region, leading the technological race against other direct competitors like Russia, Japan, South Korea and India. This could grant a position within the developing countries, that would allow Chinese technology to spread to these countries faster than western technology, granting China a favourable position in the space. This is highlighted by Hagt: "beyond the domestic sphere, China's current strategy for space is to dominate the Asia-Pacific market and become the market leader in the developing world."[97] At the same time, this policy of fostering commercial activities, paying less attention to the military use of the space can create significant gaps and vulnerabilities in the Chinese policy. Risking the entire approach to the commercial use of the space. We want to stress here that significant commercial capabilities in space would be extremely vulnerable to attacks from other space players, mainly from the U.S.; therefore, the situation could escalate very quickly.

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[95] Haynes. P. 49.
[96] Zhang. "Space Weaponization And Space Security: A Chinese Perspective."
[97] Singh. 138.

"China's increasing vulnerability will create both an opportunity and a dilemma. Its significant commercial space assets coupled with a comparable strategic weakness vis-a-vis the United States could engender a powerful incentive for China to keep space non-weaponized, which may, in turn, be a strong motivator to reach accommodation with the United States and the international community on legal measures to maintain a peaceful environment in space. on the other hand, as China reaches a point of strategic vulnerability, the need to mitigate threats to its assets in space and thus to its national security will intensify."[98]

As we can see, even if China is not only focused on developing military assets for space, the development of these kinds of assets by others, risks, and makes the assets of China vulnerable. Indeed, China sees itself as a developing economic powerhouse and does the same in the outer space. Therefore, to exploit all the potential of commercial activities in the space, China needs a reliable and secure free access to space. The difficulty to access the space would mean that the national policy of China in the commercial use of the space would not be reachable. Weaponisation of outer space, therefore, is a significant risk for China (we could argue that it is riskier in the case of China, compared to Russia. Due to the opacity of the Chinese space programme). Therefore, the Chinese commercial approach may be a source for weaponisation by other actors, "China's growing satellite and commercial interests will complicate space security."[99] This situation could lead to a space arms race to securitise the space, complicating strategic stability.

### 2.3.2. Threats

If we focus on which can be the military threats that the Chinese government and military highlight, those presented in the white books published, would be the following. We have to mention that some of the military concerns of the Chinese are shared with the before mentioned Russian concerns over American predominance. As Russians, the Chinese mention the U.S. withdrawal from the ABM treaty and the possible intention of the U.S. of placing a space-based ballistic missile system that would be able not only to target and destroy ICBMs, but Chinese authorities claim that a global striking weapon system in the space would be able to strike the 'comparatively' small Chinese nuclear strategic arsenal, "as viewed by Chinese leaders, China's own small

[98] Zhang. "Space Weaponization And Space Security: A Chinese Perspective." P. 32.
[99] Hagt. P. 89.

strategic nuclear arsenal appears to be a plausible target for U.S."[100] As we can see, China is deeply concerned about American doctrinal approaches in outer space, "Meanwhile, military doctrines and [concepts] such as "control of space" and "ensuring space superiority" have been unveiled successively, and space operation [command] headquarters and combatant troops are in the making. If we should remain indifferent to the above-mentioned developments, an arms race would very likely emerge in outer space in the foreseeable future."[101] According to Chinese statements, these unilateral acts added to a lack of interest from the Americans in multilateral approach towards outer space are not only leaning to the development of counter-space technology but also is fostering an arms race in outer space.[102] According to the same Chinese authorities, there would be two ways of avoiding this dilemma. First, investing actively in counter-space capabilities. Some scholars argue that this would be very expensive and not entirely reliable[103]. The second option would involve halting non-proliferation efforts and start developing more nuclear weapons in order to expand the nuclear arsenal, assuring their survivability to a possible strike from outer space. This would not only mean the proliferation of weapons of mass destruction but also could compromise China's compliance with certain international agreements, such as the case of the Fissile Material cut-off treaty, "constructing additional weapons would produce a need for more plutonium and highly enriched uranium to fuel those weapons. This impacts China's participation in the fissile material cut-off treaty (FMCT)."[104] This problem was addressed by the Chinese ambassador to the disarmament affairs, Hu Xiaodi, who stated that "with lethal weapons flying overhead in orbit and disrupting global strategic stability, why should people eliminate weapons of mass destruction or missiles on the ground? This cannot but harm global peace, security and stability, and hence be detrimental to the fundamental interests of all States."[105]

Other threat perceptions for the Chinese from a weaponised space would be the destabilisation of the space environment (due to ASAT technology proliferation) and Strategic Stability, a possible arms race in outer space and its consequences for both, military and commercial/civil use

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[100] Zangh. "Space Weaponization And Space Security: A Chinese Perspective." P. 26.
[101] Gallagher. P. 23.
[102] Ibis. P. 24.
[103] Ibis. P. 23.
[104] Zhang. "A Chinese view on a Fissile Material Cut-off Treaty." P. 44.
[105] Rajagopalan. "India's Changing Policy on Space Militarization: The Impact of China's ASAT Test." P. 366.

of the outer space, the mentioned threat to disarmament treaties and regimes and the issue of space debris. In this regard, China is concerned about access to space for the future. Some scientists warn that if several satellites are destroyed in the course of a war, the Earth will encase in a cloud of debris that would prevent future satellite stationing and space access.[106] Chinese authorities agree with that point: a possible conflict with multiple space assets being destroyed by kinetic strikes, the debris generated could have an impossibility to access to space due to the excess of particles impeding the correct functioning of the devices.

Although the PRC's official position about space doctrine seems to be focused on the development of the commercial potential of outer space, we can see how there is some incongruence within China's strategy. The 2007 ASAT test is the vivid image of not matching the statements and the actions by China, which is one of the main concerns of several countries. Most importantly, the divergence between the few public statements of the Chinese authorities and the published data and the actions taken by China create distrust among the players in outer space. This can be seen in the attitude of the U.S. towards China, where Americans time over time, ask for more transparency concerning Chinese interests in the space.

## 2.4. India

India could be classified as a neophyte to space, although it started to develop its space industry back in the 60s and 70s. When we talk about India, we should consider its geographical position and the relations with its neighbouring countries as a decisive background triggering its relation to outer space. We have to consider the constant clash between India and Pakistan, and the threat of a possible war that can quickly escalate into a nuclear war between these countries. However, we should bear in mind the power relations with the other Asian giant. The rivalry between China and India is increasing, and space is no alien to this competition. With the former having developed their space programme faster and in a more effective way, Indian leaders are trying to cope with their space program to avoid falling apart and still maintaining the competition with its bystander.

[106] Rodriguez.

### 2.4.1. Strategic Goals, Doctrinal Approach and Organisational Structure

Indian military doctrine changed after the attacks to the Indian parliament in the early 2000s. The Indian army decided to mobilise nearly 800.000 military personnel to its border with Pakistan. The troop mobilisation was prolonged and this granted Pakistan time to prepare countermeasures in case of an escalation. The high command of the Indian army realised they had strategic disadvantages in a possible war with Pakistan and decided to make changes in the military doctrine, trying to adapt it to the evolving environment more appropriately. This change was substantial, and it emphasised the role of space assets for the Indian army and navy for the ongoing years. There was a transition from a 'Sundarji' form of war to CSD doctrine, which in the end is an upgrade for a better adaptation to possible Pakistani nuclear attacks. Inside this doctrinal approach, the concept of NCW[107] gained importance and so did the role of space, as Lele highlights, "combining both conventional and modern technologies […] In these circumstances, space becomes an extremely important segment of India's security architecture."[108] According to the new doctrinal approach, India needed outer space capabilities, primarily centred in the surveillance and integration of data-providers into broader military capabilities.[109] The Indian government realises the need for a proactive policy on the dual use of technology, capacity building and equal access to space resources. If we compare the Indian military doctrine to the previous countries analysed, we could say that Indian doctrine regarding space its in an earlier stage. The Indian military doctrine declares space as a tool for the integration of the armed forces. In other words, India considers space within the NCW, not as a place for placing weapons. This is a notable divergence, as it posts another type of approach to space. We affirm that this stage is an earlier stage of doctrinal approach toward space, as other countries (such as the cases of the U.S. and Russia, already introduced these notions into their military doctrines decades earlier than Indians). We can also highlight the fact that Indian armed forces yet do not possess any command and control structure regarding space, "India's armed forces are still in the process of evolving their space strategy: no major command and control structures exist to address issues related to space."[110] We see the difference with other significant players that they do have this type of command and control structures in their armed forces.

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[107] Network-Centric Approach
[108] Lele. "Indian Armed Forces and Space Technology." P. 380.
[109] "Indian Army Doctrine."
[110] Lele. "Indian Armed Forces and Space Technology." P. 380.

India also states that the development of the space as an area to boost commercial applications should be exempt from any coercion and limitation. Thus, it favours free access to space as a critical point for further development of the space. India's efforts to match China in the possible commercial use of their technology has been increasing over the last decade. To some extent, Indians have become some of the most brilliant developers of certain censoring and monitoring technologies, posing a threat to possible competitors like China and Russia, "India's success in the arena of remote sensing satellites is noteworthy. India's products in this field match the best in the world."[111]

Concerning the organisational culture of space in India, we should mention that the only organisation devoted to the development of space assets is the Indian Space Research Organisation (ISRO), a public agency founded in 1969. The role of the state in the Indian space industry is persistent, and in this aspect does not differ from its competitors.

### 2.4.2. Threats

If we pay attention to the threat perceptions that India sees regarding space, we should mention some shared perceptions and other more particular to India's case. Since the relevance of the space for India is relevant, some threat perceptions are widely covered, as are the free access to space and the ASAT technology as a destabiliser compound of other nation's arsenals. Here, India is very much concerned about the 2007 ASAT test of China and the possible implications this can have on a possible escalation in the border between the two countries. The development of ASAT technology by China (and the possible reconversion of part of Pakistani arsenal, to function as an ASAT is a concern for India. Other shared concerns refer to the vulnerability of space assets and the development of counter-space technologies. One last threat perception for the Indian armed forces is a possible arms race in the space, as India possibly could not cope with its possible rivals and fall behind them, generating a possible strategic disadvantage for Indian interests.

[111] Lele. "Indian Armed Forces and Space Technology." P. 382.

## 2.5. Conclusions

Space and its relevance to military and commercial complexes have come to stay. This is no alien to neither of the countries before-mentioned, but each of them has decided to address it differently. First, we have the case of the U.S., which took the lead in giving high relevance to space concerning military activities. This is due to the involvement in several armed conflicts since the 1990s. In the U.S.'s case, there has been a specific doctrinal development around space activity, with a precise aim; being the leading player in the space and protecting this status-quo. We can see this in the unilateral acts that the U.S. has undergone in the early 2000s. We mentioned this in the first chapter, where we saw how the U.S. played a vital role in the evolution of the principle' peaceful use' from the OST treaty. Under the last presidency, space has regained momentum with the creation of a 6th branch of the U.S. army. We can also see how other countries followed the U.S. path concerning gaining relevance of military scope of space within their military doctrine. These are the cases of Russia and China. Although there are still some difficulties at the time of developing a comprehensive approach of China policy towards space, there is an unequivocal move from China to grant itself capabilities in outer space. The Russian Federation's case is a bit more precise, as its aim is to *'securitisation of the space'*. The reason for the development of this doctrinal approach is to counterbalance the power of the U.S. on space.

Moreover, some of the leading examples of this doctrine are the development of counter-space technologies. As said, Russia and China are developing counter-space technologies to try to erode the power of the U.S. in outer space. Being Russia and China considered reactionary space powers. Our last case in the doctrinal approach is the Indian one. Although Indian space programme and ambitions started during the same period as the Chinese, the development of a dedicated doctrinal approach towards space has been slower, and it had to wait until the modernisation of the armed forces to gain more preponderance in the military doctrine of the country.

Therefore we can see three categories of spacefaring states per development of their space doctrine. First, very advanced countries, with high capabilities and willingness to use them both military and commercial ones, namely the U.S. Then we have advanced countries, with still-developing doctrines, but heading to the same concepts like the very advanced countries, the creation

of separate space force commands and creation of their specialised doctrines. These countries would be both Russia and China. Thirdly we would have developing countries with enough military resources, but without the understanding of space as a separate ground for conducting military interests, namely India. For India, outer space poses an opportunity to foster certain aspects of their military capabilities, but yet has not taken the path of creating dedicated doctrinal approach towards space.

We see fewer divergencies regarding the commercial use of the space and the organisational culture of the different countries chosen, as mainly all countries have vertically integrated space agencies that promote and develop space assets and technologies. The differentiation of the military component and the civil component of these industries is difficult to separate, mainly due to the mentioned double-use technology. The difference here is the U.S. policy, where private industries have much more relevance in the space industry than in any of the other three countries analysed. The commercial use of space is often cited as crucial for national interests, and it is made indiscriminately by the four countries sampled. In this area, we again observe the preponderance of the American space industry and the relevance that especially Russia and China pose in developing their technology in order to be competitive against the Americans. Here we can observe some technological race to see who is going to be the second most crucial space technology provider after the Americans.

Last but not least, threat perception regarding outer space is crucial to understanding the countries' motivations for developing military doctrines in outer space. As we can observe in the table *(figure 1)*, there are some commonly shared threats: free access to space, the vulnerability of the space assets, the destabilisation of the environment on the outer space, and the emergence of ASATs and their development. Here we see a common ground for further understanding, as all four countries, for different reasons, fear the same thing. However, all the treats are not convergent, and we have divergent threats. For example, we can see how the U.S. is centring on maintaining the actual status quo, with the control of the space and the assets, still willing to secure it more, and state that would be ready for using the force for maintaining the current situation. Then there is a preoccupation in the side of Russia and China as they see how the American plans for weaponising the outer space could mean a vulnerability over their nuclear arsenals. Concerning Strategic Stability in outer space, we should mention the preoccupation the U.S.'s

actions are generating in other spacefaring nations. Russia, China, and to some extent, India are highly concerned and see the deterioration of strategic stability as a source for the weaponisation of outer space. Indeed, Both China and Russia agreed in the threat a Ballistic Missile System in outer space would mean to strategic stability, linking this to U.S.'s space doctrine, *space dominance,* and a possible attack against their nuclear capabilities. The destabilising effect of the U.S.'s single acting is also referred to as one of the principal threat perceptions in the eyes of Russian and Chinese policymakers. These states are also concerned with other issues, such as debris in outer space and technological dependence, but do not share these concerns. The perceived threats of India are less developed in the military doctrinal approach, over-dependence on satellite communication, and targeting, which could be easily blinded in the event of war.

Finalising this second chapter, we can conclude that the selected countries, in a higher or lower degree, have specific approaches towards outer space. These approaches are not static, preferably liquid and continuously evolving. We also have to highlight that the military is not the only field in interesting for spacefaring nations. We can observe a technological race, and its development can be as important as the military and can condition it. Therefore we should expect an increase in the commercial competition in outer space. Finally, we have seen how there are divergent threat assessment, but also convergent ones. This allows us to think that there can be developments in cooperative measures in the long turn, as some of the concerns are shared, still, in the short turn, we see how states will try to maximise their gains in space, what means more competition.

# Chapter 3. Outer Space: Cooperation or Competition

Now that we have analysed the problem of definitions of OST and that we also covered the doctrinal approaches and risks perceptions, we will focus on which are the prospects, hindrances, and possibilities of states to embrace cooperation to avoid the second stage of weaponisation of outer space. To this matter, we are going to divide this chapter into three different parts. First, we will focus on the OST treaty, the possible solutions to its loopholes, and other issues that upon arising could threaten with increasing tensions among space powers. Secondly, we will focus on the effective manners in which the spacefaring countries could prevent the second stage of weaponisation. The approach for this second part of the chapter is to use the lessons we learnt from previous chapters in order to have as outcome propositions that would refer to the principal risks these countries foresee in outer space, trying to answer these anxieties. The third and last part of this chapter will be devoted to possible future paths of main actors in outer space and how their acts could condition the future of the Outer Space. The role of loopholes and the constraints derived from the doctrinal approaches pose a challenge at the time of addressing cooperation and diplomatic effort regarding space. We will focus attention on the cooperation issues that do not create anxieties among the states, still related to threat perceptions from spacefaring states. We will try to prove whether cooperation in these matters is possible and by doing this, we will have a better understanding of whether further agreements and rules can be achieved or not.

## 3.1. OST and multilateral Cooperation in outer space

International consensus to avoid outer space arms race is a fact, although sturdy, the willingness to exercise it is weaker. The OST and its many loopholes, as seen in first and second chapters, are the best pretext to develop interests in the space, "a growing number of state parties invested in outer space, mindful of geopolitical opportunities and anxious to meet national security challenges."[112] However, if we want to study the possibilities of cooperation thoroughly to avoid *active weaponisation* of outer space, we will have to analyse the possibilities of making changes in OST. As we learnt from the first chapter, solving the loopholes and grey zones in OST could help us to halt the weaponisation of outer space. The issue, therefore, is to explore which might be the future of the cooperation and whether it is feasible. To analyse this prospect, we will focus

[112] Lim. P. 73.

on different aspects, such as the role of UN COPUOS in a possible amendment of OST, the relevance of codes of conduct within the treaty architecture, the issue with Art. II of OST and the possible consequences it can bring.

### 3.1.1. Amendments of OST treaty

The OST was adopted in 1967 and has never been amended, even though many authors are criticising its loopholes, vague definitions, and problems derived from shortfalls. Many are the reasons for the lack of amendments. First, there was never a successful political initiative to address the implications that amending OST could mean in the longer future, "efforts made towards establishing a 'rules-based' approach for conduct of activities in outer space have not received any success"[113]. Second, the OST treaty lacks a formal procedure for its amending, "[…]technically, the OST does not have provisions for undertaking any international review."[114] Therefore, it is challenging to carry amendments, although article XV of OST allows any state party to the treaty to propose amendments, "any state party to the Treaty may propose amendments to this Treaty."[115] As seen in chapter one, this has created a sort of hollow treaty in what to prohibitions comes. As seen in the second chapter, this situation fostered the development and deployment of passive weaponisation devices, as well as the emergence of ASAT technology, effectively pathing the way for the *active weaponisation* of outer space. The fact that there is no formal procedure for amendments could lead to thinking that there have not been any changes to the treaty regime. However, there are to some extent, other ways to surpass these hurdles, as is the involvement of the UN COPUOS[116] and the UNGA.[117]

The UN COPUOS is the committee entitled to "study legal problems arising from the exploration of outer space"[118] and also the one to "devise programmes […] to be undertaken under

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[113] Jakhu. "Evolution of the Outer Space Treaty." P. 5.

[114] Ibid.

[115] Jakhu. "The Future of the Outer Space Treaty." P. 209.

[116]UN COPUOS or United Nations Committee on the Peaceful Uses of Outer Space is and *ad hoc* committee established in 1958, being formally established by the UN resolution 1472(XIV) in the year 1959. The mission of the COPUOS is "to review the scope of international cooperation in peaceful uses of outer space, to devise programmes in this field to be undertaken under United Nations auspices, to encourage continued research and the dissemination of information on outer space matters, and to study legal problems arising from the exploration of outer space."

[117] United Nations General Assembly

[118] "Principles of the Committee on the Peaceful Uses of Outer Space."

UN's auspices."[119] Therefore, the committee could theoretically pass resolutions, that would be taken to the UNGA, and this way, the amendment of the OST could be achieved. As we can see, it is rather a tedious procedure to accomplish in order to amend a treaty, and as said before, political will is more than necessary to accomplish this task. This procedure, therefore, seems to be intricate enough not to prosper even with political will. Added to this, the UN COPUOS is an organ where decisions need to meet consensus, making even more complicated the procedure.

However, if we are talking about the extension or modification of specific provisions of the treaty, there is a substantial change. OST has not been amended since its adoption, but it has been supplemented. Indeed, the UN COPUOS has approved four different supplements to the OST treaty[120] during these 53 years. The main issue, therefore, is the lack of political will. As we have seen in the second chapter, leading space powers have articulated their interests in outer space in precise ways, maximisation of their interests, some of them stating the possible use of force if needed. Indeed, the current *status quo* allows them to continue their paths, even if this leads to a possible arms race and an active weaponisation of outer space. As we have reviewed, there have been some attempts to enhance more comprehensive norms, but there are enough facts to asseverate that main space actors are quite comfortable with business as usual. As we can see, there is little interest from the leading players to amend the treaty formally, but it is not the case for more soft-power initiatives. The main spacefaring powers and other actors have pursued Conduct Codes as a way to overcome the issues with the OST amendment. These conduct codes are not legally binding and have no enforcement measures, neither verification procedures, and this is what states find interesting in comparison to amendments. It is also true that these Codes of Conduct can constitute an interesting first step towards creating norms in the longer turn, as they can be useful tools to modify or extend OST treaty principles. In this regard, some parts highlight the civilian scope of this United Nations committee. Others would like to see UN COPUOS addressing military issues, but since 1980s, this has not been the case, "many members would like COPUOS to adopt the weaponization of space as an agenda item. After COPUOS held a policy conference on military uses of space in the early Reagan years,

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[119] Ibis.

[120] They are: the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (Rescue Agreement); the Convention on International Liability for Damage Caused by Space Objects (Liability Convention); the Convention on Registration of Objects Launched into Outer Space and the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (Moon Agreement)

however, there has been an unwritten, agreement, largely at the insistence of the United States, that COPUOS will no longer discuss military matters."[121] Therefore, if the committee would try to regulate military aspects regarding space, there could reach a point in which the decisions taken within this committee would not be legitimate and could not be accepted. That is why Codes of Conduct, although not being legally binding, can create a ground for further initiatives, "a code of conduct is easier to agree to […], but can still give significant impetus to both national and international political processes."[122] At the same time, a code of conduct is more comfortable to adopt for the parties, as the constraints are less, compared to a proper amendment of OST treaty.

### 3.1.2. Codes of Conduct and OST

As we have mentioned before, cooperation around space has been fostered in the form of soft-power rather than proper amendments to the OST treaty. In this regard, the ICoC[123] was the "international response to the 2007 Chinese ASAT test"[124]. The consequences of this test were severe. It is estimated that the Chinese ASAT test (and the subsequent U.S. ASAT test in 2008) generated around 3000 particles of debris, sized bigger than 10cm diameter, and many more below that size. This was seen very negatively by the international community as it created many dangers, the obvious ones concerning the increasing tension in space, but also derived from the debris creation, as these fragments can alter or incapacitate other satellites in outer space. As said, one of the main limitations of the UN COPUOS was its incapability to create any sort of law or guideline for preventing 2007 and 2008 ASAT tests, due to its civilian role. This gap was the fact that lead the EU to propose a Code of Conduct that will be covering not only the civilian activities in outer space but also military ones. In this regard, it has to be said that the ICoC differs from the OST treaty as the later is more focused on enhancing transparency measures rather than in arms control. Also important, during the first stages of its development, there were some reticences by the U.S. agreeing with the ideas established by this code. Noteworthy the particular section that was meant to cover U.S.'s preoccupation to the limitation of its

[121] Gallagher. P. 47.
[122] Rathgeber; Remuss; Schrogl. P. 34.
[123] International Code of Conduct (ICoC)
[124] Suzuki. P. 90.

capabilities that the code could pose to their ambitions and aspirations, that as seen in the previous chapter are quite significant,

> *"while it has been clear from its inception that the ICoC was to be a political arrangement rather than an international legal instrument, it is noteworthy that an explicit statement to this effect ("This Code is not legally binding") was deemed necessary to include, presumably to assuage American anxieties […]"*[125]

Therefore, Codes of Conduct can be an effective way to overcome partial immobility regarding the OST regime. They are voluntary agreements that show, to some extent, the willingness of the spacefaring nations to cooperate in space affairs. This could be a noteworthy attempt to stop the weaponisation of outer space. Still, as we have seen from the previous quotation, introducing certain aspects in these codes could be seen by some states as a '*de facto*' amendment of OST introducing specific provisions that would go beyond the non-legally binding characteristic of these codes. As these codes need universality in order to be effective, we could say that problematic issues could not be addressed and therefore, the ability of these soft-law ventures would be drastically diminished.

### 3.1.3. "Play by the same rules" principle

When we are talking about the principle of "play by the same rules", we mean having standard definitions agreed by all of the powers in the space that would allow for cutting the loopholes provided by the OST and having a more comprehensive way of judging the actions of the different actors in the outer space. Answering questions such as if space is weaponised, what is considered a hostile action, and the limit between airspace and outer space, among many others, could help to stabilise an already unstable environment. This could be seen as a difficult task, but in favour of this, we have the arguments given in the first part of this chapter. There have been additions to the OST, on four occasions, which have been accepted without any delays and with general acceptance. Therefore we could appeal to such organs as the UN COUPOS technical subcommittee for appointing another working group, simile to the LTSS (or even use the existing LTSS) to accomplish the task of creating some consensus definitions. Nevertheless, there is a particular limitation, apart from the political unwillingness of states to do so, that prevents

[125] Meyer. "The Diplomacy of Space Security: Whither the International Code of Conduct?" P. 10.

UN COUPOS to hold negotiations in this regard. We should remember that the mandate of the UN COPUOS is strictly limited to civilian activities and not no military ones. Still, this is not a burden to accurately define, for example, the difference between airspace and outer space, a comprehensive definition of weaponisation or a proper explanation of what article II of OST prohibits. These are doable definitions, not connected with military uses of outer space that could drastically improve the understanding of outer space and also create a path for future cooperation.

### 3.1.4. Issues of not amending OST

In recent years, due to the proliferation of space technology and its applicability, many are the states that joined the space club by launching satellites to outer space or developing space programmes of their own. Many are also the private companies that have been created with the same purposes in the space, starting from its commercial exploration for touristic activities, as can be the case of Virgin Galactic, all along to companies developing launching devices in order to export this technology, such as Space X.

The OST treaty, under article II and the UN resolution 1721 names the outer space as a *"res commune omnium"* territory. In other words, the treaty explicitly banned all states from claiming territorial sovereignty over space areas, extending this prohibition to other celestial bodies (the moon, Mars, among others). The logic of this decision was to try to minimise the possible conflicts arising from the converging national interests over space and its resources. Indeed, the authors of OST thought this would be the critical article to secure the peaceful activities in outer space, "this prohibition was considered by the drafters of the Outer Space Treaty the best guarantee for preserving outer space for peaceful activities only and for stimulating the exploration and use of the space environment in the name of all mankind."[126] Looking at the background of this article, it is understandable why private companies were not addressed; when this article was written, states were the only possible participants in space activities.[127] The prohibition is "*ad expressis versis*" in the case of the states, but the OST fails to prohibit the appropriation of resources and areas of the space to the private enterprises. This loophole has created a big con-

[126] Tronchetti. "The Non-Appropriation Principle Under Attack: Using Article II Of The Outer Space Treaty In Its Defence." P. 2-3.
[127] Tronchetti. "The Exploitation of Natural Resources of the Moon and other Celestial Bodies, a proposal for a Legal Regime." P. 3-4.

troversy over the second article of the treaty and indeed, allowed the rising of space nationalism, as opposed to the primary aim of the treaty, a space free for everyone. Some of the discussions have implied that as the territorial appropriation and resource appropriation of the space is prohibited to the states, this provision should also be applied to private companies, as there cannot be private ownership without a government that would ensure it, indeed "prohibition of national appropriation implies the prohibition of private appropriation because the latter cannot exist independently from the former.[128] The case is that this is an intensely debated issue, as there are already companies selling moon parcels to individuals.[129]

This is more relevant if we look at the conclusions we extracted from the previous chapter. When we were talking about the doctrinal approach of the different countries towards space, we have seen how the different countries articulate their interests in the space, taking into account both military and commercial aspects. If we recall the position of the analysed countries, we will remember the emphasis of creating a robust space-industrial scheme within the country. This can be a sign of the willingness of the countries to develop an attractive industry for exporting expensive technology. Nevertheless, it can also be the result of a very thoughtfully created approach, that would allow states to overcome the Art. II of OST and trough national companies, control the space. To this matter, we have an example that could allow us to asseverate that the U.S. is following this path towards the control of space dominions not in a military way, but also in a commercial way. As we have mentioned before, there is an ongoing debate on whether Art. II can be applied to private companies. As the debate is not yet solved, any company could make such an attempt of claiming resources of parts of the space as it would not be contriving any law. However, in order to give legitimacy to these claims, they should have some kind of legal legitimacy backing them. We should also remember that article VI of OST mentions that states are the responsible entities for the acts in outer space "states parties to the treaty (OST) shall bear international responsibility for activities in outer space […] carried out by government agencies or by non-governmental entities."[130] In this regard, and going a step further, in the year 2015 a law was passed in the U.S. Congress, the U.S. Commercial Space Launch

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[128] Virgiliu.
[129] Tronchetti. "The Non-Appropriation Principle Under Attack: Using Article II Of The Outer Space Treaty In Its Defence." P. 3.
[130] "Outer Space Treaty"

Competitiveness Act (H.R. 2262),[131] which in practical term means that "this legislation will give U.S. space firms the rights to own and sell natural resources they mine from bodies in space, including asteroids."[132] Two years later, Luxembourg passed another law, *the Law on Exploration and Use of Space Resources*[133], in the same terms. The first article of this law adopted by the Luxembourg government, which explicitly mentions the ownership rights over space and its resources, "space resources are capable of being owned."[134] These laws are setting precedents of what might come in the future, and this could be a very worrying scenario for weaponisation, as with ownership rights, claims are raised, and conflict is much more plausible. We can, therefore, observe how these laws tare creating the perfect legal environment for private companies to claim space as theirs, with the consent of national governments. Thus we could say that these two laws are seriously undermining the '*res commune omnium*' principle and are fostering space nationalism dangerously, as in the case of the U.S., only American companies would be covered by this law[135]. Therefore creating advantages and incentives for American companies to claim space as theirs. This might be a significant source of instability and a factor driving towards active weaponisation of outer space. If these kinds of laws proliferate, virtually any company could claim parts of the space as well as parts of other celestial bodies. A conflict could easily arise between these companies, and this could give cause for conflict popping between different nations. Thus even if these countries would be complying with Art. II of OST, they would be fighting for claims in space.

Coming to the conclusion that Article II of the OST should be revised and clarified, as its intention is to avoid conflict arising from space appropriation, but as we have seen, there are ways to dodge this article, and still have claims in the space. In order to avoid this situation, there is a UN COPUOS subcommittee that was created in the year 2009, that is responsible for the long term sustainability of the outer space, "the Scientific and Technical Subcommittee of UN COPUOS established a working group (Working Group) on Long Term Sustainability of Outer Space (LTSS),"[136] this sub-committee could analyse the positions of the different actors

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131 "H.R.2262 - U.S. Commercial Space Launch Competitiveness Act."
132 Ridderhof.
133 Original name: *Loi du 20 juillet 2017 sur l'exploration et l'utilisation des ressources de l'espace.*
134 "Loi du 20 juillet 2017 sur l'exploration et l'utilisation des ressources de l'espace."
135 Leon. P. 499.
136 Horikawa. P. 22.

and reach a conclusion, that could be accepted by consensus and submitted to the UNGA for its approval.

Art. II of OST could be generating in the future, increasing conflicts that can arise from the increasing commercial interests in the space. This could be the case of the U.S. and China, which have emphasised their commercial interests in space, a possible clash between private interests from different countries could provoke an escalation between the involved nations.[137]

### 3.1.5. "Right to self-defence" in outer space

As we have seen, disputes can arouse not in the national sphere, but also in the commercial sphere. As we also mentioned, states are compelled by the acts of non-governmental actors in the other space. This could lead to a possible conflict between states, which triggers would be on the commercial disputes between companies. In this case, the conflict could escalate quickly. This issue is connected with the Codes of Conduct, and which are the topics they cover. As said, the ICoC is intended to regulate and create a framework for the conduct in the space, and one of the biggest debates within it has been the right to self-defence. As said, there is a national responsibility for the acts by non-state actors in the space. Therefore a threat and intentional destruction of satellites could be understood as a provocation towards the state owner of the asset. Consequently, the owner of the assets would have the right to first, defend its assets, and second, try to deter others from attacking, "[…] the victim state would consequently have right to self-defence from this kind of aggression to its assets."[138] This could result in a deterioration of the strategic environment both in outer space and on the ground. Understandingly, the states would also have the right to accomplish protective efforts to try to protect these vital assets from aggression. Indeed, as we have seen in the previous chapter, this is mentioned in the doctrinal approaches of at least two of the analysed countries, the U.S. and Russia. They could hypothetically try to prevent strikes on their assets by counter-operations if there are suspicions over attacks towards these assets, "if there is a reasonable suspicion of a possible attack on space assets, states may act to prevent such an attack."[139] Nevertheless, in this case, how can a state determine if there is a risk of attack over space assets? It is true that there is not unified launch notification

[137] Heinrichs. P. 12.
[138] Ibis.P. 13.
[139] Suzuki. P. 91.

system that would alert states of suspicious launches as well as there is neither a notification regime stating the purpose of satellite launching. The lack of notification regimes does not automatically mean that the launch of satellites/assets or any other type of launch can pose a risk to assets. Indeed, the verification of the purpose of the launch is almost impossible to determine, due in part to double use technology as explained in the first chapter. Even if states have the right to self-defence from strikes to their assets in the space, they do not have the right to exercise preemptive actions in order to protect their assets. This is due to the fact that miscalculations could be very frequent. Not having notification regimes would mean that little to zero would be known about the intentions of a specific country to launch objects into space, to the extent that it would not be certain the pretext of these launchings. This could lead us to constant misperceptions that would increase the tension and volatility in the space. The situation would be somewhat different, and the right to self-defence would be much more transparent and legitimate in case of adoption of proper and unified notification systems. This would allow increasing the overall security of outer space, and to some extent, it could also prevent its further weaponisation. Providing clear information could possibly restrain states from taking aggressive steps that would enable weaponisation of outer space, as the actions would not remain secretive and would be known to other states.

## 3.2. Preventing active weaponisation outer space

### 3.2.1. Transparency and Confidence-building measures

When we are talking about confidence-building measures to ensure that active weaponisation of outer space is not achieved, we could centre on the launching procedure. In this part of the chapter, we will be covering the advantages a possible notification regime may bring, as a transparence measure, to somehow stop the weaponisation of outer space.

Confidence building and transparence measures are some of the most important values in modern arms control regimes.[140] This was clearly understood during the cold war, as the U.S. and the USSR agreed that, notifying each other about the launches (and data exchange) could prevent mistakes from happening and hypothetically reduce the chances of starting a nuclear war by accident. The U.S. and the USSR back then agreed on multiple occasions in sharing this vital in-

[140] Lachowski. P. 12—16.

formation, as seen in the cases of SALT I,[141] SALT II[142] and START[143] treaties, but it is in the year 1998 when the U.S. and Russia decided to sign the JDEC's[144] memorandum. This memorandum had as aim reducing the risk of misunderstanding due to non-notified launches and false warnings,

> *"the United States of America and the Russian Federation, hereinafter referred to as the Parties, Guided by the Joint Statement of the Presidents of the United States of America and the Russian Federation on the Exchange of Information on Missile Launches and Early Warning of September 2, 1998, Taking into account the need to minimise the consequences of a false missile attack warning and to prevent the possibility of a missile launch caused by such false warning."*[145]

Indeed, the first article of this memorandum mentions the data sharing and the notification of the launching and leaves the door open to a possible multilateral regime that could be extended to other countries, such as China, India and any other countries with aspirations in the space;

> Art. I follows like this,
>
> *"in order to set up an uninterrupted exchange of information on launches of ballistic missiles and space launch vehicles from the early warning systems of the United States of America and the Russian Federation, hereinafter, the warning systems of the Parties, as well as to provide for the possible implementation of a multilateral regime for the exchange of notifications of launches of ballistic missiles and space launch vehicles, the Parties shall establish, in Moscow, a joint centre for the ex-*

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141 Agreement on Measures to Reduce the Risk of Outbreak of Nuclear War Between The United States of America and The Union of Soviet Socialist Republics.

142 Treaty Between The United States of America and The Union of Soviet Socialist Republics on the Limitation of Strategic Offensive Arms (SALT II).

143 Agreement Between The United States of America and The Union of Soviet Socialist Republics on Notifications of Launches of Intercontinental Ballistic Missiles and Submarine-Launched Ballistic Missiles

144 Ibis.

*145* "Memorandum Of Agreement Between The United States Of America And The Russian Federation on The Establishment Of A Joint Center For The Exchange Of Data From Early Warning Systems And Notifications Of Missile Launches."

> *change of data from early warning systems and notifications of missile launches, hereinafter, the Joint Data Exchange Center (JDEC).”*[146]

This could be an interesting approach to further transparency and therefore enhance cooperation between states. However, there are some issues in regard to the JDEC. As said, the JDEC poses an interesting ground, as everything is already laid off and the extension of the memorandum could be easily exercised to other partners, but in the last 20 years the relations between the U.S. and Russia have been turbulent, and with the presidential changes (this memorandum was signed under Clinton-Yeltsin presidencies) the JECD has fallen in a sort of stagnation that made it not to be visible, “Although agreed to in concept almost a decade ago, there has been very little movement standing up the JDEC.”[147]

As we saw in the previous chapter, we see how the different spacefaring actors have increasing concerns about the security of their assets in the space. As said before in this chapter, possible conflicts could arise between the countries due to the problems OST originated. In this case, the JECD could serve as a tool to avoid misconceptions about the launchings into space, which could serve to be more transparent in the space activities, helping to a better understanding between different states. In this case, the inclusion of china would be interesting. As Blazejewski mentions, the U.S. is “strongly concerned about the possible ambitions of China in the space.”[148] A notification regime could somehow counter the secrecy of Chinese space plans, that would allow the parties to know beforehand about the launches of others. There are other issues regarding the JECD. The most immediate objection to the memorandum is the cheating problem. No-one can assure other members of JECD that the presented information is accurate, as we have seen in previous chapters, verification can be the main issue. What is more, in an environment of competition and technological race, cheating can be seen as a source of advantage towards the competitor, which will discourage other members from cooperating. As this memorandum relies on the will to avoid misunderstandings by sharing information, and therefore act rationally with all the possible information, states can convince themselves that competition is slightly

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*146* “Memorandum Of Agreement Between The United States Of America And The Russian Federation on The Establishment Of A Joint Center For The Exchange Of Data From Early Warning Systems And Notifications Of Missile Launches.”

147 Larrimore. P.175.

148 Blazejewski. P. 34.

more interesting for their interests than cooperation. This argument can be a significant hindrance to the revival of the JECD as a way of confidence-building and transparency. However, in the actual situation, a launch misunderstood as ASAT targeting satellites, could escalate and become a conflict. This is why an imperfect but already settled agreement can be more useful than its absence.

Apart from the JDEC analysed before, we could dig more into the possible cooperative measures of extending notification and data exchange to other significant players, and in the last instance to all of the countries. This time we should talk about the HCoC[149] as a possible solution to notification and data exchange. The members of the HCoC agree voluntarily to:

"*a) Try to curb down the ballistic missile and space technology proliferation;*

*b) adopt fundamental tenets of space law such as the Outer Space Treaty, and the Liability and Registration Conventions;*

*c) provide an annual report concerning their missile and space launch vehicle policies and programs;*

*d) exchange pre-launch notification on future ballistic missile test flights and space launches."* [150]

Points c) and d) are the most relevant for this thesis as they display principles that could be useful to increase transparency among the actors and enhance further cooperation. The multilateral approach of this code of conduct is reflected in its membership. Currently, 140 countries are members of this code voluntarily. The aim of the code is to enhance political will within the actors to avoid misunderstandings, but there are some setbacks to it. We could argue that there are some similarities between the HCoC and the JECD, as for example, the commitment of the U.S. towards this code of conduct is irregular, and the submission of information to the organs of HCoC is not always fulfilled.[151] In the case of the HCoC, Russia and other actors such as the EU meet their regular commitments towards the code. Also, similarly to the previous bilateral forum discussed before, there is no form of verification neither enforcement body

[149] The Hague Code of Conduct against Ballistic Missile Proliferation (HCoC), formerly known as "The International Code of Conduct" (ICoC), was adopted on 25-26 November 2002 in The Hague. The HCoC is aimed at curbing ballistic missile proliferation worldwide and to delegitimise such proliferation further.
[150] Larrimore. P. 179.
[151] Larrimore. P. 179.

to HCoC, so there is no way to track complying of the parties that makes it more challenging to reach the proposed goals.

Codes of conduct, should be as universal as possible to try to bring benefits, such as curbing the ballistic technology and space technology to avoid misunderstood that could lead to complete weaponisation of outer space. As we said in the first part of this sub-chapter, the relevance of the transparency and confidence-building measures should not be set aside, as they can be handy tools to avoid weaponisation of space. States could understand that with cooperation and transparency miscalculations could be reduced, "transparency and confidence-building measures (TCBMs) in outer space activities will help enhance mutual trust and reduce miscalculations" and "TCBMs can serve as a useful supplement to the prevention of the weaponisation of and an arms race in outer space."[152] These confidence measures could mean the emergence of a new concept of security provided by transparency and confidence "[…] space weaponisation […] could be a definitive threat to outer space activities, by corollary, transparency and confidence-building measures […] could establish a different concept of *space security.*"[153]

Last but not least, although confidence-building and transparency efforts can be an excellent step to slow weaponisation of outer space, they need to be as universal as possible to be effective. In the case of HCoC this is a significant hindrance as some of the key players (those with ballistic missile capacity, space technology and especially space ambitions) are not present in this HCoC.[154] This is the case of China, Pakistan, and India, and also the case of other countries suspected of possessing ballistic missile technology and WMD, as North Korea and Iran. This is the main problem, as these countries would not participate in the regimes explained before. The effect of this could be increasing distrust among actors and the urgency of weaponising space in order not to be a victim of possible attacks from other spacefaring nations.

### 3.2.2. ASAT and space weapon technology limitation, deployment, and use.

Ballistic missiles and their applications, such as ASATs, are not a new topic to arms control regimes. Ballistic missiles are seen as such strategic technology that limiting the development

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[152] "Chinese Perspective on the Promotion of Security and Sustainability of Outer Space."
[153] Froehlich. P. 66.
[154] Brachet. and Larrimore.

and deployment of these technologies seems unrealistic.[155] This is grounded by the learnings we acquired from the previous chapter. As the U.S.'s position in space is more and more contested, the technology that could allow counter-space capabilities is being further developed. Indeed, if it was the intention of limiting the technology, the countries that already possess these weapons should halt the development and destroy the stored and deployed arsenals. If this is not ensured, a ban on the technology would not have any effect, as the countries could use their existing weapons to destroy space assets.

As we have seen in the previous chapter, all the countries analysed, pose ASATs as one of the main factors for the destabilisation of space being this one of the main risks to their assets. In this regard, we should mention that limiting the development, placement, and use of ASATs would be especially prejudicial for the second-order powers, such as Russia, China, and to some extent, India. In the Russian case, the risk perception derived from the U.S.'s technological superiority leads to relying on ASAT technology as a life vest against possible American aggressive actions in space. Rejecting to develop and use these technologies would be a strategic disadvantage for the Russians, bearing the American technological preeminence in the space. In the event of an *active weaponisation* of outer space, not having ASAT capabilities would be regarded as a significant vulnerability by both China and Russia. As seen in the previous chapter, Chinese concerns are related to an utterly weaponised space. Chinese officials state that the relatively small Chinese nuclear arsenal could be destroyed, leaving China in a very delicate position towards the Americans. In the case of China, this situation can also be presented as a dilemma. As we have seen in the previous chapter, China and India are competing countries in many spheres, being space one of them. on the one hand, China does not want to renounce the ASAT technology, as this would leave China at a disadvantage towards the Americans. on the other hand, China could be more interested than Russia, in banning the development of ASATs so that India, with comparably fewer capabilities than China in the space, would not become a real menace for Chinese commercial interests. Lastly, in the case of India, the country could see with relative good eyes the limitation or even prohibition of ASAT technology. As we remember from the previous chapter, India has similar concerns about space, but it is the nation fearing the most

[155] U.S. Congress, Office of Technology Assessment. "Anti-Satellite Weapons, Countermeasures, and Arms Control."

an arms race in outer space. The reason for this is that India, to this day, does not possess the same space capabilities as its competitors. A space arms race will inevitably condemn India to intense efforts to come to the same terms with China and Russia. Being this a burden, India is also concerned about counter-space technology development by neighbouring China, which could make a relatively strong argument for India to pursue a limitation or ban on this technology.

As for the U.S., our last country analysed, we should remember that the U.S. has the most privileged position in space, so this could lead to thinking that the U.S. would be the most compelled to limit the proliferation of these weapons between its rivals. This is mentioned in the conclusions of the previous chapter, as some of the principal vulnerabilities the U.S. perceives are: the counter-space technology development; and the limitation of the freedom to act in the space. We could argue that by banning or limiting the use of ASATs, the U.S. would feel more secure. However, as we said, the US is the leading actor in space, both by means and technology. What makes us think that the U.S. would not see favourably the limitation of these weapons as it could lose an advantageous position in the space. Indeed, if we have a look at the doctrinal approach from the Americans, we can observe how aggressive actions are considered in case of necessity, for example, to secure free access to space.

### 3.2.3. Space Cooperation Enhancing Measures

#### 3.2.3.1. Open ISS membership to other nations

The ISS[156] or International Space Station is the best example to argue that cooperation in outer space is not a utopia. Indeed, the ISS allowed the peaceful use of installations shared by different countries, with the most notable participation of the U.S with the NASA[157] and the Russian Federation with ROSKOSMOS. Although, as we know, the relations between the two countries have dramatically deteriorated, their commitment towards ISS has been almost intact. The ISS has often been referred to as a miracle of modern engineering and is a source of pride for the participating space agencies. The ISS brought together competitors and allowed for better understand-

[156] International Space Station is a modular space station orbiting in the LEO. It is part of a multilateral international space programme between different partners. U.S.'s NASA, Russia's ROSKOSMOS, EU's ESA, Canada's CSA, and Japanese JAXA.

[157] National Aeronautics and Space Administration or NASA is an Agency of the U.S.'s federal administration in charge for the American civil space programme.

ing, transparency, and in instance to interdependence (currently only Soyuz rockets are able to reach the ISS[158], after the U.S. decommissioning its launcher vehicles). As we have said, the number of countries participating in the ISS is limited, and the question of opening it to other members has not been covered. However, it could be an excellent first step toward de-escalation in space and embracement of cooperation for all the parties to include such relevant players to the ISS as are the Chinese Space Agency and the Indian Space Agency. In the case of China, this could lead to the diffusion of specific technologies to the Asiatic country, which could be very helpful for the development of the Chinese space programme. This could be seen as a vulnerability by the American authorities. However, we should also highlight that in exchange of this diffusion, more transparency would be required to the Chinese space programme, "China would likely have to make concessions in the form of more stringent technology export controls"[159]. Being this a strong incentive for the U.S. to consider Chinese membership. As we can see, including China and other countries in such multinational ventures could be a source for creating interdependence in space affairs that would make it much more costly to start a possible conflict in the outer space. This can be more than an opportunity as the time of the ISS is coming to an end. With commitments of its main contributors ending in 2024 and 2025, the talks for a new ISS could include more partners in order to be more inclusive.[160]

3.2.1.2. "No first placement" declaration

Another measure to de-escalate could be a declaration of "no first placement" of weapon systems in outer space. This could be especially interesting for Russia and China if the Americans carried it. We argue that this action by the Americans would be seen very positively due to two facts. First, being the dominant power in space grants the U.S. with the moral capability of "doing the right thing" and therefore this could be seen as an exemplifier act by the most potent player declining to use its power, renouncing to part of its advantageous position to de-escalation in space what brings us to our second fact. As stated in the previous chapter and in this one, Russia and China fear that the strategic environment would worsen with the active weaponisation of outer space. With the U.S. statement, these two countries could see how one of their main fears would disappear. This could lead to distension and to a relaxation of the tensions in outer

158 "What Is the Soyuz Spacecraft?"
159 Dufour. P. 156.
160 Ruttley; Robinson; Gerstenmaier. P. 1160-1174.

space, that combined with other measures analysed in this chapter could create a better ground to enhance cooperation, thus avoiding an arms race in space and preventing *active weaponisation* of the outer space.

## 3.3. Case scenarios for the future of outer space

We have focused the analysis of this chapter mainly around the ideas of cooperation and confidence-building measures in space affairs in order to avoid '*active weaponisation'*. Although we have seen how cooperation is a real possibility, we have also seen how there are many hindrances to the cooperation between states, and we can observe how the trend is to compete rather than cooperate. First, we will focus on what could happen if nothing changes and the current trends stay unchanged. We called this first case, '*Business as Usual*'. For the second case, we focused on which could be the consequences from the termination of the OST treaty and which could be the prospects of weaponisation in this case. We named this second case as *'Withdrawal from the OST Treaty'*.

### 3.3.1. Business as Usual

As we have mentioned before, the main treaty governing outer space and its derived activities, OST treaty, has no amendment procedure. This makes it very difficult to address the problems with definitions creating loopholes. Added to this, the aforementioned lack of political will to challenge the actual system is certainly discouraging the changes from happening. Indeed, many are the countries that feel comfortable enough with the actual system, considering changes in the regime as a threat to their ambitions in the outer space. If we are mentioning discouraging elements that hamper changes in outer space, we should also mention the complicated way in which changes can be introduced to OST treaty. As we have covered before, the UN COPUOS can add modifications to the OST. Nevertheless, these are very difficult to achieve, as they have to pass a two-stage sieve, first within UN COPUOS, which requires a consensus for the approval of the resolution. Many are the states in the space, and many are their interests. Usually, these interests diverge, and therefore we could expect few consensuses to be met within UN COPUOS. Another factor that we should bring to this analysis is the willingness of the countries to open a debate over what can or cannot be changed of OST treaty. This could be a red line for many countries, as a revision of the OST could mean a complete nightmare, not only in bureaucratic

means but also because it could challenge an already fragile pace equilibrium, bringing with it unexpected consequences.

All these factors make us think that there would not be any kind of change or amendment to the OST, apart from those unambitious and obvious enough not to pose any danger to the participants. The consequence of this would be the decay of the treaty and its principles. Principles that would gradually be hindering state's interests. This could have as a consequence the reframing, or the discourse changing, of the principles of the treaty. This already happened with the term 'peaceful use' which has been replaced by the more convenient 'non-aggressive'. The last stage for this case scenario would be the states not paying attention to OST and its principles, what in effect would mean the decay of the treaty.

This could be a dangerous step forward to '*active weaponisation'* of outer space. As we remember from the first chapter, we defined active weaponisation as the process in which weapons systems would be deployed in space. The decay of such principles as the non-appropriation of space, peaceful use of space, free access to space and many others could be one of the many factors fuelling the complete weaponisation of outer space. We could argue that this process of deterioration would not be instantaneous, but as we have seen, many are the factors worsening the strategic environment in the outer space. Although we cannot surely state that the actual situation will result in a decay of OST, we could argue how this phenomenon is somehow already happening.

### 3.3.2. Withdrawal from the OST Treaty

It might be seen unreal that any of the leading powers in spacefaring would abandon the OST treaty, but the U.S. withdrawal from the ABM treaty in 2002 could be a perfect example. We will analyse the consequences a possible withdrawal could have for the system, but first, let us analyse the factors for abandoning the treaty.

First, we should mention the actual dominant political climate as a factor for possible withdrawals for OST. The OST and other multilateral agreements are the consequence of a globalist world in which interdependences play a significant role in shaping the political structure. Nevertheless, in recent years this globalist approach has been certainly challenged by nationalistic-

populistic politicians, such as Bolsonaro in Brazil, Trump in the U.S. and Johnson in the UK. Indeed, the world is leaving behind the globalist approach to centre more in a localist approach, "[…]phenomena as Brexit and Trump prove that the world is not globalising. It's localising."[161]

Indeed, many would be the excuses for these impulsive politicians making their minds to abandon the treaty. Burdens to economic ambitions and to national interests would figure the first in a long list of excuses to abandon multilateral treaties like OST. Indeed,

> *"in a climate of foreign policies that are potentially isolationistic and nationalistic, the Outer Space Treaty may become one such international agreement leading space-faring states may opt to leave. This may especially be the case to the extent that provisions of the Treaty are seen as serious roadblocks in pursuing economic interests, such as the exclusive national exploitation of space natural resources by some states and their private companies, and undermining national security interests, such as in the implicit prohibition on the deployment of weapons for use in and from space."*[162]

As we can see, the reasons to abandon the treaty are powerful enough to be considered. However, we should also focus on which can be the effects of a major power abandoning the outer space. The most immediate one that would come to our minds is the prohibition by OST of placing WMD in outer space. Therefore, the party that retreats from the OST will no longer be compelled by this principle and would be able to place WMD in the outer space unrestrictedly. This could be disastrous as tensions would arise, and indeed, other actors would leave the treaty in order not to be limited and exposed to strategic vulnerabilities. Nevertheless, placing WMD in outer space would not be the only issue to be covered. The OST also prohibits the military bases in the outer space and in the celestial bodies. The party leaving the treaty, would not be compelled, and therefore could develop military bases in the space, worsening even more the strategic environment both in space/moon and back on Earth. Apart from military consequences, there could also be commercial consequences. As we have analysed in this chapter and in the previous one, states have significant commercial interests in the space. By withdrawing from the OST,

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[161] Skinner.

[162] Jakhu. "The Future of the Outer Space Treaty." P. 188.

these countries and their companies would not need to justify the appropriation and claiming of space and its resources. We mentioned that this is a doctrine linked issue. By leaving the treaty, their hands would be completely free to do as they wish. This could raise tensions unequivocally as other players ambitions and interests would clash. Finally, the space legal system would collapse, and the anarchy could reign outer space. This would be very negative news for the prevention of the complete weaponisation of outer space. With a chaotic strategic environment in the space, hard power and military scope would be reinforced, a chaotic, unstable and unpredictable environment could, in an instance, mean a complete weaponisation of the outer space due to converging interests and a high derived probability of confrontations and clashes. It goes without mentioning that a massive arms race could be expected, as players would see competition as their only alternative to prevail in such a harsh environment.

## 3.4. Conclusions

Starting with the hindrances to cooperation in outer space, we mentioned several factors here. On the first part of the chapter, we focused on the possibility of amending the OST treaty. We saw how this might be a difficult task, since the treaty has no formal amendment to it. We highlighted this as one of the main problems, added to the political unwillingness to do it as a significant impediment to cooperation. As we have seen, the role of the UN COPUOS could be relevant here, because it could somehow help in adding proposals to the treaty. Although a good idea, as we saw in the analysis of the chapter, this way of overcoming the initial hindrance of the non-amendment procedure, we should say that there are many countries not part to UN COPUOS, as well as the fact that consensus is needed to adopt resolutions. In this case, this could be the major problem of using UN COPUOS to try to overcome the loopholes of OST. As we have learnt so far in this thesis, spacefaring states have divergent interests, what would make seriously challenging to agree in critical areas such as defining what a space weapon is and which device can be considered as weaponising outer space. Adding to this military dimension, we should stress that the UN COPUOS has a clear mandate of dealing with issues related to civil space sustainability, not being able to address the military issues. SO as we can see, states would not be able to agree in this multilateral forum, when addressing military concepts. Indeed, some decisions could be passed in this forum (military ones) and despite UN COPUOS not being legitimised to do so, many of the countries would not take part in these decision-making procedures,

what could lead to the sensation of discrimination of some interests against others. This could certainly be dangerous, as the irritated spacefaring nations could decide to forward weaponisation of space.

Not only military loophole issues pose a hindrance within OST treaty. We should also mention the destabilising effect of not addressing Art. II of OST. This situation could lead to potential conflicts between different states, who could consider protecting their assets and private space assets, possibly getting in conflicts. This situation could lead spacefaring countries to understand that for defending their commercial interests in space, some degree of space weaponisation would be necessary in order to retaliate in case of an attack against space assets. Adding to this argument is the before mentioned right to self-defence in outer space. As we can see, this right could foster active weaponisation due to miscalculations between private companies and states.

One of the last problems we saw with the OST is the proliferation of the so-called soft-law initiatives, such as the ICoC or HCoC. We should remember from the analysis conducted that the main limitation of these initiatives is that they are not legally binding and neither have verification or compliment enforcement bodies. The problem here is that in the last years these type of initiatives have posed up, maybe making a possible address of OST problems more difficult, as compromise is not reflected towards this commitment.

However, not all the case scenarios are doomed as it could appear, there is still some room to cooperation. Following the argument given before in regard to codes of conduct, even if it is true that they are not legally binding and their possibilities of preventing active weaponisation of outer space are exiguous, they actually are an excellent chance to enhance cooperation among space powers. We shall remember that the adhesion to these codes of conduct is voluntary, what to some extent means a commitment to securing space and preventing the complete weaponisation of outer space. What is more, as we saw in the analysis of this chapter, there are tools for cooperation in outer space. The before mentioned UN COPUOS is another interesting tool to address the problems in outer space. Yes, we already said that it is limited to the civilian scope, but we also mentioned that some serious issues could be the source for the weaponisation of outer space. Two of the mentioned factor that UN COPUOS could address would be the issue with the Art. II of the OST and a key definition as it is the delimitation of Airspace and Outer Space,

in which the Kàrmàn line could be an answer that would help us to differentiate better which technologies fall in the category of space technology and airspace technology. This could help us to delimitate the space actions more effectively. Other cooperative efforts that could help us to prevent the weaponisation of the outer space by increasing transparency and enhancing confidence-building measures could be the revitalising of the JECD. This tool could help to increase the transparency of launches between the leading spacefaring states, what would mean less uncertainty and more knowledge about the intentions of other player's intention in outer space. Following this argument, another interesting argument would be a declaration by the main states stating their non-willingness to launch and deploy active weaponising weapon systems in outer space. This would be a significant step, still not requiring any comprehensive action from the states. This effectively would lead to a diminished risk of active weaponisation of the space.

As we can see, different factors would lead us to think in different ways. Still, the prospects of the weaponisation of outer space rely on the ambitions and intentions of the states in outer space. As we have seen the deterioration of the OST treaty regime is a fact, there have been informal changes of critical provisions, such as the change of 'peaceful use' for 'non-aggressive'. This is a clear sign that the OST is being weakened. Not only this, but some states could start to see the OST as a severe problem for the development of their interests in the outer space and could, therefore, decide to withdraw from it. This would be the worst-case scenario, as these countries would see how trough competition, and without any impediment to their actions in the space they could decide to seriously weaponise the space, not only in order to pursue their interests but also preventing other actors from developing their own ones. This could mean an environment of conflict in which probably aggressive competition could lead to a space arms race with unpredictable results.

As we can see from this last chapter, the general conclusion that we can extract is that there are several main difficulties to cooperation, but at the same time there are ways to solve the majority of them. We can also see how the lack of political will is a direct consequence of the state's policy of pursuing competition rather than cooperation. In this sense we could say that the states are not pursuing changes, in other words, they are somehow comfortable with the current situation, where their hands are not tied enough to prevent them from pursuing interests in outer space, leaving the door open for further weaponisation in outer space in the medium turn. We also see

how there are some early attempts towards comprehensive cooperation, such as the conduct codes that could be the first step towards cooperation in the longer turn. Therefore, we can say that the prospects in short to medium turn are not very optimistic, but we can observe how the concerns of states in shared threats as ASAT tests could help to slow the weaponisation process.

# Conclusions

Outer space, once the technological frontier and hope for peaceful coexistence for the humankind, is increasingly becoming a source of concern. Raising interests due to the rapid technological development of space applications are threatening an already delicate environment. Steady militarisation has risen the stakes of the different players in space, and the possibility of a completely weaponised outer space brings dark perspectives for the future of space. Indeed, the current state of space responds to what we called as *passive weaponisation*. Outer space assets are already being used to guide weapons to targets, transforming them into weapon systems. We also suggest that space is not yet *actively weaponised*. We affirm the latter as there are, to this date, no weapon systems placed in space capable of inflicting harm, by their means, to other assets. As space is already *passively weaponised,* which are the chances to establish rules that would prevent *active weaponisation* of outer space?

We shall, therefore, focus on threat perceptions. Threat perceptions are closely related to possible *active weaponisation*, as they can be the triggers to it. Concerning outer space, there are divergent and convergent threat perceptions among the described states. The main shared concern is related to the Strategic Stability of outer space. There are two main groups with concerns over Strategic Stability.

**In the first group,** we have the U.S. and to some extent, India. These countries see the proliferation of ASAT and counter space technology as a destabilising factor in outer space, as the development of counter-space technology directly affects their interests in space. According to the U.S., Russia and China are pursuing these technologies to rival American position in space. By developing such technology, Russia and China could target American military and commercial assets in the space. Indian authorities agree that by developing ASAT technology, a possible arms-race could arise. We should remember that the commercial approach is very relevant for the Americans. The vulnerability of the space assets to possible ASAT attacks has, as a consequence, a more aggressive doctrinal approach towards space, where Americans want to retain the leadership. The Indian case differs from Americans. Indian authorities see with preoccupation the development of the Chinese space programme and ambitions, as they could hurt

strategic stability in the region by fostering an arms race. This would cause a detriment in Indian-Chinese relations and hurt Indian perspectives in space.

**In the second group,** we have Russia and China. These countries see single-acting, aggressive doctrine and no willingness to join multilateral efforts to address space problems, as critical threats to strategic stability on space. These two countries fear a possible preeminence of Americans in outer space as this would let them in disadvantage. Apart from American superiority in space, Russia and China raise concerns on the possible denial from accessing space assets from Americans. Space denial would have disastrous implications, not only for the military but also for the commercial applications of critical space infrastructure, as China and Russia would see basic applications of space assets, such as communications and command and control capabilities significantly reduced. There are also issues about the possible targeting of nuclear capabilities of these two countries by the U.S. in a possible conflict. In this matter, Russian and Chinese authorities see a possible BDM in outer space as a red line to their nuclear capabilities. Possible BDM placement would not only worsen the strategic stability in space but surely would increase hostility and aggressive rhetoric between Russia, China and the U.S.

The adverse effect of not addressing the different threat perceptions concerning space is leaning towards *active weaponisation* of outer space. Spacefaring states do not agree on the issues eroding strategic stability. Therefore the situation remains unchanged, creating fear among states, as they perceive their concerns regarding strategic stability are not satisfied. This leads to the development of counter-space technology development as a way of answering perceived threats to strategic stability, such as unilateral acting and ASAT technology proliferation, increasing aggressivity in national space approaches. The consequence of this is the increasing possibility of an arms race that would conclude on the *active weaponisation* of outer space.

Apart from the destabilisation of the outer space environment, there are other concerns, such as the vulnerability of space assets and free access to space. These two threat perceptions are related to the activities in outer space. Spacefaring states see single-acting as a threat to the strategic environment. This unilateral acting can provoke a reaction among other spacefaring nations, willing to protect their interests, which could also be a source of the *active weaponisation* of outer space. Another perceived threat by Russia, China and India is the unwillingness of the U.S.

to join multilateral talks in order to address the problems of space. The position of the U.S. in this regard is that three is no need for binding arms-control talks as there are yet no weapons on outer space. This anointment raises concerns among other players, who understand this issue derives from the U.S.'s *space dominance* doctrinal approach.

We could, therefore, say that the prospects for creating binding rules that would prevent *active weaponisation* of space in the short and medium-term are low. The prospect of not reaching binding rules is indeed a consequence of spacefaring states not willing to reach agreements. However, the roots of the problem go more in-depth. Not addressing other's threats and behaviours are halting states from reaching agreements. Outer space weaponisation is a complex issue that is often addressed separately from the variables that make it complicated, such as threat perceptions, interests and legal constraints. The result of this situation is the adoption of soft-law based agreements. The shared perception that an arms race would be prejudicial to their interests obliges states to cooperate, in order to avoid confrontation. Nevertheless, the deeper roots, such as threats to strategic stability, interest management and loopholes within the space remain untouched. Not only preventing the creation of non-binding rules but also making the prospects of future binding rules challenging to achieve.

Still, states agree to some extent in specific issues, and example of this is the adoption of the HCoC. It is indeed a non-legally binding agreement, but still, has been voluntarily accepted by the analysed countries. Adhesion to such measures can be a promising step forward for a future legal binding law. It is also true that these non-legally binding agreements help states maximise their interests in space while trying to avoid, trough self-restriction, confrontation in space.

Creating legally-binding rules is a complicated thing to do. One of the factors explaining this difficulty is that many of the concepts regarding outer space remain undefined to date. Concepts, like, where does the space start, whether companies have rights to claim space resources, defining space weapon or even what do ambiguous terms as 'peaceful use' and 'non-aggressive' mean remain unclear. As there is no comprehensive understanding of space, it is not easy to bring together diverging understandings of the same terminology. Discrepancies are one of the main factors explaining why to this date we do not have a proper comprehensive treaty. It is also worth mentioning that the reference treaty on outer space does not have a defined amendment proce-

dure, which leads to unofficial measures for adding principles. Lacking procedures make trickier the process of amendment of the OST. We should also mention the hindrances of the UN COPUOS, which has not addressed military issues concerning outer space since the 1980s. However, underlying these more superficial viewpoints, we could mention another aspect explaining why there are few legally binding rules concerning space. The problem of weaponisation of outer space has many different scopes. When we try to address these scopes separately, it is impossible to reach a comprehensive understanding. For example, if we were addressing legal concerns about space we should bear in mind the current state of space, the interest of the players, the possible clashes and what is more important, how do they understand the role of space. If we are addressing a problem only from the scope of preventing placing weapons in space, without paying attention to perceived vulnerabilities, the agreed measures will not last. They would not be successful as structural issues would remain. In this respect, the measures taken to this date have addressed the problem of weaponisation mainly from the military point of view. Not addressing other relevant variables mentioned. Therefore we could say that new initiatives are needed in order to address the gaps that current arms control initiatives do not cover.

# Annexe

Figure 1. Threat perception by country

| | U.S. | Russia | China | India |
|---|---|---|---|---|
| Destabilisation of Strategic Stability in outer space | × | × | × | × |
| Vulnerability of space assets | × | × | × | × |
| Free access to the space | × | × | × | × |
| ASATs | × | × | × | × |
| Ballistic Missile Systems | | × | × | |
| Nuclear Arsenal vulnerability | | × | × | |
| Unilateral acting | | × | × | |
| Counter space capabilities | × | | | × |
| Freedom of acting | × | | | |
| Space debris | | | × | |
| Technologic Dependence | | × | | |
| Dispersion of Technology | × | | | |
| Retention of skilled personnel | × | | | |
| Space Arms Race | | × | × | × |

This table shows us which are the main threat perceptions from each country concerning space. This table can picture the conclusions of the second chapter, where we analysed, which are the fears of different players in outer space. As we can see, all the four analysed countries agree in the risk perception of that destabilisation of Strategic Stability of outer space poses. There are common threat perceptions regarding the vulnerability of space assets, free access to space and ASAT technology present to their interests in outer space. We can also see other concerns from the analysed countries, such as single-acting, freedom of acting in space, space arms race and counter capabilities appearing after the threat perception assessment we have done.

# List of Abbreviations

| | |
|---|---|
| USSR | Union of Soviet Socialist Republics |
| U.S. | United States of America |
| UK | United Kingdom |
| EU | European Union |
| PRC | People's Republic of China |
| OST | Outer Space Treaty |
| ABM | Anti-Ballistic Missile Treaty |
| START (I, II New) | Strategic Arms Reduction Treaty |
| SALT | The Strategic Arms Limitation Talks |
| ASAT | Anti-Satellite (weapon) |
| JECD | International space launch notification and data exchange |
| UN COPUOS | United Nations Committee on the Peaceful Uses of Outer Space |
| UNGA | United Nations General Assembly |
| USAF | United State's Air Force |
| DoD | Department of Defense |
| ISS | International Space Station |
| NASA | National Aeronautics and Space Administration |
| ROSKOSMOS | Roscosmos State Corporation for Space Activities |
| ISRO | Indian Space Research Organisation |
| ICoC | International Code of Conduct |
| HCoC | Hague Code of Conduct |
| WMD | Weapon of Mass Destruction |
| CoD | Conference on Disarmament |
| LTSS | Long Term Sustainability of Outer Space |
| NCW | Network Centric Warfare |
| GLONASS | Global Navigation Satellite System |
| FAI | Fédération Aéronautique Internationale (International Aeronautic Federation) |

# List of Sources and Literature

## Sources

1. “2006 U.S. National Space Policy” [Electronic resource] // Department of Defence. 2005. P. 1—10. URL: https://assets.documentcloud.org/documents/3123562/2006-U-S-National-Space-Policy.pdf (accessed 31.05.2020)

2. “Agreement on Measures to Reduce the Risk of Outbreak of Nuclear War Between The United States of America and The Union of Soviet Socialist Republics” [Electronic resource] // U.S. Department of State. 2017. URL: https://2009-2017.state.gov/t/isn/5186.htm (accessed 31.05.2020)

3. “Annual Report 2016” [Electronic resource] // United Nations Office for Outer Space Affairs. Vienna : United Nations, 2017. URL: https://www.unoosa.org/res/oosadoc/data/documents/2017/stspace/stspace70_0_html/UNOOSA_Annual_Report_2016.pdf (accessed 01.06.2020)

4. “Annual Report 2017” [Electronic resource] // United Nations Office for Outer Space Affairs. Vienna : United Nations, 2018. URL: https://www.unoosa.org/res/oosadoc/data/documents/2018/stspace/stspace72_0_html/UNOOSA_Annual_Report_2017.pdf (accessed 01.06.2020)

5. “Annual Report 2018” [Electronic resource] // United Nations Office for Outer Space Affairs. Vienna : United Nations, 2019. URL: https://www.unoosa.org/res/oosadoc/data/documents/2019/stspace/stspace76_0_html/UNOOSA_Annual_Report_2018.pdf (accessed 01.06.2020)

6. “China’s space activities in 2011” [Electronic resource] // China National Space Administration. 2011. URL: http://www.cnsa.gov.cn/english/n6465645/n6465648/c6480839/content.html (accessed 01.06.2020)

7. “Chinese Perspective on the Promotion of Security and Sustainability of Outer Space” [Electronic resource] // UNOOSA. 2016. URL: https://www.unoosa.org/pdf/SLW2016/Roundable/1._Zhongjun_Statement_English_edition.pdf (accessed 31.05.2020)

8. “Coordination of space-related activities within the United Nations system: directions and anticipated results for the period 2006-2007. Report of the Secretary-General” [Electronic resource] // UNGA, Committee on the Peaceful Uses of Outer Space. 2006. URL: https://www.unoosa.org/pdf/reports/ac105/AC105_858E.pdf (accessed 01.06.2020)

9. “Disarmament: Problems Related to Outer Space” [Electronic resource]. UNIDIR, 1987. 190 p. URL: https://www.unidir.org/publication/disarmament-problems-related-outer-space (accessed 01.06.2020)

10. “DOD Releases Fiscal Year 2021 Budget Proposal” [Electronic resource] // Department of Defence. 2020. URL: https://www.defense.gov/Newsroom/Releases/Release/Article/2079489/dod-releases-fiscal-year-2021-budget-proposal/ (accessed 31.05.2020)

11. “Executive Order on Encouraging International Support for the Recovery and Use of Space Resources” [Electronic resource] // The White House. 2020. URL: https://www.whitehouse.gov/presidential-actions/executive-order-encouraging-international-support-recovery-use-space-resources/ (accessed 01.06.2020)

12. “Foreign Policy Concept of the Russian Federation” [Electronic resource] // Ministry of Foreign Affairs of the Russian Federation. 2016. URL: https://www.mid.ru/en/foreign_policy/official_documents/-/asset_publisher/CptICkB6BZ29/content/id/2542248 (accessed 07.04.2020)

13. “H.R.2262 - U.S. Commercial Space Launch Competitiveness Act” [Electronic resource] // U.S. Congress. URL: https://www.congress.gov/bill/114th-congress/house-bill/2262/text (accessed 31.05.2020)

14. “Indian Army Doctrine” [Electronic resource]. Shimla : Headquarters Army Training Command, 2004. URL: https://www.files.ethz.ch/isn/157030/India%202004.pdf (accessed 31.05.2020)

15. “International Code of Conduct against Ballistic Missile Proliferation” [Electronic resource] // UNGA. 57th session. Agenda item 66. General and Complete Disarmament. [Letter]. 2003. URL: https://www.hcoc.at/documents/Hague-Code-of-Conduct-A_57_724-English.pdf (accessed 28.01.2020)

16. “Loi du 20 juillet 2017 sur l’exploration et l’utilisation des ressources de l’espace” [Electronic resource] // Journal officiel du Grand-Duché de Luxembourg. URL: http://legilux.public.lu/eli/etat/leg/loi/2017/07/20/a674/jo/en (accessed 02.06.2020)

17. “Memorandum Of Agreement Between The United States Of America And The Russian Federation on The Establishment Of A Joint Center For The Exchange Of Data From Early Warning Systems And Notifications Of Missile Launches” [Electronic resource] // Federation of American Scientists. 2000. URL: https://fas.org/nuke/control/jdec/text/000604-warn-wh3.htm (accessed 31.05.2020)

18. “Report of the Committee on the Peaceful Uses of Outer Space. Fifty-sixth session” [Electronic resource] // General Assembly Official Records Sixty-eighth Session Supplement No. 20. New York : United Nations, 2013. URL: https://www.unoosa.org/pdf/gadocs/A_68_20E.pdf (accessed 01.06.2020)

19. “Report of the Committee on the Peaceful Uses of Outer Space. Fifty-third session (9-18 June 2010)” [Electronic resource] // General Assembly Official Records Sixty-fifth Session Supplement No. 20. New York : United Nations, 2010. URL: https://www.unoosa.org/pdf/gadocs/A_65_20E.pdf (accessed 01.06.2020)

20. “Report of the Committee on the Peaceful Uses of Outer Space. Sixty-second session (12—21 June 2019)” [Electronic resource] // General Assembly Official Records Seventy-fourth Session. Supplement No. 20. New York : United Nations, 2019. URL: https://www.unoosa.org/res/oosadoc/data/documents/2019/a/a7420_0_html/V1906077.pdf (accessed 01.06.2020)

21. “Report of the Group of Governmental Experts on further practical measures for the prevention of an arms race in outer space” [Electronic resource] // UNGA. 74th session. Item 98 (c) of the preliminary list. Prevention of an arms race in outer space: further practical measures for the prevention of an arms race in outer space. 2019. URL: https://undocs.org/A/74/77 (accessed 01.06.2020)

22. “Report of the Scientific and Technical Subcommittee on its fifty-first session, held in Vienna from 10 to
21 February 2014” [Electronic resource] // UNGA. Committee on the Peaceful Uses of Outer Space. 57th session. 2014. URL: https://www.unoosa.org/pdf/reports/ac105/AC105_1065E.pdf (accessed 01.06.2020)

23. “Resolution adopted by the General Assembly on 11 December 2013. 68/75. International cooperation in the peaceful uses of outer space” [Electronic resource] // UNGA. 68th session. Agenda item 50. 2013. URL: https://www.unoosa.org/pdf/gares/A_RES_68_075E.pdf (accessed 01.06.2020)

24. “Resolution adopted by the General Assembly on 23 December 2015. 70/230. Matters relating to activities under the United Nations Programme on Space Applications in 2016” [Electronic resource] // UNGA. 70th session. Agenda item 53. 2015. URL: https://www.unoosa.org/res/oosadoc/data/resolutions/2015/general_assembly_70th_session/ares70203_html/A_RES_70_230E.pdf (accessed 01.06.2020)

25. “Resolution adopted by the General Assembly on 8 December 2010” [Electronic resource] // UNGA. 65th session. Agenda item 97 (y). 2011. URL: https://undocs.org/A/RES/65/68 (accessed 01.06.2020)

26. “Resolution adopted by the General Assembly. 1962 (XVIII). Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space” [Electronic resource] // United Nations Office for Outer Space Affairs. 1963. URL: https://www.unoosa.org/oosa/en/ourwork/spacelaw/principles/legal-principles.html (accessed 01.06.2020)

27. “Resolution adopted by the General Assembly. 51/122. 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” [Electronic resource] // United Nations Office for Outer Space Affairs. URL: https://www.unoosa.org/oosa/en/ourwork/spacelaw/principles/space-benefits-declaration.html (accessed 01.06.2020)

28. “Resolution adopted by the General Assembly. 54/68 Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space” [Electronic resource] // UNGA. 54th session. Agenda item 87. 2000. URL: https://www.unoosa.org/pdf/gares/ARES_54_68E.pdf (accessed 01.06.2020)

29. “Resolution adopted by the General Assembly. 59/2. Review of the implementation of the recommendations of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space” [Electronic resource] // UNGA. 59th session. Agenda item 23. 2004. URL: https://www.unoosa.org/pdf/gares/ARES_59_002E.pdf (accessed 01.06.2020)

30. “Resolution adopted by the General Assembly. 62/20. Prevention of an arms race in outer space ” [Electronic resource] // UNGA. 62th session. Agenda item 96. 2008. URL: https://www.unoosa.org/pdf/gares/ARES_62_020E.pdf (accessed 01.06.2020)

31. “Space Operations” [Electronic resource] // Joint publication 3-14. Washington : Joint Chiefs of Staff, 2018. URL: https://www.jcs.mil/Portals/36/Documents/Doctrine/pubs/jp3_14.pdf (accessed 31.05.2020)

32. “Statement by MA Xinmin, Head of the Chinese Delegation at the 58th session of COPUOS on the Future role of COPUOS” [Electronic resource] // Permanent Mission Of The People’s Republic Of China To The United Nations And Other International Organizations In Vienna. 2015. URL: https://www.fmprc.gov.cn/ce/cgvienna/eng/hplywks/t1274614.htm (accessed 01.06.2020)

33. “Statement Delivered by H.E. Ambassador CHENG Jingye under the Agenda Item General Exchange of Views on the 56th session of COPUOS” [Electronic resource] // Permanent Mission Of The People’s Republic Of China To The United Nations And Other International Organizations In Vienna. 2013. URL: https://www.fmprc.gov.cn/ce/cgvienna/eng/hplywks/t1052113.htm (accessed 01.06.2020)

34. “Statements by Chinese Delegation at the 55th Session of the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space” [Electronic resource] // Permanent Mission Of The People’s Republic Of China To The United Nations And Other International Organizations In Vienna. 2018. URL: https://www.fmprc.gov.cn/ce/cgvienna/eng/hyyfy/t1535268.htm (accessed 01.06.2020)

35. “Supporting Diplomacy: Clearing The Path For Dialogue” [Electronic resource] // UNIDIR Space Security Conference 2019. UNIDIR, 2019. URL: http://www.thesimonsfoundation.ca/sites/default/files/UNIDIR%20space%20security%20report%202019.pdf (accessed 01.06.2020)

36. “The 1969 Moment: A Giant Leap” [Electronic resource] // Smithsonian National Air and Space Museum. URL: https://airandspace.si.edu/exhibitions/out-of-this-world/online/1969/index.cfm (accessed 31.05.2020)

37. “Towards ASAT Test Guidelines” [Electronic resource] // UNIDIR. 2018. URL: https://www.unidir.org/files/publications/pdfs/-en-703.pdf (accessed 31.05.2020)

38. "United Nations Treaties and Principles on Outer Space; text of treaties and principles governing the activities of States in the exploration and use of outer space" [Electronic resource] // UNOOSA. New York, 1967. P. 3—81. URL: https://www.unoosa.org/pdf/publications/ST_SPACE_061Rev01E.pdf (accessed 25.03.2020)

## Books

39. Brandt, A. "Military uses for space" [Electronic resource] // Air University Review. 1985. P. 40—52. URL: http://dx.doi.org/10.1080/14777622.2012.733867 (accessed 07.04.2020)

40. Dean, J. "Future Security in Space: Treaty Issues (2002)" // Pioneer in Détente in Europe, Global Cooperative Security, Arms Control and Disarmament / Brauch, H. and Grimwood (ed.). Washington : Springer, 2014. P. 199—214.

41. Dufour, F. "The Realities of Reality" // Part IV: The Reality Behind Achieving World Peace. DESS, 2020. P. 155—160.

42. Jordan, J. "Manual de estudios estratégicos y seguridad internacional." Madrid : Plaza y Valdés Editores, 2013. P. 147—178.

43. Meyer, P. "Dark forces awaken: the prospects for cooperative space security" [Electronic resource] // Nonproliferation Review. Vol. 23, issue 3-4. 2016. P. 495—503. URL: https://summit.sfu.ca/item/16960 (accessed 01.06.2020)

44. Moltz, J. C. "Asia's Space Race: National Motivations, Regional Rivalries, and International Risks." New York : Columbia University Press, 2012.

45. Monmonier, M. "Cartography in the Twentieth Century" // History of Cartography. Vol. 6. Chicago, London : University of Chicago Press, 2015. P. 551—558.

46. Mueller, K. P. "Totem and Taboo: Depolarizing the Space Weaponization Debate" [Electronic resource] // American Defense Policy /Bolt P. J., Coletta V. D., and Collins G.S. (ed.). London : Frank Cass, 2003. URL: https://www.tandfonline.com/doi/pdf/10.1080/1477-760391832499 (accessed 31.05.2020)

47. "Outer Space and Global Security" [Electronic resource] // UNIDIR. Geneva : United Nations Publications, 2003. P. 21—79. URL: https://www.unidir.org/sites/default/files/publication/pdfs/outer-space-and-global-security-307.pdf (accessed 31.05.2020)

48. Rajagopalan, R. P. "Beyond Outer Space Treaty—Time for New Mechanisms?" [Electronic resource] // 50 years of outer space treaty: Tracing the Journey / Ajey Lele (ed.). New Delhi : Pentagon Press, Institute for Defence Studies and Analyses, 2017. P. 172—185. URL: https://www.academia.edu/31761392/book_50years-outer-space-treaty-tracing_avlele.pdf (accessed 31.05.2020)

49. "Russia's securitisation of outer space, risks and opportunities" // Routledge Handbook of Russian Security / Roger E. Kanet (ed.). Routledge, 2019.

50. Sheeran, M. “The International Politics of Space.” London : Routledge Group, 1985. P. 174—184.

51. Tronchetti, F. “The Exploitation of Natural Resources of the Moon and other Celestial Bodies, a proposal for a Legal Regime.” Boston : Martinus Nijhoff Publishers, 2009. P. 9—85.

52. U.S. Congress, Office of Technology Assessment. “Anti-Satellite Weapons, Countermeasures, and Arms Control.” Washington : U.S. Government Printing Office, 1985. 146 p.

53. U.S. Congress, Office of Technology Assessment. “U.S.-Russian Cooperation in Space.” Washington : U.S. Government Printing Office, 1995.

54. “United Nations Treaties and Principles on Outer Space; text of treaties and principles governing the activities of States in the exploration and use of outer space” [Electronic resource] // United Nations Office for Outer Space Affairs. New York : United Nations Publications, 2018. P. 3—72. URL: https://www.unoosa.org/pdf/publications/st_space_11rev2E.pdf (accessed 01.06.2020)

55. “United Nations Treaties and principles on Outer space. Text of treaties and principles governing the activities of States in the exploration and use of outer space, adopted by United Nations General Assembly” [Electronic resource] // UNOOSA. New York : United Nations, 2002. URL: https://www.unoosa.org/pdf/publications/STSPACE11E.pdf (accessed 31.05.2020)

## Websites

56. “Cambridge Academic Dictionary” [Electronic resource]. URL: https://dictionary.cambridge.org (accessed 16.03.2020)

57. “Oxford learner’s dictionaries” [Electronic resource]. URL: https://www.oxfordlearnersdictionaries.com/ (accessed 09.05.2020)

## Research Articles and Interviews

58. Abbey, G.; Lane, N. “United States Space Policy: Challenges and Opportunities Gone Astray” [Electronic resource]. New York : American Academy for Arts and Sciences, 2009. P. 1—37. URL: https://www.amacad.org/sites/default/files/publication/downloads/spaceUS.pdf (accessed 25.03.2020)

59. Arvatov, A.; Dvorkin, D. “Outer Space: Weapons, Diplomacy, and Security” [Electronic resource]. Carnegie Endowment for International Peace, 2010. 144 p. URL: www.jstor.org/stable/j.ctt6wpj66 (accessed 31.05.2020)

60. Association Aéronautique et Astronautique de France. “The militarisation and weaponisation of space: Towards a European space deterrent” [Electronic resource] // Space Policy. Vol 24, issue 2 / Association Aéronautique et Astronautique de France (3AF) Strategy and International Affairs Commission. Paris, 2008. P. 61—66. URL: https://doi.org/10.1016/j.spacepol.2008.02.001 (accessed 07.04.2020)

61. Barry, T. “The militarization of Space and U.S. Global Dominance: the China Connection” [Electronic resource] // The Asia-Pacific Journal: Japan Focus. Vol. 4, issue 12. 2006. URL: https://apjjf.org/-Tom-Barry/2287 (accessed 31.05.2020)

62. “Benefits Stemming from Space Exploration” [Electronic resource] // NASA. 2013. P. 1-22. URL: https://www.nasa.gov/sites/default/files/files/Benefits-Stemming-from-Space-Exploration-2013-TAGGED.pdf (accessed 01.06.2020)

63. Bhaya, A. G. “China refutes U.S. accusations of raising space 'arms race' threat” [Electronic resource]. 2019. URL: https://news.cgtn.com/news/3d3d514f3341544e33457a6333566d54/index.html (accessed 31.05.2020)

64. Blazejewski K. S. “Space Weaponization and US-China Relations” [Electronic resource] // Strategic Studies Quarterly. Vol. 2, no. 1. Air University Press, 2008. URL: https://www.jstor.org/stable/e26267519 (accessed 31.05.2020)

65. Brachet, G. “Towards A More Responsible Use of Outer Space” [Electronic resource] // Awaiting Launch perspectives of the draft ICoC for outer space activities / Dr. Rajeswari Pillai Rajagopalan and Daniel A. Porras (editors). P. 81—86. URL: https://www.academia.edu/15278840/AWAITING_LAUNCH_PERSPECTIVES_ON_THE_DRAFT_ICOC_FOR_OUTER_SPACE_ACTIVITIES (accessed 31.05.2020)

66. Broniatowski, D. A.; Faith, G.; Sabathie G. V. “The Case for Managed International Cooperation in Space Exploration” [Electronic resource]. Washington : Center for Strategic Studies, 2006. P. 2—7. URL: http://web.mit.edu/adamross/www/BRONIATOWSKI_ISU07.pdf (accessed 31.05.2020)

67. “Challenges to Security in Space” [Electronic resource] // Defense Intelligence Agency. 2019. P. 7—32. URL: https://www.dia.mil/Portals/27/Documents/News/Military%20Power%20Publications/Space_Threat_V14_020119_sm.pdf (accessed 31.05.2020)

68. Deblois, B. M. “The Advent of Space Weapons” [Electronic resource] // Astropolitics. Vol. 1, issue 1. London : Frank Cass, 2003. P. 29—53. URL: https://www.cfr.org/content/publications/attachments/Bergman_11ast03.pdf (accessed 31.05.2020)

69. “Defence Research and Development Organisation (DRDO), successfully conducts Interceptor Missile Test” [Electronic resource] // Indian Ministry of Defence. Press Information Bureau. Government of India. Delhi, 2017. URL: http://pib.nic.in/PressReleseDetail.aspx?PRID=1514567 (accessed 31.05.2020)

70. “Delegates express concern over ever-expanding military use, weaponisation of outer space as fourth committee continues general debate” [Electronic resource] // United Nations. 2005. URL: https://www.un.org/press/en/2005/gaspd322.doc.htm (accessed 01.06.2020)

71. Edelkina, A.; Karasaev, O.; Velikanova, N. “Space Policy Strategies and Priorities in Russia” [Electronic resource]. Moscow : National Research University Higher School of Economics, 2005. P. 3—16. URL: https://wp.hse.ru/data/2015/04/02/1096590816/37STI2015.pdf (accessed 31.05.2020)

72. Estabrooks, S. “A Space Weapons Ban: Laying the Foundation” [Electronic resource] // The Ploughshares Monitor. Vol. 25, issue 3. 2004. URL: http://ploughshares. ca/pl_publications/a-space-weapons-ban-laying-the-foundation (accessed 31.05.2020)

73. Froehlich, A. “Space Security and Legal Aspects of Active Debris Removal.” Vienna : European Space Policy Institute, Springer, 2018. P. 66.

74. Fukuyama, F. “The End of History?” [Electronic resource] // The National Interest, No. 18. Center for the National Interest, 1989. P. 3—18. URL: https://www.jstor.org/stable/24027184 (accessed 01.06.2020)

75. Gallagher, N. “Towards a Reconsideration of the Rules for Space Security” [Electronic resource]. Center for International and Security Studies at Mariland, University of Maryland, 2005. P. 1—50. URL: https://cissm.umd.edu/sites/default/files/2019-08/space_rules2006.pdf (accessed 31.05.2020)

76. Gasparini Alves, P. “Peaceful and Non-Peaceful Uses of Space—Problems of Definition for the Prevention of an Arms Race” [Electronic resource]. New York : United Nations, 1991. P. 3—183. URL: https://www.unidir.org/files/publications/pdfs/prevention-of-an-arms-race-in-outer-space-a-guide-to-the-discussions-in-the-cd-en-451.pdf (accessed 31.05.2020)

77. “General Assembly Adopts 63 Drafts on First Committee’s Recommendation with Nuclear Disarmament at Core of Several Recorded Votes” [Electronic resource] // United Nations. 2014. URL: https://www.un.org/press/en/2014/ga11593.doc.htm (accessed 01.06.2020)

78. Grego, L. “A History of Anti-Satellite Programs” [Electronic resource]. Union of Concerned Scientists, 2012. P. 1—16. URL: https://www.ucsusa.org/sites/default/files/2019-09/a-history-of-ASAT-programs_lo-res.pdf (accessed 31.05.2020)

79. Hagen, R.; Shefran, J. “Space use and Ethics; Is a space weapons ban feasible?; Thoughts on technology and verification of arms control” [Electronic resource] // Disarmament Forum. 2003. P. 41—51. URL: https://www.peacepalacelibrary.nl/ebooks/files/UNIDIR_pdf-art1886.pdf (accessed 31.05.2020)

80. Hagt, E. “Mutually Assured Vulnerabilities” [Electronic resource] // China security. Issue 2. Beijing : World Security Institute China Program, 2006. P. 84—106. URL: https://www.files.ethz.ch/isn/19640/China_security2.pdf (accessed 28.01.2020)

81. Haynes, S. T. “China’s Nuclear Threat Perceptions” [Electronic resource] // Strategic Studies Quarterly. Vol. 10, no. 2. Air University Press, 2016. URL: https://www.jstor.org/stable/26271504 (accessed 31.05.2020)

82. Heinrichs, L. R. “Space and the Right to Self Defense” [Electronic resource]. Washington : Hudson Institute, 2016. P. 11—26. URL: https://www.hudson.org/research/12593-space-and-the-right-to-self-defense (accessed 31.05.2020)

83. Hitchens, T.; Katz-Hyman, M.; Lewis, J. “U.S. Space Weapons. Big Intentions, Little Focus” [Electronic resource] // Nonproliferation Review. Vol. 13, no. 1. 2006. P. 35—56. URL: https://www.nonproliferation.org/wp-content/uploads/npr/131hitchens.pdf (accessed 01.06.2020)

84. Horikawa, Y. “ICoC and Long Term Sustainability of Outer Space Activities” [Electronic resource] // Awaiting Launch perspectives of the draft ICoC for outer space activities / Dr. Rajeswari Pillai Rajagopalan and Daniel A. Porras (editors). P. 19—26. URL: https://www.academia.edu/15278840/AWAITING_LAUNCH_PERSPECTIVES_ON_THE_DRAFT_ICOC_FOR_OUTER_SPACE_ACTIVITIES (accessed 31.05.2020)

85. Jackson, J. N. “Outer Space in Russia’s Security Strategy” [Electronic resource] // Simons Papers in Security and Development. No. 64/2018. Vancouver : School for International Studies, Simon Fraser University, 2018. P. 3—19. URL: http://summit.sfu.ca/system/files/iritems1/18164/SimonsWorkingPaper64.pdf (accessed 31.05.2020)

86. Jakhu, S. R. “Evolution of the Outer Space Treaty” [Electronic resource] // 50 years of outer space treaty: Tracing the Journey / Ajey Lele (ed.). New Delhi : Pentagon Press, Institute for Defence Studies and Analyses, 2017. P. 13—19. URL: https://www.academia.edu/31761392/book_50years-outer-space-treaty-tracing_avlele.pdf (accessed 30.05.2020)

87. Jakhu, S. R. “The Future of the Outer Space Treaty” [Electronic resource] // 50 years of outer space treaty: Tracing the Journey / Ajey Lele (ed.). New Delhi : Pentagon Press, Institute for Defence Studies and Analyses, 2017. P. 185—194. URL: https://www.academia.edu/31761392/book_50years-outer-space-treaty-tracing_avlele.pdf (accessed 01.06.2020)

88. Johnson, C. D.; Porras, D.; Hearsey C. M.; O’Sullivan, S. “The curious case of the transgressing tardigrades (part 1)” [Electronic resource] // The Space Review. 2019. URL: https://www.thespacereview.com/article/3783/1 (accessed 01.06.2020)

89. Koplow, D. A. “The Fault Is Not in Our Stars: Avoiding an Arms Race in Outer Space” [Electronic resource]. Georgetown Law Faculty Publications and Other Works, 2018. P. 331—388. URL: https://ssrn.com/abstract=3058132 (accessed 28.01.2020)

90. Kowal, H. J. “Preventing The Weaponization Of Space” [Electronic resource] // Canadian Forces College. 2002. URL: https://www.cfc.forces.gc.ca/259/290/288/286/kowal.pdf (accessed 31.05.2020)

91. Kozin, V. P. “Militarization of outer space and its impact on global security environment” [Electronic resource]. NUST Global Think Tank Network (GTTN), National University of Sciences and Technology (NUST), 2015. P. 1—15. URL: http://www.space4peace.org/articles/Militarization%20of%20Outer%20Space%20and%20its%20Impacts%20on%20Global%20Security.pdf. (accessed 31.05.2020)

92. Kulacki, G. “An Authoritative Source on China’s Military Space Strategy” [Electronic resource]. 2014. P. 1—12. URL: https://www.ucsusa.org/sites/default/files/2019-10/China-s-Military-Space-Strategy.pdf (accessed 01.06.2020)

93. Kuplic, B. S. “The Weaponization of Outer Space: Preventing an Extraterrestrial Arms Race” [Electronic resource] // North Carolina Journal Of International Law And Commercial Regulation. Vol. 39, no. 4. 2014. URL: https://scholarship.law.unc.edu/ncilj/vol39/iss4/6/ (accessed 31.05.2020)

94. Lachowski, Z. “Confidence- and Security-Building Measures in the New Europe” [Electronic resource] // SIPRI Research Report. No. 18. Stockholm International Peace Research Institute, Oxford University Press, 2004. P. 7—108. URL: https://www.sipri.org/sites/default/files/files/RR/SIPRIRR.pdf (accessed 31.05.2020)

95. Larrimore, S. C. “International space launch notification and data exchange” [Electronic resource] // Space Policy. Vol 23, issue 3. 2007. P. 172—179. URL: https://www.researchgate.net/publication/248494233_International_space_launch_notification_and_data_exchange (accessed 31.05.2020)

96. Lele, A.; Sharma, M. “International Space Station: Terrestrial Confrontation to Orbital Cooperation” [Electronic resource]. 2015. URL: https://www.e-ir.info/2015/04/25/international-space-station-terrestrial-confrontation-to-orbital-cooperation/ (accessed 01.06.2020)

97. Lele, A. “China’s 2016 Space White Paper: An Appraisal” [Electronic resource] // ETH Zürich Center for Security Studies. 2017. URL: https://css.ethz.ch/en/services/digital-library/articles/article.html/6059413a-3bff-408f-835a-24009e07f261 (accessed 01.06.2020)

98. Lele, A. “Indian Armed Forces and Space Technology” [Electronic resource] // India Review. Vol. 10, issue 4. New Delhi : Institute for Defence Studies and Analyses, 2011. P. 379—393. URL: http://dx.doi.org/10.1080/14736489.2011.624023 (accessed 31.05.2020)

99. Lele, A. “The role of global cooperation in space after COVID-19” [Electronic resource] // The Space Review. 2020. URL: https://www.thespacereview.com/article/3919/1 (accessed 01.06.2020)

100. Leon, A. M. “Mining for Meaning: An examination of the Legality of Property Rights in Space Resources” [Electronic resource]. Virginia law Review Association, 2018. URL: http://www.capdale.com/files/24323_leon_final_note.pdf (accessed 31.05.2020)

101. Lim, J. “The Future of the Outer Space Treaty—Peace and Security in the 21st Century” [Electronic resource] // Global Politics Review. Vol. 4, issue 2. 2018. P. 72—112. URL: http://www.globalpoliticsreview.com/publications/2464-9929_v04_i02_p072.pdf (accessed 31.05.2020)

102. Marboe, I. “Militarization of outer space: present and future challenges from the international legal perspective” [Electronic resource]. 2012. P. 1—10. URL: https://acuns.org/wp-content/uploads/2012/06/Militarization-Outer-Space-Irmgard-Marboe-AM-2010.pdf (accessed 31.05.2020)

103. “Meeting of the Valdai International Discussion Club” [Electronic resource] // President of Russia. Sochi, 2014. URL: http://en.kremlin.ru/events/president/news/46860 (accessed 01.06.2020)

104. Meyer, P. “The Diplomacy of Space Security: Whither the International Code of Conduct?” // Simons Papers in Security and Development. No. 38/2014. Vancouver : School for International Studies, Simon Fraser University, 2014. P. 5—19.

105. Mineiro, M. C. “The United States and the Legality of Outer Space Weaponization: A Proposal for Greater Transparency and a Dispute Resolution Mechanism” [Electronic resource] // 33 Annals Air & Space L. 441. Biddle Law Library, 2008. URL: https://www.law.upenn.edu/live/files/7847-mineirouslgltymcgillpdf (accessed 31.05.2020)

106. Moltz, J. C. “The Changing Dynamics of Twenty-First-Century Space Power” [Electronic resource] // Strategic Studies Quarterly. Vol. 13, no. 1. Air University Press, 2019. P. 66—90. URL: www.airuniversity.af.edu/Portals/10/SSQ/documents/Volume-13_Issue-1/Moltz.pdf (accessed 31.05.2020)

107. NASIC. “Competing in Space” [Electronic resource]. NASIC Public Affairs Office, 2018. P. 1—25. URL: https://media.defense.gov/2019/Jan/16/2002080386/-1/-1/1/190115-F-NV711-0002.PDF (accessed 31.05.2020)

108. “National Space Policy of the United States of America” [Electronic resource] // NASA. 2010. URL: https://history.nasa.gov/national_space_policy_6-28-10.pdf (accessed 01.06.2020)

109. Oduntan, G. “Sovereignty and Jurisdiction in Airspace and Outer Space; The never ending dispute: legal theories on the spatial demarcation boundary plane between airspace and outer space.” New York : Routledge Research in International Law, 2012. P. 282—356.

110. Oduntan, G. “The never ending dispute: legal theories on the spatial demarcation boundary plane between airspace and outer space” [Electronic resource] // Hertfordshire Law Journal. Vol. 1, issue 2. 2003. P. 64—84. URL: https://pdfs.semanticscholar.org/d81b/b88753eaced1ec97cc56baed8cc25ffdc9d6.pdf (accessed 31.05.2020)

111. Pasco, X. “A European Approach to Space Security” [Electronic resource]. American Academy of Arts and Sciences, 2009. URL: https://www.amacad.org/sites/default/files/publication/downloads/spaceEurope.pdf (accessed 31.05.2020)

112. Platzgraff, R. L. “Weapons in Space” [Electronic resource] // Boston Council on Foreign Relations. 2007. URL: http://www.ifpa.org/pdf/BCFR_061807.pdf (accessed 31.05.2020)

113. Porras, D. A. “The ‘Common Heritage’ of Outer Space: Equal Benefits For Most of Mankind” [Electronic resource] // California Western International Law Journal. Vol. 37, no. 1, article 5. 2006. URL: https://scholarlycommons.law.cwsl.edu/cwilj/vol37/iss1/5 (accessed 31.05.2020)

114. “Principles of the Committee on the Peaceful Uses of Outer Space” [Electronic resource] // Committee on the Peaceful Uses of Outer Space. URL: https://www.unoosa.org/oosa/en/ourwork/copuos/index.html (accessed 31.05.2020)

115. “Raising Alarm over Possible Space Wars, First Committee Delegates Explore Ways to Build New Order for Preventing Celestial Conflict, Confrontation” [Electronic resource] // United Nations. 2018. URL: https://www.un.org/press/en/2018/gadis3609.doc.htm (accessed 01.06.2020)

116. Rajagopalan, R. P. “India’s Changing Policy on Space Militarization: The Impact of China’s ASAT Test” [Electronic resource] // India Review. Vol. 10, issue 4. New Delhi : Institute for Defence Studies and Analyses, 2011. URL: http://dx.doi.org/10.1080/14736489.2011.624018 (accessed 31.05.2020)

117. Rathgeber, W.; Remuss, N.-L.; Schrogl K.-U. “Space security and the European Code of Conduct for Outer Space Activities” [Electronic resource]. 2009. URL: www.peacepalacelibrary.nl/ebooks/files/UNIDIR_pdf-art2909.pdf (accessed 31.05.2020)

118. Reichard, T. “Embattled Heavens: The Militarization of Space in Science, Fiction, and Politics” [Electronic resource] // Freie Universität Berlin. 2014. URL: https://www.geschkult.fu-berlin.de/e/fmi/astrofuturismus/publikationen/Reichard---EH-Report-HSK.pdf (accessed 31.05.2020)

119. Ridderhof, R. “Space Mining and (U.S.) Space Law” [Electronic resource] // Peace Palace Library. 2015. URL: https://www.peacepalacelibrary.nl/2015/12/space-mining-and-u-s-space-law/ (accessed 31.05.2020)

120. Rocca, C. “Prevention of an Arms Race in Outer Space” [Electronic resource] // Conference on Disarmament [Statements]. 2007. URL: http://www.reachingcriticalwill.org/images/documents/Disarmament-fora/cd/2007/statements/1session/Feb13USA.pdf (accessed 31.05.2020)

121. Rodriguez, R. M. “The Space Program of the People’s Republic of China” [Electronic resource]. Lulu Press, 2017. URL: https://www.researchgate.net/publication/215828158_The_Space_Program_of_the_People’s_Republic_of_China (accessed 31.05.2020)

122. “Russia’s Foreign Affairs Minister’s speech at Munich Security Conference” [Electronic resource] // Permanent Mission of the Russian Federation to the European Union. 2015. URL: https://russiaeu.ru/en/news/foreign-minister-sergey-lavrovs-speech-51st-munich-security-conference (accessed 31.05.2020)

123. Ruttley, T. M.; Robinson, J. A.; Gerstenmaier, W. H. “The International Space Station: Collaboration, Utilisation and Commercialisation” [Electronic resource] // Social Science Quarterly. Vol. 98, issue 4. Wiley, 2017. P. 1160—1174. URL: https://www.researchgate.net/publication/322066773_The_International_Space_Station_Collaboration_Utilization_and_Commercialization_The_International_Space_Station (accessed 30.05.2020)

124. Sanz Fernández de Córdoba, S. “Presentation of the Karman separation line, used as the boundary separating Aeronautics and Astronautics” [Electronic resource] // The World Air Sports Federation [archived copy]. 2004. URL: https://web.archive.org/web/20110809093537/http://www.fai.org/astronautics/100km.asp (accessed 31.05.2020)

125. Saperstein, A. M. “‘Weaponization’ vs. ‘Militarization’ of Space” [Electronic resource] // American Physical Society. 2001. URL: https://www.aps.org/units/fps/newsletters/2002/july/saperstein.pdf (accessed 31.05.2020)

126. Schmitt, M. N. “International Law and Military Operations in Space” [Electronic resource] // Max Planck Yearbook of United Nations Law. Vol. 10. Koninklijke Brill N.V., 2006. P. 89—125. URL: http://www.mpil.de/files/pdf3/04_schmittii1.pdf (accessed 31.05.2020)

127. Sikorska, P. E. “For the Sake of Others: the Necessity to Regulate the Militarization and Weaponization of Outer Space” [Electronic resource] // European science review. No. 5—6. Institute of Air and Space Law, McGill University, 2015. URL: https://cyberleninka.ru/article/n/for-the-sake-of-others-the-necessity-to-regulate-the-militarization-and-weaponization-of-outer-space (accessed 31.05.2020)

128. Silverstein, B.; Porras, D.; Borrie, J. “Alternative Approaches and Indicators for the Prevention of an Arms Race in Outer Space” [Electronic resource]. UNIDIR, 2020. URL: https://unidir.org/publication/alternative-approaches-and-indicators-prevention-arms-race-outer-space (accessed 31.05.2020)

129. Simpson T. R. “The Space Station: An Idea Whose Time Has Come” [Electronic resource] // IEEE Spectrum. Vol. 22, no. 9. New York : IEEE PRESS, 1985. P. 16. URL: https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=1457895 (accessed 31.05.2020)

130. Singh, G. “China in Space Scenarios for the Future” [Electronic resource] // China in Space, International Affairs Review. Vol. XXIV. 2016. P. 6—33. URL: https://www.academia.edu/27266166/China_in_Space_Scenarios_for_the_Future (accessed 31.05.2020)

131. Skinner, C. “Brexit and Trump Prove that the World Is Not Globalizing” [Electronic resource] // Nasdaq. 2016. URL: https://www.nasdaq.com/articles/brexit-and-trump-prove-world-not-globalizing-2016-11-13 (accessed 31.05.2020)

132. “Space Café WebTalk Recap: ’33 minutes with Daniel Porras’” [Electronic resource] // SpaceWatch.Global. [Video]. URL: https://spacewatch.global/2020/04/space-cafe-webtalk-recap-33-minutes-with-daniel-porras/ (accessed 01.06.2020)

133. Suzuki, K. “ICoC and the Right of Self Defence” [Electronic resource] // Awaiting Launch perspectives of the draft ICoC for outer space activities / Dr. Rajeswari Pillai Rajagopalan and Daniel A. Porras (editors). P. 87—93. URL: https://www.academia.edu/15278840/AWAITING_LAUNCH_PERSPECTIVES_ON_THE_DRAFT_ICOC_FOR_OUTER_SPACE_ACTIVITIES (accessed 31.05.2020)

134. Swiss Federal Institute of Technology Zurich. “The militarization of outer space, Swiss federal institute of Technology” [Electronic resource]. Zurich : International Relations and Security Network, 2008. URL: https://www.files.ethz.ch/isn/130808/ISN_Special_Issues_Aug.2008.pdf (accessed 30.05.2020)

135. “The Militarisation of Space: Policy and Legal Aspects” [Electronic resource] // The Royal Military School. Brussels : Leuven Centre for Global Governance Studies, Verantwoordelijk uitgever, 2007. URL: https://ghum.kuleuven.be/ggs/events/2007/12_2007/conference_militarisation_space_6dec2007.pdf (accessed 31.05.2020)

136. Tripathi, P. N. “Weaponisation and Militarisation of outer space” [Electronic resource] // CLAWS Journal. Winter 2013. 2013. P. 188—200. URL: https://indianarmy.nic.in/WriteReadData/Documents/Weaponisation.pdf (accessed 25.03.2020)

137. Tronchetti, F. “The Non-Appropriation Principle Under Attack: Using Article II Of The Outer Space Treaty In Its Defence” [Electronic resource]. 2013. URL: https://iislweb.org/docs/Diederiks2007.pdf (accessed 31.05.2020)

138. “Trump’s ’space force’ isn’t a new idea. We've been doing that for decades, say experts” [Electronic resource] // CBC Radio. 2018. URL: https://www.cbc.ca/radio/thecurrent/the-current-for-march-19-2018-1.4582208/trump-s-space-force-isn-t-a-new-idea-we-ve-been-doing-that-for-decades-say-experts-1.4582240 (accessed 01.06.2020)

139. “US refuses to discuss Russian-Chinese idea against militarisation of space: Lavrov” [Electronic resource] // Asian News International. 2019. URL: https://www.aninews.in/news/world/europe/us-refuses-to-discuss-russian-chinese-idea-against-militarisation-of-space-lavrov20191102085757/ (accessed 31.05.2020)

140. Virgiliu, P. “Appropriation in outer space: the relationship between land ownership and sovereignty on the celestial bodies” [Electronic resource] // Space Policy. Elsevier, November 2000. P. 275—282. URL: https://doi.org/10.1016/S0265-9646(00)00037-0 (accessed 31.05.2020)

141. Voosen, P. “Outer space may have just gotten a bit closer” [Electronic resource] // American Association for the Advancement of Science. 2018. URL: https://www.sciencemag.org/news/2018/07/outer-space-may-have-just-gotten-bit-closer (accessed 31.05.2020)

142. “What Is the Soyuz Spacecraft?” [Electronic resource] // NASA. 2018. URL: https://www.nasa.gov/audience/forstudents/k-4/stories/nasa-knows/what-is-the-soyuz-spacecraft-k-4 (accessed 01.06.2020)

143. “Where is space?” [Electronic resource] // National Oceanic and Atmospheric Administration. 2016. URL: https://www.nesdis.noaa.gov/content/where-space (accessed 31.05.2020)

144. Wolf, J. M. “‘Peaceful uses’ of outer space has permitted its militarisation-does it also mean its weaponisation?” [Electronic resource] // Disarmament Forum / Kerstin Vignard (ed.). UNIDIR, 2003. P. 5—13. URL: https://www.unidir.org/files/publications/pdfs/making-space-for-security-en-346.pdf (accessed 31.05.2020)

145. Yongkyu, K. “Analyzing the recent multilateral discussions on outer space” [Electronic resource]. University of Hamburg, 2017. URL: https://d-nb.info/1139396994/34 (accessed 31.05.2020)

146. Zhang, H. “A Chinese view on a Fissile Material Cut-off Treaty” [Electronic resource] // Journal of Nuclear Materials Management. No. 4. 2002. P. 34—56. URL: https://www.researchgate.net/publication/292494437_A_Chinese_view_on_a_Fissile_Material_Cut-off_Treaty/citation/download (accessed 31.05.2020)

147. Zhang, H. “Space Weaponization And Space Security: A Chinese Perspective” [Electronic resource] // China security. Issue 2. Beijing : World Security Institute China Program, 2006. P. 24—36. URL: https://www.files.ethz.ch/isn/19640/China_security2.pdf (accessed 31.05.2020)

148. Zonghuai, Q. “An Effective Way to Prevent an Arms Race in Outer Space The Early Negotiation and Conclusion of an International Legal Instrument” [Electronic resource] // Occasional Papers No.6: A Disarmament Agenda for the 21st Century. UNODA, 2002. URL: https://www.un-ilibrary.org/disarmament/unoda-occasional-papers-no-6-a-disarmament-agenda-for-the-21st-century-october-2002_2633d85d-en (accessed 31.05.2020)