

# LUISS



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## **A Race Field for Global Supremacy: Military and Strategic Uses of Outer Space**

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# Introduction

Cooperation and competition have always been the basis of the relationship between states concerning space activities. Following the drafting of international space treaties, states have mostly focused on pursuing a cooperative model. The main purpose of space international law is indeed to preserve outer space as an environment destined to peaceful uses only. A symbol of such cooperation is, for instance, the International Space Station (ISS), where the borders of nationalities are abolished in favor of fraternity, solidarity and collaboration among astronauts from all over the world.

Such a pacific environment is the result of agreements reached following the years of the so-called “Space Race” in the 60s. It took place during the Cold War, which was a period of great tension and struggle between two main blocks, the URSS and the USA. Each of the two powers wanted to impose their ideology and their supremacy over the other in every field, including science, ideology and military; in this scenario of great competitiveness, the run to be the first to conquer space began. Because it was still unexplored and far beyond reach for the man, the space provided for the perfect arena to show who had the lead over the opponent in terms of economic and technological development. The race was part of a plan of propaganda through which both URSS and USA aimed at proving to the whole world the superiority of their own political system. Most importantly, space was fundamental for military purposes because of its huge advantages in such field; thus, from the beginning of its exploration, the outer space was dedicated to strategic uses. This is the main reason why URSS and USA wanted to gain control over space; indeed, it was and still is essential to ensuring national security and military advantage over the others.

The first chapter will discuss the Space Race and the race to military armament of the outer space during the Cold War. The race never saw the recourse to armed conflict; however, it was characterized by great tension and it was always on the verge of breaking into a nuclear war. Nonetheless, agreements for keeping space free of any sovereignty and violence were eventually signed. In those regards, the focus will be moved on the first steps towards cooperation, up to the end of the Space Race in 1975, when the joint mission Apollo-Soyuz was launched.

Over time, competitiveness has maintained a central role. Following the recent developments, despite the efforts to keep space away from armament and direct conflicts great tensions have arisen again among states and space has become again a battlefield for gaining global supremacy. This is due to the many benefits that space exploration brings to the economics,

society and military. For instance, national security systems and military forces largely rely on space devices for communication, surveillance, early warning, guidance of vehicles and many other services. Not having developed one's own space capabilities means being in a situation of great vulnerability. Because of those reasons, after a "relaxation period", competitiveness is again on the rise and many countries are increasingly pursuing military uses of outer space.

The specific matter of militarization of outer space still represents a very controversial subject as the law regulating the use of space for civil and military purposes results to be vague. International space law is characterized by gaps and leaves room to different interpretations for what is meant by 'peaceful use of outer space' and to what extent the space can be used for military purposes. No clear line is drawn to define the specific rights and duties of countries for what concerns activities on space. The lack of proper and exhaustive regulation further increases of the competitiveness, as space law is not always clear enough to punish hazardous behaviors. Consequently, the means to deal with possible controversies among countries are still missing. Although until now space has been a quite environment, mainly characterized by cooperation; however, this peaceful balance is being threatened by the rising economic and strategic ambitions of countries.

On one hand, countries are enhancing their space capabilities; nonetheless, because of state's increasing dependence on Space assets, many of them are taking steps to protect themselves and their interests from the threats of other countries. Thus, on the other hand, they are investing resources to develop counterspace capabilities as well, such as the ASAT (anti-satellite) weapons. Particularly, the latter represents a major threat because it can be used to disable or physically destroy other satellites. By now, ASAT weapons have never been used for military purposes against other countries' spatial devices; indeed, the only states possessing them (namely United States, Russia and China) have tested their ASAT capabilities against their own dismissed satellites. Nonetheless, the disruption of a satellite places in orbit a great number of debris that could pose a threat the integrity of other objects in orbit, including the very International Space Station.

Apart from being central for state's military and security, space services are fundamental for the society. Communication, GPS (Global Positioning System), internet connection, exchange of data, meteorological predictions and many other services that everybody uses in their everyday life work thanks to information sent by satellites. The economy also strongly relies on those services: the logistics, telecommunication, electric services and banks use GPS to synchronize their activities. Many of those technologies are 'dual-use', meaning that they can be used for both military and civil purposes. Inevitably, this characteristic makes it hard to

regulate them at international level. The focus will be moved on those kinds of technologies in the second chapter. In particular, three types of 'dual-use' technologies will be taken under examination: the Global Positioning System (GPS), satellites for weather assessments, and anti-satellite capabilities (ASAT). The chapter will illustrate some of the ways they are used for strategic purposes, including real world examples of their deployment in the military field. In light of the current controversies among states about the deployments of ASAT weapons, some of the recent political events concerning their use will be included.

The the topics of the third chapter will be modern space era and the developments of the last decades in the field of relations among states regarding outer space-related issues. Focusing on the strategic and military side, it will be discussed how space is becoming again one of the main battlefields for global competition, especially in the light of the great ambitions some states are pursuing. In doing so, I shall take into consideration the three major protagonists of spatial activities: USA, Russia and China.

Nonetheless, states are not the only players in the field. In order to fully understand the New Space Race, both the political and the economic side need to be considered simultaneously. Because of the huge economic gains space exploration brings, new actors entered the scene, namely investors. In recent years, private entrepreneurs have started playing a major role, conquering their spot in the race for dominating the scene. The most relevant personality is perhaps the American businessman Elon Musk, owner of Tesla motor and funder of SpaceX, a private aerospace company for commercial purposes. Hence, while governments have always been the main provider of space services, they are now becoming the main consumers. In those regards, the third chapter will include a paragraph dedicated to the reality of private space businesses; specifically, it will concentrate on the SpaceX case and its involvement in the Ukraine-Russia war.

Therefore, the present thesis will deal with the outer space being one of the major race fields for gaining global supremacy from the very beginning of its exploration. The main focus will be on the military and strategic uses of outer space as tools for gaining such supremacy. Last but not least, it will be done by analysing the development of relations among states concerning space activities from the Space Race during the 60's to the current days.

## **Chapter 1: the Space Race during the Cold War**

The discovery of the Outer Space can be considered to be quite recent. The first steps towards space research and exploration were moved just over 50 years ago and more specifically in 1957; this year marked the beginning of the so-called “Space Race” which had as main actors the USA and the URSS. It took place during the Cold War, which was a period of great tension between the two powers soon after the end of the Second World War. It never reached the point to break up in an armed conflict, but each wanted to impose their global influence on the other in many fields; they wanted to show their political, economic and social supremacy through their different ideologies. Nonetheless, the competition was extended to many other domains such as warfare, sports, art or technological development, as in the case of the Space Race. Particularly during this period, the USA’s and URSS’ intent was to show their scientific and technologic supremacy to the whole world. Nonetheless, this was not the only goal behind the Space Race and, perhaps, not even the main one. Indeed, their real aim was to prove their military and strategic superiority. Moreover, the outer Space provided as an important arena for the two powers to show not only their military abilities but also for sustaining their ideological propaganda.

From the military point of view, space technologies and satellites were mainly useful for operations of espionage, monitoring and surveillance. Ancestors of the modern Space devices were developed for strategic purposes during the Cold War. Operative ICBM (intercontinental ballistic missiles) were deployed for the first time. They were missiles specifically designed to carry nuclear warheads and to deliver them. Even though the first ICBMs were not as precise as the modern ones, they could easily target any city on Earth from space and bomb them with nuclear weapons. The very first satellite launched in orbit was a R-7 intercontinental missile. The creation of the early-warning system, which is fundamental to detect missiles, can be traced back to the 60’s. Still today, many efforts to develop space and counterspace capabilities have their links to the Cold War. Large part of the technological developments required to explore space were used in the first place for improving military capabilities.

Among all the things, the Cold War was an ideological conflict in which the main actors wanted to gain global influence. In this scenario, achievements in space exploration were the perfect excuse for each part to show off their technological and economic superiority. Space exploration was an important tool of propaganda for both the USA and the URSS to build credibility about the excellence of their political systems.

## 1.1 The Space Race: a military competition

The Space Race officially began with the launch of first artificial satellite successfully sent to Space and placed around the Earth's orbit; It was the "*Sputnik I*" and Moscow announced it on the 4<sup>th</sup> October 1957. That represented a clear message that the URSS was, at least initially, having the upper hand in terms of technological development on the USA. Nevertheless, it also constituted a military threat for the USA: the Sputnik I was a R-7 modified intercontinental missile URSS could potentially use to attack any terrestrial point by launching nuclear warheads from their own territory.

The first moves in space exploration were mostly pushed by the desire of these two great powers to show their supremacy over one another. The National Security Council of the USA had as one of their main concerns the public image of the nation; specifically, they were worried that the launch of the Russian satellite would mark the beginning of "a new progressive URSS era" and "the end of the US golden Age"<sup>1</sup>. However, the same held true for the soviets as well. Their significant achievement hadn't much to do with a real intention of exploring the space and advancing technologically; it was more than anything part of a plan of propaganda of the socialist system and the Communist party.

This commitment lied behind many other efforts as well, such as the launching of the first woman into space or the following "race to the Moon". Sending a woman to space was not aimed at including women per se but rather, again, at being superior to the Americans. That was explicitly stated by the representative of the Air Force General Staff, the General Nikolay Kamanin. Among the reasons why sending women to space, he wrote in his journal: "Under no circumstances should an American become the first woman in space- this would be an insult to the patriotic feelings of Soviet Women"<sup>2</sup>.

After another successful launch by the URSS of the satellite *Sputnik II*, the reaction of the United States began. The USA developed the Project Vanguard which, however, was a complete failure because of the increasing pressures felt. Although the event worsened the US

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<sup>1</sup> Walter A. McDougall, "*Sputnik, the Space Race, and the Cold War*", bulletin of the Atomic Scientists 41, no. 5 (1985): 23

<sup>2</sup> Kamanin. *Skrytiy kosmos*; 1960-1963. P. 62; Debra D. Facktor and Valentina ponomareva. '*Women in the Early Soviet Spaceflight Program.*', presented at a meeting of the American Association for the Advancement of Slavic Studies, Boston, MA, November 14-17, 1996; Bart Hendrickx. "The Kamanin Diaries 1960-1963." *Journal of the British Interplanetary Society* 50 (January 1997); 33-40.

public image, only four months later the satellite Explorer I was successfully launched into orbit.

On July 1958, the passage of the National Aeronautics and Space Act established the creation of the NASA ( National Aeronautics and Space Administration). This was a particularly crucial moment, as the creation of NASA marked a change of scope in the exploration of space and research. Namely, the militaristic approach was substituted with a more humanistic and scientific one. Here, for the first time, were stated the peaceful purposes of the use of space and the openness to actively cooperate with other nations for the benefit of the whole mankind. The intent can be found in the “Declaration of Policy and Purposes” in Section 102a of the Aeronautics and Space Act (1958), which cites as follow: “ The Congress hereby declares that it is the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind” and it then continues in Section 102d “ The aeronautical and space activities of the United States shall be conducted so as to contribute materially to...Cooperation by the United States with other nations and groups of nations in work done pursuant to this Act and in the peaceful application of the results thereof”<sup>3</sup> .

The passage of the Act showed the willingness of Congress to readdress and change the route of the space programs. Nevertheless, the Eisenhower administration didn't want to give up totally the militaristic approach and still wanted to discover space military possibilities.

It was only with the appointment of J.F. Kennedy as president of the United States that the interactions between the USA and the URSS for the control of the outer space undertook the path of cooperation.

Some attempts to were already made during the Eisenhower administration; the International Geophysical Year was founded, which lasted about 1 year. It was a project studying the Earth and its orbital environment, and it reunited scientists from 67 different nations. The same year the International Committee for Space Research (COSPAR) was created; it had to serve as a forum for cooperation in the field of space flight. The USA hoped to create a link for collaboration with the Soviet Union, as it was the most technologically advanced power in the field and could provide the States with a sizeable help. However, it was soon influenced by the political conflicts of the Cold War. Following the launch of *Sputnik I*, the main topic of discussion in the United Nations was about the nuclear disarmament of outer space and the willingness to avoid weapons to be introduced in the spatial environment. This was what the USA was hoping for. On the other hand, the Soviet Union had a different opinion and disagreed

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<sup>3</sup> National Aeronautics and Space Act of 1958, Sec. 102, Declaration of Policies and Purposes



in banning the militarization of the space. This is because the URSS relied a lot upon outer space military capabilities to protect themselves and attack, and particularly on the use of the ICBM (intercontinental ballistic missile). The latter is a missile with a great range and it is especially designed to deliver thermonuclear warheads.

USA had bases not only in their continent but around Europe and in the East. Hence, on its side, the URSS was surrounded by American bases while its only way to defend itself was by using the missiles it had on space. Because of that, the Soviet Union saw the desire of the United States to demilitarize space as an excuse to weaken the URSS itself and leave it without any practical response to a possible nuclear attack.

The divergent views on the matters can be clearly seen in the letters exchanged between the First Secretary of the Communist Party of the Soviet Union Nikita Khrushchev and the President of the United States Dwight D. Eisenhower; the URSS replied to the invites to cooperation sent by the United States, stating that they would accept to cooperate if and only if the USA agreed to remove their nuclear weapons in places such as Turkey.

## 1.2 Towards cooperation

When J.F. Kennedy was appointed as President of the United States in 1961, the relationship between the two powers changed. From the very beginning of his presidency, Kennedy tried to adopt a cooperative attitude, as declared in his famous statement “let both sides seek to invoke the wonders of science instead of its terror. Together let us explore the stars”<sup>4</sup>.

Firstly, Kennedy tried to make the United Nations Committee a forum for discussion about the matter. The US made a proposal presented to both the General Assembly and to the committee; the proposal included: a) to apply the international law to outer space and celestial bodies, and that those be open for exploration to all nations, b) that the states provide information about objects launched into orbit to the committee on the Peaceful Uses of Outer Space and that the Secretary-General maintain a public registry of such information, c) cooperation in weather research and analysis<sup>5</sup>, d) and “noting with concern that the continuing arms race is a heavy burden for humanity and is fraught with dangers for the cause of world peace”, welcomes the

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<sup>4</sup> J.F. Kennedy, 1961) (J.F. Kennedy “Inaugural address” (January 20, 1961), John F. Kennedy Presidential Library and Museum, available from: <https://www.jfklibrary.org/archives/other-resources/john-f-kennedy-speeches/inaugural-address-19610120>

<sup>5</sup> *Official Record of the General Assembly, Sixteenth Session, Annexes*, agenda item 21, document A/4987

Governments of the USA and URSS to undertake negotiations for the complete disarmament of outer space<sup>6</sup>. The UN resolution 1721 was passed with no abstentions by the General Assembly.

Nonetheless, the Soviet leader Khrushchev was not moved until the 1962, when the United States sent the first American to orbit around the Earth, John Glenn. The event offered a reminder for peace during a period in which both the USA and URSS were back at testing nuclear weapons. Khrushchev wrote: “it is to be hoped that the genius of man... will be able to find ways to lasting peace and ensure prosperity of all people on our planet...” and then “If our countries pooled their efforts- scientific, technical and material- to master the universe, this would be very beneficial for the advance of science and would be joyfully acclaimed by all peoples who would like to see scientific achievements benefit man and not be used for ‘cold war’ purposes and arms race”<sup>7</sup>. Nevertheless, it is worth noting that the Soviet Union was left behind United States for what concerned the development of space technologies, such as in the field of geostationary telecommunication and the ability to collect meteorological data from those satellites. The approach adopted by the two parts was very different. The Soviet Union still had a military strategy behind space exploration and everything regarding their program was kept secret, contrary to the USA space program. The Soviet Academy of Sciences was used as an official front by the military apparatus and the Communist Party. It is also important to note that, despite the efforts for cooperation and peace, some degree of competitiveness was kept. Specifically, the URSS didn’t miss the chance to sell any of their achievements as a victory of communism. On the other hand, the USA was still hoping to be recognized as the Space Race winner. Despite the efforts for cooperation advanced by the USA, they still had the desire to prevail over the URSS. Kennedy in one of his famous speech, “The Space Challenge”, declared that “the views of this nation can only be fulfilled if we in this nation are first and therefore we intend to be first”<sup>8</sup>. According to him, being second in the space race would have meant not fully ensuring national security; on the other side, being first would have meant being ahead in constructing and developing missiles weapons. That’s why the space program became Americans’ highest priority, and they were determined more than ever to be the first ones to send a man to the Moon and back safely before the end of the decade with the Apollo program. This would have improved the USA public image to its nationals.

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<sup>6</sup> *Official Record of the General Assembly, sixteenth session, Annexes*, agenda item 19, document A/4879

<sup>7</sup> Letter From Chairman Khrushchev to President Kennedy, Foreign Relations of the United States, 1961-1963, Volume VI, Kennedy-Khrushchev Exchanges

<sup>8</sup> John F. Kennedy, “*The Space Challenge: High National Priority*”, *Vital Speeches of the Day* 28, no.24 (1962): 739.

After the failures by the CIA to overthrow Fidel Castro's regime in Laos and Cuba, the conquest of the Moon was seen as a way to reaffirm the USA as the world leader.

In August 1963, the Partial Test Ban Treaty (PTBT) was signed; it prohibited the testing of nuclear weapons underwater, in the Atmosphere and in Outer Space, with the only exception of the testing conducted underground.

In October of the same year, the Resolution 1884 was passed by the General Assembly, which recalled the Resolution 1721 of 1961. Its main aim was "to take steps to prevent the spread of the arms race to outer space" and "Welcomes the expressions by the Union of Soviet Socialist Republics and the United States of America of their intention not to station in outer space any objects carrying nuclear weapons or other kinds of weapons of mass destruction" calling upon States: a) "To refrain from placing in orbit around the earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, installing such weapons on celestial bodies, or stationing such weapons in outer space in any other manner" and b) "To refrain from causing, encouraging or in any way participating in the conduct of the foregoing activities"<sup>9</sup>.

As stated in the report to Congress from the president of the United Nations, in 1963 many achievements were reached. Among those, the United States officially undertook a cooperative agreement with the Soviet Union to share data from satellites, for coordinated launches of weather satellites and experiments in space communications.

In October 1967, the most important Treaty regulating space activities entered into force: the Outer Space Treaty. It is formally known as the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies and it was opened to the signature of the three depository governments: the Russian Federation, the United States of America and the United Kingdom.

Nevertheless, the Treaty does not openly and clearly ban all military activities in space; still today, this is the cause of many controversies in the interpretation of international space law.

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<sup>9</sup> G.A Resolution 1884 'Question of General and Complete Disarmement', *Official Record of the General Assembly, eighteenth Session, suppl.no. 15*, agenda item 26, document A/5515) <https://digitallibrary.un.org/record/203960>.

### **1.3 The end of the Space Race**

Despite these first efforts for cooperation, throughout the 60s the relationship between URSS and USA in space exploration were characterized mostly by competition rather than cooperation. The situation changed during the 70s, after the Apollo 11 mission. On July 1969, the first human beings ever were sent on the Moon. They were the American astronauts Neil Armstrong and Buzz Aldrin. The mission was a clear message that the USA was far ahead of the Soviet Union and it was the final ‘winner’ of the struggling race to space.

A huge quantity of money had been spent on space programs, and the two powers, especially the URSS, were lacking funds for space exploration. The USA had reached its main goal: getting first place in the Moon race; the focus of political actors was moving to other issues that needed to be addressed, such as the Vietnam wars.

The Sovietic Union’s final attempt consisted in building their first moon rocket, the N-1. However, it was considered useless by many of the Russian military officers; because of that, the Strategic Rocket Forces, which was at the head of space programs, preferred allocating funds to other strategic and military programs rather than on it. The lack of funds caused the failure of each of the 4 attempts to launch the N-1 from 1969 to 1972.

The Space Race can be regarded to be formally concluded in 1975, when the United States and the Soviet Union planned a joint mission, known as Apollo-Soyuz Test Project.

The handshake between the American commander Tom Stafford and the Russian commander Alexi Leonov symbolically posed an end to the Space Race. Eventually, the International Space Station (ISS) was created in 1998, which is a joint project of five different space agencies: the American NASA, the Russian RKA, the European ESA, the Japanese JAXA and the Canadian CSA-ASC.

Getting an insight on the historical background of space exploration makes it possible to see how the degree of cooperation reached was born out of competitiveness. Space exploration was initiated because of political reasons and the first interests linked to it were purely strategical and military. It allowed States to develop technological tools that still today constitute a very precious strategic asset. An incentive to collaboration were, without any doubt, matters related to budget. A single mission on space, independently from its purposes, requires a huge amount of investment. Hence, budget shortage played its role in pushing States to put together their resources to take forward space activities and technological development.

## **Chapter 2: The New Space Race**

After reaching its peak at the beginning of the 70's, space exploration and activities had declined; the two main powers, USA and U.R.S.S., had reached their goals, lot of money were invested in space exploration and other matters had to be addressed. The focus was moved to other issues. The relationship between the two powers undertook the path of cooperation; to symbolize that, a joint mission was launched in 1975: the Apollo-Soyuz.

Nonetheless, a recovery has begun during the 90s, when the two powers started reinvesting in the space sector. New actors entered the scene, such as China, which in 2003 reached the two other space powers placing itself in third place. In the 70s and 80's other countries developed and launched their own satellite, such as Japan, Israel or France. France space program would later develop in a broader Europe's one; in 1975, the European Space Agency was founded (ESA), which today includes 22 countries. Nowadays, more than 60 nations developed their own space program, most of them in the last 30 years, and many of them were born because of military and strategic purposes. However, it is worth noting that only 16 space agencies have their own launching capabilities.

### **2.1 A new Battleground for supremacy**

When the Space Race started in the 60's, space was a completely unexplored area; everything that was discovered was new, technologies were at their arbors, and the potential of space as a military and economic asset was still to be found. Nowadays, things have changed. First, I will discuss later on, governments are not the only actors in this new scenario, but rather the main consumers. Indeed, private companies are making their way into becoming the leading players on the field. Some examples are the SpaceX, Axiom Space or Virgin Galactic. In the future we will witness the building of their own private space station and the beginning of space tourism. The Virgin Galactic has already launched its first commercial flight to the space with tourists on board on the 29th of June 2023.

Space offers a large number of benefits for humanity and it is an enormous source of wealth. The over 3,000 satellites flying over our heads in orbit around Earth provide us with services that we can't renounce to. Communication, navigation, exchange of data, meteorological predictions and many other services rely upon information sent by satellite. The GPS system that everyone uses in their car and that allows us to know where exactly on the Earth we are,

is provided by satellites. Our mobile phone and the internet connection rely on satellites; information gathered from space and scientific discoveries are essential for climate change, transportation, public health and many other.

Spatial structures have become so evolved that they influence the decision-making process of public policies because of the evidence they gather. In those regards, they provide, as example, natural disasters and environmental changes tracking, or support in the case of emergency management; thus, Earth Observation systems are essential in shaping decisions on policies to be adopted. Their socio-economic impacts are increasing over time, both because of the services they offer and because they are used in the study of sociological and economic occurrences. For example, information gathered by satellites could allow us to trace what consequences a political event or a policy had on such area. This also includes the detection of hazardous behaviors, such as in the cases of the deforestation of the Brazilian Amazon zone or the oil spilling in the EU marine areas.

Space infrastructures are not only important for our everyday life, but they are also pivotal for the economy of the whole world. As already stated above, the communication, the logistics, the openness to information have drastically been revolutionized by space capabilities. Because they can reach every area in the world, even the most remote ones, and because of the access to new markets they offer, satellites have opened many new paths for businesses to develop. Moreover, those technologies helped optimize operations, making businesses save time and resources, and allowing them to take real-time decisions.

In studying the new space race, inevitably the political sphere needs to be studied simultaneously with the economic sphere. To fully understand the dynamics of the space race, they need to be considered jointly: a different approach would be incomplete. Again, what influences a country's economy inevitably affects its politics as well. This is why increasing investment are being made by States to ensure control over the incredible resources provided by space.

Nonetheless, economic reasons are not the only ones pushing countries to invest in space exploration. There is also another reason behind it, that is the one which has driven the very beginning of the Space Era. On the one hand, space is treated by International Law as the "province of all mankind"<sup>10</sup> as well as the "heritage of all mankind"<sup>11</sup>. On the other hand,

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<sup>10</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (Outer Space Treaty), Art. I, Jan. 27, 1967.

<sup>11</sup> Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (Moon Treaty), Art XI, July 1984.

however, it represents a fundamental asset for something to take place that is the completely opposite of the intents expressed by the International Law: war.

Space has a long history of military uses: communication, surveillance, navigation, weather and territorial monitoring, reconnaissance, early warning systems and many others, including cyberspace operations.

Nowadays, states can't imagine fighting any war without relying on space capabilities. Satellites are the primary source of exchange of information and control and for this reason they are also essential to national security. That is why, although competition has always characterized space, it is now becoming the battleground for global supremacy.

National defense systems primarily rely on the relationship between military capabilities on Earth and the devices of control in orbit. As I shall discuss in the following pages of this chapter, satellites are pivotal in communication and surveillance to observe and control what is happening on the terrestrial area since they allow to monitor every area of the Earth's surface. Indeed, they are fundamental to guide vehicles, such as airplanes or ships; they are crucial for defensive purposes: through systems of early warning, they allow for a fast detection of weapons launched by other nations, such as missiles, and they alert in advance if a natural disaster is about to happen or is happening. Thus, the break of a war can be immediately spotted and monitored without being on the place or without directly flying over the area with an airplane. This also includes gathering of images that can show groups of civilian at risk, bombardments or demolition of infrastructures. Last but not least, satellites are essential for communications during war times, especially if ground-based structures have been destroyed. Crucial terrestrial activities depend on space asset, and any attack on the latter will inevitably cause a consequential disruption of the former. The increasing reliance upon space capabilities for enhancing national security and military has led countries to develop counterspace capabilities as well. An example are the ASAT (Anti-satellites) capabilities, which I will introduce later in this chapter, that can bind, deceive, disable or physically destroy satellites. But they are not the only threat to satellites, as cyber-attacks are also thrown to deactivate them. Having an anti-satellite weapon guarantees a form of both defense and protection against other countries' attacks.

Depriving a state of all the services provided by satellites, both military and social, would throw the country in chaos, especially during war times, making it vulnerable. This has been shown by the recent conflict between Russia and Ukraine; the very first day of war, the satellite used by Ukraine for controlling and commanding its army was hit by a cyber-attack and disabled,

leaving the whole country in a situation of enormous disadvantage. Thus, the strategic advantages they offer is something other than what Sates can renounce to.

## 2.2 Spatial Devices

Devices deployed in space provide a lot of services. Communications sent from satellites have many civil uses and applications that make our life easier; they allow us to receive phone calls or watch television without the signal being interfered and they are fundamental for security. Systems such as the ‘early warning’ and ‘space surveillance’ are clear evidence of how vital space capabilities are for strategic purposes.

First, it is important to give a brief explanation of what is a satellite. According to the definition provided by NASA, a satellite is “a moon, planet or machine that orbits a planet or star”<sup>12</sup>. Hence, a satellite can be natural, such the Moon, but also artificial, and that’s what is meant with the term ‘machine’ in the above definition. In the latter case, it is built by man and sent into orbit. They can be used for lots of different purposes. Some of them are used to take pictures of both the Earth and other planets, other are also used for sharing information and for communication purposes.

Thanks to satellites, the signal is sent upward to space and then back to any point on Earth. This allows signals to travel way faster, because they don’t travel in straight lines as it was before, they do not risk encountering obstacles, such as mountains or high buildings, or to trail off. Artificial satellites have such an expansive overview of the planet, that they can easily cover vast surfaces and, at the same time, catch very high-quality images. This allows satellites to receive a huge amount of information in a rapid time and send them back way faster than ground-based systems.

There are many different types of satellites and each with its own tasks. Some are used for scientific research, others for weather conditions assessment. Nonetheless, one of the most important uses of satellites is related to the communication field, both for civic and for military purposes. Satellites are not used as weapons or as platform for them, because that would be against the international regulations against the militarization of the outer space. However, they are used as undirect instruments for war, as they collect fundamental information and data that couldn’t otherwise be gathered, especially in such a quick way.

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<sup>12</sup> Jet Propulsion Laboratory, California Institute of Technology, *Planetary Satellites of the Solar System*, Jan. 10, 2019, NASA, available from: <https://www.jpl.nasa.gov/infographics/planetary-satellites-of-the-solar-system>



The number of satellites in orbit by leading nations and organizations registered in February 2023 are around 9.692, of which 5.465 are active<sup>13</sup>.

## 2.3 ‘Dual-use’ technologies

A crucial role is played by the so-called ‘dual-use’ satellites. A dual-use nature implies that the same satellite is used both for civil and military applications. This means that a technology originally built for military purposes, could also be used with such intents. Because of their double function, the regulation on the international level about their potential uses for war is challenging to achieve.

In this chapter, I will talk about three types of the ‘dual-use’ technologies as intended above, namely the Global Positioning System (GPS), satellite for weather assessments and ASAT (anti-satellite) capabilities. Among the three, the last is the most concerning one since, as recent developments shown, it represents a threat for state security and interests.

### 2.3.1 Global Positioning System (GPS)

One of the most relevant examples of dual-use satellites is the GPS (Global Positioning System). Indeed, there are lots of applications of the GPS that are nowadays essential for societal purposes, such as the car navigation system. However, the very invention of the GPS derives from the needs of the army. Indeed, it was created by the US Navy during the Sputnik’s Era so that they could easily track submarines with nuclear missiles on board and give precise directions. Thanks to the Doppler Effect, a satellite emitted radio signals that allowed to track its position from the ground, the same worked the other way around, allowing a satellite to track vehicles on the ground. Moreover, satellites provided for safe communication channels, which wouldn’t permit the tracking of radio signals by enemies’ devices. GPS is not only used to give us directions, but to direct missiles as well. Among the innovative capabilities in wars, some missiles are considered to be ‘smart’ by some experts, as they can hit a target in a very precise way in most of the cases. Such missiles are directed by satellite-based GPS systems;

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<sup>13</sup> Union of Concerned Scientists. (May 1, 2022). Number of satellites in orbit by major country as of April 30, 2022 [Graph]. In *Statista*. Retrieved September 21, 2023, from <https://www.statista.com/statistics/264472/number-of-satellites-in-orbit-by-operating-country/>

hence, the latter has the ability and the role to locate a specific target and send the information to the missile. The missile is equipped to receive GPS satellite's data and to head towards the chosen target. Contrarily to the GPS' Standard Positioning Service (SPS) which all people can access, the Precise Positioning Service (PPS) is available to the US Armed Forces only and to the US Federal Agencies as well as to selected armed forces.

The JDAM (Joint Direct Attack Munition) is an example of precision-guided munitions by GPS' signals. The US Force used it during the Operation Enduring Freedom in Afghanistan and during the Operation Iraqi Freedom; such a system guided by satellites signals helped detect enemy's defenses despite the weather and darkness adverse conditions and camouflage. The GPS is at the basis of any military operation, from the guidance of weapons to the guidance of soldiers in the army. That is why, by owning the GPS system, USA secures its supremacy in the military field. GPS is an instrument for global supremacy as it is essential for coordinating all the services provided in the world. Telecommunication, logistics, electric services, banks and many other use GPS to synchronize devices at the same timeline and coordinate their services. An interruption of the system would impact the entire economy of the world.

Because of its relevance, other governments committed in developing their own independent global satellite navigation system. From the 80s, Europe started investing in the Galileo project (re-named as such in 1999). From the very beginning, opposition from the USA didn't late. In 2001 the Secretary of the US Defence, Donald Rumsfeld, tried to block the 3.4 billion euros of investment that the Europe was about to invest in the project, apparently concerned about security matters rather than political or strategic. In 2003, the European Commission collaborated with China, which was planning on developing its navigation system, the Beidou. The system is a fundamental technology for modern warfare, as it allows to independently navigate missiles, ships, planes and attack enemies' vehicles. The rivalry between these three main navigation systems (Galileo, GPS, Beidou) represents a rivalry for strategic supremacy. Prevailing with one's own navigation system means staying over the other in military, strategic as well as economic terms.

### 2.2.2 Weather satellites

Data collected by satellites are essential for meteorological and weather control. In this case as well, satellites may have a dual-use; hence, data on weather registered by satellites are also used for military and defensive purposes. Their role is to observe the Earth, report any change happening on the planet surface and send such information on ground. Weather satellites are used to predict weather trends and provide data on climate conditions. Nonetheless, they can also detect emergencies in real time, such as natural disasters or armed conflicts. For these reasons, they are crucial for the detection of human rights violations and for the protection of the world society. In those cases, satellites provide real-time and high-resolution images of activities taking place on the Earth's surface, including more isolated regions. They can detect groups of civilians at risk by taking pictures of fires, cleared villages, people moved into camps, destruction of human infrastructures or enlargement of military camps. This offers a huge advantage, as aircrafts can only fly over the area after the disaster because of security problems; hence, they can only catch post-conflict damages. On the other side, remote sensing pictures can capture the before, the meanwhile and the after; this allows for a fast intervention of the international community and humanitarian aids.

In those regards, the anomalies in data collected by MODIS (Moderate Resolution Imaging Spectroradiometer) provided for a relationship between the violent armed conflict and the growth in fires in Darfur, Sudan, giving objective and detailed information on the ongoing of conflict. During the Operation Desert Storm, thanks to the DSP (Defense Support Program), which are satellites part of the North America's early warn system, civilians and coalitions forces of the Saudi Arabia and Israel were warned about the launch of Iraqi Scud missile.

Another example is the Defense Meteorological Satellite Program (DMSP) run by the USA for more than 50 years. It is used to collect data on weather for military and Department of Defense (DOD) operations. In the specific, DSMP sensors are used to measure the impact that weather conditions and parameters can have on ballistic missiles, satellite communications or early warning radar systems as well as to assess the effects that space environmental situation may have on operating satellites.

Satellite for military uses has been deployed from the beginning of the Space Exploration Era. The first military communication satellite was launched by the Air Force Ballistic Missile Division in 1958, it was the project SCORE; in 1962, a military communication satellite was used for the first time to direct and support operations in Southeast Asia: it was the Initial

Defense Communication Satellite Programme (IDCSP). Satellites are nowadays fundamental for national independence and security, and this is why more and more countries are launching their own satellites into space.

Satellites allow for the 'Early Warning System' to operate. According to the definition of the Early Warning given by the United Nations Office for Disaster Risk Reduction (UNDRR), it is a system designed to monitor, forecast and assess hazardous events. This gives the chance to quickly take action in order to lower the disaster. Early Warning system is used in the meteorological field, as example, to predict natural disasters such as tsunamis; it indeed collects data and send a warning signal to the emergency centers.

Nonetheless, this kind of system is also used in the military field, giving a significant time advantage. Early warning satellite system allows the fast detection of ballistic missiles and, thus, the elaboration of a defensive response in a rapid way. Thus, satellites are very important not only for military uses but also for defense purposes

### **2.2.3 Anti-satellite capabilities (ASAT)**

The so-called ASAT (anti-satellite) is a weapon designed to disable or physically destroy satellites. Some of them, the non-kinetic type, attack satellites in a non-physical way by blinding them with a laser or by cyberattacks. The kinetic type destroys satellites by physically crashing against them at high speed. When this happens, thousands to millions of debris start orbiting around the Earth at very high speed. The very International Space Station (ISS) has conducted several maneuvers to avoid being hit by debris coming from the destruction of a satellite.

Because of its high strategic value, more and more countries are investing in ASAT technology. In the case of a conflict, owning an ASAT weapon would ensure the government not to be defenseless in front of another with those capabilities. An attack from ASATs to early warning satellites of a country would put it in a vulnerable position. Regaining satellite signal would require too long if a counterattack needs to be planned. Owning an ASAT capability would lower the risk of being attacked from one of them, as there would be the possibility of responding with the same arm; satellites are fundamental to military forces, and countries would be reluctant to run the risk of their satellites being attacked and destroyed, as it would

easily outplay them. So far, China, Russia, US and India are the only powers that have succeeded in using ASAT Weapons.

Debris deriving from the destruction of a missile can remain in orbit for over 50 years, as in the case of the testing of the Istrebitel Sputnikow ('destroyer of satellites') during the 70's, some debris of which are still orbiting around the Earth. In 2007, China conducted a test against one of its own satellites, the Fengyun-1C which has seen as the most severe fragmentation in the last 50 years; according to the Air Force Space Command, the number of debris created increased the risk to be hit by one of them for about 700 spacecraft. Based on the estimations provided by the ESA (European Space Agency) in June 2023, there are currently in orbit 36500 of space debris objects greater than 10 cm, 1million object from 1 to 10 cm, and 130 million of space debris from 1 mm to 1 cm. Collision of those debris with both active and non-space objects causes further debris.

Because of its vagueness, current law regulating space such as the Outer Space Treaty or the Customary International Law of the International Telecommunication Union, fails to precisely control the use of ASAT weapons and safeguard satellites from their attacks. Article IV of the Outer Space Treaty states 'The moon and other celestial bodies shall be used by all States Parties to the Treaty exclusively for peaceful purposes ...'<sup>14</sup>. However, it is not specified what it is meant by peaceful; moreover, it prohibits testing on or close to the Moon and other celestial bodies. Hence, tests against one's own assets is not explicitly prohibited. Moreover, the Outer Space Treaty bans the placement around orbit, the instalment or the stationing of weapons in outer space , but it only refers to weapons of mass destruction, and it does not say anything about the transit of such weapons. Hence, countries are technically allowed to transit such weapons in outer space.

Another characteristic of those capabilities that makes the matter hard to regulate is that, again, we are in front of a device that can be 'dual-use'. Many technologies that are not classified as weapons can potentially put a satellite out of use, such as the Active Debris Removal (ADR) device; hence, in many cases it is not easy to distinguish what can be considered to be a weapon and what can't. As example, the recently developed satellite by China has a robotic arm for removing debris but it could potentially grab other satellites as well. Hence, their 'dual-use' nature makes developing regulations on ASAT weapons difficult. Moreover, the increase of debris orbiting around the Earth could potentially crush against a satellite and threaten the civil

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<sup>14</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (Outer Space Treaty), Art. IV, Jan. 27, 1967

society as a whole. Indeed, many fundamental services such as transportation, GPS or public health depend on data collected by satellites.

Because of the increasing dependence of states on services provided by satellite and the lack of a proper law protecting states, many other countries such as India, Iran, North Korea or France have started developing their own counterspace capabilities, .

ASAT capabilities represent a threat to the safe exploration and use of space, and this is why steps are being made to negotiate on anti-satellite weapons ban treaty.

In 2014, Russia and China advanced the idea of reviewing the 2008 Treaty on Prevention of the Placement of Weapons in Outer Space Objects (PPWT) but it was rejected by the USA for several reasons, one of which was that it just included the ban of space-based ASAT, leaving out ground-based ASATs. Hence, the two countries could continue developing ground-based launching systems. The US was the first power to advance the need to reach an agreement over the destructive conduction of ASAT satellites testing because of the threat they pose to international security.

Following 2021 Russia's ASAT tests against one of its own satellites, which caused the dispersion of more than 1,500 debris into orbit, in 2022 the Vice- President of the United States, Kamala Harris, announced that 'the United States commits not to conduct destructive, direct-ascent, anti-satellite missile testing'<sup>15</sup> and called upon other nations to join as well. The Vice-President then gave the task to the Department of defense and other agencies for national security to draft a proposal that would safeguard USA security and scientific and economic interests and would keep the outer space secure. In December 2022, the U.N. General Assembly passed a non-binding resolution to invite other countries to join such commitment; 155 nations signed it but Russia and China didn't vote in favor of it while India abstained. Russia was accused of endangering the International Space Station with such a test, but it denied all accusations. Also other countries have expressed on the matter: France regarded it as a "destabilising, irresponsible and likely to have consequences for a very long time in the space environment and for all actors in space"<sup>16</sup> while Germany called for establishing principles governing a responsible behaviour in space.

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<sup>15</sup> Jan Psaki (2022), *FACT SHEET: Vice President Harris Advances National Security Norms in Space*, whitehouse.gov, available from:

<https://www.whitehouse.gov/briefing-room/statements-releases/2022/04/18/fact-sheet-vice-president-harris-advances-national-security-norms-in-space/>

<sup>16</sup> Maya Yang, *Russia admits to anti-satellite missile test but denies 'dangerous behavior'*, Nov 16, 2021, The guardian, available from: <https://www.theguardian.com/science/2021/nov/16/russia-defends-anti-satellite-missile-test>

There is evidence that Russia has committed in reactivating many of its counterspace capabilities from the Cold War. Nonetheless, from the 1960s the United States presidential administrations have been directing the research and construction of counterspace capabilities, even if only for defensive purposes against specific threats. Since 2014, the United States have been enhancing their space security and better equipping for a potential future space war. This led to the Space Command (USSPACECOM) re-establishment and the creation of the U.S. Space Force in 2019.

Apart from USA, Russia and China, many other countries such as India, Iran, North Korea or France have started developing their counterspace capabilities.

## Chapter 3: The modern Space Era

As already stated earlier, the Outer Space has been already used for military purposes in the past. The very first use of the Space as a military asset can be traced back to the Cold War when military forces used satellite signals for espionage, monitoring and surveillance; the information gathered through satellite imagery deeply shaped the political and military decisions made by the nations involved. The use of Space as an asset for the detention of nuclear weapons also is something already seen. Before the entry into force of the ban for the use nuclear weapons in outer space, some tests were indeed carried out, such as the 1962 Starfish Prime over the South Pacific. The USA also planned a secret project, named Project A119, to detonate nuclear bomb on the moon; the explosion would have been visible from Earth. The test would have helped answer some scientific questions about astrology, but the main purpose was to show their power to the URSS and to the world.

The race to Space of the two great powers, USA and URSS, has always been sold as a race for scientific and technological advantage; however, it was a race to gain military and strategic advantage and it was always on the verge of the break of a nuclear war.

The very conquer of the Moon was pursued not only for scientific research purposes, but also for military ones. Many politicians and soldiers believed that having a military base on the moon's surface would guarantee them control of the Earth as well<sup>17</sup>. Famous are the words of the Brigadier General Homer A. Boushey, who, during a speech in front of the Washington Aero Club, declared: "Who controls the moon controls the Earth. Our planners must carefully evaluate this statement for, if true — and I for one think it is — then the U.S. must control the moon"<sup>18</sup>.

### 3.1 Privates as new space actors: SpaceX

In the past the space race was mainly a political matter; however, in order to understand the New Space Race, both the political and the economic sides need to be considered simultaneously: a different approach would result to be incomplete. In the last two decades,

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<sup>17</sup> Marcello Spagnulo (2019), *Geopolitica Dell'Esplorazione Spaziale, la sfida di Icaro nel terzo millennio*, prefazione di Luca Palermitano, postfazione di Carlo Pelanda, Rubettino.

<sup>18</sup> Nigel Watson, *America's forgotten plans to reach the moon*, Aug. 30, 2021, space.com, available from: <https://www.space.com/forgotten-plans-to-reach-the-moon>



new actors entered the scene and are on the right path to dominating it: investors. Some of those are so powerful that are playing a significant role in influencing the future world order. Although the battle for space control is fought outside the Earth's territory, the consequences are felt on the Earth itself only<sup>19</sup>.

Capitalists launch their own satellites for commercial purposes. Those satellites, however, can become powerful instruments to gain information, so they can even change the evolution of a war. Until today satellites were mainly owned by governments and armed forces; yet the scenario has changed, and they passed from being the main providers of satellite services to being the consumers.

The most prominent example of a powerful entrepreneur in the space field is the American businessman Elon Musk, owner of Tesla Motors. In 2002, he founded SpaceX, his own aerospace company for commercial purposes. SpaceX is entirely independent from external sources: it builds its own rockets, satellites and spaceships, and it launches them from its launching sites. It is the first time that a private company succeeds in launching and returning its own spacecrafts into orbit and back to the Earth; it also is the first company to launch a crewed spaceship, including NASA astronauts, and anchor it to the International Space Station (ISS). SpaceX made a page in history by developing the first world's reusable rocket, the Falcon 9, and launching a successful mission to bring new supplies to the IIS (the CRS-13 mission). Building reusable rockets leads to an enormous quantity of money saved: indeed it costs half the money spent to create a new one.

SpaceX operates its own satellite constellation, Starlink; it is the world's largest constellation in the Earth Low Orbit, providing internet coverage to more than 60 countries. According to the Astronomer Jonathan McDowell, there currently are around 5,000 Starlink's satellites in orbit around the Earth and Elon Musk's goal is to reach 42,000 satellites in orbit before the end of the decade<sup>20</sup>. Starlink's internet signals cover remote areas where internet connectivity was not available or had troubles, war areas and areas hit by natural disasters. Indeed, it is the only operational low orbit satellite constellation, and this allows for a high-speed and reliable internet connection. Thus, it has a high value for the military, especially because it doesn't rely on ground-based infrastructures. Because of these reasons, governments and armed forces are becoming the biggest consumers of SpaceX services. The U.S. Army is one of main users

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<sup>19</sup> Marcello Spagnolo (2022), *Capitalismo Stellare, come la nuova corsa allo spazio cambia la terra*, prefazione di Alessandro Aresu, Rubettino

<sup>20</sup> T. Pultarova, E. Howell, Starlink satellites: *Everything you need to know about the controversial internet megaconstellation*, Aug. 2, 2023, space.com, available from: <https://www.space.com/spacex-starlink-satellites.html>

of Starlink's satellites. The Air Force has conducted several tests using its satellites to connect its combat aircraft and air defence system.

The USTRANSCOM, namely the United States Transportation Command, is dealing with the agency for an agreement in order to use its spaceships for the transportation of both commodities and troops in the future. The agency has already received several funds from both NASA and the Pentagon.

Elon Musk put the Starlink internet service at the disposal of protestants in Iran and Turkey against the shutting down of the connection by the governments of the countries.

Starlink's satellites have had a prominent role during the war in Ukraine. After a few days for the Russian invasion of Ukraine, Elon Musk activated his satellites in the country to support the Ukrainian government after the request on Twitter by the Deputy Prime Minister Mykhailo Fedorov. The same day as the beginning of the War in Ukraine, the American satellite company Viasat was hit by a cyber-attack. Viasat was the leading service provider for the Ukrainian military, which relied upon the company's KA\_SAT satellite for controlling and commanding its army. Thus, on the first day of the invasion, the country was victim to a massive loss of communications. Starlink's satellites allowed Ukrainian military and population to keep communicating with one another, bypassing ground-based and Moscow's infrastructures. Thanks to encrypted messages, militaries on the front could communicate with one another, with their families and friends and they could launch live streams and appeals on the web from any place. The satellite link was also of great help to the Ukrainian soldiers for military purposes, such as identifying targets.

Moscow's clearly expressed its disapproval towards the placing of SpaceX's satellite service at the disposal of Ukrainian forces. In 2020, the Russian Parliament, the Duma, was considering fining all the users of Starlink's services, both ordinary users and legal entities. Indeed, using an independent source of internet connectivity would bypass Russian infrastructure to monitor communications and internet usage.

In 2022, during a meeting of the United Nations on the matter of outer space security, the Russian official Konstantin Vorontsov defined the use of commercial satellites for war purposes as "an extremely dangerous trend that ... has become apparent during the latest developments in Ukraine" and explicitly declared that those satellites might become the "target for a retaliation"<sup>21</sup>. Those concerns were generated by the use of commercial satellites of the

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<sup>21</sup> Sandra Erwin, *Russia escalates rhetoric on commercial satellites, calls them 'legitimate targets for retaliation'*, Oct. 27, 2022, SPACENEWS, available from: <https://spacenews.com/russia-escalates-rhetoric-on-commercial-satellites-calls-them-legitimate-targets-for-retaliation/>

SpaceX agency during the conflict in Ukraine; nonetheless, worries also derived from the announced intents of the USA of using commercial satellites for strategic and military purposes in the future as well, and of finding a way to compensate agencies in the case of damages.

The satellite link did not raise concerns for Russia alone, but it also worried the Chinese government, especially in the sight of the claims for Taiwan. Already in 2021, the Chinese government accused the Tesla Motors of high espionage, because of the camera implanted in the cars. Thus, Tesla cars were banned from military complexes because of the fear they could collect sensitive data through their cameras. Those concerns were explicitly expressed in several articles. In 2022 a research paper written by researchers of the Institute of Tracking and Telecommunications, titled “The Development Status of Starlink and its Countermeasures” it was posted on the South China Morning Post. The article’s content discusses the military threats that Starlink poses and what countermeasures China’s should government take. Another article was posted on the South China Morning Post called “China Military must be able to destroy Musk’s Starlink satellites if they threaten national security: scientists” in which it is stated that the China’s concerns come from the activation of Elon Musk’s satellites in Ukraine. Moreover, in an article published in China Military Online, titled “Starlink’s Expansion, military ambitions alert world”, it was stated: “In addition to supporting communication, Starlink, as experts estimated, could also interact with UAVs [Unmanned Aerial Vehicles] and, using big data and facial recognition technology, might have already played a part in Ukraine’s military operations against Russia”<sup>22</sup>. In the same article, the political and military threats for the national security are introduced: “In 2019, SpaceX received funds from the US Air Force to test how well Starlink satellites can connect with military aircraft under encryption; in May 2020, the US Army signed an agreement with SpaceX on the use of Starlink’s broadband to transmit data across military networks; in October 2020, SpaceX won a USD 150-million contract to develop military-use satellites; in March 2021, it announced its plan to work with the US Air Force to further test the Starlink Internet[...] When completed, Starlink satellites can be mounted with reconnaissance, navigation and meteorological devices to further enhance the US military’s combat capability in such areas as reconnaissance remote sensing, communications relay, navigation and positioning, attack and collision, and space sheltering”<sup>23</sup>.

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<sup>22</sup> Li Xiaoli, edited by Li Weichao, *Starlink’s expansion, military ambitions alert the world*, May 5, 2022, China Military Online, available from: [http://eng.chinamil.com.cn/OPINIONS\\_209196/Opinions\\_209197/10152439.html](http://eng.chinamil.com.cn/OPINIONS_209196/Opinions_209197/10152439.html).

<sup>23</sup> *Ibid*.

As in the case of the satellite KA\_SAT, cyberattacks represent a threat to satellites. However, numerous Starlink's satellites have been victim to cyberattacks, but they proved to be able to resist to them and survive. That is also why the big powers in the sector, such as Russia and China, are increasing their investment in the ASAT capabilities to attack a satellite. Being able to make use of satellite services, depriving other nations of them, is nowadays an essential element during wartime.

SpaceX is the most prominent example of how a commercial space agency is shifting the outer space domain from a purely governmental to a private one. If governments were the primary provider of space services, in the last decades they are becoming the consumers of private agencies providing them. Moreover, it also shows how those companies are becoming so powerful to influence the world's political order.

## **3.2 Space for competition**

From the end of the first Space Race between URSS and USA during the Cold War, competition and cooperation in space have gone hand in hand. On one side, many collaboration efforts have been pursued; the most relevant examples are the Treaties, such as the Outer Space Treaty, or the creation of an international Space Station (ISS). However, because of the importance of space assets for strategic and military purposes, competition still characterizes international relations in outer space. This dualistic component can be seen, as example, in the control of space capabilities taking place simultaneously with the armament race. The level of cooperation reached towards the end of the Cold War is now being undermined by the higher and higher ambitions states pursue. As analyzed in the previous pages, national security and the global economy deeply rely on space capabilities. Keeping up with the development of space capabilities and the advancements in the field of space exploration is pivotal for a State for economic, security and social reasons. Furthermore, outer space is a shared domain and it is still not fully regulated by international law, which is vague and leaves space to misinterpretation. The lack of regulation doesn't always make space law effective in punishing hostile behaviors, which triggers further competition and investment in counterspace capabilities.

In recent years countries have taken initiatives to enhance cooperation in the outer space, such as the effort pushed to establish some codes of conduct or the call for banning the ASAT tests by the United States. The UN also pushed for agreements through the creation of several forums

such as the UN Committee on the Peaceful Uses of Outer Space, the Conference on Disarmament or Resolution on the Prevention of Arms Race on Outer Space.

Because of the increasing dependence on space assets, states have undertaken several steps to secure themselves protection of their interests and from military threats of other countries. As example, in 2015 the US passed the Commercial Space Competitiveness Act, giving American industries property rights on space resources as it allows them to explore and exploit space resources. Even though it states that “the United States does not [by this Act] assert sovereignty, or sovereign or exclusive rights or jurisdiction over, or the ownership of, any celestial body”<sup>24</sup>, some countries, such as China and Russia, see in the Act an attempt to privatize of outer space. This is an example of what could be a new source of tension in the relationships in outer space, although the Outer Space Treaty asserts that “outer space is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means”<sup>25</sup>. On April 2020, the USA President Donald Trump signed an executive order entitled “Encouraging International Support for the Recovery and the Use of Space Resources” encouraging the exploitation of such resources. He has declared indeed that the United States do not see the latter as “global commons”

Following the development of counterspace capabilities and threatening space programs, some countries are even beginning to consider the break up of a space war. That’s the case of USA, which has been preparing for a potential break up of a space war. On May 2023 the American general Morehouse stated that “If someone was to threaten the United States of America, or any of our interests, including those of our allies and partners with whom we have treaties of mutual defence support, we are ready to fight tonight”<sup>26</sup>.

Despite the numerous controversies arisen in other fields, Space was one of the only domains in which cooperation between the West and Russia was kept. Since the end of the Cold War, the international Space Station (ISS) has been the main symbol of this cooperation among the two blocks. Nonetheless, on July 2022 the head of Roscosmos, the Russian space agency, together with the president Vladimir Putin, have declared: “of course, we will fulfil all our obligations to our partners but the decision to leave this station after 2024 has been made”<sup>27</sup>.

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<sup>24</sup> K.G. Orphanides, *American companies could soon mine asteroids for profit*, Nov. 12, 2015, Wired, available from: <https://www.wired.co.uk/article/how-to-mine-asteroids-for-fun-and-profit>

<sup>25</sup> *Ibid* 11.

<sup>26</sup> Ian Sample, *US ‘ready to fight in space if we have to’, says military official*, May 28, 2023, The Guardian, from: <https://www.theguardian.com/science/2023/may/28/us-ready-to-fight-in-space-military-official>

<sup>27</sup> Le Monde, *Russia announces it will leave International Space Station ‘after 2024’*, July 26, 2022, available from: [https://www.lemonde.fr/en/international/article/2022/07/26/russia-announces-it-will-leave-international-space-station-after-2024\\_5991508\\_4.html](https://www.lemonde.fr/en/international/article/2022/07/26/russia-announces-it-will-leave-international-space-station-after-2024_5991508_4.html)

Their goal is to build their own space station and to achieve independence. It is important to note that the American space agency NASA declared that no official notice from Russia about those plans has been received. However, in order to allow both sides to keep running their operations in a smooth way, other agreements have been made. Namely, American astronauts will be allowed to ride Russian rockets and vice-versa to reach the ISS.

The outbreak of the war in Ukraine has made other space agreements come to an end. An example is the collaboration made between Roscosmos and ESA (European Space Agency) to explore Mars. Moreover, Russia stopped using ESA launching sites to launch the Soyuz spacecraft.

One of the greatest competitors of the United States in space activities is China. While Russia and the United States have cooperated for decades, it isn't the case with China. In the latest years, China has been developing its own space and counterspace capabilities, which represents a threat for the other space powers as they can potentially be used to destroy enemies' devices. In 2007 China has run an ASAT test, leaving in orbit a huge quantity of debris that constitute a potential danger.

In 2015, China prioritized to the space sector in its military program, stating that "outer space and cyberspace are the new commanding heights of international security competition"<sup>28</sup>. In 2017, during a National Congress of the Communist Party of China, the country declared its intention to overcome Russia by 2030 and finally the USA in 2045, becoming the most potent power in space.

The USA has sent a warn to the Congress about the Chinese satellite Shijian-17, which as a robotic arm that could be used to grab other satellites. In 2021, the US Intelligence sources warned that the Chinese government had tested nuclear hypersonic capabilities. The Chinese Foreign Military declared that it was not the testing of a new weapon but rather a test for assessing the reusability of spacecrafts. On its side, Russia defended China by telling that "China is developing its armed forces and weapon systems without going beyond the scope of any international commitments"<sup>29</sup>.

In 2021, the Congress passed the Wolf Amendment, which doesn't allow government agencies, such as NASA or the House's Office of Science and Technology Policy (OSTP), to collaborate

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<sup>28</sup> International Institute for Strategic Studies, *Cyber Capabilities and National Power: a Net Assesment*, June 18, 2021, available from: <https://www.iiss.org/research-paper//2021/06/cyber-capabilities-national-power>

<sup>29</sup> Shannon, Bugos, China Tested Hypersonic Capability, U.S. says, November 2021, Arms Control Association, available from: <https://www.armscontrol.org/act/2021-11/news/china-tested-hypersonic-capability-us-says#:~:text=China%20has%20tested%20a%20nuclear.sources%20told%20the%20Financial%20Times.>

with China without previous authorization. Indeed the FBI (Federal Bureau of Investigation) must confirm that, by engaging in a collaboration with China, there is no risk in sharing the information and that the Chinese officials involved haven't taken part in violations of human rights. Because of the fear of espionage by the Chinese government, China was left out the International Space Station. The NASA Administrator Bill Nelson declared that he feels the Wolf Amendment appropriate and, when asked, confirmed that they are in a space race with China; especially the U.S. feels to be in a new Race to the Moon against China<sup>30</sup>.

The United has signed with other nations the Artemis Accord, which, in sight of the return of humans on the moon, aims at ensuring several principles such as transparency, peace and the minimization of conflicts. The Artemis Accord is one of the most relevant efforts in space relations made since the Outer Space Treaty in 1967. Such accord also has another intent, namely to finally bring back the U.S. on the moon and establish a permanent presence over it. As of January 2023, 21 countries have signed. However, both Russia and China haven't taken part to the agreement. Nonetheless, Russia and China have been signing agreements for cooperation. In 2021, the China National Space Administration (CNSA) together with the Russian State Space Corporation (ROSCOSMOS) made deals to collaborate in the joint creation of an International Lunar Research Station (ILRS).

The newly born Race to the Moon between USA and China has not the only goal of getting on the lunar soil, as it was during the Cold War. The main goal is to seize lunar resources, such as water. According to the Vice-president Mike Pence, China wants to “seize the lunar strategic high ground and become the world's preeminent spacefaring nation”<sup>31</sup>.

Recent political developments discussed in the present paragraph prove how tensions are growing among states and how the race to control space is intensifying more and more. This is mainly due to the gaps of international space law, which doesn't provide for many forms of protection against other states' hazardous behaviours. First of all, this pushes states to build their own counterspace weapons. Owning them allows a state to have a way of defending itself, and, consequently, to be less vulnerable to other's attacks. Secondly, this triggers competitiveness even more, as there is no way of punishment. The high ambitions of China, together with its support from Russia, are a major cause of worry especially for the USA, which

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<sup>30</sup> Jeff Foust, *Nelson supports continuing restrictions on NASA cooperation with China*, SPACENEWS, April 21, 2023, available from:

<https://spacenews.com/nelson-supports-continuing-restrictions-on-nasa-cooperation-with-china/>

<sup>31</sup> Christian Davenport, *As China's space ambitions grow, NASA tells Congress it needs more money to compete*, June 17, 2021, The Washington Post, available from: <https://www.washingtonpost.com/technology/2021/06/17/china-space-race-nasa/>

has long been the leader of space activities. Hence, in light of this, developing more exhaustive regulations and agreements keeping space away from any form of armament or conflict is now more urgent than ever.



## Conclusion

It was shown how competitiveness and cooperation have always been the basis of the relationship among states in space. The first chapter has evidenced how, from the very beginning of the space exploration, just over 50 years ago, the outer space was dominated by competition among countries. The Space Race began with the aim of the two great powers USA and URSS to demonstrate their superiority over one another during the Cold War. Although it was sold from its start as a competition for technological and scientific development, it instead was a race to gain military and strategic advantage and it was always on the verge of breaking into a nuclear war. The very first devices placed into orbit were designed to carry out tasks for the military such as espionage, monitoring or surveillance; still today, devices deployed into space have their links to the Cold War. Although the path of cooperation was finally undertaken during the 60s', competitiveness was kept as both USA and URSS were aiming to be recognized as the Space Race winners. Being first in the Space Race meant being the strongest from a strategic point of view.

After enormous resources had been invested into space exploration, the attention was drawn to other issues that needed to be addressed and space exploration was not the priority anymore. However, a recovery has started during the 90s with new states entering the scene, such as China, followed by over 60 other nations having developed their own space program. Nowadays, states are increasingly and inevitably dependent on space asset for military, social and economic reasons. Many essential services depend on information and signals sent by satellites such as communication, navigation, surveillance, reconnaissance, internet connectivity, data exchange, meteorological predictions and many others. In those regards, the Global Positioning System (GPS) provides for a fundamental tool, as it is at the basis of any military operation and of the coordination of activities taking place all around the world. Since it's the only one currently owning such system, the USA is far ahead any other state for the predominance of space. Nonetheless, competitors are on their way to develop their independent navigation systems, such as the European 'Galileo', or the Chinese 'Beidou'.

Because of the evidence gathered by satellites, data sent from space profoundly influence the political decision-making process. Indeed, satellites track events over the whole Earth's surface, spotting environmental changes, threats or even the outbreak of a war, allowing for a real-time monitoring of such occurrences. Thanks to systems of early-warning, hazardous events can be detected quickly, making a prompt intervention possible. Most important, space assets are fundamental for security matters: national defence systems and military operations

rely on the relation between Earth-based asset and devices in orbit for both offensive and defensive purposes. Depriving a state of satellites services would really make it vulnerable, especially during wartimes.

The whole society depends on state asset for the co-ordination of services (such as transportation) and of everyday activities. Because of all the benefits it provides, space is an enormous source of wealth. The third chapter highlights how the modern space era can't be understood without taking into consideration the economic side. The economy of the entire world depends on space systems to coordinate and synchronize its activities, from the logistics to bank transactions. Hence, apart from the great military and strategic advantage it offers, this is one of the reasons why states want to impose their control over space. For those same reasons, new actors entered the scene and are on their way to dominate it, namely private businessmen; one of the most relevant examples is Elon Musk, the owner of a private aerospace company named "SpaceX". Their involvement in political matters also shows their increasing relevance; as example, Elon Musk put its constellation of satellite, Starlink, at the disposal of the Ukrainian army and civilians during the Ukraine-Russia war. This gave rise to several concerns, especially from Russia and China, which see SpaceX and its satellites as a threat. Private companies are becoming so powerful in the space sector, that governments are passing from being the leading providers to being the main consumers of spatial services.

Hence, the interconnection between politics and economics in the space field is evident, and, in order to understand the new Space Race, those two sides need to be considered simultaneously.

Because of its increasing importance, more and more states have developed their own space programmes in recent decades. Many efforts of cooperation were made and treaties establishing a peaceful use of outer space have been signed; the most important one is the Outer Space Treaty of 1967. Nonetheless, the existing space law results to be unclear and incomplete, and leaves room to misinterpretation. The lack of a proper law regulating space activities only fosters competitiveness even more, as it doesn't provide a concrete way for states to protect themselves against the hazardous behaviour of other states. Consequently, States are taking initiatives to guarantee themselves a form of protection, such as investing in ASAT capabilities. Owning a ASAT weapon both guarantees a way to defend and to prevent attacks from other countries holding the same arm. Recent events have shown how tensions in space sector are increasing over time. The very symbol of cooperation among countries, the International Space Station, has been hit by those tensions: indeed, Russia declared its intentions to leave it after 2024. The third chapter once again put the focus on the competition aspect that characterizes

relations in space. The three major space powers, namely China, Russia, and USA are the protagonists of such environment. Each of them wants to overcome the others and gain control over space. Russia and the USA have been competitors in the space race from the very beginning of the space era. Nonetheless, they also have many years of cooperation behind them. This isn't the case with the China's rising power, which represents a major threat for the USA. USA has until now been ahead in the Space Race, but the high ambitions of China in the space sector and its increasing investments in ASAT weapons are cause of worry. Indeed, USA has already enacted forms of protection against China and it is one of the main pushers for banning ASAT weapons. Moreover, the USA recently declared to be in a New Space Race with China and that they have been preparing for a potential outbreak of a space war.

Hence, in light of the recent events, the development of a more exhaustive space law protecting states from other's threats is fundamental to make sure the outer space remains a peaceful and open-to-all environment.

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