

# New and Old Issues in Space Security: from Space Debris Removal to Italy's Call for Satellite Protection

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#### Abstract

Following the recognition by Italy of space as a domain for military operations, the country must increase the robustness and the protection of its satellites. This decision aligns with international and transnational organisations of which Italy is a member, such as the European Space Agency (ESA) and the North Atlantic Treaty Organisation (NATO). The problem to be tackled is active attacks in space and the always present issue of space and orbital debris.

## Introduction

Recent developments on the global stage brought international actors to adapt their strategies. One domain that is gaining importance day by day is the space sector. While during the Cold war there were just two important actors in space, the United States of America (USA) and the Soviet Union (USSR), in the last decades, new actors have emerged. Not only the ESA gained importance, but also European national agencies, the China National Space Administration (CNSA), and more (Khan, 2020). In addition to national agencies, private companies have become important players, now known at the same level as the National Aeronautics and Space Administration (NASA) (Frankowski, 2017). This is the case of Space Exploration Technologies Corporation, known as SpaceX, and Blue Origin, owned respectively by Elon Musk and Jeff Bezos. In addition, many other companies settled their business in space beyond the most famous examples. The Space sector has been growing in the past years. In 2020 alone, the sector achieved a growth of 6.6%, primarily drawn by the commercial sector (Space Foundation Editorial Team, 2021). While the fame of the private space sector comes from space travel, the most profitable business is another. The biggest share of revenue and most space activity involve communications. These activities comprehend direct-tohome satellites for the transmission of voice, data, and internet services like the ones provided by Intelsat Ltd., SES Global, and Eutelsat (SpacePolicyOnline.com, 2022). Other than delivering television or telephonic signal, they are also the ones allowing the Global Positioning Systems (GPS) to work, vital for location services but also the conduction of business. Without GPS services, automatic payments, such as the one by credit card, cannot take place nor be easily certified and tracked (de Montjoye et al., 2015). In addition, they provide monitoring for the weather and the conditions of our planet and its environment (Arino, 2008; Chuvieco & Justice, 2008). Finally, they determine the functioning of emergency services such as Search and Rescue (SAR) and more (SpacePolicyOnline.com, 2022).

#### The issue of space debris

Decades of space activities and the growing importance and exploitation of space come with drawbacks. One of the main issues in outer space is the increasing presence of space and orbital debris (Radtke & Stoll, 2016). According to NASA, orbital debris is defined as "any human-made object in orbit about the Earth that no longer serves a useful function", including "nonfunctional spacecraft, abandoned launch vehicle stages, mission-related debris, and fragmentation debris" (Garcia, 2015). As many studies have shown, orbital debris has been increasing without solution of continuity since the beginning of the space race, both in mass and number of the overall debris (European Space Agency, n.d.). In parallel, several projections have proven how the ever-increasing amount of space debris will be a challenge also in the future, even if we stop launches of new satellites completely because of cascade effects (Griffiths, 2010). This means that Near-Earth Orbit (NEO) and Low-Earth Orbit (LEO) are becoming more and more congested, increasing the risk of collisions with satellites and noise for the ground located observation satellites (Chen, 2011). International efforts are currently being made to control and reduce the debris population, including measures for active debris removal (Castronuovo, 2011; Chen, 2011). As studies that compare real-world data to past projections show, the situation is highly volatile and strongly depends on unpredictable parameters such as launch and explosion rates and solar activity, making the past previsions too optimistic (Castronuovo, 2011). In conclusion, creating self-de-orbiting technologies and recycling the same space objects in future missions will be a necessary but not sufficient condition to control this global problem. Active space debris removal, in various forms, will be essential (Damjanov, 2017).

## The short-term solution & irresponsible or aggressive behaviours

While long-term solutions to the problem must be pursued, space agencies and defence ministries cannot avoid dealing with space security. Given the number of services that depend on satellites and their structural importance, the Rome-based think-tank Institute for International Affairs (IAI) called for the Italian government to beef up space defence while keeping orbital paths clear of debris (Elio Calcagno, 2022).

Space gained its strategic relevance during the Cold war, but after its end, it started to benefit from cooperation and international missions that made countries rely each on other. While this has not been the case for the development of GPS, the International Space Station (ISS) is a clear example of this cooperation. Now, as the world seems to be inclined to a multipolar system and Russia plans on withdrawing from the ISS, each country must be able to protect its satellites (Foy, 2021).

In line with these trends, Adm. Giuseppe Cavo Dragone, the Defence Chief of Staff of Italy, recognised an "increase of threats" and a risk for security in space, calling for the "essential" increase of robustness of the protection of satellites (Kington, 2022). As the number of satellites in orbit is expected to drastically increase from 4500 today to 50000 by 2030, Italy needs to produce new legislation to align with the need for self-de-orbiting satellites, as advised by reports (Elio Calcagno, 2022). Italy has history and expertise in building satellites; therefore, the practical update of the new systems should not be a major concern. The country has already launched rather extensive programmes such as its Cosmo-SkyMed constellation and the Sicral for military communications. Moreover, they have experience in multinational missions, as their efforts in ESA and international missions testify. Cooperation networks go further to the industrial level. Since 2005 Italy and France have been working together in the Thales Alenia Space business of satellites. In addition, Italy has been managing the OptSat-3000 optical surveillance satellite launched with Israel Aerospace Industries.

## Answers to threats by NATO and ESA

Even though there is room for further improvement, the Italian government has already begun to give more salience to the space domain. The first steps in terms of legislation were taken in 2018 when the responsibility for coordinating the space policy was given to the Prime Minister's office, enhancing its military synergy. What is more, in 2019, the Italian Defence General Staff instituted the General Space Office and the Space Operations Command in 2020to plan and manage the satellites' life cycle to their retirement (Kington, 2022). These political tools follow the identification of the Italian military to recognise "space as an operational domain in which we must protect a delicate ecosystem and protect services and infrastructure", as stated by Cavo Dragone (Kington, 2022). To make this protection feasible, Italy dedicated €100 million of the state budget to military space research for 2021 to 2023. This should allow for the new satellites to be more resilient to external threats, or at least to sensors onboard that will be able to identify external actors, which might target national satellites with irresponsible or aggressive behaviours and provoke incidents. This creates at least potential deterrence to kinetic aggressions, which are trackable.

However, these budget increments in the space sector are not comparable to Italy's allies. For instance, the British Defence Ministry pledged £420 (€502) million for three years in their recently released Defence Space Strategy (Chuter, 2022; UK Space Agency, 2022). Finally, the European Union (EU) Space Programme has achieved relevant steps forwards, specifically relevant to the armed forces (Elio Calcagno, 2022). The EU recently obtained interoperability between its Global Navigation Satellite System (GNSS) Galileo and the American GPS (Paziewski et al., 2020). Galileo, together with EGNOS and Copernicus, are the core of the EU space programme (Boerkamp, 2021; EU Space Programme, n.d.). Through them, member states are granted autonomy in the locating and terrain awareness systems. Additionally, those satellites are directly protected by the North Atlantic Alliance, like any other NATO member state. Indeed, in 2019 NATO announced how space became an operational domain, incorporating it into its deterrence and defence posture (NATO, 2022). In this framework, space is recognised on paper as an au pair to the other domains. In other terms, attacking an Italian or allied satellite becomes comparable to an attack on a ship, which could entail a military response in line with the alliance's Article 5 (Kington, 2022; NATO, n.d.).

## Conclusions

To conclude, it can be noted that improvements are being made in the space sector of European countries such as Italy. Several steps forward are possible thanks to the pooling of resources both at the bilateral and EU level, for example, the partnership between the European Defence Agency (EDA) and ESA on Next-Generation Secure Satellite Communication (European Defence Agency, 2021). Although it must be recognised how certain countries need to step up their military expenditure, this problem can be overcome through European cooperation and tools such as the Coordinated Annual Review on Defence (CARD) that could involve the space sector as part of the defence one under specific criteria. Not to be forgotten is also the partnership that the EU should continue to pursue with the United Kingdom. Though less relevant than for land forces, this partnership would still benefit the defence financial plan of both sides.

Finally, European space agencies and the ESA must continue their common vision for a secure space with NASA, their ally, and diplomatically engage in drafting new rules at the UN level on accountability in space and orbital debris removal.

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