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Effects of Current Transition to A Multipolar World on Developments in the Space Domain

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Abstract: Conflicts in Ukraine and Iran underline the multi-dimensional transformation in the international security paradigm in the context of the ongoing transition towards a multipolar world. Among the domains undergoing significant change, outer space is not always in the foreground, yet it shows significant developments. The objective of this paper is to identify and describe such developments, not presented so far in an integrated approach. The research is based on the observation of recent events related to outer space, complemented by analytical deduction derived from often contradictory media reports addressing sensitive security issues. Although space is a new operational domain, it already encompasses multiple areas of utilization in security-related activities. The results of this paper highlight key developments in navigation systems, communications, surveillance, anti-satellite capabilities, and electromagnetic warfare, emphasizing their growing role as critical infrastructures and potential vulnerabilities. This paper offers a perspective on space domain challenges relevant for future debates and contributes to shaping security considerations in the evolving architecture of a multipolar world.

Keywords: Global navigation systems; satellite communications; Intelligence, Surveillance and Recconnaisance; anti-satellite weapons; outer space competition.

JEL Classification: F51; K33; O33

1. Introduction

The contemporary international system is clearly changing. It is gradually moving away from a structure dominated by a single power and evolving towards a more complex multipolar world. In this new context, emerging states are gaining influence and started to question once stable hierarchies.

If colonisation resulted in inequality, then decolonisation created the perfect conditions for change. As previous colonies became independent, they began to develop economically and socially, and through this process they gradually grew in power. This did not happen suddenly, but overtime. In this sense, multipolarity is not something new but the result of a longer process shaped by decolonisation and development. Formerly known as the 'Third World' the newly independent states grow as increasingly

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important actors in the global system. Over time these transformations have become associated with what we call 'The Global South', or the group of states, historically positioned at the periphery, states that increased gradually their economic and political influence. Through continuous evolution, these developments have led to the use of the term 'Global Majority', in their language, reflecting both its demographic weight and growing influence within the international system. But it is not enough that power is shared between many states. Stability is not only about who has power but also whether other nations accept and recognise that power. Globalisation made states more connected than ever, allowing movement of capital, labour or information. Nonetheless, its strategic benefits remain limited.

For some, it creates opportunities for growth and cooperation while for others it makes vulnerabilities more visible. As one perspective suggests, "we've moved into a truly multipolar world where the power of relatively weaker states is suddenly much greater" (Wallerstein, 2008, n p). But states are no longer the only actors shaping what happens. There are also transnational companies, financial institutions and different centers of influence, whose role can often be noticed in the way governments act. All these elements together, gradually reshape power dynamics at the global level.

2. The Expansion of Confrontation Domains and Limitations in Militarisation of Outer Space

Recent developments in international security show how the nature of international conflict is changing in the modern world. International conflicts in traditional areas such as land, maritime, and air environments, have expanded into new domains, created by technology and globalisation. States are competing now not only with conventional military forces, but also through cyber operations, information and media influence, using satellites and electromagnetic spectrum systems for communications, surveillance, and navigation. As states become more interconnected economically and technologically, competition between emerging powers becomes more complex. In the beginning, power was strongly connected to the control of land territories, maritime routes and strategic chokepoints, because these spaces allowed states to protect trade, project military force and influence regional balances of power. Maritime control became especially important in geopolitical thinking through Nicolas Spykman's Rimland Theory, which argues that states controlling the coastal regions surrounding Eurasia could influence the global power dynamics in a significant way (Spykman, 1944, pp. 43-45). Contemporary examples would be strategic checkpoints points such as the Straits of Gibraltar, the Suez Canal, the Strait of Malacca or the Strait of Hormuz, all essential for fuel supply, international trade, security and military mobility. Technological progress changed the nature of the warfare once again trough the emergence of air power. The First World War showed for the first time that aviation was no longer used for observation only but had become an important operational instrument capable of influencing the battlefield through reconnaissance missions, bombing operations and ground troop support. These developments emphasised the strategic value of controlling the air, an idea further developed by Giulio Douhet, who argued that air superiority could play a decisive role in determining the outcome of future wars. (Douhet, 1983, pp. 15-30).

Then, the emergence of space domain took place. Unlike traditional spaces of confrontation, outer space and its exploitation in the electromagnetic spectrum remain poorly regulated. This judicial deficit complicates the establishment of stable international rules and increases uncertainty in strategic interactions. The development of outer space as an operational domain has raised important questions regarding its regulation as the limits of its militarisation. The main legal framework governing activities

in outer space is established by the 1967 Outer Space Treaty, which sets fundamental rules for the use of space. According to this treaty, outer space is to be used for peaceful purposes and is not subjected to national appropriation. One of its key provisions prohibits the placement of nuclear weapons or other weapons of mass destruction in orbit or on celestial bodies. However, the treaty does not ban all forms of military activity in space, allowing the continued use of satellite systems for communication, navigation, and surveillance. Technological development has created new forms of dependency that international law does not yet cover. Modern societies increasingly rely on satellite-based systems operated not only by states but also by private companies with strategic influence over communications, navigation and critical infrastructure. As a result, interruptions and restrictions affecting these systems may produce significant civilian and military consequences, revealing how contemporary conflicts extend beyond traditional state control and into technologically interconnected environments.

The concept of 'hybrid warfare' reflects the way modern states and non-state actors increasingly seek strategic and operational advantages/asymmetries by combining military force with cyberattacks, disinformation campaigns, technological tools, influence operations, and other non-conventional domains. Unlike traditional wars, which are usually clearly defined and regulated by international law, hybrid conflicts often take place in areas where legal norms remain unclear and insufficiently developed, if at all. This allows actors to exploit technological progress and legal ambiguities without formally declaring war. In practice, modern confrontation may involve cyber operations, disinformation campaigns, interference with critical electronic infrastructure, or the manipulation of public perception, showing that contemporary conflicts evolve faster than the international legal frameworks designed to regulate them. In this sense, hybrid warfare has become one of the clearest expressions of modern strategic competition and asymmetrical confrontation between state and non-state actors (Hoffman, 2007, pp 8-14).

The growing interdependence of technological systems further amplifies these vulnerabilities, especially when essential infrastructures are not entirely controlled by states. According to the Organisation for Economic Cooperation and Development (OECD), increasing digital connectivity has created new security challenges for critical infrastructure and essential services, particularly in highly interconnected societies (OECD, 2019, pp. 4-8). A relevant contemporary example is the possible expansion of Central Bank Digital Currencies (CBDCs) whose future development may significantly influence the global security environment through new forms of digital dependence, cybersecurity risks, and financial interconnectedness (Bank for International Settlements (BIS), 2023, pp 5-12). This situation reflects a broader challenge for the international order, as existing legal and governance frameworks struggle to keep pace with rapid technological and strategic transformations.

There is an increasing gap between what international law formally prohibits and what modern technology actually makes possible in practice. Existing treaties were created in a different technological context and mainly established general principles, but they did not anticipate many of the capabilities that exist today, such as anti-satellite weapons, electronic warfare, cyber operations, or the growing role of privately operated infrastructures in security related activities. International law has yet to adapt to the speed of technological and strategic changes, and challenges to international order. In other words, legal frameworks are trying to regulate a world that has evolved faster than the rules themselves. The gap between legal provisions and operational realities raises important challenges for control, predictability, and stability in the space domain.

3. Relevant Developments in Satellite Capabilities

Recent conflicts have changed traditional military concepts such as air superiority, armoured warfare, naval confrontation, missile defense and anti-aircraft systems. For example, the growing use of drones in land and naval operations has demonstrated that relatively inexpensive technologies can significantly challenge traditional military structures. Also, missile defence systems, anti-ballistic technologies, and operations conducted beyond clearly regulated legal frameworks show how warfare increasingly extends into areas where international law has less reach. These changes are not simply theoretical trends, but concrete capabilities already shaping how power is exercised internationally. The directions that stand out are communications, navigation systems, surveillance, anti-satellite capabilities (ASAT) and electromagnetic warfare.

Space-based communication systems. A plethora of communications systems are based on space assets, belonging not only to government organizations, but also manufactured and operated by private companies, such as Starlink.

The international Telecommunication Union (ITU) has a very important role in the international system. The organisation was created in 1865 with the purpose of facilitating communication between countries. The ITU coordinates radio frequency allocation, establishes technical standards and ensures that communications networks and satellite systems can operate without disrupting one another. What appeared to be a purely technical domain has become deeply connected to issues of security and geopolitical influence. Modern states rely heavily on communication systems not only for economic development and civilian life, but also for crisis management and military operations.

A particularly relevant example is the use of satellite communication systems during the conflict in Ukraine. Services provided through Starlink allowed communications to continue even when traditional infrastructures were severely affected (RAND Corporation, 2022, pp. 14–21). It appears that Internet and Starlink utilization during the protests against the authorities in Iran were also a reason for the government in Teheran to block these networks in January 2026, which arguably led to a halt in anti-government protests.

Access to essential communication systems may therefore increasingly depend on decisions taken outside direct state control, creating options and vulnerabilities that did not exist in the same form in the past. More broadly, these developments reflect an important transformation of the international security environment, where strategic infrastructures are no longer controlled exclusively by states, but are increasingly shared between state and non-state actors, creating a more interconnected and less predictable operational environment.

Navigation systems. Satellite navigation and communication systems have gradually become essential infrastructures for both civilian life and military operations (dual use). By providing basically just satellite location and timing, satellite-based systems such as GPS, GLONASS, BeiDou, and Galileo support navigation services that modern societies increasingly depend on every day. Although these systems operate with different levels of precision, some capabilities remain deliberately restricted in order to limit their use in military targeting activities. Recent conflicts also show that precision is no longer a secondary operational aspect. Access to accurate positioning, navigation, and targeting data has become a decisive factor in modern military operations, even if the exact technological sources supporting these capabilities are not always publicly confirmed. It is obvious that satellite-based systems are the only that can provide precision striking deep into enemy territory, which reveals the participation

of actors capable of such technological performances in certain military strikes, be it with missiles or drones.

In this context, what becomes increasingly important is not only how these systems function technically, but also who controls them and they are employed to attain and impose power on the international chessboard. As states become more dependent on external infrastructures, many governments have started developing their own alternatives to reduce strategic vulnerabilities. China's BeiDou system represents a relevant example of this tendency, reflecting the desire to achieve technological autonomy in a domain that is becoming increasingly important for national security and geopolitical influence (European Space Agency, 2023, pp. 6–9).

Anti-satellite capabilities. If satellite navigation systems prove how space supports modern operations, anti-satellite capabilities reveal how this same environment can become an arena of strategic competition. Space is no longer viewed as a neutral or purely scientific domain. Instead, outer space is increasingly perceived as a contested operational environment in which states seek not only to access space-based infrastructure, but also to deny adversaries the benefits provided by these systems (Mocanu, 2019, pp. 13–15).

These capabilities are no longer limited to theoretical military planning. Today, several states are actively developing technologies designed to interfere with, disable, or even destroy satellites. Such actions may involve kinetic interception, cyberattacks, electronic warfare, or disruptions targeting ground-control infrastructure (CSIS, 2022, pp. 8-13).

Modern states such as the United States, Russia, China and India have already tested land-based missile systems capable of targeting satellites from Earth. They destroyed their own decommissioned satellites, but in the process they experimented this form of anti-satellite (ASAT) technology. Beyond direct physical attacks (ramming), communication and navigation systems are vulnerable to cyberattacks, signal jamming or electromagnetic interference, which can disrupt military coordination, intelligence operations, and civilian communications at the same time. But the non-kinetic anti-satellite procedures are treated separately, as electromagnetic warfare.

Today, satellites support communication networks, navigation systems, surveillance capabilities, financial transactions, and critical civilian infrastructures that modern societies depend on every day. Consequently, attacks against these systems could affect not only military operations, but also economic stability, public services, and civilian life. At the same time, ASAT operations generate additional long-term risks through the creation of space debris, contributing to the growing vulnerability and unpredictability of the space environment itself.

Electromagnetic Warfare. Compared to traditional forms of confrontation, electromagnetic warfare is less visible, yet increasingly important in contemporary security competition. Unlike conventional military attacks, it does not necessarily focus on crushing targets. Instead, it aims to disrupt the technological systems on which modern societies depend, including communication networks, navigation systems, satellites, drones, and digital infrastructure.

Electromagnetic pulse (EMP) effects and electronic warfare (EW) (largely said) capabilities can interfere with or disable electronic systems on a large scale without direct physical destruction. In highly interconnected societies, even temporary disruptions may affect transportation, financial systems, energy infrastructure, or civilian communications (RAND Corporation, 2021, pp. 5-7).

Recent developments in the Middle East have proved how relevant these capabilities have become. During periods of regional tension involving Iran, Israel, and maritime operations in the Persian Gulf,

reports of GPS jamming and navigation interference have affected both civilian aviation and commercial shipping routes. Similar incidents have also been observed in the Baltic region and around the Black Sea, where aircraft and maritime operators reported disruptions to satellite navigation systems. These examples illustrate how electromagnetic interference (including spoofing) is increasingly used not only in military contexts, but also as a asymmetric tool of strategic pressure and technological disruption, in the framework of hybrid warfare.

What makes electromagnetic warfare particularly significant is that it targets functionality itself. The objective is often not to destroy equipment physically, but to interrupt, confuse, or degrade the systems that allow states and societies to function efficiently. Communication systems, various military equipment, and even energy networks may therefore become vulnerable without a single missile being launched. During the war in Ukraine, all ground operations were impacted by EW actions to the level where the character of combat changed significantly, looking more like World War I confrontations than high intensity sophisticated armoured combat.

In this sense, electromagnetic warfare reflects a broader transformation in the nature of conflict. Contemporary confrontations increasingly focus not only on controlling territory or destroying military assets, but also on disrupting systems, information flows, and technological processes. The effects may be less visible than conventional attacks, yet in some situations they can be equally destabilizing and strategically consequential.

Surveillance. Today, satellites can follow military movements, monitor strategic areas and provide information accurately, making military operations much harder to conceal than in the past. Through Intelligence, Surveillance, Reconnaissance (IRS) capabilities, armed forces are able to collect and process information much faster and much more accurately, which has increased the importance of space technologies in both security and military planning. This was proven both in Ukraine and in the Middle East conflicts.

This transformation shows how modern warfare is evolving toward a model based on speed, precision, technological dominance and constant situational awareness. Satellite surveillance is a crucial part of the Intelligence Preparation of the Battlespace (IPB) and makes concentration of forces almost impossible. Therefore, tactical actions during the war in Ukraine scaled down to section level raids, and operations during winter were much diminished, as the leaves do not offer necessary cover to larger formations. Consequently, operations on the front in Donbass looked like an operational stalemate, and territorial gains were hardly visible, although achieved after intense struggle.

4. Conclusions: Increasing Complexity of Global Power Competition and the Fragility of the International Law

The developments analysed throughout this paper suggest that the transition toward a multipolar world is changing not only the distribution of power, but also the way power itself is exercised. In this context, outer space is no longer viewed as a distant or secondary domain, but as an increasingly important environment where military, technological, political, and economic interests intersect. Navigation systems, satellite communications, anti-satellite capabilities, and electromagnetic warfare are intricately connected, and actions affecting one system may quickly influence several operational domains at the same time (CSIS, 2022, pp. 8–16; Mocanu, 2024, pp. 13–18).

Another important transformation is the growing role of private actors in strategic infrastructures. Access to essential communication and navigation systems may increasingly depend on decisions taken outside direct state control, creating new forms of dependency and vulnerability (RAND Corporation, 2022, pp. 14–21). In this sense, power today is no longer linked only to territory or military force, but also to the ability to maintain or disrupt the functioning of interconnected technological systems. On the other hand, strategic infrastructures are no longer controlled exclusively by governments, as private satellite companies now play an increasingly important role in surveillance, communications and access to real time information.

These developments also reveal the growing fragility of the international legal framework. Current international treaties continue to provide important principles, but many of them were created in a hugely different technological context. As technology evolves faster than international regulations, the gap between legal norms and operational realities becomes increasingly visible (UNOOSA, 2022, pp. 4–7; Kissinger, 2014, pp. 343–350).

More broadly, the growing dependence on interconnected systems creates vulnerabilities that extend beyond the military sphere into civilian life, communication networks, and economic stability. In highly technologized societies, disruptions affecting satellite infrastructures or communication systems may generate wider instability and uncertainty within the international environment (RAND Corporation, 2021, pp. 18–24). Rather than offering clear lines of control, this introduces new forms of dependency and uncertainty, suggesting that future efforts may need to reconsider not only strategic approaches, but also the relevance of international law itself.

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