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SATELLITE RECONNAISSANCE AND THE PRIVATISATION OF SPACE WARFARE

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Abstract
Armed conflicts often act as a trigger for changes in the military. This is also the case of the Russia-Ukraine war. This article looks at trends in the militarisation of space, broadly understood as any military activity in outer space. It focuses on satellite reconnaissance, recognised as remote sensing from space for military purposes. Particular attention is paid to the use of commercial imagery for the purposes of armed conflict. The text focuses on the impact that the fusion of the military and commercial dimensions of space activity may have on conducting military operations and on the broader political environment. The concept of space power was adopted as the theoretical framework, with its two key factors: capacity and autonomy. The main conclusion is that although direct and indirect adaptation of solutions from the commercial sector increases the level of capacity, this trend is also a challenge in terms of autonomy, as new space economy entities gain far-reaching independence from the countries in which they operate.

Keywords
space militarisation, satellite reconnaissance, new space economy, space commercialisation, space power

Introduction

The militarisation of space, as a phenomenon in the field of international security studies, has become the object of rapidly growing interest in recent years. Scientists dealing with these issues include Joan Johnson-Freese (2017), Linda Dawson (2018), Robin Dickey (2020), Todd Harrison (2020), and Bleddyn Bowen (2022). In Poland, this phenomenon is discussed, among others, by Marek Czajkowski (2020) and Radosław Bielawski (2022). Although this process has its roots in the 1950s (the CORONA reconnaissance satellite program, launched in 1958 and resulting in the first photos of the Earth taken from space two years later [Ruffner, 1995]), is subject to constant changes. As is often the case in military history, armed conflicts are an important catalyst for such changes. Some of them gain the status of symbols and are labelled as the beginning of a new era, although this is usually a kind of simplification that makes it easier to reach people outside the narrow

circle of specialists in a given field. Thus, the war in the Persian Gulf in 1991 is often considered the "first space war" because the use of satellite battlefield support had a significant impact on the course of operations for the first time, according to the Chief of Staff of the United States Air Force, General Merrill McPeak (Lambeth, 2013, p. 75). In turn, the Russia-Ukraine war, in its full-scale phase lasting from February 24, 2022, is often called the "first commercial space war", because commercial satellite systems had a significant impact on the course of military operations. Among the authors who use such labelling are Sandra Erwin (2022), Juliana Suess (2023), and Setsuko Aoki (2023, pp. 313–337).

In this article, we will deal with one of the elements of the militarisation of space: satellite reconnaissance, especially the changes under the influence of the processes of commercialisation of space activities. These changes are primarily observed in the context of the Russia-Ukraine war, but both their genesis and impact go beyond this conflict. However, the immediate war can be considered as a catalyst for these trends. At the beginning, the phenomenon of militarisation and commercialisation of space will be embedded within the framework of space power, connecting these two dimensions of space activities (and not only them) and indicating the relations in which they are entangled. The analytical sections will address two research questions: What trends in space reconnaissance can we observe in the context of the Russia-Ukraine war (phenomena that may have occurred for the first time in significant intensity)? What impact do these trends have or may have on conducting military operations and on the broader political environment (including state autonomy over the means used in armed conflicts)?

The initially adopted hypothesis supposes that, in accordance with the assumptions of the "first commercial space war", the process of militarisation of space, especially space reconnaissance, is transformed primarily by technical solutions originating from the commercial sector, having their conceptual roots there or even offered as services by commercial entities. With regard to the second research question, we initially supposed that the key phenomenon is the further—or more precisely, more complete—descent of satellite support to lower and lower levels of the art of warfare, which has not been complete so far in the field of space reconnaissance.

The text is based on open sources, so the conclusions result from an analysis based on available information on military operations and development programs, interpreted in the context of the basic assumptions of the theory of militarisation of space.

The basic method is strategic analysis, carried out in relation to a given problem rather than in relation to a specific entity (Dawidczyk, 2014, pp. 54–55). Strategic analysis can be perceived as a set of activities diagnosing the phenomenon and its environment (in this case, we focus on the environment), which enables the predicting the future states of elements of this environment. We also look at strategic analysis as the first stage of the strategic planning process, to which we will necessarily limit ourselves in this article, although in favourable circumstances it may become a contribution to subsequent stages. This view of strategic analysis is represented by the functional approach, in which this analysis is an activity enabling the creation of a strategy. In turn, in the tool approach, strategic analysis is treated as a set of analysis methods. Among them, three should be mentioned, used in the text below in a mutually complementary way: factor analysis, system analysis, and forecasting analysis.

Factor analysis involves "breaking down" the observed phenomenon into its component parts to examine their features and the features of the structure within which they

occur. The need to isolate key factors is a derivative of the assumption that within a given phenomenon, despite its diversity and variability, there is a network of connections, at least to some extent conditioned by a relatively small number of functional units, i.e. these key factors (Babiński et al., 2017, p. 71). Factor analysis is particularly responsible for identifying currently observed trends in the space reconnaissance. System analysis, in turn, is based on the assumption that no element is completely neutral in relation to the others. It allows us to look at the phenomenon under study as a system connected by a network of functional relationships (Huczek, 2010, p. 129). System analysis is responsible for indicating the impact of the previously distinguished trends on the basic process and its environment. Due to the fact that to some extent we are talking about possible impact, i.e. we are partly referring to the future. This aspect of the work had to be carried out using another method, i.e. forecasting analysis. It refers to those elements that constitute an attempt to extrapolate currently observed trends into the future. Extrapolation involves inferring future consequences based on the analysis of the past and present, which allows the formulation of models of the possible course of processes in the future. Forecasting analysis is based on the knowledge that uses the identifiable premises extracted from the course of the current tendencies (Wiśniewski, 2021, p. 12). Of course, we should be aware that the forecasting method is, by its very nature, highly uncertain, as it relies to some extent on intuition. Intuition is a tool to achieve the right balance between too far-reaching futurism, which is not supported by rational premises, and prognostic presentism, i.e. an unreflective projection of the current situation into the future.

The analysis is embedded in a realistic view of international relations, emphasising the role of the state and the importance of military potential as a mechanism regulating relations between states. The issues discussed in this text, however, require a more nuanced standpoint on the state's nature than that represented by classical realism. The approach developed by Fareed Zakaria to the historical analysis of American expansion turned out to be particularly inspiring and useful. What is crucial for the article's objective is Zakaria's assumption that the state is not a coherent unit. It is important to determine to what extent rulers can use power resources, because "state power is that portion of national power that government can extract for its purpose" (Zakaria, 1998, p. 9).

Space power and its dimensions

The category that covers all space activities from the national security interest point of view is space power. We can define it as the overall potential of a country in space; of having the ability to influence other entities of international relations using space tools. It is an element of the state's power, capable of contributing to the state's interests in those spheres where space activities are involved.

Space power is a category assigned to the state because "only nation-states can acquire and maintain the status of space power" (Aliberti et al., 2019, p. 15). Understood in this way, space power, which constitutes the conceptual framework of this study, refers to two key conditions: capacity and autonomy (Aliberti et al., 2023, pp. 4–6). Capacity regards the state's possession of specific technical capabilities related to space activities. It's worth noting that the range of these competences is very wide and covers three main areas:

- Access to orbit, which is a subsidiary element of the next two but necessary, including launch sites and launch rockets.

- Orbital operations, which primarily generate space services. In some aspects, the ability to carry out orbital operations itself can increase space power, for example, manned spaceflight is considered a symbol of power status (Lewis, 2014, p. 1).
- Space services, which are practical effects resulting from orbital operations. These are crucial from the perspective of state power.

The second condition is a certain degree of state autonomy in these indicated areas, which determines the possibility of implementing space activities without relying on the support of external entities. This allows the state to formulate and pursue its own interests independently, regardless of the will or even against the will of other centres of power within the international system.

The combination of capacity and autonomy reveals a number of important issues related to the fact that currently few space states have such a scope of space power that would cover all key space competences (capacity) with full national autonomy. Usually, in certain areas, states are dependent on other entities operating within international relations, not only other states. A significant question remains to what extent limited space autonomy translates into the ability to complete tasks crucial to the state's interests.

The second issue, partly different but partly related to the capacity/autonomy puzzle, concerns interdependency. Within the framework of space power, we look at the entire space capabilities of the state, realising that a contribution to these capabilities can be made directly by state agencies (which was the traditional model of space exploration, dominant during the Cold War), as well as entities operating within the state, especially its legal system, but not under its total control (this refers to the concept of "state power" by Zakaria). Here we are primarily discussing commercial entities, whose contribution to the exploration of space has been increasing in recent years. The process of taking over space tasks by commercial entities is most rapid. To illustrate this, we can refer to the statistics of space launches in 2024 (McDowell, 2025, p. 4). Out of the 263 total orbital launches,[1] SpaceX, a private company, carried out a staggering 138 launches, including 132 Falcon 9 launches, two Falcon Heavy launches, and four test launches of Starship. Rocket Lab, another private company, achieved 14 orbital launches. For comparison, China, second on the list, carried out 66 launches; Russia launched 17. This raises the question whether the dominance of SpaceX should be counted as a contribution to the creating of US space power, or whether we are dealing with a completely new process, i.e. the creation of a private space power, to some extent independent in setting the goals of the state under whose legal system it operates. At a more general level, the dilemma arises as to what degree of state control over commercial entities is desirable, and what methods can be used to enforce such control.

When considering spaceflight statistics, the European Space Agency's low launch count of only three stands out. This means that, in terms to access to orbit, European countries are dependent on external entities–primarily on SpaceX in practice. This state of affairs leads to further dilemmas, such as the degree of dependence of the state in relation to foreign non-state entities and the possibility of mutual influence.

Referring to the definition of space power as the overall potential of a country in space, this phenomenon can be divided into three dimensions: political, military, and commer-

[1] This number may vary slightly depending on the compilation, as Jonathan McDowell includes four test launches of the Starship rocket, defining them as "near-orbital", but it does not include a missile flight from North Korea, which was suborbital but reached orbital energy.

cial (Ziarnick, 2015, p. 46). The political dimension manifests itself in space activities carried out for symbolic and prestigious reasons, or as a practical instrument for achieving political goals, e.g. building a sphere of influence. The latter may be done by including other entities in their own space programs, by making available to other states space products and services that cannot be purchased on the free market (e.g. providing a military satellite navigation signal) and by promoting own technical standards among other states. This dimension constitutes a significant context of the article, but does not fall within the scope of the issues discussed.

The military dimension encompasses key areas of military activity in space, including militarisation (also known as passive militarisation in Polish literature, as discussed by Czajkowski, 2020; Kopeć, 2022) and weaponisation (active militarisation). The former involves conducting tasks of supporting terrestrial military operations by orbital systems. It includes three basic forms of action: obtaining information (satellite reconnaissance), transmitting information (satellite communication), and positioning (satellite navigation). The third requires the establishment of anti-satellite operations aimed at the enemy's space assets. So far, attention has focused on the development of systems that affect enemy satellites in a destructive way (Lauer, 2022, p. 7), hence the term weaponisation. Now, however, destructive capabilities such as jamming, hacking, and spoofing are gaining importance (Martin, 2023, p. 3). This kind of space militarisation also includes weapons systems that operate from orbit on targets within the Earth's atmosphere, but with some exceptions[2] as they have remained only a theoretical possibility. In this article, we focus on passive militarisation, especially satellite reconnaissance.

The commercial dimension refers to activities undertaken for profit and to the perception of space as an area of wealth creation. The development of the space economy in the last decade has been rapid not only in the quantitative but also in the qualitative sense, resulting in significant re-evaluations in the field of space activities. The revolution in the commercial use of space is often associated with the emergence of a sector known somewhat enigmatically as new space (Parnella et al., 2022, pp. 291–297; Paikowsky, 2017, pp. 84–88). New space sector companies strive to make their space activities self-financing. Initially, they rely on financing from enthusiastic entrepreneur-owners who take on the risk (Denis et al., 2020, p. 434; Tchakerian, 2014, p. 4). This triggered a paradigm shift in the history of space sector, marked by the transition from "the space race between countries to the space race between billionaires" (Di Tullio, 2022, p. 15). New space enterprises usually offer a specific product or solution that they are trying to sell to the commercial non-governmental market (Peeters, 2021, p. 212). They are not dependent on the government sector (Gonzales, 2023, p. 3); government contracts are not a condition for their survival, although they try to obtain them. The entry of companies from the new space sector onto the market has created a new organisational form of space activities. James Clay Moltz (2019, p. 78) calls this model of activity netocracy, contrasting it with technocracy, the current model established during the Cold War rivalry between superpowers. The impact of this model is so great that in the USA, many important components of

[2] The exception are systems consisting of a satellite equipped with a nuclear warhead, placed into fractional orbit and deorbited so that the warhead falls and explodes in the enemy's territory. This type of weapon is referred to in the English-language literature as FOBS (Fractional Orbital Bombardment System) and was in operational service in limited numbers in the Soviet Union from 1969 to 1983 (Siddiqi, 2000, pp. 22–32).

space activity (including manned missions) have been outsourced from the state sector represented by NASA to the commercial sector (Eriksson & Newlove-Eriksson, 2023).

The changes caused by the new space economy also affect, and perhaps even primarily, the technical sphere. We can even talk about a technological renaissance that the space sector has experienced thanks to the new space economy (Punnala et al., 2024, p. 46). Pioneering technologies are primarily reusable launch systems, making access to space cheaper and more flexible (Tartar & Qiu, 2018), and small, mass-produced satellites with high capabilities, making it possible to build constellations consisting of a significant number of satellites and, in their extreme form, taking the shape of the so-called mega-constellations consisting of hundreds or thousands of satellites (Grotch, 2022, pp. 103–104). The result is a process known as the democratisation of space, i.e "rapidly growing availability of various space-derived services provided by an increasing number of commercial entities operating satellite systems" (Czajkowski, 2024, p. 236).

There is a feedback loop between the two dimensions of space power: military and commercial. Mutual relationships can take many shapes, but two patterns are the most important:

- The use of instruments provided by the commercial sector and designed to provide economic benefits for conducting of military operations. This takes the form of purchase by official state bodies (armed forces, ministry of defence) of space services from commercial entities. To illustrate the scale of the conjunction: U. S. Space Force's Commercial Satellite Communications Office predicts that American military orders for commercial satellite services may reach a value of as much as $2.3 billion by 2027 (Erwin, 2025). This phenomenon can be treated as a new incarnation of the warfare privatisation and it converts satellite operators into a new type of PMCs (private military companies).
- Drawing patterns from commercial solutions and creating state-controlled military orbital systems based on these patterns. Such systems would be based on the scheme of a "new space architecture" (Kopeć, 2022, pp. 368–370), primarily referring to mega-constellations. The new architecture, at least initially, will not be an alternative but rather a complement to the traditional architecture based on a small number of complex and expensive satellites. The process of its dissemination will probably be compatible with the direct use of the services of commercial operators, especially in areas where there is no monopoly position of one entity.

Trends in space reconnaissance

Analysing the current conditions of satellite reconnaissance, especially in the context of the Russia-Ukraine war, the following trends can be identified.

Firstly, we are seeing an increasing role of satellite reconnaissance data obtained from commercial sources. Satellite imagery provided by entities doing business in third countries–primarily the United States, but also other Western countries–is used by Ukraine, which itself has virtually no military orbital systems (Dageert, 2024). The significance is confirmed by the words of the former head of the Ukrainian Space Agency, Volodymyr Usov, in December 2022, that about 50 percent of the intelligence data provided to Ukraine came from the commercial space sector (Bingen et al., 2023, p. 35). This points to an important element of the space revolution, which is that countries without their own

satellite infrastructure can acquire significant military capabilities simply by purchasing services (Burbach, 2022).

Moreover, the commercial sector is also becoming an important supplier of satellite reconnaissance data for countries that have their own capabilities in this field. The example of Russia is symptomatic here, where a Russian private military company known as the Wagner Group has exclusively purchased two high-resolution imaging reconnaissance satellites belonging to the Chinese Chang Guang Satellite Technology constellation and the right to obtain images from other satellites of this constellation, which consists of approximately 100 orbital objects (Defense Post, 2023). The contract was concluded through the Nika-Fruit company belonging to the business empire of Yevgeny Prigozhin. This illustrates the trend of multi-level privatisation of space warfare, as one PMC purchased military services from another private company, in this case a satellite operator. This trend does not concern only Russia, which, although it has its own reconnaissance systems, is struggling with their insufficient capabilities.[3] The United States, which has the world's largest military satellite reconnaissance systems, also makes extensive use of data obtained from commercial sources, as evidenced by contracts concluded in recent years. A particularly strong pursuit of signing such agreements appeared in the months following the start of full-scale Russian aggression against Ukraine. A prime example is May 2022 umbrella multi-year deal between National Reconnaissance Office and satellite operators Maxar Technologies, BlackSky and Planet Labs, worth several billion dollars (the exact value was not disclosed – Evans, 2022).

Commercial satellite imagery makes it possible to provide military assistance to other countries without directly involving their own military infrastructure. This is the nature of the contract concluded in February 2023 by the Pentagon and was worth $192 million, under which Maxar provides imaging to US allies (Albon, 2023). This avoids the limitations that would arise if state-owned military systems had to be used for such assistance. In this way, political costs are reduced because the support is formally provided by a private entity, not the state. This situation is also advantageous in that there is no need to engage military infrastructure, and satellite reconnaissance systems are among the most clandestine elements of this infrastructure and the state may not be willing to share intelligence data from this source even with proven allies.

Secondly, there is an increase in data obtained from large reconnaissance constellations, which are a manifestation of the "new space architecture". This is a direct result of the previous trend, as mega-constellations are currently the domain of commercial operators. For example, the Planet Labs satellite fleet consists of approximately 200 objects (Planet 2025) and more than 80 objects for Maxar Technologies (Via Satellite, 2025). For comparison, the KeyHole series of US military optical reconnaissance satellites, akin to the Hubble Space Telescope but optimised for Earth observation, currently comprises approximately four objects (David, 2024). While commercial remote sensing satellites may offer smaller capabilities compared to specialised military satellites, they compensate with advantages. The increasing size of the constellation allows for a greater geographical scope of reconnaissance and a reduction in revisit time, meaning the satellite flies over a given location less frequently. For the Pelican constellation run by Maxar Technologies the revisit time is up the 10 times per day for most of the globe, and up to 30 times per day at

[3] As of December 2022, Russia had only 15 military reconnaissance satellites, including eight electronic, five optical and two radar reconnaissance (Dageert, 2024).

mid-latitudes, while Legion satellites by Maxar can revisit up to 15 times per day (Sheetz, 2022). Current small commercial satellites offer very high parameters, and a resolution of 30 cm/pixel has already become a new standard in the case of optical imagery. In 2025, the first Albedo satellite is to be in orbit, offering a resolution of 10 cm/pixel, previously unattainable in the commercial sector (Werner, 2024). This is one of the examples of the mentioned technological renaissance related to the new space revolution.

Thirdly, there has been an increase in the capabilities and operational significance of a particular type of satellite reconnaissance, i.e. synthetic aperture radar (SAR) imagery. Although they cannot completely replace optical systems, which do not match the detail and ease of analysis (largely due to the nature of the "radar image"), they offer the possibility of conducting reconnaissance regardless of the time of day and weather conditions, including looking through the cloud layer. In Ukrainian conditions, where cloud cover is relatively common, this is a huge advantage. Another benefit, highlighted by Ukrainian Defence Minister Oleksiy Reznikov in a statement from September 2022, is the ability to detect camouflaged targets, including vehicles (Mishchenko, 2022).

In the field of SAR imaging, commercial systems based on large constellations play a leading role, which connects this trend with the previous two. This especially applies to the largest constellation of this type in the world, created by the Finnish company ICEYE. The usefulness of the ICEYE satellites turned out to be so great that Ukraine, in addition to obtaining data from the entire constellation, exclusively purchased one of the satellites. In practice, the contract assumed unlimited and exclusive access to images from this satellite, while maintaining the possibility of obtaining data from the entire constellation (ICEYE, 2022). The agreement was renewed in 2024 (ICEYE, 2024). The company is also one of US National Reconnaissance Office's key contractors in the field of SAR imagery, alongside Capella Space and Umbra (Hitchens, 2024–1).

Impact on the battlefield and political environment

The history of space militarisation is marked by the process of satellite support descending to lower levels of warfare, from the highest and chronologically first strategic level through to the operational level and the lowest tactical level. Operation Desert Storm in 1991, already mentioned, is symbolic here, when satellite tactical support had a significant impact on the course of combat operations for the first time. The GPS system was an indispensable navigation aid in desert conditions, enabling the US military to bypass the right flank of Iraqi troops and achieve a decisive victory known in American military tradition as "73 Easting" (Macgregor, 2009, p. 28).

This "descent" to the tactical level, however, concerned one type of activity falling within the framework of passive militarisation: navigation. We are currently witnessing the next phase of this process, which involves the full implementation of satellite communications at the tactical level. For instance, the Starlink network is being used to control drones and coordinate artillery fire (Tan, 2022). Only the last stage remains, i.e. satellite reconnaissance. Observing trends in this area, it can be assumed that this is a matter of the near future. If satellite reconnaissance is fully brought down to the tactical level, then "getting access to satellite data should be as easy as hailing a car via Uber", as Kari Bingen, former head of Pentagon intelligence, said (Hitchens, 2024–2).

We are currently observing some symptoms of this process, but it will become complete when systems enabling global reconnaissance in real time and on a continuous basis come into use. This last issue is especially a challenge due to the specificity of orbital motion in every orbit except the geostationary one, which is not very useful for reconnaissance purposes. For this reason, the satellite cannot maintain its position over a given location, and reconnaissance is characterised by a specific time resolution (revisit time). To continuously monitor a location using satellites in low orbits, a vast constellation is required, which was once unimaginable. The number of satellites in the low several thousand range depends on the height of their orbit and the off-nadir angle. Taking the current size of the Starlink constellation as a reference point–approximately 7,000 orbital objects at the beginning of 2025 (Palturova, 2025)–the building of a reconnaissance constellation of comparable size currently seems completely realistic.

An important question is whether such opportunities will be created by purchasing services from commercial operators or by drawing patterns from commercial solutions and establishing state-owned military systems based on the layout of the new space architecture. The latter scenario is possible, which is indicated by two US programmes currently being developed.

The first forerunner of changes is the Ground Moving Target Indicator (GMTI) program, which assumes the building of a SAR satellites constellation to detect and indicate ground and surface targets (Marrow, 2024). The system is intended to fill the gap left by the E-8 JSTARS (Joint Surveillance Target Attack Radar System) aircraft, which were withdrawn without introducing direct successors. The details of the system are classified, so it is not known how many satellites the constellation will have. However, if GMTI is to fulfil the tasks previously performed by aircraft, this number must be much greater than in the case of heritage reconnaissance constellations. Satellite reconnaissance data is to be available directly even to an individual soldier, which, in the words of General Devin Pepper, vice commander of the Space Force's Space Operations Command, will be the game changer (Erwin, 2024).

Another program emblematic of the described trends is the Proliferated Warfighter Space Architecture (PWSA), aimed at the construction of an early warning satellite system for detecting and tracking launches and flight paths of ballistic and hypersonic missiles. The system is to consist of low-Earth reconnaissance satellites with infrared sensors and retranslation satellites transmitting data in real time. The constellation is to include approximately 500 satellites of both types to provide constant coverage of 95 percent of the Earth's surface at all times (Hadley, 2023). Compliance with the assumptions of the new space architecture refers not only to the size of the constellation, but also to its openness, spreading out contracts among multiple vendors and development based on the spiral model, where the contracts will be divided into tranches and the satellites within them are constantly improved, implementing adjustments from the use of previous iterations.

Finally, the third programme, about which very little is known, is SpaceX's Starshield reconnaissance system. Operating in low Earth orbit, it is under a classified contract from 2021 worth $1.8 billion (Roulette & Taylor, 2024). By March 2024, there were more than a dozen prototype satellites launched in several tranches in orbit, while the NROL-146 mission in May 2024 carried an unspecified number (probably several dozen) of operational satellites of this constellation. Since then, further missions have been carried out–perhaps six more–as of the beginning of February 2025. The technical specifications of

the satellites are confidential, as are the target number of satellites (it can be expected to be at least several hundred objects) and the possible connection of this program with the GMTI program.

The entry into service of systems with such capabilities would have a significant impact on armed conflicts. In the Russia-Ukraine war, the presence of reconnaissance drones has become ubiquitous on the front line, directly influencing every military activity by generating a constant risk that a given activity is visible to the enemy. Tactical SAR satellite reconnaissance in real time and in continuous mode (so-called persistent surveillance) can take this situation to an even higher level thanks to the greater capabilities of orbital systems compared to unmanned aerial vehicles and more difficult countermeasures. Such capabilities will also increase the risk of being under geographical surveillance not only the front line, but also the entire territory of the warring countries (in fact, the entire globe) will be within the range of constant reconnaissance. This will allow Clausewitz's "fog of war" to be dispersed to a degree previously unattainable. By analogy to the term "dronisation", which describes the ubiquity of unmanned aerial vehicles on the modern battlefield and their overwhelming impact on combat operations (Adamowski, 2024), this phenomenon can be called "satellisation".

In the broader context of space power, state control over satellite capabilities becomes crucial. This aspect has two dimensions. Firstly, it is about ensuring that information from satellite reconnaissance does not reach unfriendly countries. In practice, this control may aim both to encourage business entities to operate in the way which is beneficial from the point of view of the state's national interest (e.g. offering services to its own military system and the military systems of allied countries), as well as to discourage them from such actions when they are unfavourable (e.g. offering space services to countries considered rivals or enemies). First of all, this control will extend to commercial entities operating within the legal system of a given country, but tools to influence commercial entities operating in other legal systems are also available. Of course, this influence depends on the political and economic position of the state trying to exert it. The United States is in a privileged position in that a significant number of space sector companies operate within the American legal and regulatory regime. Additionally, they are able to impose sanctions with relatively high effectiveness on entities operating in other countries and harming national security and the interests of American foreign policy, e.g. contributing to Russian aggression against Ukraine. From the author's experience,[4] it seems that this control is quite strict when it comes to data that can be used to supply a kill chain, i.e. ordered in advance and delivered in close to real time. It is important that governments orchestrate regulations in such a way as not to stifle the innovation of the commercial sector.

The second dimension refers to a possible tendency towards too much autonomy of commercial companies from the state, to the point that they become independent actors in international relations. Of course, this applies to corporations operating on a very large scale internationally. The example of SpaceX and the Starlink network in the war in Ukraine shows that the decisions of the owner of private infrastructure had a significant impact on the course of the conflict (Gurantz, 2024, pp. 20–22). Importantly, the logic of SpaceX's actions in the context of the war in Ukraine was neither a purely business logic

[4] The author gained this experience while preparing a scientific project using commercial satellite imagery to monitor Russian military installations.

nor a logic directly representing US interests, but a derivative of the political views of the company's CEO.

Joshua Abels (2024, p. 844), analysing this case, highlights that "private businesses engage in the production and operation of infrastructures for profit-seeking purposes, but that this calculus is amended by preferences for political outcomes that might be detached from the interests of their countries of location". The relationship between the state and companies operating within it becomes dynamic and mutual, and it is no longer strictly hierarchical. The highest level of market monopolisation by a single commercial entity concerns broadband satellite communication, where there is practically no alternative to the Starlink system. However, also in the case of satellite reconnaissance, we have several entities dominating the entire market,[5] so the issue of the autonomy of the commercial sector from states must also be taken into account here.

Conclusion

From a military perspective, there has been a significant increase in the role of space reconnaissance based on the purchase of services from commercial entities. Additionally, the emergence of state-owned systems drawing patterns from commercial solutions, which is a phenomenon that is only just beginning to manifest itself. Further development of these capabilities may lead to the "satellisation" of armed conflicts, i.e. a situation in which space support in the field of reconnaissance, communication and navigation will be ubiquitous at every level of warfare, from strategic to operational and tactical. This may be a game changer in conducting military operations, raising the importance of information on the battlefield to an even higher level. Satellite reconnaissance will become one of the most crucial military assets. In general, the capacity is growing dynamically, which applies both to the leading space power, the United States, and to countries that have not had space support capabilities so far, but obtain them thanks to the service purchase model.

At the political level, the new space economy is growing so much that it is becoming an essential, and to some extent independent and demanding to control, element of space power. Together with the tendency to outsource other military capabilities to the big-tech sector[6] (which, through the likes of Elon Musk and Jeff Bezos, is connected to the new space sector), this leads to the privatisation of key war-fighting capabilities in the United States. With the fraternisation of political elites with business elites–a process that is not new at all but has gained new dynamics with the US presidential administration in 2025–a new oligarchy with a complex network of mutual dependencies is being created. The new American tech-oligarchy, on the one hand, fits into the framework of the oligarchy theory by Jeffrey A. Winters (2011, p. 11), who defines it as "concentrated material power based on enforced claims or rights to property and wealth" and emphasises that it is not inconsistent with democracy. However, on the other hand, tech-oligarchy goes beyond Winters's approach, who sees it primarily as a policy of defending wealth (Ocampo & Winters, 2022), because the new cohort of the super-rich went beyond the traditional

[5] The SAR reconnaissance sector is dominated by companies: ICEYE, Capella, Airbus, Umbra, PredaSAR.

[6] Examples include contracts for the cloud information storage and processing under the umbrella Joint Warfighting Cloud Capability program — contracts worth a total of USD 9 billion were awarded to Google, Amazon, Microsoft and Oracle (Gill, 2024).

goals of gaining political influence (protecting the accumulated wealth, possibly multiplying it) and moved to implement their own political agenda (Pruszynski, 2025, p. 9). When considering space power, this constitutes a significant challenge in the area of autonomy.

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