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## **Outer space, a new dimension of Security**

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### *Outer space, a new dimension of Security*

#### *Abstract:*

*Outer or outer space is transparent for a population that, however, has a great dependence on this medium, which alone makes it relevant from the perspective of Security, which affects the very structure and missions of the Armed Forces. Space is a very weakly ordered medium from a legal perspective when technology, to which the presence in it is linked, makes it increasingly accessible. In this context, geopolitical rivalries are projected onto it and not only on a symbolic level as during the Cold War.*

#### *Keywords:*

*Space, technology, astropolitics, Armed Forces, Gray Zone*

**\*NOTE:** The ideas contained in the **Analysis Papers** are the responsibility of their authors. They do not necessarily reflect the thinking of the IEEE or the Ministry of Defence.

## El espacio exterior, una nueva dimensión de la Seguridad

### Resumen:

El espacio exterior o ultraterrestre es transparente para una población que, sin embargo, tiene una gran dependencia de este medio razón por si sola que lo hace relevante desde la perspectiva de la seguridad lo que afecta a la propia estructura y misiones de las fuerzas armadas. El espacio es un medio muy débilmente ordenado desde una perspectiva jurídica cuando la tecnología, a los que se encuentra ligada la presencia en el mismo, lo hace cada vez más accesible. En este contexto las rivalidades geopolíticas se proyectan sobre este y no solo a nivel simbólico como durante la Guerra Fría.

### Palabras clave:

Espacio, tecnología, astropolítica, fuerza armadas, zona gris.

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## The military dimension of space

Outer space is technology; a technology domain to be more precise. Competition in space is really a technological competition, nothing exists in it or outside of it. At the same time, the Armed Forces has a relationship with technology on its behalf; they are forces, as they say, but with a significant technological element, weapons, and they evolve with them. In this way, space, technology and Armed Forces are in alignment.

Outer space exploration is indebted to the military competition of the Cold War; it was originally linked to the Defence sector. The staging of the moon conquest was one such moment. Moreover, to avoid mutual destruction, the confrontation between the superpowers, the "cold" war developed symbolically in the form of military manoeuvres and the race for space. This physical element became a theatre for ideological confrontation.

As a result, the confrontation shifted from the military to the techno-economic realm. In this way, it does not materialise physically as it is developed in imaginary spaces and in the key to the future. The result, however, was the economic breakdown of the USSR, its ideological collapse and, consequently, the loss of its will to fight. War is an activity of the spirit; one is defeated when one accepts such a thing. It was thus established from the outset, as Wang argues, that "international space policy can be treated as the projection of terrestrial geopolitics"<sup>1</sup>.

Space policy was simultaneously becoming more economically focussed and more satellite-based and near-satellite oriented. It had a lower visibility, but did not achieve a lesser scope or results, as was the case, for example, with GPS (*Global Position System*); a programme of military origin and use. In this transition, space has partly lost the military character from where it emerged—and which continues to exist as up to 75% of satellites today are military—developing a new business and service facet that is still limited by the high cost of launches, but for which a very encouraging future can be envisaged.

In any case, strategic competition in a weakly regulated outer space—except for telecommunications—as the oceans once were, is a renewed reality both because of the development of anti-satellite technologies (ASAT), which by their aggressive nature

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<sup>1</sup> GÓMEZ-ELVIRA, Javier. "Vuelta a la exploración del espacio" (Return to space exploration), *Global Affairs Journal*. Centre for Global Affairs & Strategic Studies. School of Law-International Relations. University of Navarra, March 2020, no. 2, pp. 14-21.

increase the possibility of confrontation; and because of technological progress that gives space exploration new opportunities and unfathomable benefits that foster all kinds of ambitions<sup>2</sup>. In this context, being able to impose the rules is decisive.

This implies a certain return to the positions sponsored from the oldest commercialism for which war is not so much the continuation of trade by other means as its substitute<sup>3</sup>. In the words of General Monck, when requesting the resumption of the war with the Dutch in 1662, "What does this reason or that reason matter? What we want is an even bigger share of trade with the Dutch"<sup>4</sup>.

The absence of sovereignty rights, the debate over ownership, and the freedom of exploration in the context of the possibility of high economic returns accentuate such risks now as then. As Zygmunt Baumann says, "Postmodern wars seek to promote global free trade by other means."<sup>5</sup>

### The control of space

Space provides discretion and freedom of action. Its control implies "full spectrum domination", which means having the ability to dominate it, but also to deny its use to other actors. In President Trump's own words, "to defend the US, it is not enough to have a presence in space, we must have space dominance."

However, such "total control" is not feasible for any single actor, even the US, given the scale and scope of the environment. However, as in maritime space and the other *global commons*, sufficient control is necessary to ensure freedom of action<sup>6</sup>.

Moreover, attempting to achieve total control would most likely lead to an arms race that would destabilise it and have geopolitical consequences. The difficulty of achieving

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<sup>2</sup> CALVO ALVERO, José Luis. "El espacio exterior como ámbito estratégico" (Outer space as a strategic area), *Española de Defensa Magazine*, February 2020 no. 369, pp. 54-57. Available at: <https://www.defensa.gob.es/Galerias/gabinete/red/2020/02/p-54-57-red-369-espacio.pdf>

<sup>3</sup> ARON, Raymond. *Guerra y paz entre las naciones (War and peace between nations)*, Revista de Occidente, 1963, Madrid, p. 299.

<sup>4</sup> HOWARD, Michael. *The causes of conflict and other essays*. Ediciones Ejército, 1987, Madrid, p. 227.

<sup>5</sup> BAUMANN, Z. *Liquid Modernity*. 2002, Buenos Aires: FCE, pp. 16-17.

<sup>6</sup> MARTÍNEZ CORTÉS, José M. "Las fuerzas aéreas y el espacio: un desafío de cooperación internacional" (Air forces and space: a challenge for international cooperation), *Revista de aeronáutica y astronáutico*. 891, March 2020, pp.184-198.

adequate space control lies, as we have seen, among other factors, in the profusion of commercial satellites. Its importance will increase due to orbital congestion<sup>7</sup>.

Spatial control in turn implies surveillance, protection and the ability to deny. Space surveillance involves detecting, identifying and tracking thousands of objects in space. Satellites were —and are— the key to elaborate early warning systems for the deployment or launch of ground-based nuclear weapons. Thus, given their passive, discreet and non-intrusive nature, the intelligence tasks developed from them are considered crucial. Moreover, and in light of this, it would be logical for a nuclear strike to be preceded by a another against such systems in order to nullify their early warning capability.

Protection is a requirement to ensure freedom of access to space and to allow action in it. Protection can be achieved by making satellites more difficult to locate, attack or destroy. Whichever option is chosen, providing a system with protection means making it physically heavier and technologically more complex, such as the deployment of constellations, and therefore entails additional costs.

The third component of space control is the denial of space, consisting of the ability to veto certain space systems, and even certain commercial satellites. This denial of space, at least in low orbits, is relatively easy to achieve<sup>8</sup>.

We can also analyse control in the offensive/defensive duality; thus, we have offensive control and defensive control of space. Both are necessary, on one hand, to ensure access and freedom of action, and, simultaneously, to degrade the spatial capabilities of potential adversaries by discouraging their actions<sup>9</sup>.

In fact, since 2015, the United States has placed great emphasis on the "development of offensive space control and active defence strategies and capabilities." "Offensive space control" is a clear reference to anti-satellite weapons (ASAT). "Active defence" is much more nebulous, and refers to undefined offensive countermeasures that could be taken

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<sup>7</sup> PÉREZ GIL, Luis V. "La militarización del espacio: el desarrollo de satélites inspectores por EE. UU. y Rusia" (The militarisation of space: the development of inspection satellites by the US and Russia", *Global Affairs Journal. Centre for Global Affairs & Strategic Studies*. School of Law-International Relations. University of Navarra. March 2020, no. 2, pp.24-31.

<sup>8</sup> CANO GARCÍA, Ricardo. "Military use of space. Space: A New Battleground for Japan", *Nippon.com* 10.12.2018. Available at: <https://www.nippon.com/en/in-depth/a06101/>

<sup>9</sup> MARTÍNEZ CORTÉS, José M. "Las fuerzas aéreas y el espacio: un desafío de cooperación internacional" (Air forces and space: a challenge for international cooperation), *Revista de aeronáutica y astronáutico*. 891, March 2020, pp.184-198.

against an attacker and further expanding routes. This would accentuate the ongoing militarisation of space<sup>10</sup>.

It is therefore advisable to continue developing a legal framework outlawing aggressive actions in space, while simultaneously accepting, in the name of the realism that Security demands, that nothing guarantees respect for these rules.

Indeed, from the perspective of the Armed Forces, the application of force in space is evolving in much the same way as aviation. Thus, today, space activities focus primarily on communications and intelligence (equivalent to observation hot-air balloons in the 19th century, for example) but, as with aviation, they are now evolving towards the application of force first against the surface and then in the context of the space environment.

In this regard, the major space powers are working on new generations of both surface-based and space-based ASATs. It is estimated that this generation of weapons will be operational by 2025, and will force a change in the philosophy of warfare. This will result in a change in the *modus operandi* and structure of the air force, which by its nature will be the main actor in this environment<sup>11</sup>.

Let's remember once again that space provides important services to society: telecommunications, situation, meteorology, reconnaissance, intelligence, among others. In addition to the military ones that must be protected.

Indeed, from a specifically military standpoint, there is a marked dependence on space.

### **The space of military activity**

The revolution in military affairs, which characterises the so-called Third Generation Wars, is based precisely on technology and space: sensors, communications systems, intelligent weapons, etc. A set, as we have seen, based in outer space whose simplicity of operation involves tremendous structural and design complexities.

Modern warfare is based on the use of systems that combine intelligence, communications, navigation and other military space systems at the same time. It is about

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<sup>10</sup> "La guerra en el espacio puede estar más cerca que nunca" (War in space may be closer than ever), Scientific American. Available at: <https://www.scientificamerican.com/espanol/noticias/la-guerra-en-el-espacio-puede-estar-mas-cerca-que-nunca/>

<sup>11</sup> CANO GARCÍA, Ricardo. "Military use of space. Space: A New Battleground for Japan", *Nippon.com* 10.12.2018. Available at: <https://www.nippon.com/en/in-depth/a06101/>



seeking the synergistic effect of convergence and fusion. To do this, platform-centric operations must be transformed into network-centric operations. Each platform must "connect, share and learn" within a system of systems (families). This is possible by pooling data collected across the entire battlespace and this is only possible with the use of secure and resilient communications links<sup>12</sup>. But such advantages simultaneously imply a vulnerability due to the strategic dependency they create<sup>13</sup>.

War, being an integral event —and for this very reason— moves in the multi-domain terrain. This, rather than being a strict sequence of operations, is about seizing fleeting advantages in the domains as they arise and using those victories to open the way for operations in the other domains.

The arrival of space necessarily implies a transformation in the way war is waged. The result is that the joint force can attack so massively and with such speed and complexity that it overwhelms enemy defences. The key is, again, integration into a connected network. Victory depends less on individual capabilities and more on strengths gained through networking<sup>14</sup>. Along these lines, the North American Aerospace Strategy conceives "space activities as a unique resource of national and military power" and incorporates "the principles of joint warfare in space operations."

In this way, space-based services may be transparent or invisible to the end-user, but they permeate almost every aspect of joint and combined operations. For this reason, the spatial domain should be considered as routine as the other operational domains and should be included in military planning processes as well as in drawing up joint campaign objectives and courses of action. Similarly, possible support for space operations by other domains should be considered and, if necessary, integrated<sup>15</sup>.

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<sup>12</sup> MARTÍNEZ CORTÉS, José M. "Las fuerzas aéreas y el espacio: un desafío de cooperación internacional" (Air forces and space: a challenge for international cooperation), *Revista de aeronáutica y astronáutico*. 891, March 2020, pp.184-198.

<sup>13</sup> PIKE, John. "The military uses of outer space", *Stockholm International Research Institute (SIPRI)*, SIPRI yearbook 2002. Available at: [www.sipri.org/yearbook/2002/11](http://www.sipri.org/yearbook/2002/11)

<sup>14</sup> MARTÍNEZ CORTÉS, José M. "Las fuerzas aéreas y el espacio: un desafío de cooperación internacional" (Air forces and space: a challenge for international cooperation), *Revista de aeronáutica y astronáutico*. 891, March 2020, pp.184-198.

<sup>15</sup> MARTÍNEZ CORTÉS, José M. "Las fuerzas aéreas y el espacio: un desafío de cooperación internacional" (Air forces and space: a challenge for international cooperation), *Revista de aeronáutica y astronáutico*. 891, March 2020, pp.184-198.

## Space and the grey area

Therefore, given its vulnerability and the relevance of the spectrum of functions covered by it, space becomes a target of military interest whose control confers an advantage. What's more, satellites are very vulnerable and valuable objects; but it is only the objects, not the people, that blur the seriousness of any possible action against them by conferring less symbolism while not explicitly bloody.

Moreover, the intrinsic characteristics of this domain install the violence carried out in it in what has come to be known as the "grey area". If, on one hand, the level of structural damage from an attack on all space systems can be very high, it can cause significant degradation of the opponent's capabilities and, at the same time, severe economic harm.

On the other hand, lethality, the number of direct human casualties resulting from the action is zero or very low as it is carried out in an uninhabited environment and can be the result of a cyber action. This hinders any response outside the aforementioned plane due to the very proportionality that is often sought in retaliation.

In addition, it is difficult to know exactly what the situation in outer space will be in the event of a conflict. The "fog of war" in this environment is much thicker than on the earth's surface: And the forms that eventual attacks can take are much more muted than in the case of an ordinary physical attack: *jamming*, cyberattacks, use of lasers from the ground or other satellites, interference with the GPS system (e.g. Norway accused Russia of this during manoeuvres in late 2018). Cyberattacks in the aerospace domain are a highly profitable activity because of the link between space and the cyber domain and because of the repercussions of such attacks on the earth's surface since they render the whole system unusable, making it a critical infrastructure.

In addition, there is, as is commonly the case in the "grey area", uncertainty as to what happened and difficulties in reliably attributing the source of the aggression and even as to whether this is such or just a failure of the system. This places actions in this area in the context of what has come to be called "political warfare" or as a preliminary —and even reasonable— step in the direction of an eventual armed conflict<sup>16</sup>.

Since military operations are meant to be multi-domain operations and, as we have seen, are not sequential but integral; it may be that winning in space does not mean winning;

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<sup>16</sup> CANO GARCÍA, Ricardo. "Military use of space. Space: A New Battleground for Japan", *Nippon.com* 10.12.2018. Available at: <https://www.nippon.com/en/in-depth/a06101/>



but what is crystal clear is that being defeated in space means being defeated<sup>17</sup>. This calls for a consistent foresight effort.

The response of a state governed by the rule of law to a challenge such as an attack in the "grey area" is consequently complex, as it would undoubtedly be aggressive and harmful, but not bloody. In addition, this would have to be applied to those who, moreover, proclaim their innocence, deny the fact and even where everything points to a guilty act, there is no reliable or definitive evidence of it, however much it may be intuited. And that is when the use of a democratic state's aggressive capabilities is assessed, subject to international law and subject to national and international control.

However, some analysts argue that countries are not interested in this type of action because they do not want to lose their own satellites in retaliation. In addition, the use of "kinetic" destruction measures could generate significant amounts of space debris—one of the biggest problems in space today, since it contaminates orbits and can cause severe damage—and start a chain reaction and thus give rise to a sort of "demolition derby" akin to mutually assured destruction transposed to a spatial level, which would render the satellite spaces unexploitable. But also the existence of third-party terrorist and criminal organisations that can acquire these capabilities—even at a cyber level—makes it appropriate to speculate strategically about this eventuality.

Thus, just as in the context of World War II, in which none of the actors involved used chemical weapons, implicitly agreeing with each other within the dialectic of war, so it is with attacks on satellites. This would create an extreme *lose-lose* dynamic due to the vulnerability of the satellites and the damage that would be done to such a critical and important infrastructure, which would be transmitted to all the ground networks that rely on them. This, again, does not detract from the fact that a third actor could appear with an interest in the chaos resulting from something like this.

At the same time, in this implicit logic, no space agreement has yet been reached that would serve its strict and verifiable prohibition of weapons of such debatable use under the provisions of the Outer Space Treaty. Nor does any code of good practice in space, such as that being proposed by the EU in an intellectual line with the Vienna Documents on Confidence and Security Measures. This requires more transparency and trust-

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<sup>17</sup> MARTÍNEZCORTÉS, José M. "Perspectiva de la universidad y la industria" (Perspective of universities and industry), *Revista de aeronáutica y astronáutica* no. 891, March 2020, p. 199.

building among spacefaring nations, but which is rejected by the revisionist powers who, by accepting it, would lose a factor that would allow them to resolve the disadvantage they have in the space realm.

This would be a first step towards agreements that will become increasingly urgent and peremptory. As recognised by the National Aerospace Security Strategy , international cooperation in all areas is essential to meet challenges of such magnitude and coordinate a growing presence as well as to ensure interconnectivity, interoperability and to develop technical agreements to exchange space surveillance information at a minimum.

This has not yet been achieved because of the technical difficulties involved, since, starting from the definition of what an anti-satellite weapon is —something far from easy— it should include ground-based anti-satellite weapons such as those China tested in 2007 and again in July 2014. It is worth recalling, *nolens volens*, that the disagreement between China and the United States was triggered by the first test, which seems to have been a turning point in those relations.

In short, there is much speculation about ASAT testing and research —including missile testing— conducted by revisionist powers such as Russia and China. Even India, which rivals China as the great power in the Asia-Pacific, successfully tested such weapons in 2019, joining a select club.

Moreover, the United States —which has supported the aforementioned code of conduct, which, as we have seen, would defuse the lesser capacity of revisionist states in this area— has a notable advantage on the spatial chessboard that this type of treaty would restrict without conferring any real advantage over actors who would be limited to its formal compliance.

In light of this situation, in 2013 the US declassified its Geosynchronous Space Situational Awareness Program (GSSAP), which is capable of monitoring high Earth orbits and even interacting with other satellites to closely inspect them. Such a gesture is probably a kind of warning to navigators, in anticipation of possible attacks against their space facilities<sup>18</sup>.

Moreover, and to point out the implicit duality of all technology, to refer that the United States could use ballistic missile defence systems, its X-37B long-range space planes

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<sup>18</sup> "La guerra en el espacio puede estar más cerca que nunca" (War in space may be closer than ever), *Scientific American*. Available at: <https://www.scientificamerican.com/espanol/noticias/la-guerra-en-el-espacio-puede-estar-mas-cerca-que-nunca/>

and even the aforementioned GSSAP programme could easily be transformed into weapons for space warfare<sup>19</sup>.

However, and in this dialectic intrinsic to the confrontation, the answer to ASAT weapons in the short to medium term, as Colonel Calvo Albero points out, is the progressive miniaturisation of satellites, which the *CubeSats* have consolidated also implies a considerable reduction in launch costs and can make efforts to destroy them uneconomical. In some cases, a space launch is not even necessary, and microsattellites can be launched from a fighter jet at high altitude, as in the Spanish *Pilum* programme. Furthermore, even if an ASAT system could interfere with, destroy or remove most of a fleet of microsattellites, it would not cost much to get a new fleet into orbit<sup>20</sup>.

Finally, as a practical result of all these concerns, NATO agreed at its 2018 Summit to develop the Alliance's Space Policy.

The Atlantic Alliance explicitly considers space to be essential for the command and control functions of operations and support in decision-making, which is why it is essential in defensive and deterrence policy. In the words of its secretary general, "Space is part of our daily lives. It can be used for peaceful purposes, but also aggressively. Satellites can be blocked, hacked or attacked. Anti-satellite weapons can cripple the communications and services on which our society depends."

In 1947, as airspace became more technologically advanced, the US Air Force broke away from the Army to become an independent service with its own logic. The same is happening today with the space force: the emergence of space as an operational domain is driving the creation of an independent military army that will draw on the Air Force for foundational support and infrastructure (security forces, financial managers, etc.)<sup>21</sup>.

For this reason, the renewed strategic relevance of outer space was definitively sanctioned when, in 2018, the United States created the *Space Forces* as an independent service, a sixth branch of the Armed Forces, something that goes beyond the formal

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<sup>19</sup> "La guerra en el espacio puede estar más cerca que nunca" (War in space may be closer than ever), *Scientific American*. Available at: <https://www.scientificamerican.com/espanol/noticias/la-guerra-en-el-espacio-puede-estar-mas-cerca-que-nunca/>

<sup>20</sup> CALVO ALVERO, José Luis. "El espacio exterior como ámbito estratégico" (Outer space as a strategic area), *Española de Defensa Magazine*, February 2020 no. 369, pp. 54-57. Available at: <https://www.defensa.gob.es/Galerias/gabinete/red/2020/02/p-54-57-red-369-espacio.pdf>

<sup>21</sup> MARTÍNEZ CORTÉS, José M. "Las fuerzas aéreas y el espacio: un desafío de cooperación internacional" (Air forces and space: a challenge for international cooperation), *Revista de aeronáutica y astronáutico*. 891, March 2020, pp.184-198.

Unified Space Command created in 1985 and integrated as a mere component into the Strategic Command in 2002. Its purpose is "toorganise, train and equip space forces to protect the interests of the United States and its allies in space and to provide space capabilities to other US military branches".

This makes space formally yet another field of military operations with some 15,000 troops and a budget of \$15.4 billion in 2021. Previously, in 2017, it published its *National Security Strategy* where space occupied a relevant place; and subsequently, in 2020, a new *National Security Strategy for Space*, proving its renewed interest that the creation of this sixth service makes more than evident and provides a will for permanence.

Moscow and Beijing condemned the project, saying that if implemented it would violate the Outer Space Treaty signed by the US the prohibits the militarisation of space. Russia also refused to renew a contract with NASA for the transfer of US astronauts to the International Space Station<sup>22</sup>.

Russia had a space force from 1992 to 1997 and 2001 to 2011, but this command is now part of the Russian Aerospace Forces —or VKS— which includes the air force. China also has a Space Systems department in its Armed Forces, and a Strategic Support Force for these purposes<sup>23</sup>.

In 2019, France announced the creation of the Space Command within the Air Force with the idea of transforming it. As proof of the significance of these circumstances, in July 2020, the French Defence Minister announced that the French air force would change its name to the French Air and Space Army, with all the symbolic and functional significance that this entails.

In the case of our Air Force, the Defence Minister, Margarita Robles, has already opened the door to a similar procedure. It should be noted that in 2018, the Air Force Chief of Staff approved the directive to implement the space surveillance capability in the Air Force. Meanwhile, the Department of National Security has also approved the *National Aerospace Security Strategy* with the aim of protecting Spanish infrastructure in its

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<sup>22</sup> RENGEL, Carmen. "Las grandes potencias pelean por el control militar del espacio" (Great powers fight for military control of space), *Huffington Post*, 29/08/2019. Available at: [https://www.huffingtonpost.es/entry/las-grandes-potencias-pelean-por-el-control-militar-del-espacio\\_es\\_5d6638efe4b022fbceb335ee](https://www.huffingtonpost.es/entry/las-grandes-potencias-pelean-por-el-control-militar-del-espacio_es_5d6638efe4b022fbceb335ee)

<sup>23</sup> VÁZQUEZ CARNEIRO, Ignacio Juan. "La última frontera: el espacio exterior" (The last frontier: outer space), *Código Público*. Available at: <https://codigopublico.com/a-fondo/la-ultima-frontera-el-espacio-exterior/>

airspace and in outer space, as well as the National Aerospace Security Council with the aim of guaranteeing the security of ground space and outer space.

## Conclusions

Outer space is a reality in everyday life. Despite its low visibility and its transparent nature for the user, it determines a significant part of the economic activity of our societies.

Space becomes a critical infrastructure, indeed, an additional domain in the military realm in addition to the traditional. This is due to the high technification of almost the entire infrastructure and also to the high possibility of knock-on effects due to the high interconnectivity on which the system is based.

Particular and specific consideration needs to be given to its simultaneously vulnerable and high-value nature. Military operations in the 21st century are multi-domain operations, in which space is essential. And it is key to the development of the revolution in military affairs, enabling planetary surveillance and support for actions on the ground. All Western and post-Cold War military operations have made use of space. To be defeated in space is to be defeated in absolute terms.

War is a social fact and, as such, it reaches wherever man reaches, be it physical places, symbolic spaces or domains of knowledge. Those who fail to heed its demanding nature will inevitably find themselves outflanked or even defeated. If human beings reach into space or social networks, war is not so much a military activity as a political activity and a clash of powers. It is therefore it has its own dialectics and logic.

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