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LEGAL AND POLITICAL IMPLICATIONS OF OFFENSIVES ACTIONS FROM AND AGAINST THE SPACE SEGMENT

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ABSTRACT

The Outer Space Treaty had been adopted to avoid the possible denial of peaceful uses of outer space, and because, technically speaking, using effectively a satellite as a weapon was also a difficult task to perform. The problem remains for non-state international actors which are not bound by international treaties.

It is important to remember that the military use of outer space has both stabilizing and destabilizing potential. Military and civilian satellites perform functions that contribute to treaties verification, transparency, confidence building and nuclear deterrence. Putting weapons in space – that is a military use of outer-space – would threaten the instruments and sensors deployed into orbit to monitor potential enemies, control the compliance to disarmament treaties, detect ballistic missile launches, and maintain reliable communications. A sudden attack against such systems would lead to a main international crisis.

In conclusion, the issues related to offensive actions towards and from space shall be taken into consideration not only from a military perspective, but also from a political viewpoint – terrorist actions against the space segment – and from an economical point of view.

TEXT

Hundreds of satellites benefit the people of the world economically, scientifically and by their contribution to international security. So far, activities in space have proceeded without much conflict. Means have been found for regulation and agreement to minimize interference in the radio spectrum, while making more efficient use of limited spectrum resources.

Today, maintaining the peaceful use of space is becoming more complicated due to the privatisation of the notion of security by commercial actors and the emerging of high technology non-state threats, which are not bound by international treaties.

The key questions that this paper addresses can be summarised as follow:

- Is space warfare inevitable?
- What will happen if one country decides to develop and deploy space warfare systems?
- According to some technical scenarios, the use of nuclear, kinetic energy, directed energy weapons and information warfare, what would be the political and legal implications of offensive actions from and against the space segment?

WARFARE IN SPACE

To deter war and to protect the security of the country are the key missions of the Ministry of Defense of all countries of the world. Defense space programs support such missions but, if the prevention and the deterrence fail, it is vital to be able to have the capabilities to defend the nation and its interests.

The access and the use of outer space could be one of the main national interests of a country from a defense and from an economic point of view. In this sense, the question of the inevitability of a space-based conflict seems of primary importance. Especially because there are good arguments in support and against the inevitability of such possibility. In the following paragraphs, we will analyse how and why this situation is not such a paradox as it may seem at a first glance.

Space warfare cannot be avoided

Space leaders understand how the space capabilities might be used as one of the primary instrument of power in pursuit of national and international objectives. In other words, militarily speaking, space is a force multiplier: it allows to gain an advantage in time, maneuver and logistics against an adversary via a more efficient Observation Orientation Decision and Action (OODA) loop. At the same time, space is also a market with growing possibilities not only in the field of services, but also for the exploitation of natural resources.

If we define warfare as a situation of conflict amongst two or more actors that have the purpose to acquire and maintain the control over a resource or a set of resources, then we must conclude that warfare for and in space is highly probable.

Militarily speaking, the developed countries feel the need to be able to project power anywhere on Earth, and, for this purpose to make a large use of space (navigation, observation, communication...). In addition, new capabilities will be developed that can deter attack on and defend national interests and many of these capabilities would be based in space. For this reason, an eventual attack against the space segment could give a strong advantage to the actor that carries out such an action because the current strategic, operative and tactical situation awareness, the superiority in mobility, in logistics, in positioning and the precise guidance of weapons greatly relies upon space technology. For this reason, an actor who would decide to affect the space segment knows the advantage it may gain in term of disorganizing and disturbing its adversary's forces. At the same time, the impact over the public opinion would be very strong and capable to create and maintain a feeling of insecurity that reduces the will to fight or to support the conflict by the population.

In terms of commercial space activities, the possibility to affect the space segment could be used not only as integrated into a military action but also as a commercial action against a competitor in the same field, in particular by reducing the lifetime of the competitor's satellite or by disturbing its missions. This leads to the possibility of conquering the market and ruining the competitor. Of course, such actions are not legal and it is very unlikely that they will take place, but, for the purposes of this paper it is important to take into consideration also non military scenarios.

Politically speaking, affecting or taking down a satellite could have a great effect upon the public opinion. For this reason, a non-state actor may think about such kind of offensive action to attract attention. In particular, the chinese spiritual organization Falung Gong recently hacked the satellite Sinosat in order to send some messages to the population to talk about the repression that the chinese government was operating against them. These kind of actions, are likely to grow in

importance and intensity, for this reason there is a strong need to protect the space segment. In any case, the political will is a start, but policy is meaningless if the nation lacks the tools to implement it.

In conclusion, today, space is becoming an area of military operations in its own right—much the same as land, air and sea—not simply a place from which information is acquired and transmitted or through which objects pass.

Space warfare can be avoided

To wring the greatest capability out of the medium of space it is necessary to master highly complex technology; develop new doctrine and concepts of operations for space launch, defensive space operations, power projection in, from and through space and other military uses of space; and operate some of the most complex systems ever built and deployed.

It is complicate to wage war in space, and for this reason, space can be considered as a sanctuary. Even if affecting the space segment can give an important advantage from a military point of view, the technical systems required to do so are very costly, difficult to conceive and to operate in an efficient way. In addition, similar results to an attack against the space segment can be achieved throughout offensive actions against the ground segment.

In terms of commercial space activities, since space warfare is not a loyal concurrence and it is very bad for the image of the company who would be discovered carrying out such actions, the trade off among risks and gains make very unlikely the possibility to use such techniques to gain a market.

In conclusion, space warfare is not a fatality and will not be carried out unless a strong political will of one or more international actors. The term "states" is intentionally avoided, because, nowadays, States are not anymore the only actors on the international arena, and some non-states actors are the most important warring factors to the international security, that includes avoiding the weaponisation of the outer-space.

HOW TO WAGE SPACE WARFARE

It is possible to summarise the political issues related with space warfare as follow:

- The identification of the aggressor, especially if it uses information warfare techniques. It is essential, especially in this field where the use of weapons of mass destruction is possible, to clearly identify the aggressor and the reasons of the attack in order to size the counteraction.
- The management of the public opinion facing such kind of offensive action against its nation satellites. An international actor able to conduct space warfare can also attain the national territory with great damages.
- The feeling, at political level, to have failed a policy of conflict prevention and deterrence of strategic attacks.

Space weapons

Putting weapons in space would threaten the instruments and sensors deployed into orbit to monitor potential enemies, control the compliance to disarmament treaties, detect ballistic missile launches, and maintain reliable communications. At the same time, space weapons can be directed against targets that are still in the atmosphere and in the national territory of a country or in the international sea and air. According to the international law, a boat or an aeroplane is considered as part of the national territory of the country which owns it.

The Outer Space Treaty had been adopted to avoid the possible denial of peaceful uses of outer space. In addition, technically speaking, using effectively a satellite as a weapon was and still is a difficult task to perform. For

example, an orbiting laser might take hours or days to be on the target. Weapons of mass destruction are voluntarily omitted because they are the objects of the only specific prohibition to weapons in space, according to the art. 4 of the Outer Space Treaty. In addition, the ABM Treaty prohibits the deployment of space systems with ballistic missiles defence missions (art. 5).

It is currently very difficult to oppose space weapons. For this reason, they could be significantly effective against an adversary. However, there are several ways to counter nation controlled space-based weapons: anti-satellite systems, economic and technological blockade and an international legal system that forbids/restricts such weapons. The problem remains for non-state international actors which are not bound by international treaties. For this reason, the principle established by the United States to tie a common responsibility among the non state-actor Al-Quaida and the State of Afghanistan – that supported and hosted such organisation – is an example that deserves special consideration.

Antisatellite weapons

According to the international customs, the satellites are part of the national territory of the nation's owner. As a result, any attack on the space–based systems is considered as a threat to which armed force, including nuclear force, might be the reply: an attack to the space segment is an attack against the vital interest of a country. In addition, according to the ABM Treaty (art. 12) and the SALT I Treaty (art. 4) the interference in the means used for treaty verification is forbidden.

In a world in which Russia and the United States are no longer enemies, no individual nation has a strong motivation to develop and deploy space weapons for solely military purposes. Such weapons could be seen as inextricably tied to the purpose of achieving space dominance not only for military reasons – achieving full spectrum dominance thanks to a superior information management – but also for economical and political reasons.

It is important to remember that the military use of outer space has both stabilizing and destabilizing potential. Military and civilian satellites perform functions that contribute to treaties verification, transparency, confidence building and nuclear deterrence. A sudden attack against such systems would lead to a main international crisis. For this reason, in February 2000 the Chinese delegation to the United Nations Conference on Disarmament circulated a paper identifying a present and pressing necessity to prevent an arms race in outer space. A treaty forestalling the use of any kind of weapons in space, argued the delegation, would greatly support global peace and security. Moscow agreed with Beijing on this subject.

LEGAL AND POLITICAL IMPLICATION ACCORDING TO DIFFERENT SCENARIOS

Nuclear attack from and against the space segment

Nuclear weapons are a variety of weapons of mass destruction; as we stated before, the art. 4 of the Outer Space Treaty bars the stationing of such kind of weapons in space. In addition, it is also stated that nations are responsible for damages that their space activities may cause to others, perhaps including destruction of the space assets of another nation.

This chapter will focus upon nuclear weapons, because the effects of biological and chemical weapons against a satellite are very limited. Of course, it is still possible to attack ground targets from space with biological and chemical weapons, but it is more cost-effective to carry out such kind of attack with more traditional means.

Nuclear explosions have three main effects: rays effects, mechanical effects and radiological effects.

These effects had been studied by the different countries to understand the advantages and drawbacks of possible uses of nuclear weapons for space warfare. Of course such results are classified and will not be analyzed in this paper.

What it is possible to say is that nuclear weapons used against the space segment will affect not only the satellites targeted, but also all the spacecrafts in a wide surrounding area and will produce space debris. This situation will increase the dimensions and the intensity of the on-going conflict. For this reason, there is not a strong motivation to use nuclear weapons for antisatellite missions, and there is very few chances that the obligations of the different treaties would be compelled.

At the same time, because of technical constraints – lifetime, attitude and control, etc. – the option of placing nuclear weapons into space could not be seen as the most efficient option.

Nuclear weapons raise important political and legal issues. For this reason their development and use had been deeply studied and analysed. At the moment it does not seem that non-state actors may acquire such technology and conduct space warfare at this level.

In conclusion, although the issues related to nuclear weapons are one of the priority of the spacefaring nations, it seems that they are the best studied and those who raises the less uncertainties with respect to the other form of space warfare.

Kinetic energy weapon attack from and against the space segment

None of the Treaties bans the stationing of conventional weapons in space, and such weapons can be used to damage other satellites.

Kinetic energy weapons destroy things by using the energy generated by a moving mass impacting a target mass. Such kind of weapons for space application in the form of antisatellite systems date back to the mid to late 1960s. They can be employed from the ground, air, or space against targets in any medium. Knowing that, the space environment of the future will be one of multiple users of military, civil, and commercial satellites. In many cases, political considerations will prevent or severely constrain military options which involve actually destroying satellites. Having a solid capability in this area, however, will serve to deter similar aggression against satellites and will give the option to counteract if necessary.

The option of placing kinetic energy weapons into orbit to counter air/ground target is very complicate to realise and not efficient. It is much better to conduct such kind of operations in a more conventional way, such as using aeroplanes, missiles, soldiers, etc...

In conclusion, even if there is not a specific legal constraint against the stationing of such kind of weapons into space, the experience shows that they could be used only against other satellites, but the targeting and the guidance process are very complicated.

In addition, there are only few countries in the world able to build and guide missiles – launched by ground or air platforms – able to achieve the orbit and thus attain the satellites. It means, that it is quite easy to discover the author of the action and then organise the proper reaction.

Another effect of the explosion is the production of orbital debris, that jeopardizes the space activities of other actors that are not involved in the conflict. This situation will give them a good reason to be involved in the fight and thus increase the dimensions and the intensity of the conflict.

In conclusion, politically and technically speaking, the use of kinetic energy weapons

for space warfare does not seem the most efficient solution to conduct counter-space operations.

Directed energy weapon attack from and against the space segment

A directed energy weapon must be able to generate energy, direct it on the target, propagate it through air or space, to the target, and induce some lethal effect in the target.

Charged particle beams are probably the best at generating, directing, and killing but are clearly the worst at propagating. Neutral particle beams can propagate and kill but cannot yet be generated with sufficient intensities.

In addition, none of the Treaties bans the stationing of directed energy weapons in space, and such weapons can be used mainly to damage other satellites or ballistic missiles, although the ABM and START I treaty prohibits such kinds of actions.

At the moment, the problems related to the development of directed energy weapons systems are mainly technical and related to the following issues: the cost, the need of good weather, the need of no high pollution, the presence of an ecological threat, and the need of big installation to produce the energy needed. Finally, at the moment there is not a strong political interest on such field of research.

In conclusion, although the use of directed energy weapons is very efficient, since it is possible to grade the effects from soft kill to hard kill, the constraints listed above must be taken into serious consideration and they could slow down the development and use of such systems.

Information Warfare attack to the space segment

Space superiority will be one of the key pillars in the future military doctrine because it is the key for an efficient information management. In fact, space superiority means to be able to access to space and to gain a strategic advantage with a more efficient use of space technology than the other international actors.

The purpose of the information warfare actions against the space segment can be identified as following: identify the satellites and their missions, monitor the satellites transmissions, deny the use of its satellites to an adversary, and find the end users of the information with the purpose to gain a position of information dominance against the adversary.

Soft kill systems such as jamming, cyberwar and electromagnetic pulse energy will selectively jam or interrupt a satellite's signals without destroying it. This capability greatly increases the flexibility of space warfare operations. In addition, for achieving the same effects, the technical requirements are lighter than for the other scenarios.

Legally speaking, although some steps had been made to clarify what is legal and what is not in the field of electronic warfare (e.g. it is legal for a country to jam a foreign signal of a foreign satellite inside its national territory), there is a long way forward in the field of the cyberwarfare.

The legal context related to the cyberspace is particularly difficult to define. The first difficulty is related to the absence of a defined territory where laws are enforced, in addition there is no harmonization in the ways of perceiving frauds and the applicable sanctions among the countries. The second difficulty is related to the necessity of a compromise between the data and infrastructure protection and the private life of the people. The third difficulty is related to lack of specific laws and juridical documents related to the cyberspace. Finally, anyone with a computer connected to the Internet could be a potential victim or a potential danger, and it is very

difficult to discover the author of a cyberattack.

For these reasons, state and non-state actors may have an interest in carrying out such form of offensive actions to gain a strategic or an economical advantage against its adversary. And, this kind of space warfare operations had already been conducted by non-state actors: not only Sinosat seems to have been hacked, but also Skynet 4, the british military communication satellite.

The use of electronic warfare and cyberwarfare tactics is very efficient: it is possible to grade the effects from soft kill to hard kill. At the same time, the lack of co-ordination among the spacefaring nation in this field jeopardise the freedom of use of outer-space: e.g. a dangerous organisation might stop or hack some broadcasts, and this action will have a great impact on the public opinion and its sense of security.

In conclusion, even if, for most people, the first thought about space dominance goes to the weaponisation of space or the destruction of satellites and spacecrafts, the information warfare threat is the most likely action to be conducted in the near future.

CONCLUSIONS

From an international legal perspective, the development and the deployment of strategic weapons, kinetic energy weapons and directed energy weapons are contained within existing rules, more or less strong, and such issues are being addressed by the international community. The main problem in this area is the same for the international law in general: how to enforce the legislation to prevent an eventual weaponisation of the outer-space?

At the same time, politically speaking, the weaponisation of the outer-space may lead to a "proliferation-like" phenomena, since more and more countries have space capabilities, and will try to protect their interests also in this way. Therefore, it is important to prevent an eventual deployment of weapons in outer-space, and it will be only possible if everybody understand that there is not a political interest in doing that and the need to defend the space segment can be answered with other tools and means.

Although the use of cyberwar and electronic warfare to counter space technology are easily available to many kind of organisations and even to individuals, this issue not only encounters a void of international rules, but it is a question that is very rarely taken into consideration while addressing talking about space warfare.

Summarising, space superiority is not only a matter of military actions, but they shall be addressed also from a political viewpoint – terrorists actions against the space segment – and from an cost/benefit point of view. Unfortunately, the international law binds only the countries, but nowadays there are non-state international actors that shall be taken into serious consideration.

In conclusion, there are three key points related to the achievement of space superiority with military actions: the first one is related to the political will, the second one concerns the non-state actors that are not bind by the treaties and the decisions of the international organisation and, finally, there is a legal blur in the regulation of the cyberspace.

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