RUSSIA'S OFFENSIVE COSMOSTRATEGY

Anne Maurin

Cosmostrategy, a term rooted in the notion of geostrategy, concerns strategic maneuvers in a given space environment. Russia, a leading historical spacefaring nation, has a cosmostrategy that bears scrutiny as its purported lagging outer space industry is somewhat at odds with the sudden flurry of space-launch activity in 2022. In fact, Russia's space fleet, while precarious, is mostly complete. Moreover, Moscow is buying time by engaging in a guerrilla strategy in space—nonkinetic offensive actions in orbit—so that it can bolster its capabilities and remain a leading military space power.*

On March 2, 2022, during the early days of the war with Ukraine, Dmitry Rogozin, then-head of Roscosmos (Russia's federal space agency), decried an execution of cyberattacks launched at its satellite infrastructure, going so far as likening them to casus belli.[1] Subsequently, a month later, the United States in turn accused Russia of jamming its own navigation satellites, with US Space Force Vice Chief of Space Operations General David Thompson claiming that "Ukraine may not be able to use GPS because there are jammers around that prevent them from receiving any usable signal."[2] To reflect in hindsight, these two cases all but demonstrate that even a partial paralysis of space assets could become an unavoidable event in the midst of a large-scale conflict.

Considering this new strategic shift, it is precisely the study of "cosmostrategy" that may grant a better understanding to this unfamiliar context. Like its name suggests, cosmostrategy stems from the term "geostrategy." The latter, to recall, is the study of

*This is a reprint of an article first published in *Vortex: Studies on Air and Space Power* 3 (June 2022), https://en.calameo.com/.

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1. Interfax, "*Rogozin: kiberataki na rossiyskiye sputniki—eto casus belli* [Rogozin: Cyber Attacks on Russian Satellites Are Casus Belli]," Interfax—*Agentsvo voennyxh novostei*, March 2, 2022, https://www.militarynews.ru/.

2. See NBC Nightly News, "Russia Is Jamming US-Provided GPS Signals in Ukraine," NBC, April 4, 2022, https://www.nbcnews.com/.

strategic maneuvers in a given geographical environment for the purpose of acquiring command over the said environment, where it can be exploited for power purposes.[3]

In conjunction, cosmostrategy designates these maneuvers to outer space and the cosmos. The study has been awarded its marker of legitimacy as outer space becomes more and more indispensable by the day, not only for implementing military and economic strategies, but also for everyday use.

Indeed, since the 1990s, military operations have relied on civilian, military, or dual-use satellites that constantly fine-tune information regarding terrains and operational situations, all while facilitating the conduct of actions in a coordinated, faster, and more precise manner. Considering the valuable resources they provide, satellites must be protected at all costs against numerous threats, both human and natural. Such threats only increase with the growing congestion of orbits due to collision risks. To use the expression of Julien Gracq in his *Carnets de Grand Chemin* [*Notebooks of the Great Road*—a French philosophical work on the linkages of Earthen landscapes], further developed by Yves Lacoste in his *Dictionnaire de Géopolitique*, outer space has become a "dangerous landscape."

Cosmostrategy, when applied to Russia, gains quite the nuance. During the past decade, experts have been asserting that Russia has been lagging behind industrially, especially in relation to outer space. Yet the media and open-source networks around the world regularly reveal troubling conduct by Russia in this theatre. Indeed, while Russia's satellite range remains incomplete, recent months have witnessed a turnaround, most likely due to the ongoing conflict with Ukraine.

In particular, from February 5, 2022, onwards, there have been five military launches, four of which have been satellites with the fifth remaining a test. As a result, within but three months, Russia has launched more military satellites than in all of 2021. Hence, the enigma inevitably emerges as to how Russia manages to maintain an offensive military strategy in space with seemingly limited resources.

Yet contrary to popular opinion, Russia's space fleet is in fact relatively complete, albeit precarious, which, as a result, allows the country to maintain its space defense strategy. To detail, its nonkinetic offensive actions in orbit encompass a guerrilla strategy with the power to cause harm. Subsequently, it is able to buy more time to gradually reinstall its offensive capabilities in space and remain, under all costs, a military space power.

Russia in Space on (Nearly) All Fronts

On April 12, 2021, the 60th anniversary since Yuri Gagarin's first flight to space, President Vladimir Putin stated that in the twenty-first century, Russia must adequately sustain its status as one of the leading nuclear and space powers, due to the

3. F. Debié et al., "*À quoi sert la géostratégie* ?," *Géostratégie, Stratégique* no. 50 (1991), http://www.institut-strategie.fr/.

fact that the space industry is directly linked to its defense. This only highlights even more so the strategic importance of space for the Russian Federation.

For it to be possible to conduct an autonomous cosmostrategy, spatial access is first and foremost essential. Today, Russia possesses several launch pads, known as cosmodromes. The oldest is located outside of Russian territory in Baikonur, Kazakhstan—which ironically impedes on its increasing priority of and endeavors toward self-sufficiency. Vostochny was opened recently in the Siberian Far East, a few hundred kilometers from the Chinese border.

Plesetsk, originally a strategic missile base, is another cosmodrome located 800 kilometers north of Moscow in the Arkhangelsk region. This area is fully enclosed and defended by the *Vozdushno-kosmicheskye sily* (VKS), the Russian Aerospace Forces. From there, missiles and rockets carrying military payloads are regularly launched. Kapustin Yar, and to a lesser extent Iasny, are also launch sites for military satellites. Lastly, up until March 2022, Russia was present on the North American continent thanks to the Soyuz launch pad at the Guiana Space Centre.[4] Every one of these infrastructures make it possible for Russia to position its satellites, spacecrafts, probes, etc. across a wide range of orbits.

A Seemingly Complete but Precarious Russian Military Space Park

Quantitative Aspects

In general, it is difficult to identify Russia's exact battle order in space. The military, civil, commercial, or dual usage (i.e., combining civil or commercial use with military) of space objects in the Russian Federation is often ambiguous. Nevertheless, there are approximately 120 Russian satellites of all categories—civil, commercial, dual, and military—that are operational in orbit. (Of note, the term "operational" in this article refers to the satellite appearing to be operational on April 7, 2022, according to open-source databases. This figure may seem to fall short of Russia's self-claimed amount of 160 by June 2022.) This is a quite low number that lies in stark contrast with the high rate of space launches by other space powers, state or otherwise. For Starlink, tens or even hundreds of nanosatellites are regularly launched on a daily basis. The same is the case, although to a lesser extent, for OneWeb or even for China. On the contrary, the number of Russian military or dual-use satellites in service is estimated to be at around 80. This is excluding any civilian or commercial programs whose use, according to Russian law, must be made available to the state according to its needs, particularly the operational ones.[5]

4. Following the widespread sanctions against Russia in response to the conflict in Ukraine, Roscosmos closed its Soyuz launch pad in French Guiana and recalled all its employees to Russia.

5. Russian Federal Law: Zakon RF ot 20.08.1993 N 5663-1 (red. ot 11.06.2021), *O kosmicheskoi deyatelnosti* [The Concept of Space Activities], Article 2.

Of note, the above estimate of 80 is relative, as it depends on various databases, namely the Union of Concerned Scientists (UCS) Database, which is updated regularly. For a more precise account of the operational status of certain satellites, this article refers to the database created by astrophysicist Jonathan McDowell, which lists a launch date (LDate) and a date on which the satellite is known to be no longer operational (TDate) for each object launched into space since 1957. It is then necessary to assume, and thereby difficult to verify, that in the absence of a TDate, the satellite remains potentially still operational.

Qualitative Aspects

Although access to space is guaranteed, Russia's space component is quantitatively reduced. Many satellites are gradually becoming obsolete as the number of military launches can no longer catch up, thereby creating gaps in some constellations. The current analysis of its space fleet, either military or civilian, shows that Russia is far below the standards it had upheld during the Cold War; the country increasingly struggles to hold on to its position as a space power.

The rare budget increases for the renewal of its satellite programs, the lack of essential components due to economic sanctions, corruption, and embezzlement, as well as the difficulties in program monitoring and management have led to repeated deficiencies and delays in many of its programs. The only area where Russia had a monopoly—up until spring 2020—was manned space flight. However, this privilege is now shared with the private US actor, SpaceX. Nonetheless, military space remains a priority for Russia, particularly in a tense geopolitical context.

The space component of optical and radar Earth military observations is undoubtedly the weakest pillar constituting Russia's space capabilities. Optical Earth observation is provided by two post-Soviet programs, Persona and Bars. Although quite old and with a rather low resolution (around 50 centimeters for Persona), five satellites continue to be operational in sun-synchronous orbits, which allow a wide view.

Radar observation capability, which has imaging advantages that can penetrate cloud layers and remain unaffected by weather conditions, is almost nonexistent. There is no certainty that the Kondor satellite, dedicated to this task, is still operational. However, said capability could be reacquired with the Neitron.1 satellite (launched on February 5, 2022) that purportedly has both optical and radar imaging capabilities. Regardless, Russia's military forces can still rely on its civilian and commercial constellations, which are most likely already providing their images for state use: Kanopus and Resurs, or GEO IK2 for mapping.

Beyond surveillance and observation missions, the Russian Aerospace Forces also manages space-based early warning capabilities, namely, the EKS constellation, comprising four satellites launched between 2017 and 2021, as well as electromagnetic and

signals intelligence. The Lotos satellites intercept radio signals, making it possible to locate and identify possible military targets, mobile or otherwise.[6]

The Pion satellites are new-generation electronic listening devices, of which only one is currently in orbit, launched on June 25, 2021. It has a radar, making it essential in supporting land or naval operations and in detecting targets that do not emit radio signals.[7] The ELINT component (KREN in Russian) is moving upmarket after being in the hands of a high-risk state. It has had three satellite launches since 2021. Such a high number may be hinting at Russia moving to prioritize this component and secure its space capabilities in this area. Further supporting this hypothesis are the Akvarel and Repei programs,[8] which are both already in development to ensure ELINT's replacement.

Another key military space priority is the maintenance of an autonomous Russian satellite navigation constellation. The Glonass program, designated for this purpose, began in the 1980s. Today, Russia's navigation component consists of approximately 24 satellites. This is the minimum amount needed to obtain a relatively accurate position without the use of other global navigation satellite systems (GNSS). New Glonass satellites had been launched every year or so. Yet the most recent launch was back in October 2020. Lack of launches since then may play a factor in hindering future performance levels.

Finally, Russia's communications component is the largest in number of all—61 operational satellites in all fields. Commercial constellations are developed by companies whose majority shareholder is Roscosmos (Gonets, Yamal, Ekspress, etc.). The Loutch constellation supposedly serves as a relay linking terrestrial- and space-based communications, namely the International Space Station. This constellation may seem small at first glance, as it only comprises four satellites. However, it originally housed the Loutch-Olymp spy satellite, which regularly undertakes SIGINT missions on foreign satellites, particularly French ones.[9]

The military communications component involves 29 satellites. Military telecommunications—data transfer, etc.—are provided by the Blagovest constellation composed of four operational satellites, launched between 2017 and 2019. The constellation of 16 Rodnik satellites—launched between 2009 and 2018 in low orbit of 1,500 kilometer apogee—offers the Russian government, military, and its intelligence services the possibility of having a protected communication relay. In addition to the old Raduga satellites, smaller modern constellations, such as the Meridian with six satellites launched between 2010 and 2022, are operating within the Molniya orbit. They enable military communications to be established in uninhabited or difficult-to-

6. A. Zak, "Soyuz launches an ear in the sky," Russianspaceweb.com, updated on April 7, 2022, http://www.russianspaceweb.com/.

7. B. Hendrickx, "The Status of Russia's Signals Intelligence Satellites," The Space Review, April 5, 2021, https://www.thespacereview.com/.

8. Hendrickx, "Signals Intelligence."

9. Statement by French Minister of the Armed Forces Florence Parly on space defence, given in Toulouse, France, on September 7, 2018.

access areas, such as the Arctic, Siberia, and the Russian Far East, between ships, aircraft, and ground or mobile stations.

All these space assets are intended to be integrated into a high-performance combat system. The Russian Ministry of Defence (Minorobony) regularly publishes, as it did during the intervention in Syria, diagrams explaining the use of its space components on a battlefield.[10] However, considering the actual state of its constellations, along with the apparent difficulty its armed forces are having in optimizing their C2, doubts are raised regarding the system's level of functioning. Firstly, the number of satellites is too low for each to function perfectly in continuation. Moreover, Russia's spacecraft were not always operational nor were there a sufficient number to cover across several theaters. Media articles and analyses published throughout the conflict in Ukraine also highlight this problem.[11]

On the other hand, these difficulties that Russia encountered in its invasion of Ukraine could very well be what will accelerate the many programs that were months or even years behind schedule. Roscosmos's Rogozin is increasingly referring to these problems in an effort to prioritize defense space programs. On April 11, 2022, the day before Cosmonautics Day (the annual commemoration of Gagarin's flight, with 2022 being its 60th anniversary), he made the following statement in an interview for the *Rossiyskaya Gazeta* channel:

> In a situation where it is necessary to aid our armed forces, we have rather modest resources at our disposal. This worries me personally. Therefore, a decision has been made: to devote all attention—which previously [we] did not regard as a primary importance in this particular situation—towards ensuring that allocated funds are entirely directed towards the creation of new spacecrafts. We need to double our orbital constellations. Let's pour all our resources into this: design, organisation, production, technology, and funding. We need to see everything, hear everything, and be able to transmit all necessary information.[12]

Indeed, the conflict in Ukraine seems to have accelerated the launch of military satellites to complete certain constellations. On February 5, 2022, the Russian armed forces placed a Neitron satellite into orbit to allegedly capture radar imagery. On March 22, 2022, Russia announced the launch of a Meridian-M military communications satellite into the Molniya orbit, a distant, ultra-elliptical orbit of more than a 40,000 km apogee.

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10. Found on https://syria.mil.ru/split.htm, a website dedicated to monitoring the operational situation in Syria.

11. M. Krutov and S. Dobrynin, "*Slepaya Rossiya. Armiya Putina proigryvaet sputnikovuyu voïnu* [Russia Blinded. Putin's Army Is Losing the Satellite War]," Radio Svoboda, April 8, 2022, https://www.svoboda.org/.

12. Editor's translation of N. Yachmennikova, "*Rogozin: Nash prioritet segodnya–orbital'naya gruppirovka nablyudeniya i svyazi* [Rogozin: Our Priority Today Is an Orbital Observation and Communication Constellation]," *Rossiyskoy gazety*, April 11, 2022, .https://rg.ru/.

On April 7, 2022, the Russian Ministry of Defence declared that it had placed a Lotos-S1 military eavesdropping satellite into low-Earth orbit. With the first launch of the Angara heavy launcher on April 29, 2022, came the opportunity to put into orbit the Ministry of Defence's space object, Cosmos-2555. Some sources initially identified this to be an EMKA observation satellite (about 0.5 meters in accuracy), which now has no object in orbit. However, it now appears to be gradually plunging towards Earth and disintegrating in the atmosphere. This suggests instead that it was more so a test for a far-orbiting satellite launch. Even more recently on May 19, 2022, again from Plesetsk, a Soyuz 2.1a put into orbit a new optical observation satellite for the Bars constellation.

To juxtapose, 2021 only saw three Russian military satellites launched, while the first half of 2022 already had five military objects launched into space. This pace is only expected to continue in the coming weeks and months. The bottlenecks hindering many military programs—often put on hold for various political, administrative, industrial, and civil reasons—seem to be rapidly dissipating. This change of tempo, borne after the abandonment of many scientific space programs, has led to a twofold observation: Russia is now acknowledging the insufficient level of its constellations and is thus realigning its priorities toward military space.

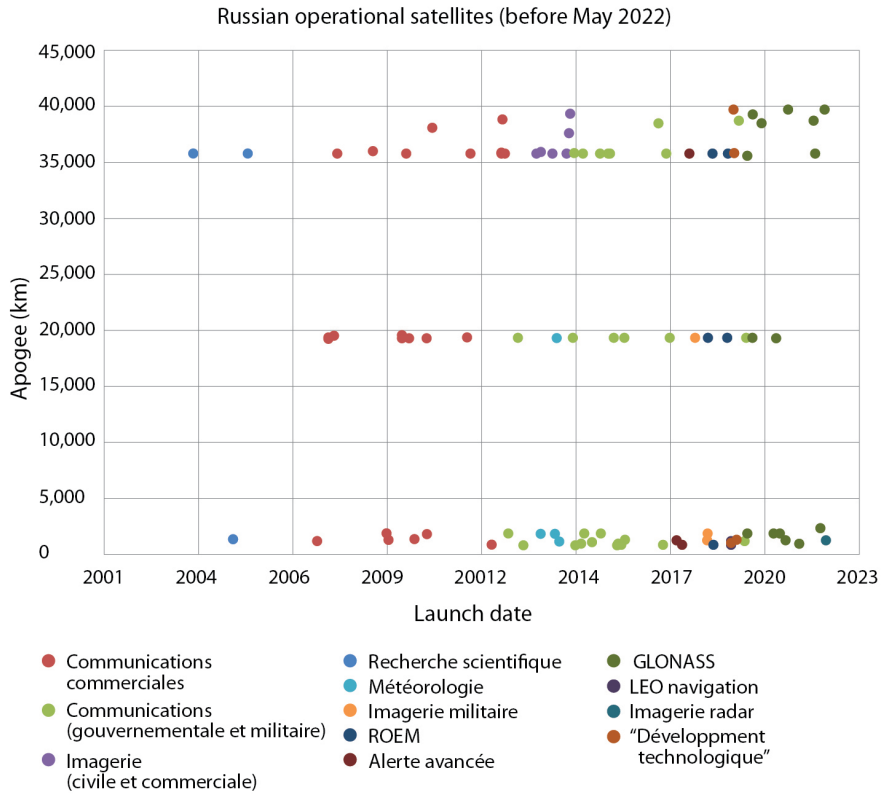

Figure 1. Launch date and apogee of Russian operational satellites

Cosmostrategy: The Study of Russian Maneuvers in Space

In Russia's inventory, a handful of satellites whose characteristics remain unknown stand out for their unusual uses: maneuvers in space, orbital rendezvous, and its self-professed "technological development" missions. Similarly, activities left unclaimed occur regularly, especially during periods of geopolitical tensions or conflicts such as the jamming of navigation satellites, US GPS, internet relays, and communications used in the Ukrainian crisis. Ground-based and space-based operations attempt, nearly always indirectly, to harass or temporarily paralyze state or private entities. As these activities are not often easily attributable, their perpetrators continue to be shadowed by a question mark. Nevertheless, a new front line is emerging, despite its relatively obscure nature.

Inspector Satellites: Intelligence Agents in Orbit

On May 23, 2014, a Rokot rocket from Plesetsk placed several military satellites, including three Rodniks, into low orbit. In addition, observers noticed that in close proximity to these three communication satellites was the presence of another unidentified object. This situation is reflective of a similar occurrence from a few months earlier.[13] Initially thought to be debris, the object had seemingly performed a number of maneuvers in a progressive manner, changing its apogee and perigee by a few kilometers. It was eventually listed and numbered as Cosmos-2499.[14] Undoubtedly, its maneuvers led to many unanswered questions about this entity's role. However, neither Roscosmos nor the Ministry of Defence provided any details to Anglo-Saxon researchers and officials, who perceived these activities as a threat to the proper functioning of their own spacecrafts.

The movements of Cosmos-2499 are worth considering for several reasons. Such a capability that Russia is deploying is not directly meant to be aimed toward foreign assets. Indeed, such actions would be outrightly considered as aggression. Rather, these maneuvers are meant to provide the opportunity to perform tests and carry out training in preparation to execute a space offensive, should the occasion call for one.

Developing the capacity to move a mobile object in space and project it from one orbit to another remains an essential technique to have at hand. Cosmos-2499, in particular, can change its trajectory to move closer toward a target. As a result, it is purported to be able to intercept images and communications from its target to eventually photograph and transmit the intercepted information to ground stations. In addition, this type of survey satellite is predicted to also possess the capability of launching a high-speed projectile or even a satellite from space. Such an ability to launch a projectile from an orbiting spacecraft requires a high degree of technical sophistication. Needless

13. A. Zak, "Kosmos-2499: Is It a Spy or an Assassin...or Both?," Russianspaceweb.com, April 30, 2017, http://www.russianspaceweb.com/.

14. Zak, "Kosmos-2499."

to say, it fosters added fears of the possibility of a new, emerging paradigm where space itself becomes weaponized.

From 2014 to 2016, Cosmos-2499 was noted to have performed several maneuvers around the Rokot launcher's rocket stage, Briz. Cosmos-2499 approached Briz to position itself in a parallel orbit of close proximity, before finally overtaking it at low speeds. This kind of space rendezvous requires a scrupulous accuracy in the piloting of the hunter satellite, so that it may accurately adapt its trajectory to that of the hunted object. However, Cosmos-2499 is not the only satellite type that holds a monopoly on such capabilities. Other devices have also been identified, and subsequently categorized together under the name Nivelir by Western experts. According to observer and astrophysicist Jonathan McDowell:

> In 2017 Russia started launching a new series of satellites which performed proximity operations and released subsatellites. The satellites were launched by Soyuz-2-1v from Plesetsk. These satellites appear to be follow-ons to those launched along with communications satellites on Rokot missions in 2013-2015 (Kosmos-2491, 2499, 2504). The US government has suggested that the satellites represent tests of space weapons. Bart Hendrickx has suggested the satellites are part of the Nivelir program.[15]

Indeed, after the three aforementioned satellites, Cosmos-2519, -2521, -2523, -2535, -2536, -2542, and -2543—some of which were nicknamed as "Russian dolls"—were noted to have performed the same modes of action. These were placed into orbit between June 23, 2017, and November 25, 2019, both from Earth and from space. Since then, a number of orbital maneuvers have been carried out, either around launch vehicle stages and debris or from domestic and foreign satellites.

From 2013 and onwards, about four of the 11 Nivelir satellites launched are believed to be currently operational in space. The others seemed to have been deactivated or repositioned into the atmosphere. It is possible, however, that the deactivated ones may "awaken" in the coming years. In addition, there seems to have been other maneuvers that had been intentionally coordinated. Notably, these include the approach of Cosmos-2542 in January 2020 and August 2021 and Cosmos-2543 in December 2019 and June 2020 to the US imaging satellite, USA-245.

A case in point is the Cosmos-2543 fighter, which, after its rendezvous with the USA-245 satellite, ejected an object in June 2021, before being immediately registered as the S45915. The Russian Ministry of Defence was severely criticized, especially by the United States, which denounced these movements as offensive actions. However, the Minorobony repeatedly insisted that these missions were carried out within the

15. J. McDowell, "Nivelir (Kosmos-2519 et al.): A New Series of Russian Military Satellites," Jonathan's Space Report, accessed June 1, 2022, https://www.planet4589.org/.

framework of satellite maintenance and experiments, similar to when Cosmos-2542 itself had launched the -2543 satellite on December 6, 2020.[16]

This capacity to launch from space—an environment that is difficult to observe—calls for the necessity of a permanent and continuous monitoring of Russian space objects. It is no longer solely a question of assessing the danger of natural debris, but also of monitoring the possible increase in the number of Russian satellites in space.

Much speculation has also arisen regarding the potential capabilities of a handful of Russian inspector satellites, which constitute but a small percentage of the Russian space fleet. Recent events have signaled that Russia's strategic thinking is veering towards adopting an asymmetric and discreet military response. With neither the necessary quantitative resources nor the desire to wage an ostentatious war in space, the Russian Aerospace Forces are hence defaulting to a semblance of guerrilla warfare to destabilize opposing space powers via exercises or actual interventions.[17] This strategy is illustrative of Marshal Alexander Suvorov's famous maxim: fight not by numbers but by skill.

Nevertheless, Russia is not the only country equipped with fighter satellites. The United States (the X-37B shuttle) and China also possess similar instruments. Yet, these operations from Moscow—comparable to slipping a "pebble into a shoe" as evoked by geographer Isabelle Sourbès-Verger who specializes in space—not only grants additional time for Russia, but also allows the country to continuously showcase its presence in this increasingly contested environment. This ballet of inspectors is but an adamant reminder for the West that Russia still maintains nuisance capabilities in space, despite deceitfully projecting the image of neglecting its offensive means during the past decades. Notwithstanding all the difficulties that Russia is facing in maintaining its status as a space power, Moscow continues to present itself as a worrisome threat.

War or Peace? From Secret Missions to Confrontations in Orbit

All in all, the capabilities developed from inspectors would still be insufficient in the event of a high-intensity conflict. Here, belligerents would endeavor to weaken all

16. Editor's translation: "Today, as part of the ongoing testing of new space technologies, the Ministry of Defence of the Russian Federation conducted an experiment to separate a small spacecraft from a unified multifunctional space platform. The purpose of the experiment is to continue endeavours to evaluate the technical status of domestic satellites. The visualisation information is transmitted to ground processing facilities to determine the technical status of the satellite under study." See Russian Ministry of Defence, "*Minoborony Rossii prodolzhaet ispytaniya novoi kosmicheskoi texhniki* [Russian Defense Ministry Continues Testing New Space Technology]," Russian Ministry of Defence, statement made on December 6, 2019, at 17:23.

17. A parallel can be drawn with "cybernetic guerrilla warfare" as seen in J. S. Mongrenier, *Le monde vu de Moscou: Dictionnaire géopolitique de la Russie et de l'Eurasie postsoviétique* (Paris: Presses Universitaires de France, 2020), 183.

orbital components of their adversaries. Beyond inspection missions and closing-in maneuvers, electronic warfare operations would be carried out in addition, including those involving antisatellite weapons (ASATs) and laser weapons. These would maneuver more or less from Earth, although an offensive capability directly in orbit is gradually being developed overall. Russia specifically, despite its limited resources, is also involved in these areas.

Electronic Warfare Extending All the Way into Space

Should there ever be a destruction of an object in orbit, an adversary could consider this as casus belli. On the contrary, the use of electronic warfare is much more discreet, allowing its user to achieve significant results without necessarily leading to a declaration of war. Regarding this issue, Hendrickx writes that "electronic warfare is probably perceived by Russia as a relatively inexpensive, asymmetric response to Western military technological development."[18]

A two-point mission has thus gradually emerged in the discourse among Russia's governmental, military, and industrial authorities. On the one hand, such a mission permits the protection of the country's national interests, while on the other hand, it has the ability to paralyze or even suppress enemy radio-electronic systems. Russia's electronic warfare program, published in 2013 with projected developments up until 2020, had already indicated the need to deploy multifunctional electronic warfare programs in space, although they are currently mostly deployed on the ground. At the time, they were meant to enable reconnaissance and the suppression of radio-electronic systems, employed by radar, navigation, and communication systems.[19]

John Venable, a defense policy researcher at the US-based Heritage Foundation, wrote in February 2022 in finer detail that Russia's space portfolio includes a sophisticated offensive capability that can jam sensors in space and blind them.[20] Moscow is currently implementing jamming systems that can be deployable from the ground, which would threaten not only GNSS capabilities, but also internet and communication relays used in a particular region.

These electronic warfare systems can be extremely mobile as they are apparently mounted onto trucks, including the Krasukha 4, which is capable of jamming satellite waves, including GPS. The Murmansk-BN electronic warfare system is another high-performance system, which was abandoned in the 1990s, but then revived and deployed in 2018. Some specialized press articles, such as http://www.avia-pro.fr (but no doubt reframed by Russian media), report that the system disrupted the operation of F-35s

18. B. Hendrickx, "Russia Gears Up for Electronic Warfare in Space (part 1)," The Space Review, October 26, 2020, https://www.thespacereview.com/.

19. M. Doskalov, "*Perspektivy razvitiya sistemy radioelektronnoi borby rossiskoi federatsii na period do 2020 goda* [Prospects for the Development of the Russian Federation's Radio-Electronic Warfare System for the Period until 2020]," Defense complex of the Russian Federation, May 21, 2013, http://federalbook.ru/.

20. T. Novelly, "The First Shots in a Ukraine Conflict May Be in Space," Military.com, February 15, 2022, https://www.military.com/.

during a NATO exercise in the Baltic Sea at the end of 2021. The communications of these fighters, notably via satellite relays, could have been completely obstructed and cut off. These electronic warfare systems could be put into use by Russia in the ongoing conflict with Ukraine.

In April 2022, the United States accused Russia of blocking a satellite navigation signal (presumably Navstar) that had been covering Ukraine.[21] Even shortly before the start of the conflict, similar accusations were already made against Russia, after issues with GPS signals over the Baltic region and northern Europe had arisen. SpaceX officials also decried Moscow for similar acts carried out against its Starlink system. These activities had sought to prevent the functioning of the private entity's internet coverage that it was providing to Ukraine. Thankfully, an update to the system restored its capabilities.

These acts by Russia and their subsequent accusations by the West only demonstrate Moscow's premeditated planning of such spatial operations. The evident motive to act below the threshold of war may indeed be considered as a strategic choice to avoid escalation. It may also be interpreted that Russia is well aware of its weakness should there be retaliatory strikes launched against its own assets upon the execution of an overly aggressive maneuver. With limited means at its disposal, it currently has to settle for solely the ability to momentarily paralyze the specific functions of its adversary, as in the case of the conflict with Ukraine. However, should Russia wish to remain as a leading space power, these modes of action will not be enough to satisfy such an ambition.

Russia's Offensive Capabilities in Space

To significantly improve its offensive capabilities in space, Russia is already presently designing or even developing other programs. These are at times detected by experts, owing to statements and industrial fact sheets presented in the Russian media. In this particular context, initiatives in the field of directed energy (laser) weapons, especially against satellites, or ASAT missile propulsion from Earth, air, or space can be especially highlighted.[22] According to the 2021 version of the annual *Global Counterspace Capabilities* report, Russia has been endeavoring since the 2010s to rebuild its ASAT capabilities either from Earth or co-orbitally in order to acquire an operational ASAT range.[23]

However, furthering this development will only be feasible if military space becomes a true priority at the budgetary level. The destruction in direct ascent (i.e., with

21. NBC Nightly News, "Jamming."

22. B. Weeden and V. Samson, eds., *Global Counterspace Capabilities—An Open Source Assessment* (Washington, DC: Secure World Foundation, April 2021), https://swfound.org/.

23. Editor's Translation: In response to Russian launching an antisatellite missile in November 2021, the Chief of Staff of the French Air Force, General Stéphane Mille, stated in an interview with French newspaper *Le Monde* on December 1, 2021, that Russia had demonstrated that it was now capable of acting in space across the entire spectrum of conflict.

a Nudol missile fired from Earth) of one of Russia's former low-Earth orbit electronic listening satellites on 15 November 15, 2021—now inoperative—is emblematic in this respect. The firing of the Nudol proves that Russia no longer intends to act in a discreet and irregular manner. It nevertheless violates two taboos: the generating of a substantial amount of debris and the potential placing of weapons of mass destruction into orbit.

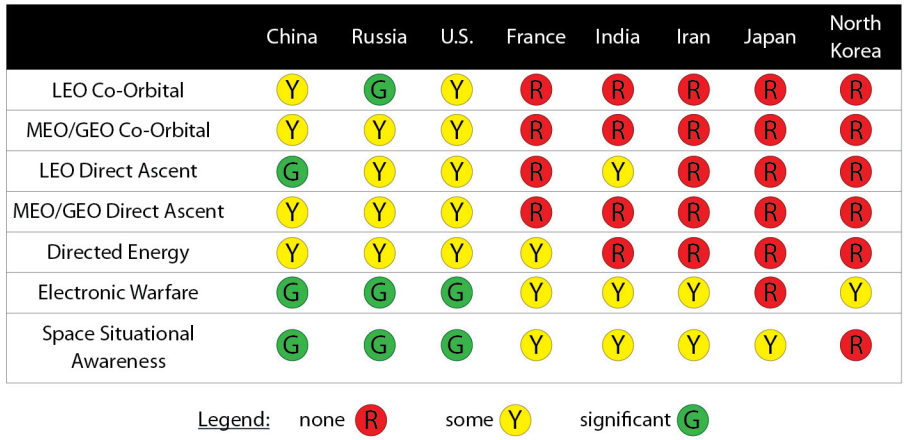

Figure 2. Comparison of global antisatellite capabilities (Source: Global Counterspace Capabilities—An Open Source Assessment, ed. 2021)

Conclusion: What Kind of Offensive Cosmostrategy Will Russia Adopt Moving Forward?

Political and military statements are regular reminders that space is entirely subordinate to the security and defense interests of the Russian Federation. Of particular interest is Rogozin's televised speech broadcasted on the *Perviy Kanal* channel as a part of the 60th anniversary celebrations for Gagarin's first flight. The head of Roscosmos describes that even though the objective is to be one of the top three space powers, Russia intends to fully ensure its nation's strategic shield and defense via the use of space. Indeed, he insists that this is because Roscosmos is the entity that creates the material basis for strategic nuclear forces. This, Rogozin explains, makes it all the more vital for the country to construct itself in its own spirit, by way of its own independence and sovereignty.

Regardless, the consideration of outer space as a military theater is nothing novel. In fact, several Soviet strategists as early as the 1960s referred to this theater in the same way as they did for land, sea, and air.[24] This is not to mention that the use of outer space remains strongly connected to the implementation of nuclear components

24. V. D. Sokolovsky, *Soviet Military Strategy*, trans. H. Dinerstein, L. Gouré, T. Wolfe (Santa Monica, CA: RAND Corporation, 1963), 21, https://www.rand.org/.

due to ballistic technology. Indeed, the propulsion technology of a rocket finds its origins from that of a missile. Fittingly, both the terms for missile and launchers in the Russian language are identical: *raketa*.

Since the fall of the Soviet Union, several Russian publications have sought to either adapt military space to new forms of armed conflict or to incorporate it into high-intensity wars. In 2000, in the conclusion of a strategic history text whose editing was overseen by General Vasilii Zolotarev, space was described as the main arena of struggle.[25] Specifically, the text outlines that military operations would likely begin in space long before the deployment of any large-scale strategic operations on land, in the air, or at sea. The main objective in such a case, the publication claims, would therefore be the mutual destruction of military and support assets in space, including the execution of a covert destruction of these assets.

More recent is a critical article, found in a Russian military strategy journal, that was published in March 2022 by Colonel Yuri Krinitsky, professor at the Tver Military Aerospace Defence Academy. The author argues that it is essential to recognize outer space as a "niche to be occupied" through the development of all necessary weapons and equipment. In Krinitsky's view, the foremost priority in the conquest for aerospace superiority would be acquired not only by blinding, suppressing, and defeating air defenses, as well as infrastructure facilities on the ground and in the air, but also by similar effects on the enemy's spacecrafts and orbital systems.[26]

Yet considering the above, Russia's space sector is, on the contrary, in crisis, while the Russian Aerospace Forces' space operational assets remain precarious. In short, a gap exists between Russia's strategic thinking and the veritable reality. If Russia manages, despite the imposed-upon sanctions, to mobilize and recreate an effective and offensive space battle order, then it may very well obtain the means to pursue its envisioned strategy.

However, it currently does not have the most modern, technically advanced, or precise arsenal. It uses rustic tools that are indeed functional, but whose technical performance is nevertheless oftentimes inferior to that of other major space powers, particularly the United States. As such, it is rather its ability to act across the entire space spectrum and to subsequently attack (should it be necessary) that actually guarantees its place in the exclusive club of space powers.

From the conflict in Ukraine, the results in space reveal that Moscow is currently adhering to a form of pragmatism that carefully considers the escalation risks at hand, should either US or European spacecraft indirectly serving Ukrainian forces be destroyed. Russia's "special operation" in Ukraine does not witness any activities of a kinetic nature

25. V. A. Zolotarev et al., eds., *Istoriya voennoĭ strategii Rossii (Rossiĭskaia voyenno-istoricheskaya biblioteka)* [History of Russia's Military Strategy (*Rossiĭskaia* Military History Library)] (Moscow: Poligrafresursy, 2000), 534–35.

26. Y. Krinitsky, "*Napravleniya razvitiya form i sposobov deystviy voysk (sil) vozdushno-kosmicheskoy oborony* [Directions for the Development of Forms and Methods of Action of Troops (Forces) of Aerospace Defense]," *Voyennaya mysl'* [Military Thought], no. 3 (2022), https://vm.ric.mil.ru/.

from its side. This is most likely because Moscow wishes to establish a certain level of consistency with its intentionally woven narrative, which adamantly refers to the conflict in Ukraine as a simple operation and not as a war. For the former, the use of destructive measures against its competitor is not required, at least not theoretically.

To be precise, the targeted adversary, the Ukrainian state, does not own a space program; only its latent adversaries—mainly NATO member states—do. Because the latter are not deemed as cobelligerents, should their space assets and infrastructure be destroyed, there would be a gross misalignment with the Russian authorities' account of events.

Indeed, such an operation would have an extremely high escalation risk. As it is highly dependent on its space sector, be it at the military, private, or societal level, Russia would be at a disadvantage with much to lose should it plunge into a high-intensity war in space. Inevitably, it could neither protect itself nor retaliate in a substantial manner. This element most likely encapsulates Russia's overall communication strategy, which remains strongly committed to international institutions against the weaponization of space. As such, the options of employing asymmetric and covert maneuvers continue to be Russia's most preferred method to inflict harm upon its adversaries.

The situation moving forward will continue to witness an increasing amount of advanced offensive equipment placed into orbit, functioning as an insurance policy of sorts for major space powers to hold on to their positions. The lessons learned from the conflict in Ukraine could catapult a reorientation of Russia's space programs toward an "all-military" approach. On March 3, 2022, Rogozin announced on Rossiya 24 that the Russian space program, against the backdrop of sanctions, would be adjusted to prioritize the creation of satellites in the interests of Russia's defense. The recent launch of military satellites at such an accelerated rate seems to be in line with this statement. Consequently, two aspects must then be carefully monitored: the renewal of offensive space capabilities, and of course, the competence of Russia to put them into use. ***Æ***