

Safety Norms for Space Security:

How the Development of STM Norms Can Strengthen Security in Space

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Intro

"Space traffic management" (STM) encompasses several concepts, including space-traffic-coordination (where things should go), space-object monitoring (where things are) and implementing regulatory regimes (keeping things where they should be). At the multi-lateral level, STM and its relevant components are typically discussed in the context of civilian and commercial activities with the intention of mitigating "safety"¹ concerns and promoting the long-term sustainability of space activities. The relevant forum for this discussion is the UN Committee on the Peaceful Uses of Outer Space (COPUOS), which meets in Vienna every year. What is often missing from these conversations, however, are the covert activities of military actors. The space community typically classifies these activities, such as military rendezvous proximity operations (RPOs), as "security" issues which civilian stakeholders rarely address. Even UN COPUOS hardly touches the topic of military RPOs. Ironically, the multilateral bodies that do deal with space-security issues, such as the Conference on Disarmament, rarely discuss STM as they see this as predominantly a "safety" issue. This division of labour exists so that difficult security issues do not derail other important discussions such as space sustainability.

However, one of the particular challenges that arises among the international community from not having a security discussion on STM is that it is difficult to call out an offending party for doing something "aggressive" or "hostile" when there is no objective standard by which to measure orbital activities. There is not even any global consensus on what constitutes a "hostile" activity by a space object. Consequently, offending activities remain unaddressed, as several actors - including China, Russia and the US - are all engaging in provocative RPOs. The "worst-case scenario" is that these RPOs will one-day result in miscalculation or misinterpretation by strategic rivals, leading to possible nuclear escalation.

Another challenge that arises in security discussions around STM is that of "verification". Even if there were norms of behaviour around RPOs, could the international community even detect and attribute breaches of those norms? Ten years ago, the answer among the international community was an emphatic "no", and many security discussions around norms for STM did not even begin. However, the field of space situational awareness has changed considerably. Today, there are more telescopes, better telescopes and better data processing. As such, today, it is technically feasible to verify at least some activities in orbit. Indeed, with space-observation businesses and civilian organisations cropping up all around the world, it is becoming increasingly difficult for any activities to go unnoticed, even if they go unreported.

¹ For purposes of this paper, "safety" refers to a state of being free from accidental harm and "security" refers to a state of being free from intentional harm.

In this context, the development of two STM-related norms could lead to both safety and security benefits for all.

- The first is the establishment of “safety zones” for RPOs. If a party comes within a particular distance of another space object without prior permission, the approach can be classified as hostile.
- The second is the increased sharing of mission data among government agencies, companies and organisations, as a means of creating trust among all space actors.

By focusing on these two norms, the international community can bring greater security and safety for all space operations. Critically, such norms can create a guardrail against possible strategic escalation by setting norms for RPOs that all space actors can recognize. Under these circumstances, States could be much more effective in calling out hostile behaviour by bad actors in space.

Questionable Behaviour

The need for satellite servicing capabilities (repairing, refuelling or removing satellites) and active-debris removal (ADR) has led to advances in co-orbital technology that enable more manoeuvrable and more versatile space objects. While industry and academia are presently making tremendous strides in this field, particularly with a view towards reducing space debris, several militaries are also seeking to leverage this technology. Unlike civilian actors, the military has additional interests in activities such as keeping an eye on the assets of rivals, intercepting communications, or even degrading/destroying a specific object. During the Cold War, the Soviets and Americans were the only ones actively seeking these capabilities. However, in the last few years, the activities of several actors brought wider attention to co-orbital technology that is enabling a new generation of threats to space objects. Consequently, many countries that are worried over their own space capabilities are looking to protect themselves with the same technology.

The country that probably receives the most attention for military RPOs is Russia. As early as 2013, Russia recommenced the testing of RPO capabilities, but without alarming too many members of the international community. However, in September 2018, their activities reached a new level of notoriety when the French Defence Minister, Florence Parly, declared that a Russian satellite, designated by the US Air Force as Luch/Olymp (2104-058A, 40258), had moved “too close” (roughly 85km) to a French-Italian military satellite (Athena) in geostationary orbit (GEO).² Indeed, over the course of its life, Luch/Olymp parked near dozens of commercial communications satellites, typically close enough to be within the ground uplink window.³ At the time of the alleged incident with Athena, Luch/Olymp actually parked closer to a Pakistani satellite, though it is not clear who the target was. Nevertheless, the conclusion was that Luch/Olymp was spying on satellites. This particular action involving the Athena satellite, however, highlighted that Russian military space activities were not just a US concern. In the years since this incident,

² “Florence Parly, ministre des Armées, s'exprime sur les enjeux de l'espace pour la Défense”, Ministère des Armées, 7 Septembre 2018 : <https://www.defense.gouv.fr/actualites/articles/direct-florence-parly-s-exprime-sur-les-enjeux-de-l-espace-pour-la-defense>

³ Brian Weeden and Victoria Samson, “Global Counterspace Capabilities: An Open-Source Assessment”, Secure World Foundation, April 2021, p 2-12: <https://swfound.org/counterspace/>

countries such as France,⁴ Japan,⁵ Germany⁶ and the U.K.⁷ have all adopted measures to protect their own satellites from RPO interference. The options range from resilience and flexibility of space capabilities, to high-energy lasers and “guardian drones”. This range of capabilities is meant to protect satellites from a wide spectrum of “hostile” activities, including spying or even physical attacks.

In addition to Russia, China is also often cited as one of the drivers for concern behind “hostile” RPOs, though the specifics are not always apparent. Chinese activities date back to at least 2010 and involve numerous RPOs, although all of these operations have involved only other Chinese satellites.⁸ Perhaps for this reason, China did not raise as many concerns. However, some suspect that China’s RPOs are part of a larger military strategy, potentially involving Taiwan.⁹ While the evidence to support such an assertion is often more speculative than concrete, it is echoed not only in U.S. military policies on space security but also by civilian institutions like NASA.¹⁰ In this context, any activity conducted by China appears hostile, regarding of its true nature or intentions. RPOs happen to be one of them.

Ironically, Russia and China’s “hostile” behaviours mirror US activities with similar technologies. U.S. research into co-orbital anti-satellite technology goes back to the 1950’s and 60’s, but these efforts increased near the turn of the 21st century. In particular, since 2016, the U.S. Geosynchronous Space Situational Awareness Program has used two satellites to approach more than a dozen operational satellites in GEO to within nearly 10km, many of which were military satellites belonging to Russia and China.¹¹ This is considerably closer than the distance of the Luch/Olymp to the French-Italian satellite, which was 85km. In this light, when countries such as the US and France have sought to publicly shame Russia and China for its co-orbital activities, Russia and China can simply point to the US and cite inconsistencies in standards, or the lack thereof.

The Challenges

This type of inconsistent behaviour by the three most prolific spacefaring nations creates several challenges that threatens strategic security and the long-term sustainability of space

⁴ Therese Hitchens, “Space Lasers for Satellite Defense Top New French Space Strategy”, Breaking Defense, 26 July 2019: <https://breakingdefense.com/2019/07/france-envisions-on-orbit-lasers-for-satellite-defense/>

⁵ Daniel Darling, “Japanese Government Considers Launching a Satellite Interceptor”, Defense and Security Monitor, 26 August 2019: <https://dsm.forecastinternational.com/wordpress/2019/08/26/japanese-government-considers-launching-a-satellite-interceptor/>.

⁶ Vivienne Machi, “Germany establishes new military space command”, Defense News, 13 July 2021, <https://www.defensenews.com/space/2021/07/13/germany-establishes-new-military-space-command/>.

⁷ “UK military opens first space command centre” BBC News, 30 July 2021: <https://www.bbc.com/news/uk-politics-58029083>

⁸ Brian Weeden and Victoria Samson, “Global Counterspace Capabilities: An Open-Source Assessment”, Secure World Foundation, April 2021, p 1-4 to 1-11: <https://swfound.org/counterspace/>

⁹ Brian Chow and Brandon Kelley, “China’s Anti-Satellite Weapons Could Conquer Taiwan—Or Start a War”, The National Interest, 21 August 2021: <https://nationalinterest.org/feature/china%E2%80%99s-anti-satellite-weapons-could-conquer-taiwan%E2%80%94or-start-war-192135>

¹⁰ Marcia Smith, “Nelson: Watch the Chinese”, SpacePolicyOnline, 25 May 2021, <https://spacepolicyonline.com/news/nelson-watch-the-chinese/>.

¹¹ Brian Weeden and Victoria Samson, “Global Counterspace Capabilities: An Open-Source Assessment”, Secure World Foundation, April 2021, p 3-8: <https://swfound.org/counterspace/>

activities. The first and perhaps most pressing problem is that there is no clear messaging among the major spacefaring nations as to what is acceptable and what is not. It is evident that at least two nuclear powers are willing to approach military satellites belonging to rivals in clandestine operations. One such operation, perhaps edging too closely to an early-warning missile detection satellite, might trigger an escalation scenario that leads to conflict in not only space but also here on Earth.

The second challenge relates to the development of norms of behaviour. Today, there is considerable discussion around the adoption of “norms of behaviour” to ensure the long-term sustainability of space activities. These “norms” will serve as a form of voluntary best-practices, adopted and implemented by all space actors wishing to be seen as responsible. Importantly, the effectiveness of norms is based on the ability to call out bad actors and publicly shame them for irresponsible behaviour, as was the case with the Chinese ASAT test in 2007. However, in the context of RPOs, any effort to call out countries like Russia as bad actors for its covert activities is undermined by US activities of the same nature. In venues such as the Conference on Disarmament, discussions around issues like RPOs often devolve into diplomatic arguments that have more to do with politics than actual irresponsible behaviour. As such, provocative actions that represent real threats to space security and stability go unaddressed, while more and more countries set new policies to develop their own counterspace capabilities.

Need for “Norms”

One of the main reasons why discussions around RPOs can appear politically driven is that there is no objective standard for what is “responsible” and what is not. As such, it appears that responsible behaviour is determined more by who one’s allies are, rather than on the behaviour itself. In this context, what is needed is international agreement on what safe and responsible behaviour looks like. In this way, there could be a baseline standard to which international leaders can point to and say, “This is what responsible behaviour looks like, and you are not doing it.” By having such a standard, public shaming could gain some of its potency to deter bad actors once more.

Is it verifiable?

One of the main roadblocks that arises before “arms control” for outer space is that of verification. In the disarmament world, verification means not only to observe whether actors are complying with their obligations, but also to be able to do something about it before the offender can gain a strategic advantage.¹² In years past, some of the discussions around arms control for space contained difficult concepts to verify, such as the placement of “weapons” in outer space. How can one verify the placement of weapons when there is not even a definition for a weapon in space? However, over the years, new technologies are enabling far greater Space Situational Awareness (SSA), such that it is possible to effectively verify at least some behaviours.¹³ Given the amount of publicly available data that exists about RPOs, there is at least some confidence

¹² Porras, Daniel, “Eyes on the Sky: Rethinking Verification in Space”, UNIDIR, October 2019, p. 7, https://www.unidir.org/sites/default/files/2019-10/Eyes%20on%20the%20Sky%20%7C%20Rethinking%20Verification%20in%20Space_1.pdf.

¹³ Porras, Daniel, “Eyes on the Sky: Rethinking Verification in Space”, UNIDIR, October 2019, p. 13-19, https://www.unidir.org/sites/default/files/2019-10/Eyes%20on%20the%20Sky%20%7C%20Rethinking%20Verification%20in%20Space_1.pdf.

that certain norms are verifiable. The trick will be to determine the precise scope of norms to make sure that they fall into this category.

What could be the norms?

In 2019, the Consortium for Execution of Rendezvous and Servicing Operations (CONFERS) issued a number of recommendations regarding RPOs.¹⁴ Notably, they addressed several ideas meant to avoid interference with third parties that could also serve as “norms” for military actors. These recommendations included:

- The utilisation of “passively safe” trajectories to avoid close approaches with third parties;
- Notification of possibly affected third-parties in advance of the mission and exchanges of information.

These norms are intended to minimise negative impacts of RPOs on the safety of third parties. However, they could also have certain security benefits.

Safety zones

CONFERS talks about having a “passively safe” trajectory, implying there is a distance at which co-orbital vehicles can pass by without posing a threat to others. In this same regard, the international community could agree on a “safety zone” around satellites, within which other objects cannot wilfully enter without permission. If they do, the party being approached can consider the action “hostile” and respond appropriately. In order to work with the verification capabilities available today, such zones could be set at a distance where it is no longer practicable to distinguish between two space objects with industry-grade SSA technology.

While this norm may not stop all nefarious activities (such as eavesdropping), it could at least prevent the threat of physical harm to a space object. This approach is not unlike that in maritime activities, where a fishing vessel would not approach a naval destroyer for fear of giving the wrong impression. This approach also has the advantage of being effectively verifiable, meaning that current technology is able to track RPO movements, can attribute them to a launching State and can determine with a certain level of accuracy where an object is headed.

Data sharing

One of the biggest problems with RPOs is that they are often done in secret. There is little to no information about military RPOs on international registries, and military actors do not divulge the purpose of their manoeuvres. This means that the purpose behind many military RPOs are left up to the imaginations of observers. In times of great geopolitical tension, rivals assume the worst.

In order to build trust among all actors, RPO stakeholders should seek to share, publish and document as much data and information about their operations as possible. This can include naming the target object, planned orbital trajectories and even the nature of the operation (removal, repairs etc.). The more information that is shared, the easier it will be for observers to monitor and verify that RPOs are doing what they claim. By increasing the amount of pre-mission

¹⁴ Consortium for Execution of Rendezvous and Servicing Operations, CONFERS Recommended Design and Operational Practices, 1 February 2019, <https://www.satelliteconfers.org/wp-content/uploads/2019/02/CONFERS-Operating-Practices-Approved-1-Feb-2019-003.pdf>.

data being shared, it will be easier to monitor and enforce STM norms and regulations, as well as to deter norm violations. It also allows for cross-checking data, ensuring that actions are not being misattributed. Moreover, it will make it less practicable for actors to conduct unsolicited RPOs that might be labeled as “hostile”. This will have the advantage of easing tensions among rivals if they have even a rough idea of what RPOs are up to. Again, this will not be a salve for all security related issues to RPOs, but it will at least raise a certain level of confidence among space actors.

Where to discuss?

While the major security concerns surrounding RPOs should be dealt with by international bodies such as the Conference on Disarmament, it is unlikely that there will be any breakthroughs in security related discussions at this time. Politics have thus far prevented the advancement of any international agreements on space security, and all signs indicate that the relationships among geopolitical rivals are only getting worse. However, there are certain opportunities that are recently available, and they could lead to promising results.

Most recently, the UK put forward UN General Assembly Resolution 75/36, inviting UN Member States to address what they thought were threats to space security and what could be norms of behaviour. RPOs featured in many of those entries, including those of the UK, the US and Secure World Foundation.¹⁵ As such, norms surrounding RPOs seems like a topic around which many interests converge. The UK recently announced that they would table another resolution this year, calling for the formation of an open-ended working group to examine norms for space security. RPOs could be a good candidate for discussions around a specific, tangible behaviour that is threatening space security.

Additionally, other fora could be sought as STM is largely a “safety” issue, rather than a “security” one. Discussions could take place at COPUOS on STM, with UN delegations receiving the same support from Capitals as would their security counterparts. The critical element would be to have buy-in from the major spacefaring nations, and any other countries seeking RPOs for covert operations.

Conclusion

Experts and scholars have well documented the possible benefits of RPOs, not least of all for space-debris removal. However, it is becoming evident that RPOs also have the potential to disrupt space security, as well as global geopolitics. While countries are presently able to call each other out for possibly “hostile” behaviour, the lack of an objective standard of behaviour taints these discussions as political, making it difficult to address offending actions. In order to overcome these hurdles, it is necessary to adopt some type of “norms” of behaviour for RPOs. These could include the establishment of safety zones, as well as the sharing of pre-mission data. By creating these norms, which can be seen as norms for “safety”, the international community could also be adopting guardrails to ensure that RPOs do not mistakenly trigger an escalatory situation among strategic rivals.

¹⁵ Report of the Secretary-General on reducing space threats through norms, rules and principles of responsible behaviours (A/76/77), <https://www.un.org/disarmament/topics/outerspace-sg-report-outer-space-2021/>