Preventing the Increased/Uncontrolled Militarisation of Outer Space

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Introduction

Space has long been a stage for geopolitical competition, but in recent years it has developed into the new battleground for global supremacy. The reasons for this are clear. Humanity is becoming increasingly and irreversibly dependent on outer space and signals-directed government and commercial satellites. We rely on space-based assets for many of our daily needs, not least the Internet, navigation, aviation and weather prediction. Space infrastructure plays a pivotal role in our global economy. Powered by satellites, our global communications systems allow us to keep track of the trillions of dollars' worth of goods being traded every day. These satellites monitor and track disturbing changes in our climate and environment, and help us to thwart many natural disasters and save thousands of lives by providing crucial intelligence regarding geological and meteorological developments.

Resources in outer space are also central to military operations and play an important role in national defence and security. Over the past decade militaries have grown increasingly dependent on satellites to monitor troop movements, detect missile launches, and organise and facilitate battlefield communications. These satellites are becoming increasingly vulnerable to attack or disruption by rivals. Terrestrial security is intrinsically linked to space security. This means that any disruption of space assets – irrespective of whether the disruption is accidental or intentional – will disrupt vital activities on Earth. Despite growing fissions between global space powers, outer space remains an inspirational, critical, and consequential domain for future peace and prosperity. It is a "global commons" and thus the responsibility, opportunity, and potential problem for major and minor space powers alike, as well as for states currently without any space presence. With this in mind, this Policy Brief will set out the key security challenges threatening peace and prosperity in outer space, before providing policy implications and recommendations aimed at preventing a serious arms race in the cosmos.

Security challenges

As the US National Security Space Strategy proclaimed in 2011, space is becoming increasingly "congested, competitive, and contested".[1] The rising importance of outer space combined with the lack of regulation in this important domain has increased the potential for competition and hostile behaviour between space-faring countries. In recent months the conflict between Russia and Ukraine has highlighted the military utility of space and how it is becoming a theatre of strategic rivalry.[2] But the security challenges faced by the international community in outer space are deeply rooted and much broader in scope than a single geopolitical conflict. The five most pressing challenges are outlined below.

Militarisation of space

According to the Secure World Foundation's 2022 *Global Counterspace Capabilities report*, "an increasing number of countries are looking to use space to enhance their military capabilities and national security" by developing defensive and offensive dual-use technologies.[3] The reduced barrier to entry afforded by technological innovation has seen an increasing number of states deploying infrastructure in space: in addition to the China, Russia and the United States, other countries such as France, India, Iran, Japan, and North Korea have also invested in counter-space programmes.

Malicious activities in outer space such as kinetic and non-kinetic attacks, jamming, hacking, and spoofing are likely to become more common as the number of valuable targets rises. This could catalyse the militarisation of space and increase the risk of future conflicts there.[4] The potential for conflict and geopolitical squabbles is aggravated by the growing sophistication of dual-use space technologies. If applied in a specific way, some non-military technologies can be used to cause aggression. For example, a Chinese prototype robotic arm for debris removal could also be used to seize other satellites, possibly resulting in an aggressive response by the countries owning the satellites.[5] A serious space arms race is already

[1] Remarks by Prof. Nayef Al-Rodhan during the United Nations General Assembly's session on *Our Common Agenda*, led by Secretary-General António Guterres, 4 August 2022a, https://media.un.org/en/asset/k1p/k1pa8gpxxf.

[2] P. Taylor, "Europe Can Help Prevent Disaster in Outer Space", *Politico*, 21 June 2022, https://www.politico.eu/article/europe-can-help-prevent-disaster-in-outer-space/.

[3] B. Weeden and V. Samson, "Global Counterspace Capabilities – An Open Source Assessment", Secure World Foundation, April 2022, https://swfound.org/media/207350/swf_global_counterspace_capabilities_2022_rev2.pdf.

[4] S. Kreps et al., "The Promise and Perils of the New Space Boom", Brookings Institution, 2 November 2022, https://www.brookings.edu/techstream/the-promise-and-peril-of-the-new-space-boom-us-china-competition-spacex-international-law/.

[5] M. Peel et al., "Vulnerable Satellites: The Emerging Arms Race in Space", *Financial Times*, 13 November 2019, https://www.ft.com/content/a4300b42-f3fe-11e9-a79c-bc9acae3b654.

under way. Without an internationally recognised framework to oversee extra-terrestrial weapons deployments, growing competition between space-faring nations seeking to protect their extra-terrestrial assets could spiral into a full-blown conflict.

Space debris

The increased reliance on outer space for many of our daily needs has created a dangerous amount of space debris than can endanger spacecraft. This includes defunct spacecrafts and satellites, bits of old rockets, debris caused by electromagnetic storms, and other waste.[6] Space debris in the form of shrapnel is also caused by anti-satellite missile tests, often conducted to demonstrate the ability to destroy enemy satellites in wartime.

Despite several countries' banning of anti-satellite tests,[7] they are still taking place. In November 2021 Russia conducted a direct-ascent anti-satellite test that destroyed one of its defunct satellites in low-Earth orbit (LEO).[8] In doing so it created thousands of pieces of space debris that some experts claim will endanger space assets and human space flight for years to come.[9] Previously, China, India and the United States conducted their own anti-satellite tests, which also resulted in dangerous amounts of space debris. There is a real and ever-present danger that space debris will cause an accident that damages or destroys space assets.

Space-traffic management

According to Josef Aschbacher, the director-general of the European Space Agency, the number of satellites launched in 2020 and 2021 is comparable to the total number launched since the Soviet Union launched its first Sputnik satellite in 1957.[10] The race to occupy outer space and mine celestial minerals brings with it an increased risk of collision between space assets. There are currently no universally accepted "rules of the road" or clearly defined behavioural norms to regulate space traffic. Space-object tracking and collision warnings are often insufficient. There is also no international regulation governing launches, positions of satellites or space stations in orbit, or space mining rights. The only licensing authorities for launches are national, and they are under no obligation to coordinate their activities with other countries. Meanwhile, the authority of the UN Office for Outer Space Affairs is limited and hampered by geopolitical tensions.

[6] Taylor, 2022.

[7] The United States banned these tests in 2022 and has so far been joined by Canada, Germany, Japan, New Zealand, South Korea, Switzerland and the United Kingdom.

[8] N. Raju, "Russia's Anti-satellite Test Should Lead to a Multilateral Ban", SIPRI, 7 December 2021, https://www.sipri.org/commentary/essay/2021/russias-anti-satellite-test-should-lead-multilateral-ban.

[9] Ibid.

[10] Taylor, 2022.

Increased commercialisation of space

Private operators' commercial exploitation of space is growing exponentially. In the last 15 years commercial activity in space has tripled from US$110 billion in 2005 to US$357 billion in 2020, and is projected to rise to US$1.1 trillion by 2040, according to Morgan Stanley projections.[11] Commercial operators are starting to overtake state actors. A single company, SpaceX, has launched roughly half of all active satellites in space – more than 2,200 out of an estimated 4,500.[12] Meanwhile, private sector competitors from the China, the United Kingdom and United States have plans for their own mega constellations of satellites.

The rapid expansion of commercial space activity represents a leap into uncharted waters.[13] As advances in launch technologies reduce costs and lower barriers to entry, there is a growing danger of a "free-for-all" in increasingly congested orbits. This could challenge the capacity of both individual states and the international community to regulate and coordinate private space activity effectively.[14]

Lack of regulation

The growing dependency on outer space outlined above exposes the glaring gaps in space law. The Outer Space Treaty of 1967 (the main international agreement on space law signed by over 130 countries) is dated and lacks authority. The treaty does not address the militarisation of space, anti-satellite (ASAT) weapons tests in space, the proliferation of modern technologies or the bourgeoning role of the private sector in the space industry.[15] This has created a vacuum in the space domain that has been filled by increasing anarchy and narrow unilateral geopolitical goals. The unwillingness of the signatory parties to develop their space capacities exclusively for "peaceful purposes", as stipulated in the treaty, has set a precedent for accepting militarised space use that continues today.[16]

[11] Morgan Stanley, "Space: Investing in the Final Frontier", 24 July 2020, https://www.morganstanley.com/ideas/investing-in-space.

[12] Taylor, 2022.

[13] Kreps et al., 2022.

[14] Ibid.

[15] N. Al-Rodhan, "We Must Address the Glaring Gaps in Space Law", *Reaction*, 21 September 2022b, https://reaction.life/we-must-address-the-glaring-gaps-in-space-law/.

[16] N. Al-Rodhan, "Regulate Outer Space before It Is too Late", *Modern Diplomacy*, 16 July 2022c, https://moderndiplomacy.eu/2022/07/16/regulate-outer-space-before-it-is-too-late/.

Policy implications

Until recently, countries with a presence in orbital space constituted a very exclusive club limited to China, several European nations, Japan, Russia (previously the Soviet Union) and the United States. These countries were the only ones capable of launching rockets into space and building large satellites. This is no longer the case. In the past decade countries with limited space-faring experience – such as Belarus, Bolivia, Hungary and Lithuania – have launched satellites into orbit, as have a growing number of start-up companies and scientific research institutions.[17] At a time when outer space is becoming ever more congested and contested, we need to start asking – and answering – serious policy questions about the future of space security and the sustainability of our activities in space. What can we do to improve cooperation and build trust among major space powers? How do we reconcile national interests with global and planetary interests?

There is a growing realisation in policy circles around the world that the LEO area of outer space, currently occupied by numerous small satellites, is not unlimited, and ensuring that it remains accessible to all will require several significant policy challenges to be overcome.[18] One of the international community's most urgent priorities is to increase trust, transparency, and cooperation in outer space while strengthening oversight and accountability. The advent of the commercial use of space has compounded this challenge, not least because many commercial actors have demonstrated their willingness to diverge from – and even contest – government policy and strategy.[19]

Another pressing issue for the policy world is the problem of increasingly crowded orbits and the growing risk of collisions in space. This challenge is becoming more dire as increased competition and new technological advances drive down costs and increase the number of launches. Some experts warn of the so-called Kessler Syndrome, a phenomenon in which the amount of junk in orbit around Earth reaches a point where it creates more and more space debris, causing serious problems for satellites, astronauts and mission planners.[20] According to the Brookings Institution, this nightmare scenario could pollute entire orbits with impassable debris fields for many years.[21] A growing number of analysts, including experts at the Atlantic Council, claim that humanity is quickly reaching a "tipping

[17] Z. Rosenberg, "The Coming Revolution in Orbit", *Foreign Policy*, 12 March 2014, https://foreignpolicy.com/2014/03/12/the-coming-revolution-in-orbit/.

[18] Kreps et al., 2022.

[19] Ibid.

[20] M. Wall, "Kessler Syndrome and the Space Debris Problem", Space.com, 14 July 2022, https://www.space.com/kessler-syndrome-space-debris.

[21] Kreps et al., 2022.

point" in space.[22] This tipping point will come with enormous challenges – but also potentially tremendous benefits. Our current global order remains an anarchic system with no overarching global authority that is able to arbitrate among contesting countries and enforce mandates in a just, equitable, and impartial way.[23] It is therefore easy to understand why most states choose to prioritise what they consider to be their national interest. However, in a connected and deeply interdependent world, one of the most certain ways of achieving national interest in a sustainable way is through reconciliation with other national, global and planetary interests.[24]

With this in mind, recent years have produced examples of proactive engagement and multilateral cooperation aimed at tackling the security challenges in outer space. This includes efforts by China, the European Union (EU) and Russia to draw up a consensus on codes of conduct and ways to prevent a space arms race. In a similar vein, the United States is to be commended for unilaterally banning ASAT tests.[25] This move has pushed other countries to follow suit. The United States has also taken an important step to help declutter space debris, with the US Federal Communications Commission set to introduce a five-year deadline for deorbiting LEO satellites.[26] In Europe, the United Kingdom deserves praise for inspiring the December 2020 adoption of UN General Assembly (UNGA) Resolution A/RES/75/36, which initiated the Open-Ended Working Group. The latter is focused on helping states work together to reduce threats to space systems by developing norms and rules that might contribute to further consideration of legally binding instruments.

More broadly, the UN is to be commended for its relentless efforts in recent decades through various forums, including UNGA, the UN Office for Outer Space Affairs, the UN Committee on the Peaceful Uses of Outer Space, the Conference on Disarmament, UNGA Resolution A/RES/52/37 on the Prevention of an Arms Race in Outer Space, and the UN Office for Disarmament Affairs, in addition to existing intergovernmental instruments and mandates. The recent inclusion of outer space in the UN Secretary-General's landmark Our Common Agenda report, and the Summit of the Future are also important developments.[27] While some of these efforts have suffered setbacks and many are still ongoing, all of them deserve both recognition by and the continued support of the international community, because they are helping to plug the policy gaps created by a rapidly changing outer space.

[22] A. Poling, "Outer Space Has Reached a 'Tipping Point' as Activity Outpaces Space Traffic Management", Atlantic Council, 14 September 2022, https://www.atlanticcouncil.org/commentary/event-recap/outer-space-has-reached-a-tipping-points-as-activity-outpaces-space-traffic-management/.

[23] N. Al-Rodhan, "Geopolitics, Governance, Security and Sustainability in Outer Space", Statement at the UN, 27 October 2022d, https://press.un.org/en/2022/gaspd761.doc.htm.

[24] Ibid.

[25] Ibid.

[26] Ibid.

[27] Ibid.

Policy recommendations

Improve space-traffic management

Collective political, financial and technological efforts are needed to declutter space orbits, especially the LEO. These efforts need to include all states, international organisations and private space actors. We also urgently need a contemporary regulatory framework that helps to demilitarise orbits, increase coordination and improve space-traffic management. In short, the world needs a "space traffic cop, a global body to allocate parking spaces and issue mining permits, with fines for littering, a binding obligation to take out your own trash, and space road sweepers".[28]

Develop a code of conduct reflecting technological advances

There have been multiple attempts – most recently by China, the EU and Russia – to establish a code of conduct governing human activity in outer space. None has succeeded so far, but the foundation has been laid. These efforts need to be reinforced through existing intergovernmental and multilateral instruments in parallel to modernising the antiquated Outer Space Treaty. The norms embodied in such a code of conduct must reflect rapid technological changes and should address issues such as the race for resources in outer space and the exponential growth of space debris.

Create safeguards to prevent military escalation in outer space

Article 39 of the UN Charter obliges the Security Council to identify and respond to "the existence of any threat to the peace, breach of the peace, or act of aggression".[29] However, there is a growing risk that space-faring nations could misperceive a competing nation's space activities and escalate to a possible military conflagration. Therefore, all stakeholders in the use of sustainable space, including UN member states, commercial actors and scientific bodies, need to increase their efforts to reach a common understanding of what types of space activities warrant Security Council involvement. This is crucial to efforts to avoid potentially lethal escalations caused by misinterpretations or misperceptions.

Rewire the geopolitical mindset

Security in outer space and terrestrial security are intertwined and cannot be achieved without reconciling the national interests of states with transnational, global and planetary interests. Therefore, creating a safe,

[28] Taylor, 2022.

[29] UN, Charter of the United Nations, 24 October 1945, 1 UNTS XVI, https://legal.un.org/repertory/art39.shtml.

secure and prosperous global future for humanity in outer space will require rewiring the current geopolitical mindset. We need to move away from zero-sum security paradigms that do not work to a "multi-sum security" approach that helps to ensure non-conflictual competition defined by absolute rather than relative gains.[30] This is critical in outer space, given its importance for humanity's collective security and prosperity.

Improve good governance in outer space

Beyond the common challenges, there are also multiple opportunities shared by the international community to further global and planetary interests, including the UN Sustainable Development Goals. Good governance in space will boost sustainability and security on Earth. For example, space technologies such as remote data sensing can enhance our understanding of terrestrial water cycles and forest cover. Other space-industry technologies could help us to improve energy efficiency and strengthen food security.[31] At the very least, working towards a common goal could help space powers overcome their mistrust – as demonstrated by the US-Soviet Apollo-Soyuz space mission in 1975, at the height of the Cold War. In practical terms, more resources should be dedicated to expanding transparency and confidence-building measures, which are urgently needed among states with assets in outer space. We should also ensure the engagement by all states, including small states, even if they currently do not have any space assets.

[30] Al-Rodhan, 2022b.

[31] Ibid.

Conclusion

Outer space is a global commons that belongs to everyone. This makes it everyone's responsibility, opportunity and potential problem.[32] Given the intimate connection between space security and terrestrial security, a simple yet compelling principle must guide space security and interstate relations down here on Earth: if outer space becomes critically unsafe, it will be unsafe for everyone, without exception.[33] Universal commitment to this principle is essential if the international community wants to prevent a serious arms race in outer space. Developing and implementing rules of the road and codes of conduct will not only help to keep the peace, but will also help to protect our diverse terrestrial interests, ranging from navigation, communications, sustainable development goals and supply chains to cybersecurity, climate change, the Internet and financial markets.

With an eye on the future, we need to stay alert to new dimensions of the arms race in outer space. For example, the race to "conquer" outer space could soon expand to the launch of sovereign space stations by geopolitical rivals. This could have immense military implications. Most importantly, it is crucial that even while significant differences remain, all space-faring nations should be on the same page regarding what constitutes peaceful and hostile actions in outer space.

[32] Al-Rodhan, 2022d.

[33] Al-Rodhan, 2022b.

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