

## DID RUSSIA TEST A WEAPON IN SPACE? WHAT THE QUESTION AND THE ANSWER TELL US ABOUT THE SECURITY OF OUTER SPACE

by Jessica West; research contributed by Chris Earle

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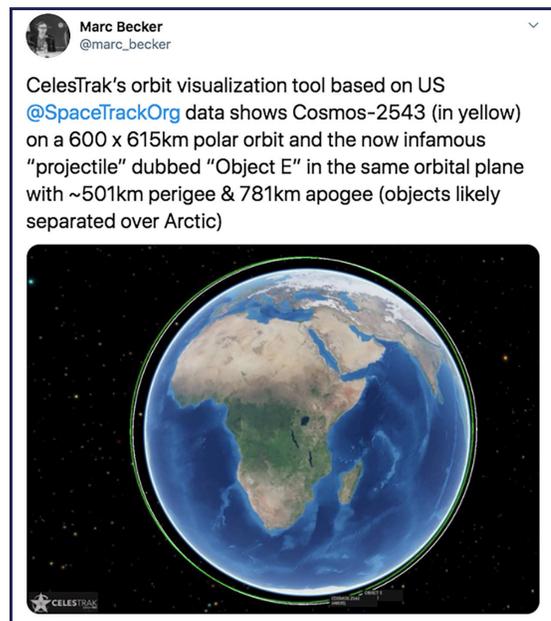
What happened on July 15?

On July 23, 2020, the United States Space Command Public Affairs Office released [information](#) claiming that on July 15, Russia “injected a new object [Object 45915] into orbit from Cosmos 2543” and “released this object in proximity to another Russian satellite.”

U.S. Space Command describes this action as a non-destructive co-orbital (space-based) anti-satellite weapon (ASAT) test in close proximity to another Russian satellite.

[Dr. Jonathan McDowell](#), an astrophysicist at Harvard University, calculated that the object was released at “a fairly high relative velocity” compared to its host satellite. Public orbital information indicates that it was ejected at [700 kilometres/hour—a higher speed](#) than would be expected if it were merely “released” into space. Because of the speed, analyst Brian Weeden of Secure World Foundation [tweeted](#), “That’s a projectile being fired, not a satellite deployment.” British Air Vice-Marshal Harvey Smyth posted a similar tweet.

However, the Russian Ministry of Defence [stated](#) that, on July 15, “a small space vehicle ... inspected one of the national satellites from a close distance using special equipment” that “provided valuable information about the object that was inspected.” This claim makes the object out to be part of a [satellite-servicing](#) or inspection capability.





## Response to Russian satellite test

We are concerned by the manner in which Russia tested one of its satellites by launching a projectile with the characteristics of a weapon. Actions of this kind threaten the peaceful use of space and risk causing debris that could pose a threat to satellites and the space systems on which the world depends. We call on Russia to avoid any further such testing. We also urge Russia to continue to work constructively with the UK and other partners to encourage responsible behaviour in space.

Air Vice-Marshal Harvey Smyth,  
Head of the UK's Space Directorate

## WHAT DO WE KNOW ABOUT COSMOS 2543?

According to information on [RussianSpaceWeb.com](http://RussianSpaceWeb.com), Cosmos 2543 is a Russian subsatellite released into orbit on December 6, 2019 from Cosmos 2542, a military satellite launched on November 25, 2019. The Russian Ministry of Defence described 2542 in terms that have become associated with "inspector" satellites, claiming that it is "based on a standard platform which can

perform monitoring of the condition of Russian satellites." Both 2542 and 2543 are registered with the United Nations under the terms of the Registration Convention, as "intended for assignments on behalf of the Ministry of Defence of the Russian Federation."

Before this event, amateur satellite observers noted significant orbital movements by both Cosmos 2543 and parent satellite Cosmos 2542, with the latter [appearing](#) to shadow U.S. reconnaissance satellite USA 254. The United States publicly raised [concerns](#) about the activities of these satellites and [similar](#) spacecraft.

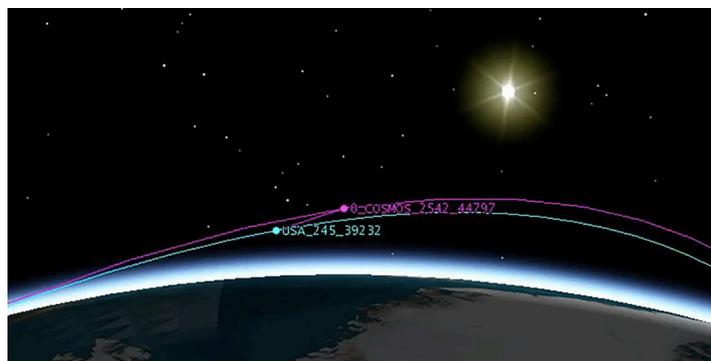
After trailing the U.S. military satellite, in June 2020 Cosmos 2543 maneuvered again, this time closely approaching Cosmos 2535, launched in 2019, which the Russian Ministry of Defence later described as a participant in the July 15 satellite-servicing [experiment](#). It is at the point that the suspected projectile was released.

## HOW UNUSUAL WAS THE EVENT OF JULY 15?

The speed of the object released by Cosmos 2543 clearly stands out.

The persistent shadowing of USA 254, which took place over months, was unusual, if not unheard of. The combination of this activity with the unusual velocity of the object released on July 15 led the U.S. Space Command to [claim](#) that the "satellite behaviors were inconsistent with their stated mission and that these satellites displayed characteristics of a space-based weapon." It contends that the July 15 event was the second of a [two-part test](#) of a single system capable of closely approaching a foreign target and then releasing a kinetic weapon. Government officials from the United Kingdom came to the same conclusion.

A similar sequence of events involving Russian military satellites occurred in August 2017. The Russian Ministry of Defence [described](#) a satellite launched in June 2017 as "a space platform which can carry different variants of payloads" and claimed that it had released a subsatellite "intended for the inspection of the condition of a Russian satellite." The subsatellite later released a third satellite, which was officially designated Cosmos 2523. The U.S. military calls these satellites "[Russian dolls](#)," which are engaged in close proximity operations, but not with foreign satellites. Recently, public information



Russian satellite Cosmos 2542 near an American KH-11 satellite. Photo: Michael Thompson

has been released that suggests that this third satellite was an ejected “[projectile](#),” although with a considerably slower velocity than the object released in July 2020. As in 2020, the United States raised public concerns, although with fewer details.

Since 2013, the Russian military has launched a series of so-called inspector satellites that have [reportedly](#) “performed extensive orbital maneuvers” and “hosted technological experiments,” often with other Russian military satellites. Russian satellite Olymp-K (registered with the UN as Luch) raised concerns over its close approaches to U.S. commercial communications satellites and military satellites operated by [France](#) and Italy.

In general, it can be said that, while most satellites travel in known, predictable orbits a safe distance from others, in recent years, some satellites have been involved in non-traditional space activities, including close approaches for purported inspection or servicing purposes and the release of subsatellites. Some of this activity is linked to new capabilities such as on-orbit satellite inspection and servicing, sometimes with commercial operators. Most involves military actors, raising threat of harmful applications.

## WHAT RELATED ACTIVITIES ARE HAPPENING IN SPACE?

The U.S. Space Command and intelligence units have previously [accused](#) Russia of conducting non-destructive tests using ground-based anti-missile systems as recently as April 2020. Similar tests, both destructive and non-destructive, have been conducted by China, the United States, and India.

Additional open-source [reports](#) suggest that Russia has resumed work on several different [ASAT](#) systems, including a co-orbital capability that could function in tandem with a space-based Space Situational Awareness (SSA) program. (Officially, Russia suspended its ASAT program in 1993, 50 years after it was [begun](#) by the Soviet Union.) Many capabilities have benign or less aggressive functions, such as space-based satellite servicing and space-based surveillance or inspection of satellites.

Russia is not alone in developing new, mysterious capabilities that could have [counterspace](#) applications. Among other countries, the United States has tested a variety of close-approach and rendezvous capabilities in recent years. The U.S. military openly operates six Geosynchronous Space Situational Awareness Program satellites that have the capability to perform rendezvous and proximity operations (RPO) with non-cooperative satellites and to manoeuvre widely to perform what is described as space-based SSA or a “neighbourhood watch” function. Further experiments are being conducted by the [Mycroft](#) satellites.

China first demonstrated RPO capabilities in 2008. Recent examples include the Shijian 15 and Shijian 17 satellites; the latter has engaged in extensive [manoeuvres](#). There is no public information that they have approached foreign satellites.

However, a review of [data](#) published by Secure World Foundation on such activities by all space actors suggests that the extent of Russia’s military RPO behaviour stands out. So does its secrecy.

Both Russia and the US have “space platform” technology that allows for launching additional payloads. The U.S. military has launched an Evolved Expendable Launch Vehicle Secondary Payload Adapter Augmented Geosynchronous Laboratory Experiment ([EAGLE](#)) that consists of a main satellite that has been modified to carry up to five subsatellites into space at once, but these deployments are disclosed in advance. It is also connected to servicing and inspection capabilities. However, in 2019, the U.S. X-37B spaceplane released three small, [undisclosed satellites](#) that have not been registered with the United Nations.

Russian space platforms consistently involve layers of secrecy. Sub payloads are often [spotted](#) by observers and catalogued well in advance of their acknowledgement by officials. This was the case on July 15<sup>th</sup>.

## WHERE DOES INFORMATION ABOUT ORBITAL EVENTS COME FROM?

Basic orbital information about the position of objects in Earth orbit is published by the U.S. 18<sup>th</sup> Space Control Squadron based on data collected by its Space Surveillance Network. This information is available to registered users on the Space-Track.org website; the U.S. Space Command referenced this site in its statement of July 23.

Other national and commercial actors maintain similar, non-public databases. [Victoria Samson](#) of Secure World Foundation notes that the incident of July 15 had been observed and discussed by the amateur satellite-observation community before it was made public.

## WAS THE EVENT ON JULY 15 AN ANTISATELLITE TEST?

Russia's activity was clearly a test of a new technical capability. In the absence of a destroyed target, it is difficult to label that capability an ASAT with any certainty. As Russia [asserted](#), the "tests carried out did not create a threat for other spacecraft." But not all antisatellite tests are destructive. Historical [data](#) collected by Secure World Foundation indicates that only 15 of 74 identified ASAT tests have intercepted a target.

Many tests fail. But there are also reasons why an actor might choose not to conduct a destructive ASAT test. One is concern for the environment; the intentional destruction of objects in orbit creates significant clouds of debris that can linger in the space environment. And a direct hit in the location of the test (500-800 km above Earth) would have created a lot of debris. A non-destructive or flyby test, particularly in close proximity to other objects, allows testing of speed, reach, and precision of a system without causing debris.

It is known that the Soviet Union developed and tested [co-orbital](#) antisatellite weapons during the Cold War. The [Space Security Index](#) has documented efforts in recent years to revive several of these legacy programs. There are plausible indications (some say [evidence](#)) that Russia's space-based inspection program is linked to an active ASAT program.

There are other plausible explanations. The event could be linked to an inspection or satellite servicing experiment, as Russia maintains. It could also have been used to test sensors for applications such as [missile detection](#). This uncertainty and the multiple functions that space hardware and activities can support is one of the challenges of space security.

## WHY CAN'T WE BE MORE CERTAIN OF THE FACTS?

Information on objects in orbit and their activities is a core part of Space Situational Awareness. While all states with active space programs and even amateur astronomers and satellite observers have knowledge of some orbiting objects, a complete and precise picture is beyond the capability of any single actor at present.

There is no global SSA system. Instead, surveillance and tracking of space objects are conducted by national actors. However, the sensitive military nature of most SSA data impedes both widespread

data sharing, as well as [trust](#) in data that is provided. Disparate data sets that report different orbital parameters also create a persistent challenge.

Because not all orbital information is published—indeed, not all satellites are registered with the UN Registration Convention—much of the public understanding of objects in space remains guesswork, particularly for more advanced and secret military operations, as well as for capabilities with multiple functions.

Finally, the global community has not developed clear definitions or understandings of either space weapons or bad behaviours in space that would be associated with weapons testing. One reason is because there is considerable overlap between the technical requirements for inspection and servicing capabilities and the development of space-based weapons. Even if the behaviour of the satellites does not appear to be consistent with the stated activities, the growing prevalence of similar orbital behaviour, by the United States and China among others, makes it difficult to distinguish Russia's actions on July 15 as an ASAT test, without more clear evidence.

## DID THE EVENTS OF JULY 15 LINE UP WITH INTERNATIONAL LAW AND NORMS?

Russia has stated that its actions in July “did not breach any norms or principles of international law.” This is mostly because those norms and principles are so poorly developed.

Russia claims that it did not conduct an ASAT test, but what if it did? Such activity is not illegal. The 1967 Outer Space Treaty, which lays out the legal principles for the peaceful use of outer space, bans the placement of weapons of mass destruction in orbit, or on the Moon or other celestial bodies. It is silent on the use of conventional weapons.

Efforts to fill this gap have been stalled at the United Nations Conference on Disarmament (CD) for almost four decades. Russia and China have jointly proposed several initiatives at the CD, including a draft treaty on the Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force against Outer Space Objects (PPWT); they also support a political declaration of no-first-use of space weapons at the UN First Committee on International Security and Disarmament. Neither initiative has received sufficient support from the international community of states, particularly from Western states.

So, if Russia's diplomatic efforts are considered, it must be said that its testing a weapon in space seems hypocritical, if not illegal.

No other arms-control measures are in place. Instead of a ban on weapons, the United States and its allies emphasize the need to develop norms of responsible behaviour. Did Russia engage in bad behaviour? Here, too, the standards by which the international community can hold actors to account are currently weak.

Previous moratoria on the testing of antisatellite weapons have been voluntary and self-imposed. They began to unravel following China's ASAT demonstration in 2007. At most, international outcry against this behaviour has focused on the production of space debris. Fortunately, Russia's activity did not produce debris.

Other norms have been developed to ensure the safety and sustainability of outer-space activities. Some of the following are relevant, but all are voluntary:

- Guidelines to prevent and mitigate the creation of space debris were adopted by the United Nations in 2008.

- In 2013, a UN Group of Governmental Experts adopted a consensus [report](#) that recommended a number of measures linked to enhanced information exchange about space objects and their function and also called for additional norms to promote spaceflight safety built on practices of notification and consultation.
- A set of voluntary guidelines to promote the long-term sustainability of outer-space activities based on 21 best practices was adopted by the UN Committee on the Peaceful Uses of Outer Space in 2019. It reiterates some of the 2013 recommendations, including efforts to improve accuracy of orbital data and the sharing of orbital information on space objects. While the guidelines are intended to apply to all space actors (including the military), they steer clear of military-specific activities.

Could Russia have acted more responsibly to allay international fears of what was seen as threatening behaviour? Absolutely. Are there clear standards and processes through which to do this? No. And here lies the central problem.

## CAN WE MAKE OUTER SPACE SAFER?

There have been numerous calls to develop rules or norms of behaviour that could help to define threatening or potentially harmful activities. Some civil society organizations have done significant [work](#) along these lines.

Project Ploughshares work on the security of outer space points to the feasibility of extending existing rules and best practices associated with safety and sustainability to military and security activities. A [recent survey](#) of more than 100 global space experts suggests that these rules and practices—which relate to transparency, due diligence for safety, due regard for the environment, and collaboration—are both applicable and reasonable.

But progress requires political buy-in from states. On July 27, 2020, we saw an example of this.

For the first time since 2013, the United States and Russia held a bilateral [Space Security Exchange](#), with a focus on possible ways to regulate military activities in space. The U.S. State Department reported mutual interest in continuing to discuss ways to better manage security-related tensions through better communication. Yet a political stalemate [remained](#) in place: Russia wants a treaty and the United States wants voluntary norms.

Without more action, we risk entrenching the status quo. The status quo is not acceptable.

A secure outer-space environment needs better governance, arms control

Political tensions on Earth are rising. Meanwhile, various actors are developing new technical capabilities for use in outer space, with few measures in place to keep the peace and prohibit the use of space weapons. A simmering arms race in outer space could be about to boil over. Action to reduce tensions and restrict dangerous activities is needed now.

While we don't know definitively if Russia conducted an ASAT test on July 15, it is fair to say that Russia has been testing advanced space-based capabilities that could have weapons applications. In this, it is not alone. But its behaviour stands out and is clearly perceived by others as threatening, which is worth calling out.

More critically, this activity risks chipping away at the last threads of normative taboo against the or-

biting of weapons systems in space, which holds the international commitment to peaceful purposes together. And it brings to life the long-held fear that weapons could secretly be orbiting in space.

What July 15 clearly shows is the poor state of international relations and governance in outer space. This event is one more wake-up call that urgent steps are needed to create better rules in space that make permitted activities more transparent, safer, and more predictable, while at the same time restricting or prohibiting those that are most dangerous and harmful.

The time may also be ripe to attempt to achieve arms-control agreements, which in other domains and at other times have been important in enhancing stability and security. As outer space is increasingly seen as a possible, even probable, site for warfighting by some of Earth's most advanced military powers, it is only prudent to try to limit the damage in advance. While concerns about dual-purpose and multiuse technology remain, the assertion that Russia launched an object with the "characteristics of a weapon" suggests that we may finally be ready to identify what those characteristics might be.

As experts around the globe assert, and our current research shows, there are practical and feasible steps rooted in existing norms of behaviour that could be taken in the short term to enhance security in outer space. Such steps would increase the transparency of military space activities and help to build the trust needed to support long-term arms control measures.

## **PROJECT PLOUGHSHARES**

140 Westmount Road North  
Waterloo ON N2L 3G6  
Canada

**[www.ploughshares.ca](http://www.ploughshares.ca)**

519-888-6541

[plough@ploughshares.ca](mailto:plough@ploughshares.ca)

Project Ploughshares is a Canadian peace research institute with a focus on disarmament efforts and international security, specifically in the areas of the arms trade, emerging military and security technologies, nuclear weapons, and outer space security.