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Debris from India's anti-satellite test is still zipping about in orbit, and now we might know why

Moving forward, India plans to set up a telescopes & radars to track debris in space

Despite numerous claims by the Indian Defense Research and Development Organisation that space debris from an anti-satellite missile test that was carried out in March 2019 would cause no threat to orbiting satellites and the International Space Station, the US space agency NASA has identified 49 remnants still orbiting Earth as of mid-July. In the latest Orbital Debris Quarterly News (ODQN) report, NASA added that it is unable to track the remaining debris pieces, which likely disintegrated over the past four months.

The 5000-km range Agni-V nuclear-capable missile was launched from Kalam Island off Odisha at 9.50 am on 27 March 2019. Image: Hemant Kumar/Twitter

On 27 March 2019, India had launched an Agni-V ballistic, nuclear-capable missile in an anti-satellite test (ASAT), destroying a 740-kilogram active satellite (MicroSAT-R) that was launched by the Indian Space Research Organisation (ISRO) just a few months prior.

The test was a demonstration of India's ability to protect its space assets if need be, and that it can destroy an active satellite moving in space that poses any threat to the country or any of its critical, space-based functions. India's show of technological prowess received praise as well as condemnation for acting irresponsibly by generating space debris.

DRDO Chairman G Satheesh Reddy said in April 2019 that most of the debris generated from the anti-satellite test conducted by India in March has decayed and that the rest of it will dissipate in a "short period of time".

"As I had mentioned on 6 April, the debris were to decay in a few weeks' time. As per the information that we have already got, most of the debris has decayed. And, whatever couple of pieces are there, they will be decaying in a short period of time," Reddy said.

There could be an explanation for the "unusually long" period of time the debris is taking to fall through the atmosphere, as DRDO expected it might. On an average day, the Earth's upper atmosphere is heated and puffed up by ultraviolet (UV) radiation from the sun. Orbiting satellites in low-Earth orbit experience friction as they skim over the edges of the atmosphere, producing drag. The satellites, therefore, lose speed over time, eventually falling back to Earth. Drag is good news as far as space junk in concerned, as it helps keep low-Earth orbit more or less debris-free.

The Earth is currently in the middle of a 'solar minimum' phase, which some experts are citing as the reason for the slow disintegration of the debris. There is little to no solar activity during this period — the least in the sun's 11-year solar cycle. Sunspot and solar flare activity diminish to a minimum for days on end. This affects the Earth's upper atmosphere, too, where the natural heating mechanism by UV radiation subsides. The upper atmosphere cools, and to some degree, collapses, NASA says. With lesser drag than on an average day, space junk, too, tends to linger in low-Earth orbit for longer.

The longer the fragments stay in orbit, the greater the risk to satellites belonging to several nations, as well as other expensive infrastructure, the Space Station included. Since India has no means of tracking the debris on its own yet, NASA's ODQN report remains the only credible estimate of the remaining debris. NASA, via the US Air Force, had initially claimed it was tracking 400 pieces of debris from the ASAT test, suggesting that they could even collide with the Space Station. But the agency was able to catalogue only 101 of those pieces due to the low-altitude the test was carried out in and the rapid decay of the remaining fragments, DRDO revealed in a recent statement.

The quarterly report also revealed that out of the 19,524 catalogued pieces in total orbiting the Earth, a mere 254 belong to India (1.3 percent). The US and the Commonwealth of Independent States (including Russia) have the highest fraction of (spacecrafts+rocket+debris) fragments, roughly 6,500 in all, followed by China with 4,000+.

Moving forward, India is all set to establish a network of telescopes and radars to track the debris that could pose potential risks.

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