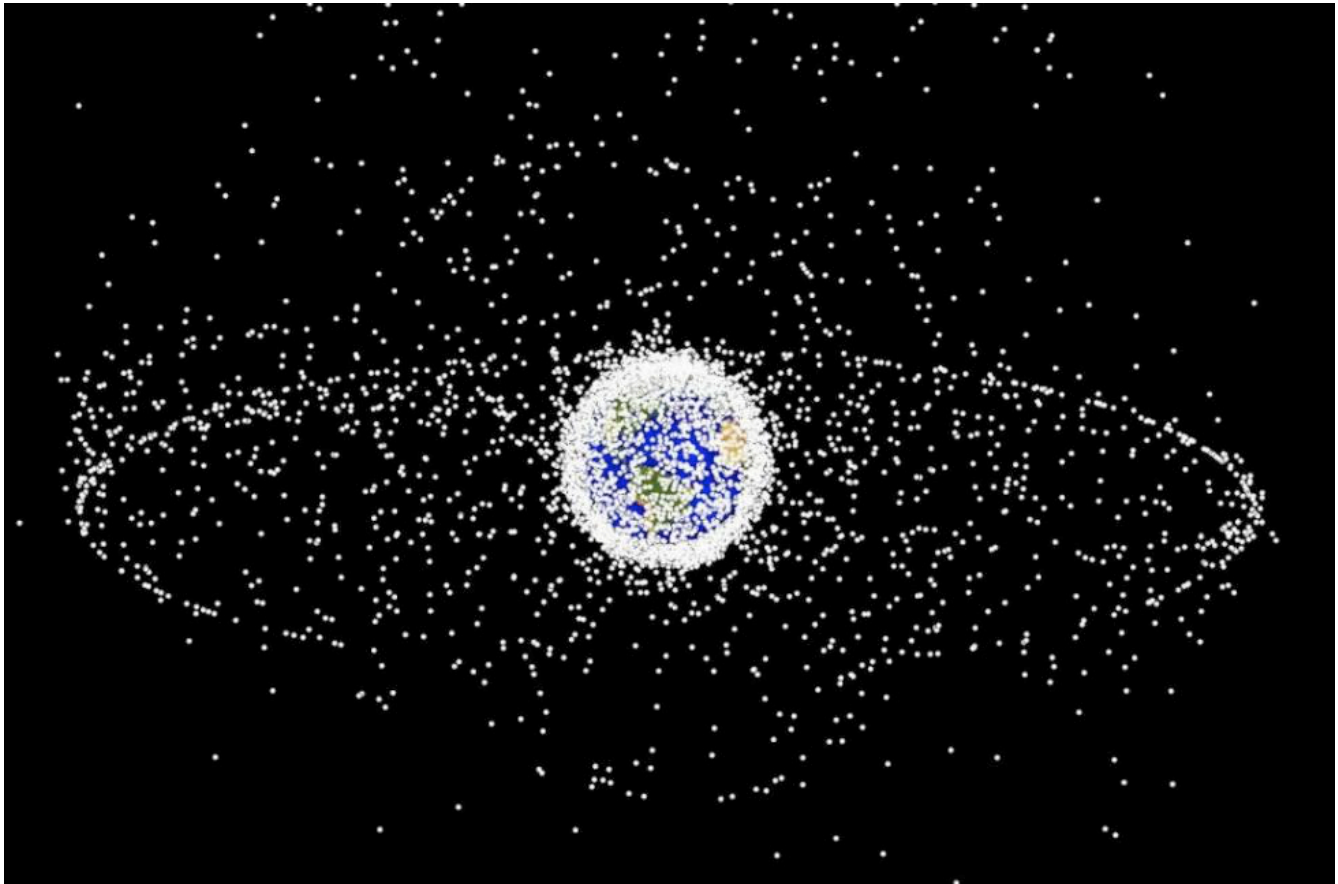


## Who Keeps Track of All Those Satellites?

By Jim Siegel, Space Insights

Given the 57 satellites being launched by SpaceX for its Starlink constellation this week, added to the 31+ already in orbit just to support the GPS in our cars on smart phones, you may be wondering just how many satellites orbit the earth. And who, if anyone, keeps track of them?



Representation of Operational Satellites

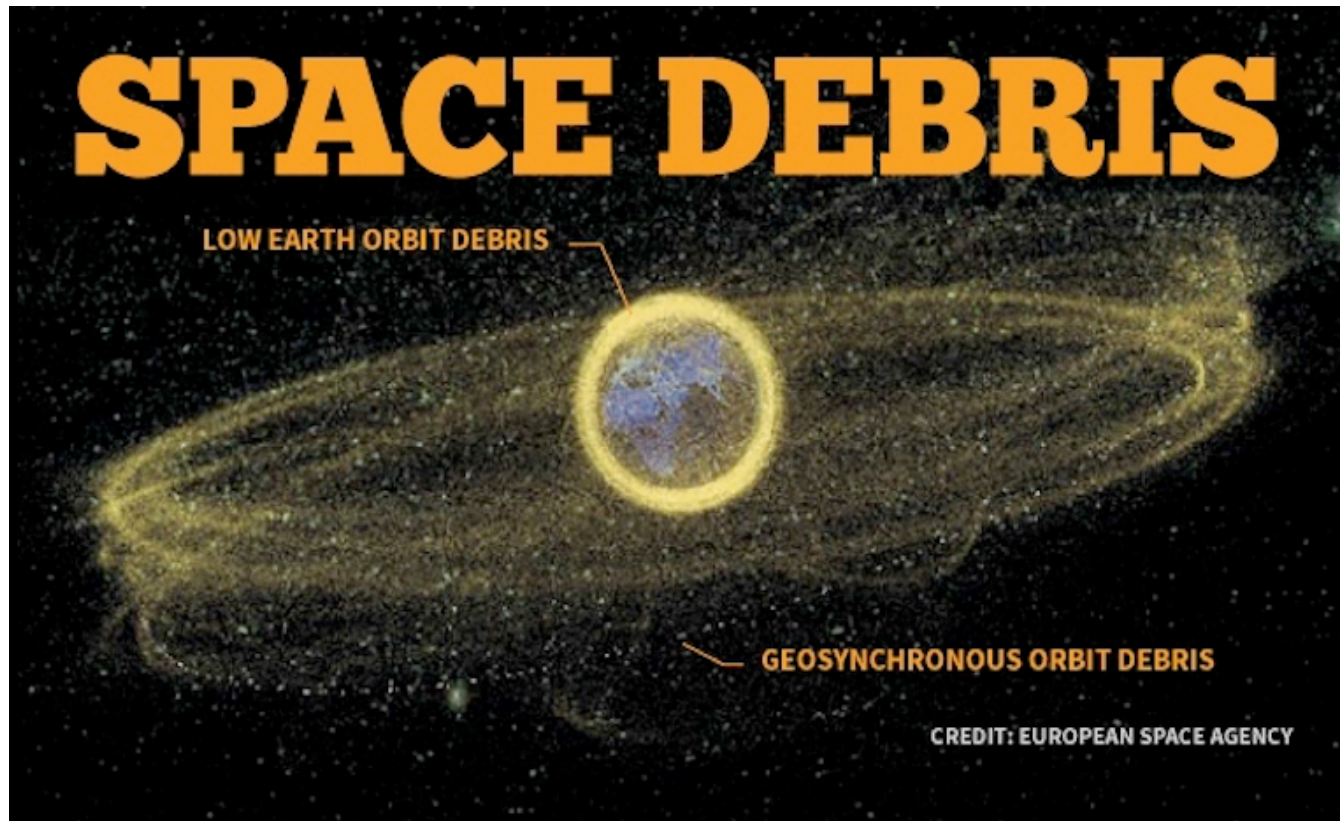
Photo Credit: UPI

According to some estimates, about 9000 satellites have been launched by about 40 countries since the Soviet Union launched Sputnik in 1957. Of those about 5000 remain in orbit, and of those about 2700 are still operational.

The Union of Concerned Scientists (<https://www.ucsusa.org/resources/satellite-database>) maintains a useful satellite database. That database indicates that the United States leads in the number of operational satellites with about 1400, followed by China at about 365, Russia at about 170, and others at about 800. See <https://www.ucsusa.org/sites/default/files/2020-05/changes%20to%20the%20database%204-1-20.pdf>

Of the United States satellites, about 950 are commercial, about 200 are military, about 170 are government, and about 30 are civil.

What about space debris, including dead spacecraft, lost equipment, boosters, and weapons? In addition to the roughly 2700 operational satellites, experts estimate, as of January 2019, more than 128 million pieces of debris smaller than 1 cm (0.4 in), about 900,000 pieces of debris 1–10 cm, and around 34,000 of pieces larger than 10 cm were estimated to be in orbit around the Earth. Keep in mind that many of these items are traveling at up to 15,000 miles an hour. A golf ball sized piece of debris can do big time damage.



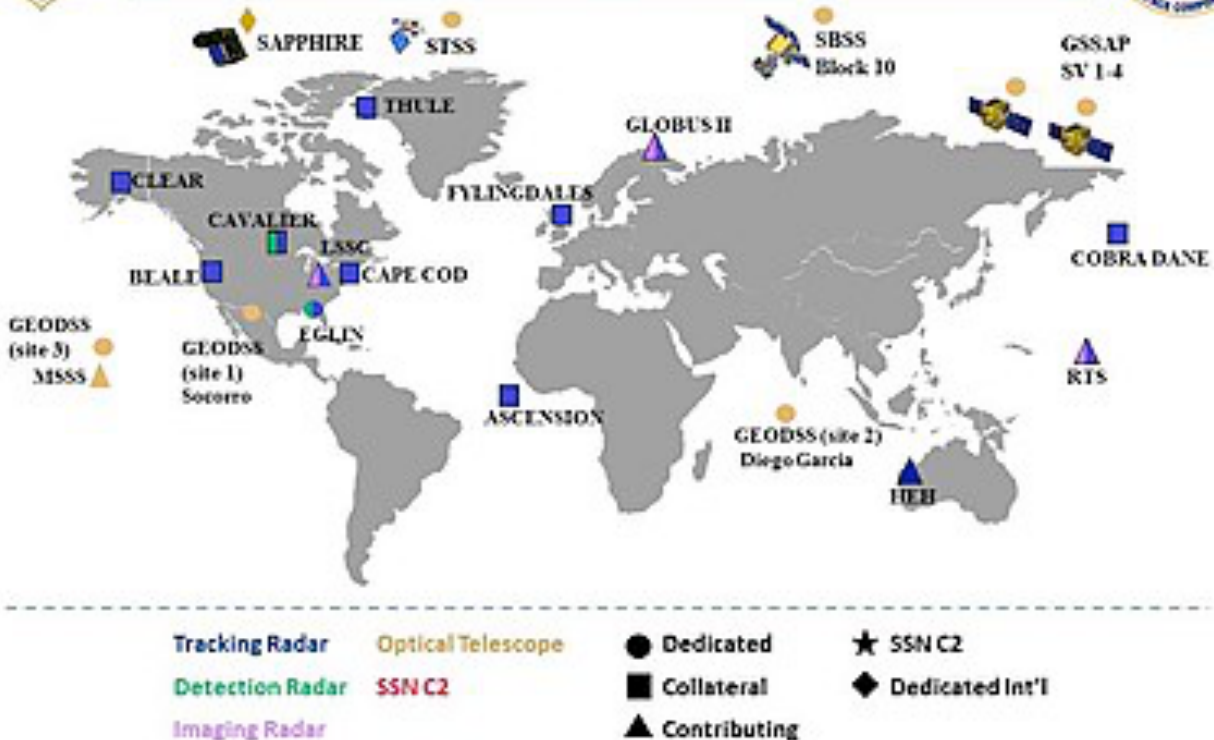
Is there anyone that monitors all this stuff?

Given the military, as well as scientific, importance of space and satellites, there are a number of governments and civilian organizations that keep track of man-made items in space. The most important appears to be the United States Space Surveillance Network (SSN); it detects, tracks, catalogs and identifies artificial objects orbiting earth (e.g. active/inactive satellites, spent rocket bodies, or fragmentation debris). The system is the responsibility of the Joint Functional Component Command for Space, part of the United States Strategic Command (USSTRATCOM).

The Command accomplishes these tasks through its Space Surveillance Network (SSN) of U.S. Army, Navy and Air Force operated, 30+ ground-based radars and optical telescopes worldwide, plus 6 satellites in orbit (reference: US Policy and Capabilities on SSA, Secure World Foundation. 24 January 2019).



# Space Surveillance Network



While there is no single space-wide traffic cop, *Quartz* reports that the most significant source for space situational awareness is the US Air Force's Combined Space Operations Center (CSpOC), which uses data from the SSN mentioned above to track orbital objects 10 centimeters in diameter or larger with a worldwide radar network. Most satellite companies, especially those with large fleets, automate their communications and “station keeping” maneuvers. But when they receive a warning from CSpOC that there is a risk of collision with another spacecraft or with space debris, their team consults with the Air Force to make a decision about how to move.



NASA's Eugene Stansbery-Meter Class Autonomous Telescope was deployed on Ascension Island and achieved first-light in June 2015. The ES-MCAT is a 1.3-m, f/4, DFM Engineering optical telescope with an ObservaDome, both fast-tracking to easily accommodate tracking debris at all orbital altitudes.

Credit: Royal Air Force





Combined Space Operations Center

Photo Credit: LOMPOC Record

Also noteworthy is a space surveillance telescope, the most sophisticated ever developed, that was recently placed into operation at the Space Surveillance Telescope site atop North Oscura Peak on the northern part of the Army's 3,200-square-mile White Sands Missile Range in New Mexico. "It's not often we get an opportunity to witness the beginning of an entirely new military capability," Air Force Maj. Gen. Nina Armagno said at the dedication event, "but that's exactly what we're doing here today. We are ready to begin tracking thousands of space objects as small as a softball. It's a boon to space surveillance and science and a new military capability important to the nation and the globe."



Photo Credit: Albuquerque Journal