

Quarterly review: October 2022

In 2019, 800 functional satellites were operating in low Earth orbit (LEO). Now, there are over 5,000. The LeoReport is your guide to this rapidly changing environment — providing crucial data and expert analysis to help uncover the challenges and solutions for today's dynamic space era.

## Key observations in LEO from June to September 2022

### CLOUDS

250+ objects have fragmented in LEO over the last 60 years, spreading across space like clouds. Three collision-induced clouds currently dominate LEO: Fengyun 1C, COSMOS 1408 and COSMOS 2251.

- COSMOS 1408 debris fragments decreased from ~600 to ~500, but there was no corresponding decrease in dangerous conjunctions: ~2,500 in June and ~3,000 in September

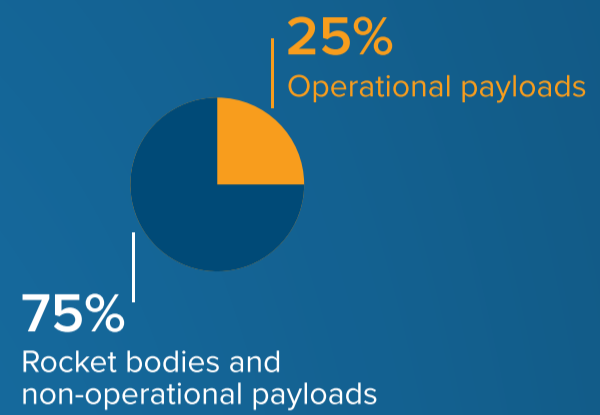


- Roughly 45% of dangerous events observed involved remnants from just ten breakup clouds

### CLUSTERS

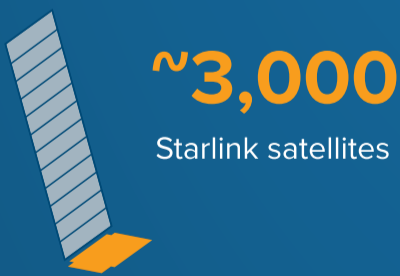
75% of the total mass in LEO is currently made up of derelict objects. These objects were abandoned in large numbers and in similar orbits primarily during the first 45 years of the space age.

- The most populous family of rocket bodies are the 285 Russian SL-8 rocket bodies; nearly 4,000 high-probability of collision (PC) conjunctions involved an SL-8 rocket body



### CONSTELLATIONS

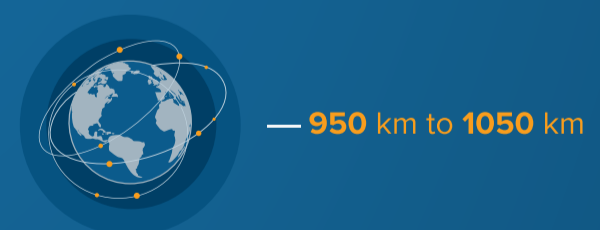
Nearly 25% of objects in LEO today are operational payloads deployed in lower altitudes (i.e., below 1,300 km). Space X's Starlink remains the largest constellation in LEO, increasing to 3,000+ operational satellites in the last quarter.



- The spatial density at the Starlink altitude (~550 km) is now the largest than any place else in LEO, but spatial density is not an accurate measurement of collision risk between members of a constellation

### BAD NEIGHBORHOODS

Certain regions in LEO are littered with derelict objects. This includes 950 km to 1050 km, where ~160 SL-8 rocket bodies along with their ~160 payloads reside.



- In the last quarter, there were 1,400 high-PC conjunctions involving SL-8 rocket bodies
- The riskiest conjunction event so far in 2022 occurred between Cosmos 2334 and Cosmos 2315. The event occurred at ~1,000 km with a miss distance of 15 m and a PC of 3%

We're bringing clarity to the dynamic space era. [Join us.](#)

**Reference note:** The findings shared in this report and infographic are derived from the hundreds of thousands of data products LeoLabs' global network of phased array radars collects daily.

About LeoLabs: LeoLabs is transforming the way satellite operators, commercial enterprises and federal agencies across the world launch and track missions in low Earth orbit. Through its vertically integrated Vertex system, LeoLabs delivers the information superiority needed to succeed in today's space race.