Facts about SpaceX's proposed Orbital Data Center

- SpaceX has applied to the FCC for one million "AI data center" satellites.
- There are currently no functioning "AI data center" satellites in orbit, and there remain likely insurmountable technical challenges like heat dissipation, radiation effects on electronics, and micrometeorite/debris impacts before this is a viable technology.
- This is untested technology, with unclear benefits, and huge costs that would be placed upon many different communities and environments outlined below.

The costs to safety and human health

- If the one million satellites are disposed of in Earth's atmosphere like Starlink satellites are today, with 5 year lifetimes, there would be one satellite reentry every 3 minutes.
- This would be approximately one thousand tons of satellites deposited in Earth's atmosphere per day, more than two-thousand times the natural infall rate of aluminum from meteoroids. The full impact of such deposition is currently understudied. Initial analyses suggest potentially catastrophic changes in the atmosphere, including ozone depletion.
- If the satellites do not burn up completely, they will hit the ground. The current expected casualty risk for megaconstellations is already a 40% chance of one or more casualties every 5 years, and will get higher as more satellites are launched into orbit.
- If the satellites are disposed of in "heliocentric orbits", they will require a large amount of extra fuel and a large propulsion system to leave Earth's gravity well, and could pose collision risks to spacecraft travelling to the Moon. Additionally, they are likely to collide with Earth in the future.

The costs to astronomy

- Preliminary simulations by astronomers based on Starlink brightnesses suggest this megaconstellation would result in many thousands of satellites easily visible to the unaided eye crawling in grids across the sky every night, from the entire surface of Earth.
- These satellites would disrupt every type of astronomy in every wavelength (e.g., radio, infrared, optical), wasting many decades and billions of dollars in taxpayer money that has been invested in astronomical observing facilities. Science like observing the deaths of stars and looking for new planets would become much harder than it is already.
- The crawling grid of light in the sky would disrupt naked eye stargazing, astrotourism, and cultural astronomy worldwide.

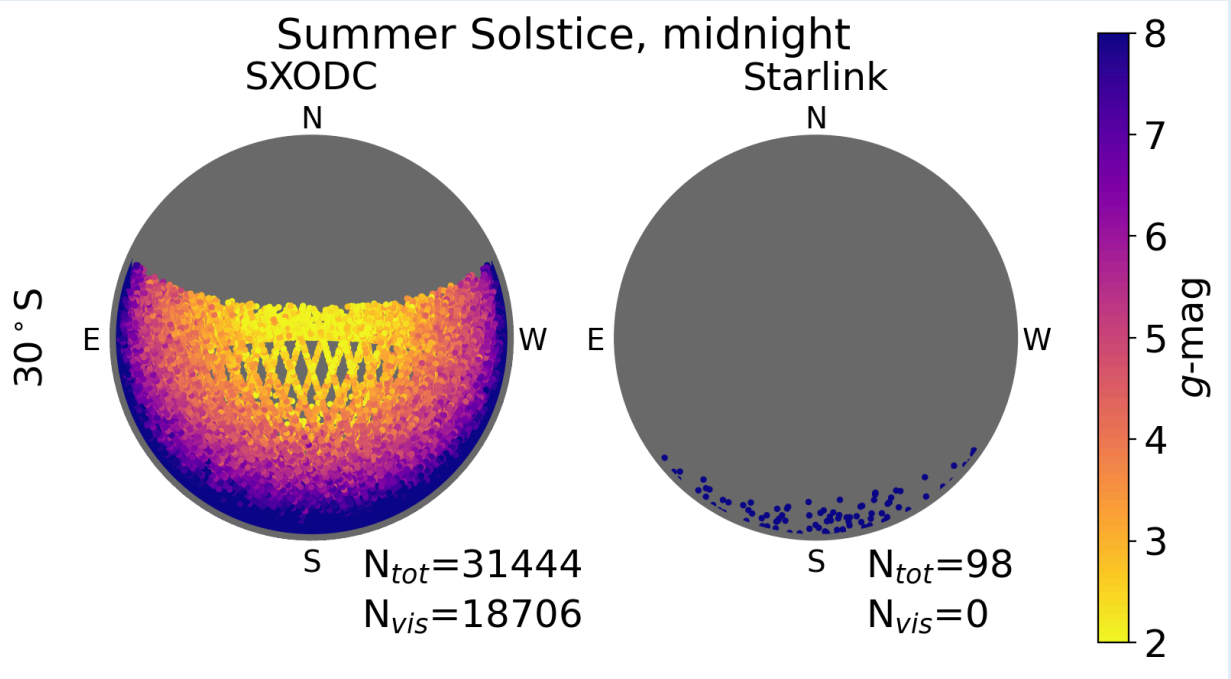
The costs to ecology

- All life on Earth – including humans, migrating birds, pollinating insects, plankton in the oceans – depends on the natural day-night cycle of light and darkness. Many hundreds of scientific studies document the importance to ecosystems and agricultural crops of protecting that natural cycle. Bird migrations, pollination, plant growth, and animal behaviors could all be disrupted by reflected sunlight from orbit.

The costs to orbital safety

- According to the CRASH Clock metric, if collision avoidance maneuvers stopped, we would have a collision in orbit within 3.8 days (using orbital data from January 2026).

- Many parts of orbit are already (as of May 2025) above the runaway collision threshold. Many experts agree we are already in the early stages of Kessler Syndrome, and we need to do all we can to keep orbital operations safe for future generations. Launching a million satellites into an already-crowded Low Earth Orbit would virtually guarantee runaway collisions and destruction of a large fraction of our currently operating satellites, many of which serve as a public good, for example, weather forecasting, communications, and mapping.



The grey circles show full-sky simulations of how many satellites would be in the night sky and how bright they would be for SpaceX's million satellite filing ("SXODC") and Starlink for comparison, as seen at midnight on the Summer Solstice from latitude 30 degrees south, near the latitude of the Vera Rubin Observatory and other major astronomical research facilities. N_{tot} gives the number of sunlit satellites in the sky, and N_{vis} gives the number that are bright enough to be visible to the naked eye. Brightnesses are scaled from Starlink simulations and use orbits from a model consistent with SpaceX's million satellite filing.

What can individuals do?

- Submit comments to the U.S. Federal Communications Commission (FCC) demanding they keep orbit safe. Instructions here and here.
- Contact your government representatives, no matter where in the world you live, because this light pollution will be worldwide.
- Tell others about the negative impacts from a million satellites on human safety, the atmosphere, orbital safety of existing satellites, wider ecological effects, and the night sky.

List of astronomers who can be interviewed about the effects of millions of satellites

- **Samantha Lawler**, University of Regina/University of Canterbury, samantha.lawler@uregina.ca, satellite reflections and orbital dynamics. Time zone: UTC+13
- **John Barentine**, Dark Sky Consulting, john@darkskyconsulting.com, environmental effects of artificial light at night. Time zone: UTC-7
- **James Lowenthal**, Smith College, jlowenth@smith.edu, importance of protecting natural darkness at night for humans and all other life. Time zone: UTC-4
- **Aaron Boley**, University of British Columbia, aaron.boley@ubc.ca, space sustainability. Time zone: UTC-7
- **Michelle Wooten**, University of Alabama at Birmingham, michellewooten@uab.edu, importance of protecting natural darkness at night for humans and all other life. Time zone: UTC-5