

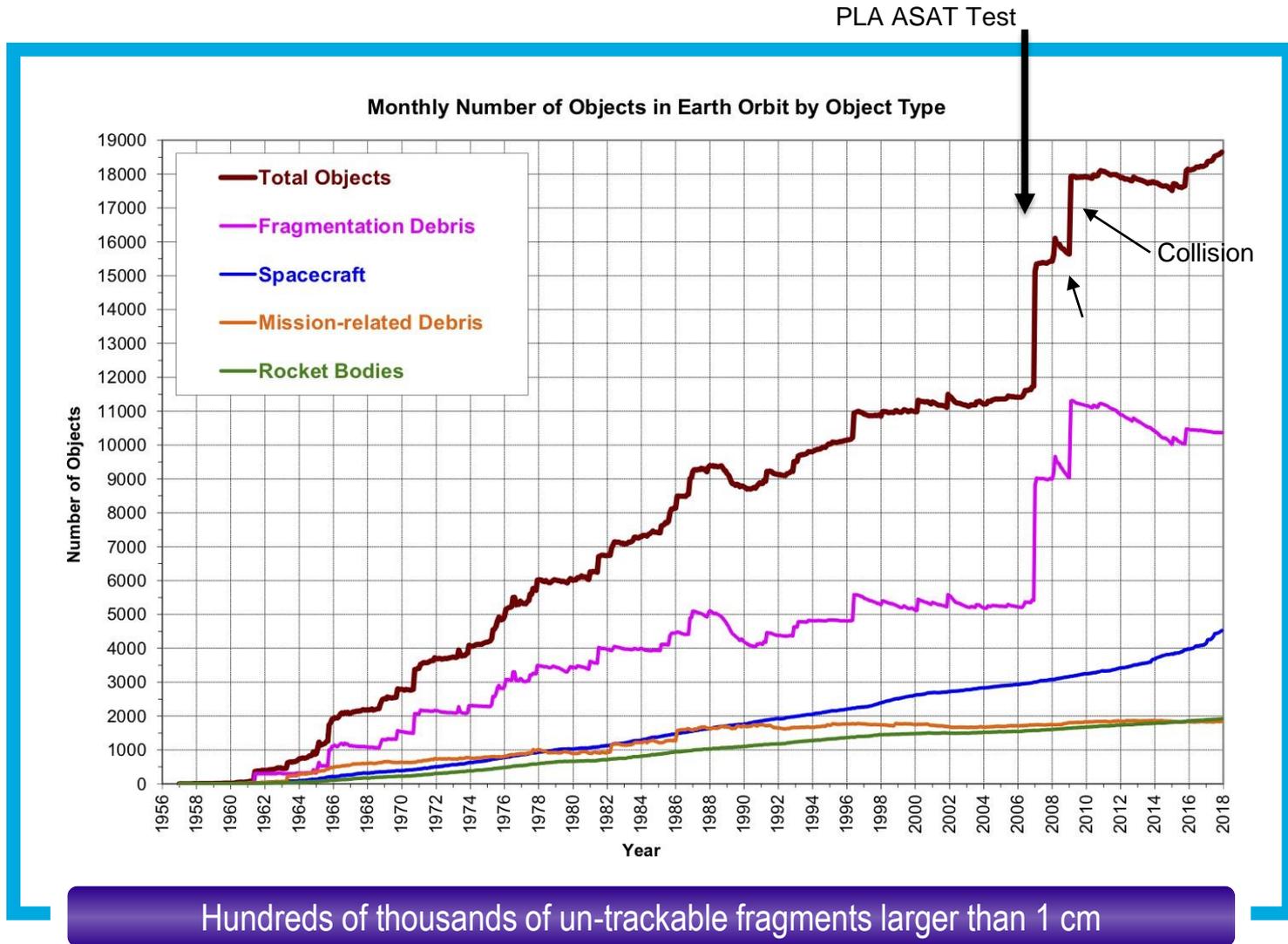


***SPACE DEBRIS, SPACE TRAFFIC
MANAGEMENT AND INTERNATIONAL
NORMS***

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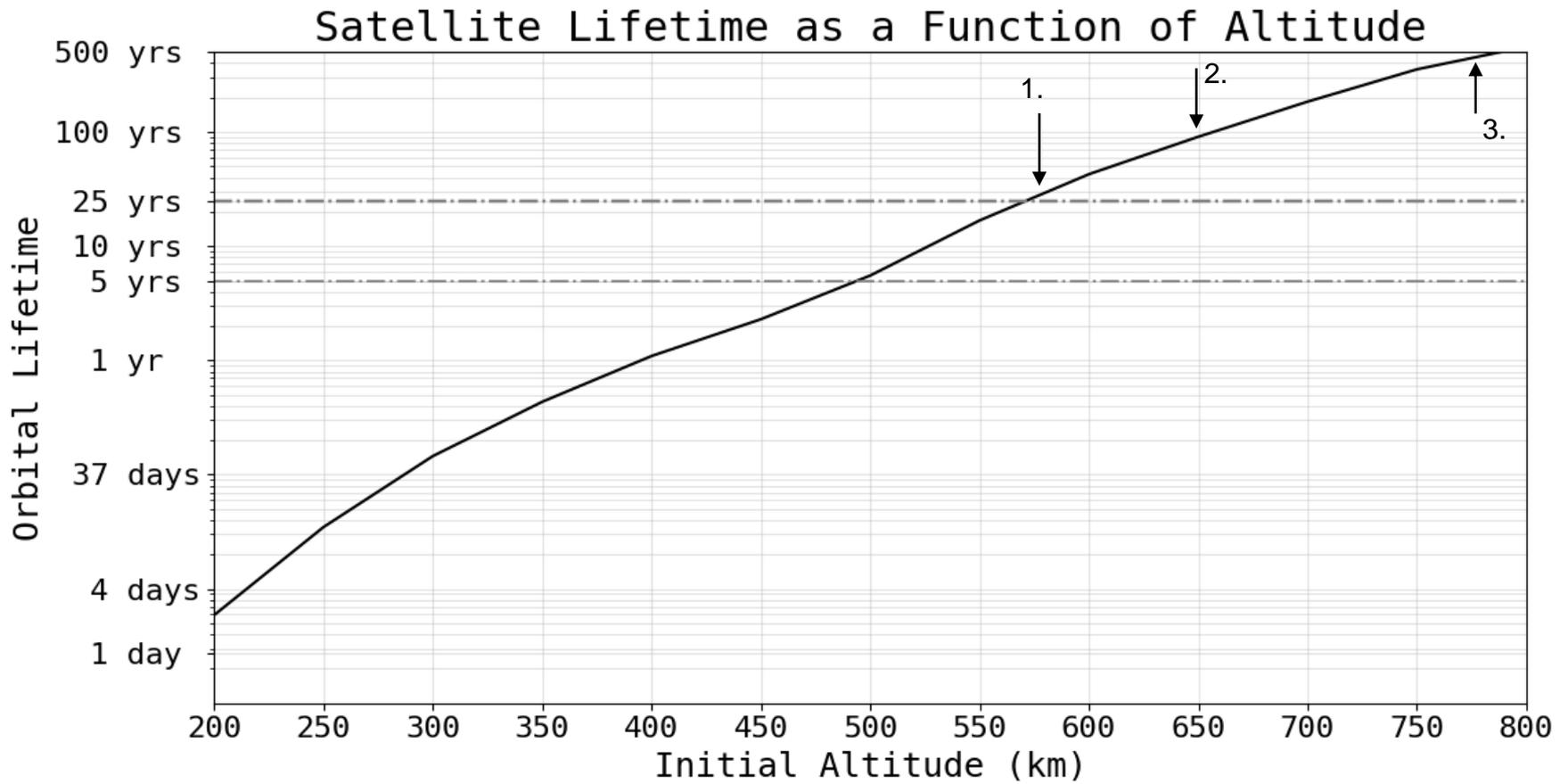
November, 2020

How Much Debris Is There and Where Did It Come From?





How Long Will a Satellite (or Debris) Remain in Orbit



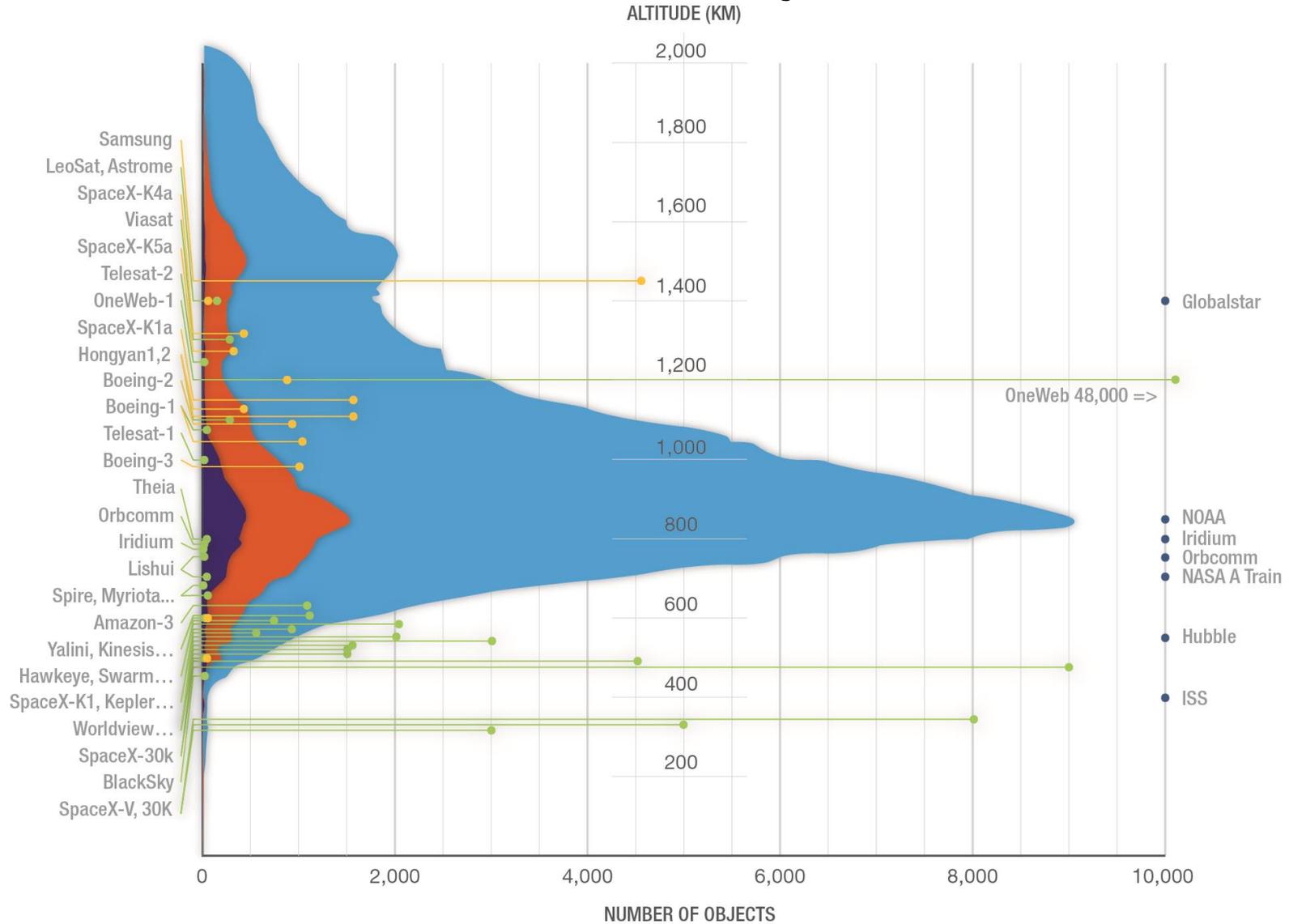
247 282

865

75 km change between 1) 25 yrs and 2) 100 yrs in orbit w/out action to deorbit/remove



What altitude are most objects?



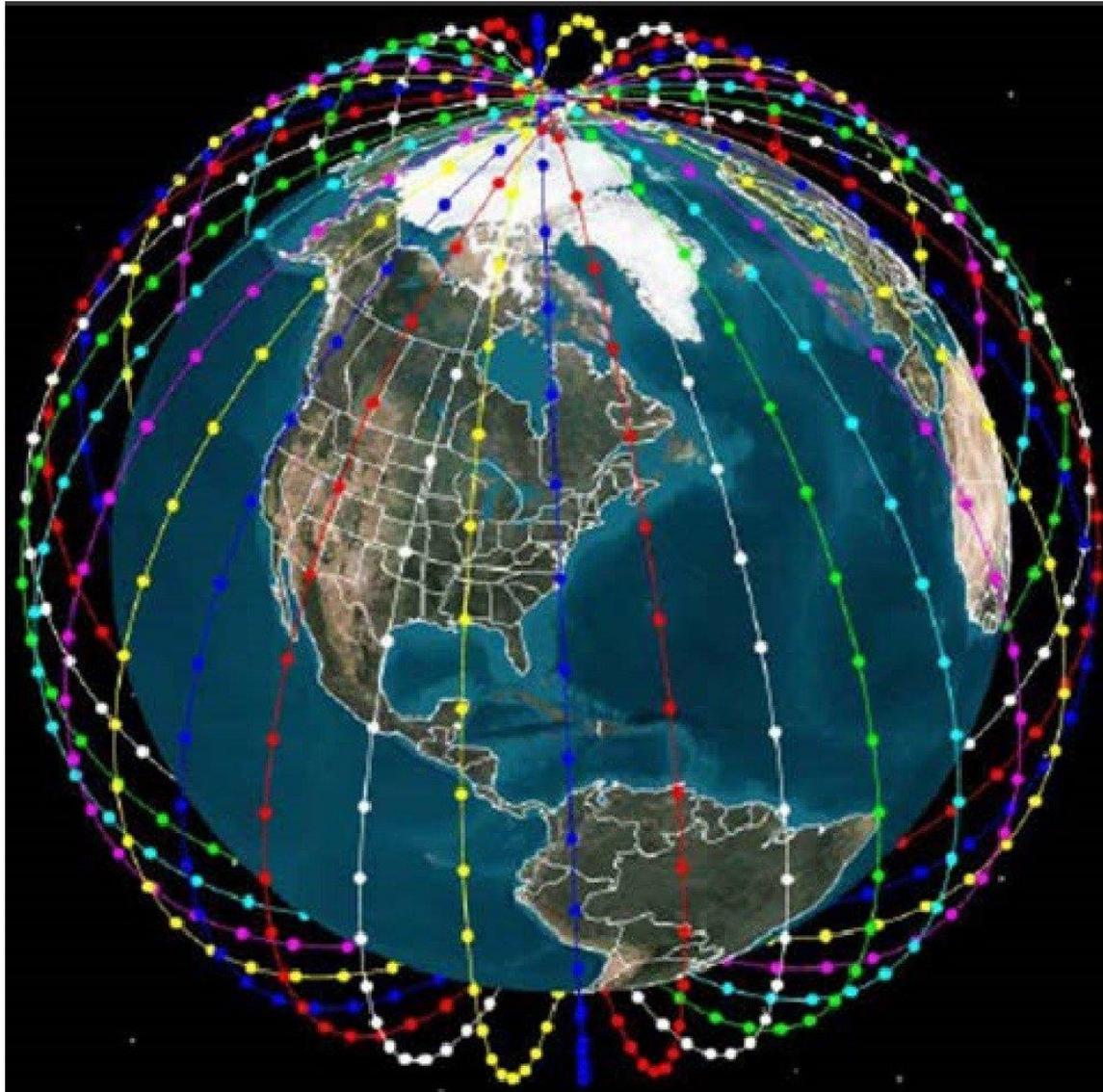


Problem Growing Due to Rapid Growth in Space Activities

- 1957 – 2019 (62 Years)
 - 9600 satellites placed in orbit
 - 5,550 still in orbit (as of November 2019)
 - *2,300 operational*
 - ~21000 pieces of *trackable* debris
- 2020 – 2030
 - *Plans for 100,000+ satellites announced by private industry*
 - Some skepticism that all announced will be launched
 - Starlink satellites (SpaceX). 800 launched and seeking approval to launch 30,000 more.
- What is driving this change?
 - *Smallsats*
 - *Large Constellations*



A mega-constellation *Hundreds or thousands of satellites*





Four Elements of a Global Solution to Mitigate Problems

- Better tracking
- Better orbital predictions, identification of objects, and avoiding collisions
- Strategies for minimizing or eliminating space debris
- Developing standards and international norms of behavior for outer space



Voluntary, international standards, guidelines, and norms of behavior for outer space: Why they matter

- Outer Space Treaty establishes “freedom of use” of outer space
 - *Space is outside any country’s jurisdiction*
- Voluntary international standards, guidelines and norms
 - *Provide broad-based international legitimacy*
 - *Reduce dangerous actions in space*
 - *Stimulate predictable and supportive space governance*
 - *Reduce off-shoring incentives*



Key Take Aways

- Rapid growth is changing how the space environment needs to be managed
- The New Space Age requires new ideas on how to sustain the space environment
- There are numerous opportunities for international cooperation in this area



Thank you

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