

Consequences of the Collision of Iridium 33 and Cosmos 2251

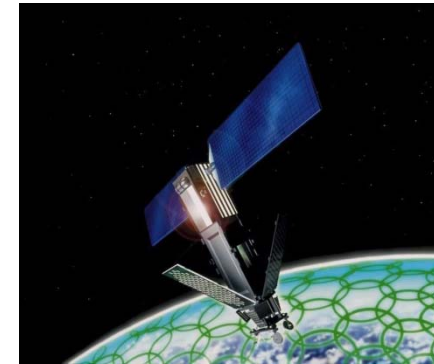
**Presentation to the 52nd Session of the
Committee on the Peaceful Uses of Outer Space
United Nations**

3-12 June 2009

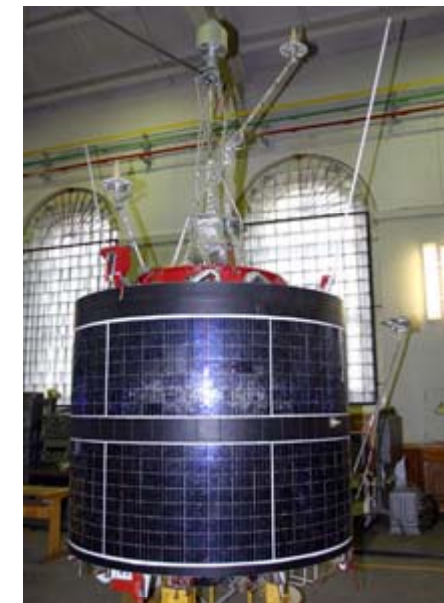


Collision of Iridium 33 and Cosmos 2251

- **The first accidental hypervelocity collision of two intact satellites occurred on 10 February 2009 at an altitude of 790 km.**
 - The collision occurred in a region of high spatial density, i.e., high concentration of objects.
- **Iridium 33 (1997-51C), an operational U.S. communications satellite, collided with Cosmos 2251 (1993-36A), an non-functional Russian communications satellite. The Iridium satellite ceased functioning at the time of the collision.**
- **The U.S. Space Surveillance Network has tracked more than 1400 new debris in the orbital planes of the two spacecraft.**
 - Many more debris smaller than 10 cm have also been detected.



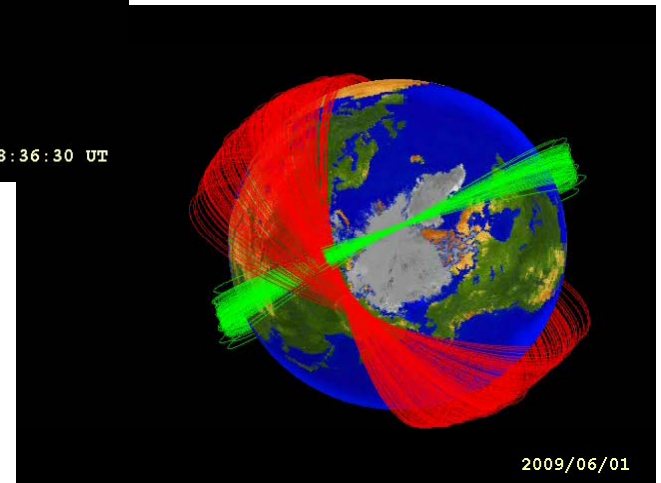
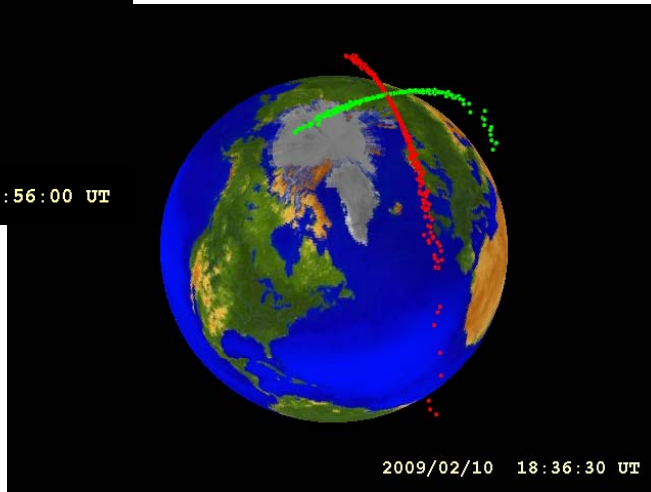
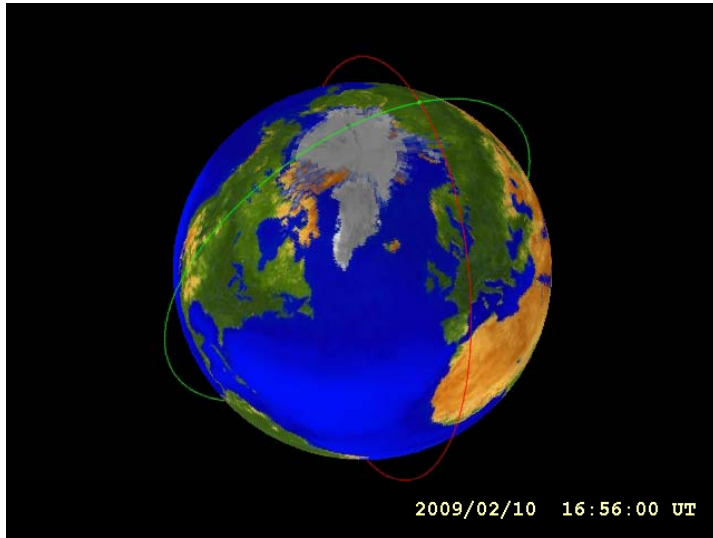
Iridium 33

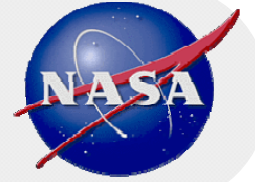


Cosmos 2251

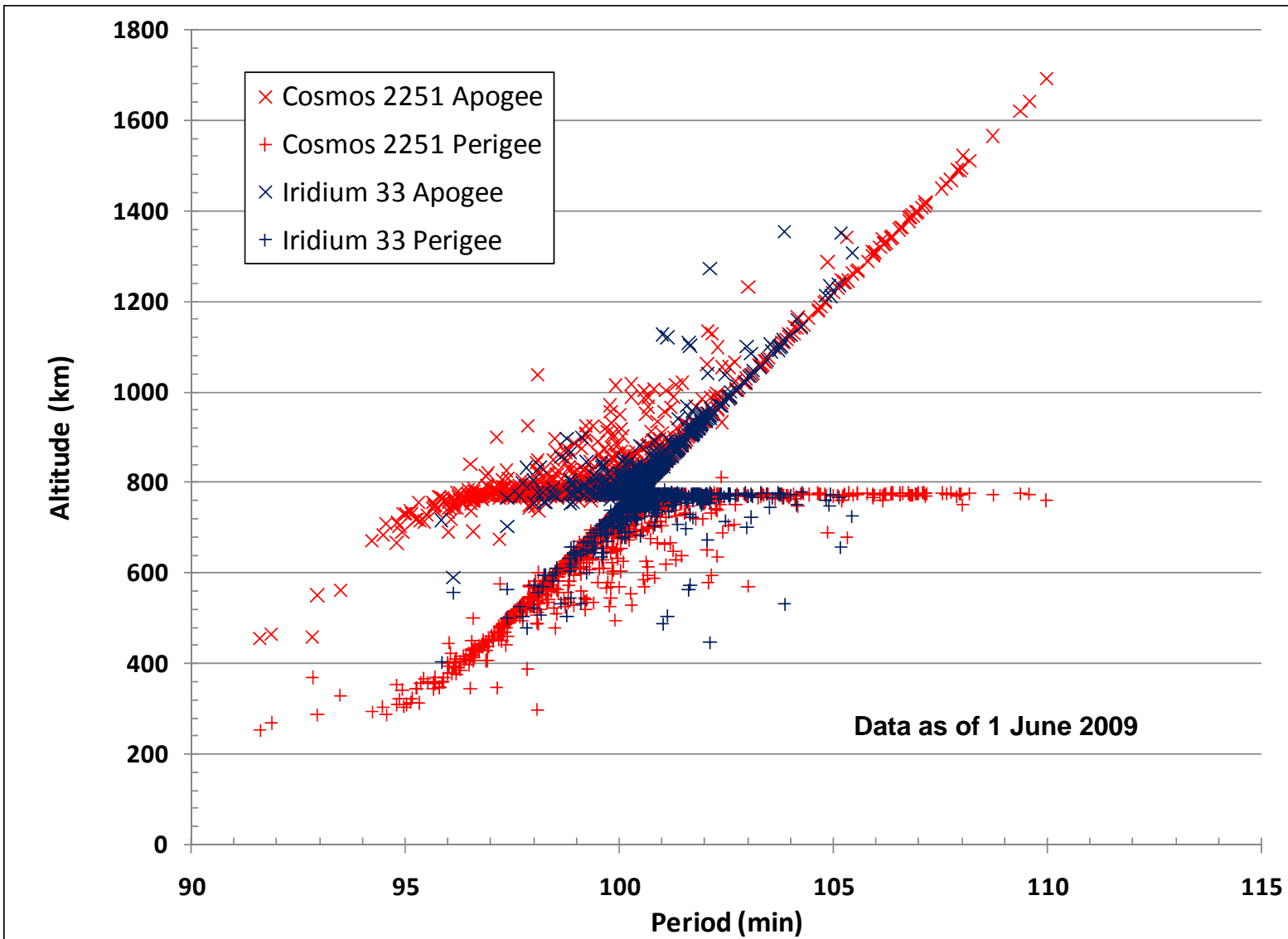


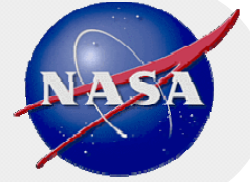
Simulation of Debris Clouds





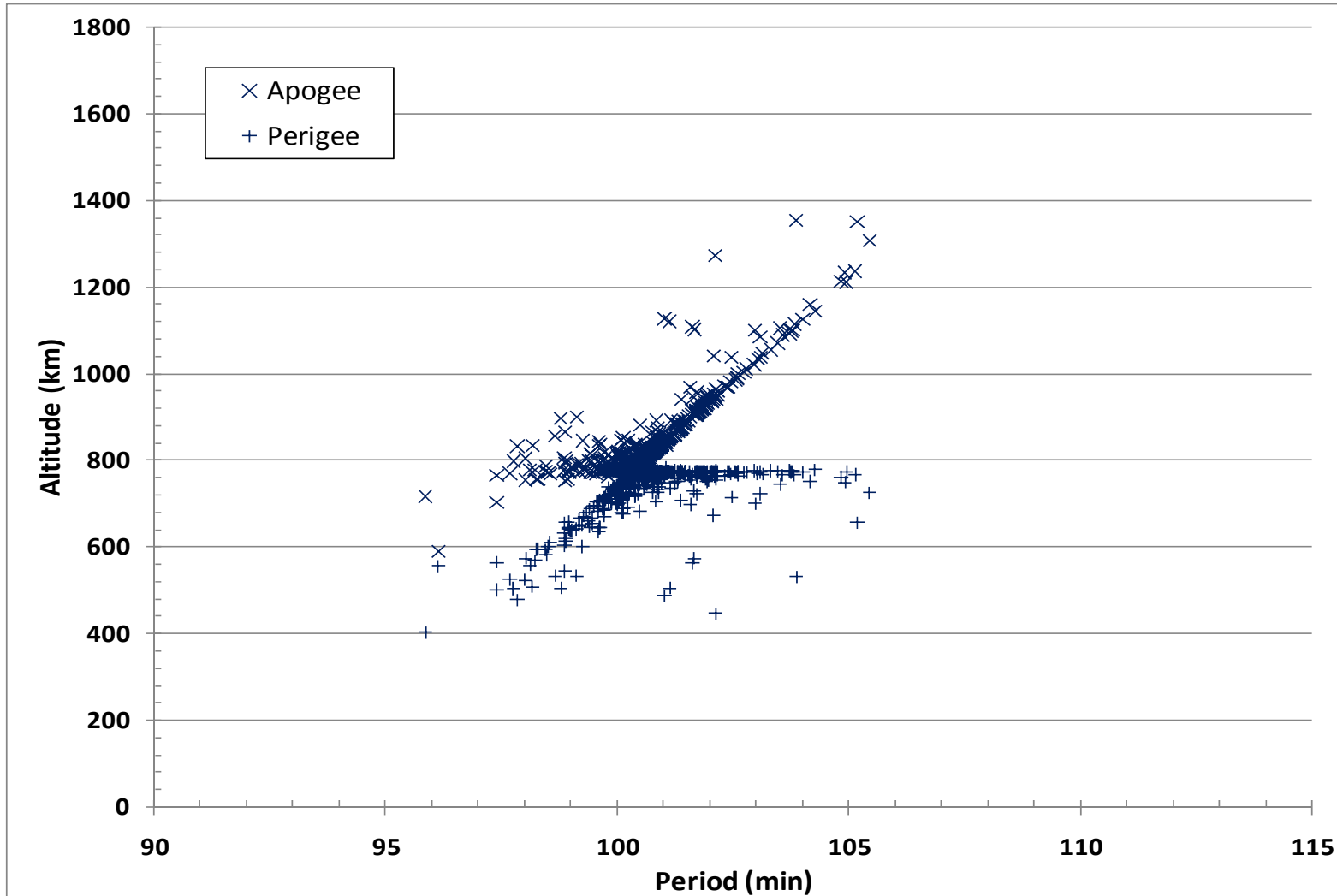
Composite Debris Tracked by US SSN





Tracked Debris from Iridium 33

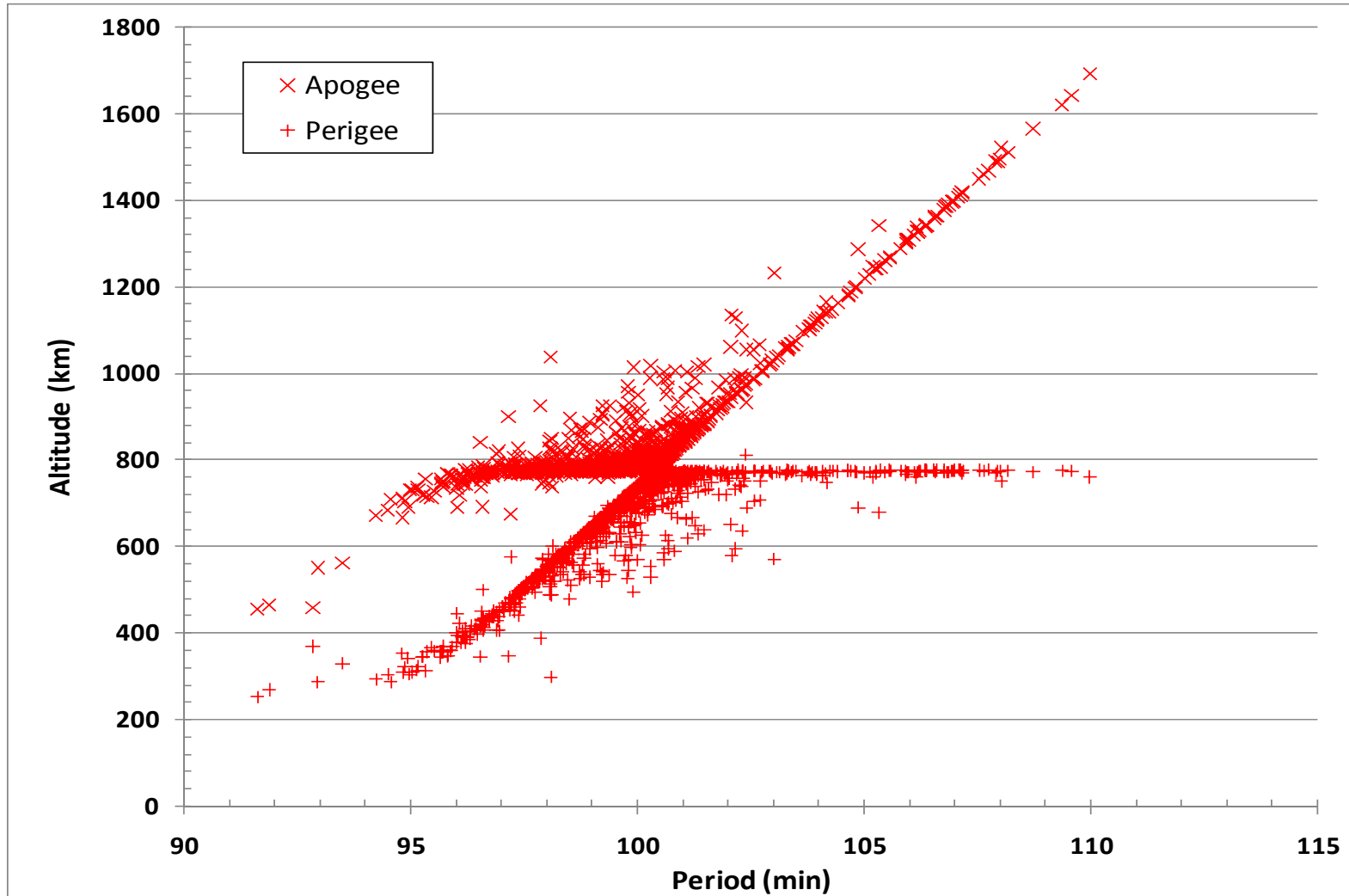
- **Total number of debris: 430 (as of 1 June 2009)**





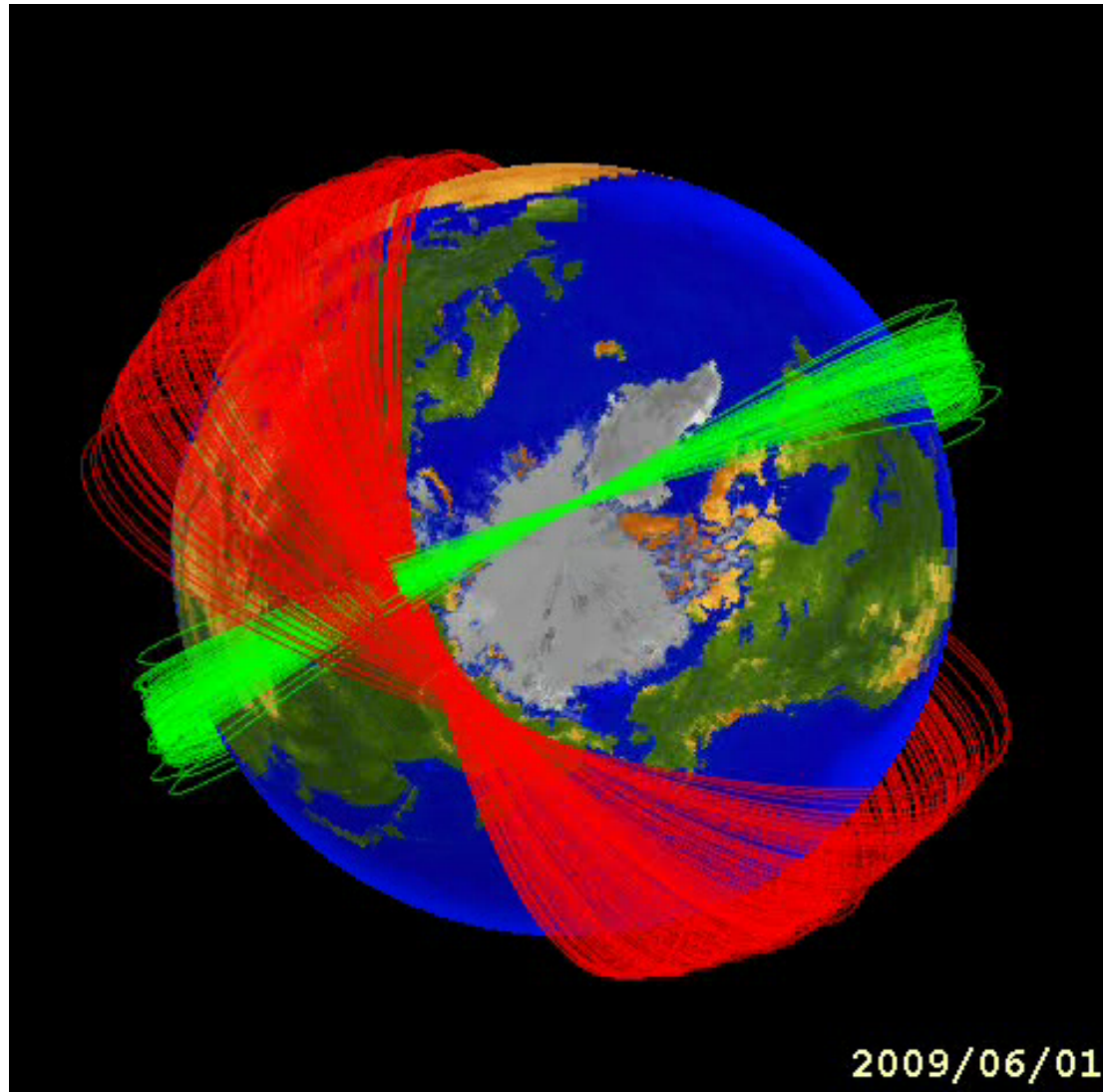
Tracked Debris from Cosmos 2251

- **Total number of debris: 1009 (as of 1 June 2009))**





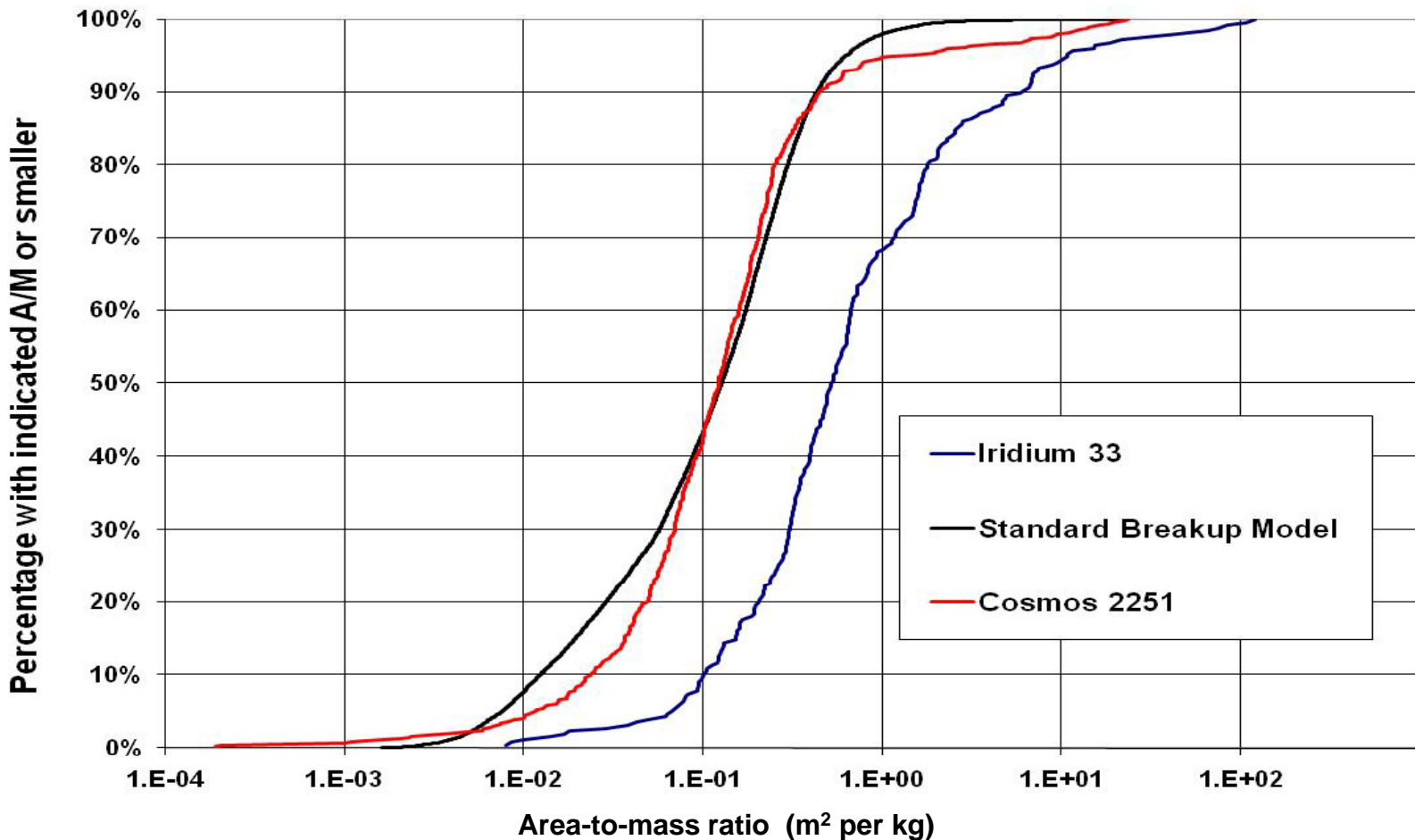
Spread of Debris Orbital Planes

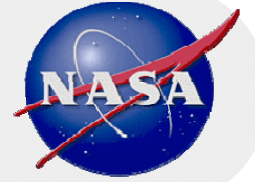




Differences in Debris Characteristics

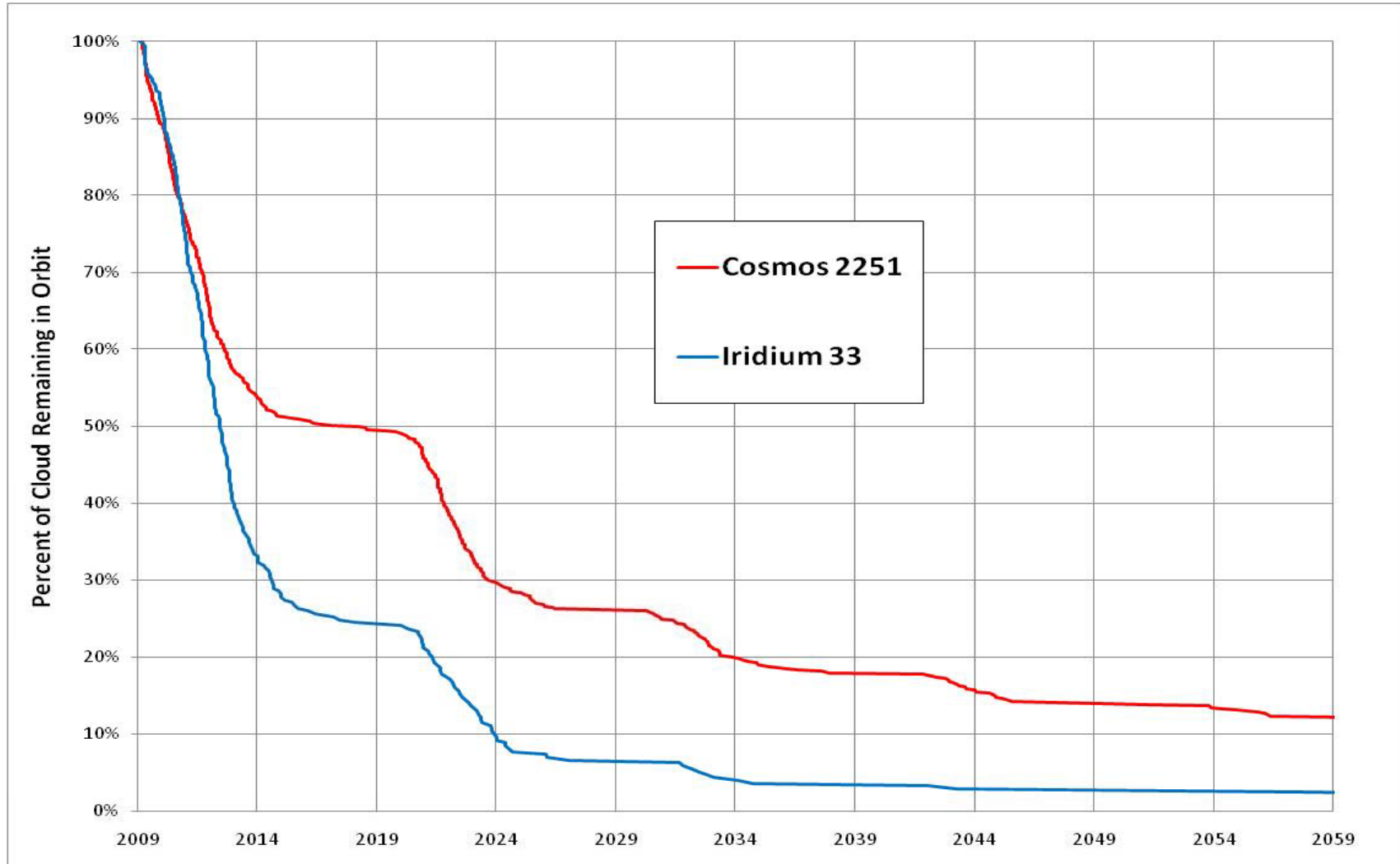
- The debris from Iridium 33 and Cosmos 2251 exhibit markedly different area-to-mass distributions, probably due to the greater use of composite materials in Iridium 33.





Projected Debris Orbital Lifetimes

- **Based upon standard solar cycles.**





Summary

- **The collision of Iridium 33 and Cosmos 2251 was the most severe accidental fragmentation on record.**
- **More than 1400 debris larger than 10 cm were produced.**
- **If solar activity returns to normal, half of the tracked debris will reenter within five years.**
 - Only 35 cataloged debris had reentered by 1 June 2009
- **Some debris from both satellites will remain in orbit through the end of the century.**