



Micrometeoroids and Orbital Debris (MMOD)

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Subject Preference: GS III (Space Technology)

- **The News:** A debris strike on China's Shenzhou-20 return capsule cracked its window, highlighting the increasing risk of space junk.
- **Basics:** MMOD includes naturally occurring dust (micrometeoroids) and man-made "space junk" (orbital debris) like old satellite parts.
- **Scientific & Space Safety Context:**
- **Kessler Syndrome:** The fear that a collision in Low Earth Orbit (LEO) could trigger a **chain reaction** of more debris, eventually making space travel impossible.
- **Shielding:** Spacecraft use **Whipple Shields** (multi-layered barriers) to break up debris before it hits the main hull.
- **Indian Initiative:** ISRO's **Project NETRA** and **IS4OM** are India's primary systems for Space Situational Awareness to protect our assets like Mangalyaan and Gaganyaan.