Aditya-L1

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Aditya-L1: Advancing Solar Research

Context

- The Sun influences **space weather**, affecting satellites, communication, and power grids.
- **Aditya-L1**, India's first solar observatory at **L1 (1.5 million km from Earth)**, ensures uninterrupted solar studies.
- Recently, its **SUIT telescope captured the first-ever detailed image of a solar flare 'kernel'**, marking a major breakthrough.

Solar Corona: The Sun's Outer Layer

- The **corona** extends millions of kilometers, with temperatures **1–10 million K**, much hotter than the surface (**~5,800 K**).
- Made of **highly ionized plasma**, emitting **ultraviolet and X-ray radiation**.
- Key for **understanding coronal heating and solar wind formation**.

Solar Flares: Intense Solar Energy Bursts

- Sudden energy release due to **magnetic field reconnection**.
- Classified into **A, B, C, M, and X-class**, with **X-class being the most powerful**.
- Impacts **satellites, GPS, power grids, and astronauts**.

SUIT (Solar Ultraviolet Imaging Telescope)

- **First telescope to capture full-disk solar images in near-UV (2000–4000 Å)**.
- Helps study **ozone, solar radiation, and high-energy solar activity**.

Aditya-L1's Breakthrough Observation

- **SUIT recorded an X6.3-class solar flare**, one of the strongest observed.
- Captured **NUV brightening (200-400 nm)**, confirming how flare energy spreads across solar layers.
- Strengthens theories linking **lower atmosphere activity to corona heating**.

Conclusion

- **Aditya-L1 enhances India's space research**, improving **solar physics and space weather predictions**.
- Its findings help **protect satellites, astronauts, and communication systems** from solar disruptions.