SMILE Mission

Prelims – *Current events of national and international importance | Space*

Why in News?

The European Space Agency (ESA), in collaboration with the Chinese Academy of Sciences (CAS), is set to launch the in Europe's Spaceport, French Guiana.

- **Mission Name –** Smile (Solar wind Magnetosphere Ionosphere Link Explorer).
- **Aim -** To build a more complete understanding of the ***Sun-Earth connection*** by measuring the ***solar wind and its dynamic interaction with the magnetosphere.***
- It is part of ***ESA's Cosmic Vision program.***

  "Cosmic Vision 2015-2025" is the ***current planning cycle for ESA's space science missions.***

- **Launched by –** European Space Agency (ESA) and in collaboration with the Chinese Academy of Sciences (CAS).
- **Launch Vehicle –** Vega C.

  Vega-C is Europe's high-performance light-lift rocket, designed to launch up to 2,300 kg into polar orbit.

- **Scheduled Launch –** April 9, 2026 (Postponed - to be confirmed)
- **Mission Duration –** 3 years.
- **Trajectory –** *Highly Elliptical Orbit (HEO -121,000 km apogee / 5,000 km perigee*), which is a specialized trajectory that looks like a long, stretched-out oval.
- **Features - Global Imaging –** Unlike previous missions that focused on local conditions, SMILE will provide the first-ever **X-ray images** of the Earth's magnetic field on a global scale.

- **Space Weather Prediction –** By observing how the magnetosphere reacts to solar activity, scientists hope to better protect satellites, power grids, and communication systems from space weather disruptions.
- **Aurora Study –** The spacecraft will monitor auroras in ultraviolet and X-ray energy bands for ***up to 45 hours*** at a time.
- **Technical details - 4 Instruments –** Soft X-ray imager, Ultraviolet imager, Magnetometer, Ion analyzer.
    - **ESA Contributions –** Payload module, soft X-ray imager, launcher, testing facilities, partial UV imager.
    - **CAS Contributions –** Spacecraft platform, magnetometer, Ion analyzer, operations in orbit.
- **Significance –** Provides global imaging of the magnetosphere, unlike earlier missions such as Cluster which observed only local conditions.
- Enhances preparedness against geomagnetic storms and solar activity impacts.

References

1. MSN | SMILE
2. ESA | SMILE

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