



Aditya-L1 Mission

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Why in News

The **Indian Space Research Organisation (ISRO)** is preparing for its first scientific expedition to **study the Sun, Aditya-L1**. It would be placed into a point in space known as the **L1 Lagrange point**.

- Aditya L1 will be ISRO's **2nd space-based astronomy mission after AstroSat**, which was launched in 2015.
- **Aditya 1** was renamed as Aditya-L1. The Aditya 1 was meant to observe **only the solar corona**.

AstroSat

- AstroSat, was launched in September, 2015, by PSLV-C30 from Sriharikota (Andhra Pradesh).
- It is the **first dedicated Indian astronomy mission** aimed at studying celestial sources in **X-ray, optical and UV spectral bands simultaneously**.

Key Points

- **Launch Vehicle:** Aditya L1 will be launched using the **Polar Satellite Launch Vehicle (PSLV) XL** with 7 payloads (instruments) on board.
- **Objective:** Aditya L1 will study the Sun's **corona** (Visible and Near infrared rays), Sun's **photosphere** (soft and hard X-ray), **chromosphere** (Ultra Violet), solar emissions, solar winds and flares, and **Coronal Mass Ejections (CMEs)**, and will carry out **round-the-clock imaging** of the Sun.

- **Challenges:** The distance of the Sun from Earth (approximately 15 crore kms on average, compared to the only 3.84 lakh kms to the Moon).This huge distance poses a scientific challenge.
 - Due to the risks involved, payloads in earlier ISRO missions have largely remained stationary in space; however, Aditya L1 will have **some moving components** which increases the risks of collision.
 - Other issues are the **super hot temperatures and radiation** in the solar atmosphere. However, **Aditya L1 will stay much farther away**, and the heat is not expected to be a major concern for the instruments on board.

Importance

- Evolution of every planet, including Earth and the exoplanets beyond the Solar System, is governed by its parent star i.e the Sun in our case. The Solar weather and environment affects the weather of the entire system. Therefore, it is important to study the Sun.
- **Effects of Variation in Solar Weather System:** Variations in this weather can **change the orbits of satellites or shorten their lives, interfere with or damage onboard electronics, and cause power blackouts and other disturbances on Earth.**
- Knowledge of solar events is key to **understanding space weather.**
- To learn about and **track Earth-directed storms**, and to predict their impact, continuous solar observations are needed.
- Many of the instruments and their components for this mission are being **manufactured for the first time in the country.**

Lagrange Point 1

- Lagrange Points, named after Italian-French mathematician Joseph-Louis Lagrange, are positions in space **where the gravitational forces of a two-body system (like the Sun and the Earth) produce enhanced regions of attraction and repulsion.**
- The L1 point is about 1.5 million km from Earth, or about 1/100th of the way to the Sun.
- L1 refers to Lagrangian/Lagrange Point 1, one of 5 points in the **orbital plane of the Earth-Sun system.**
- These can be used by spacecraft to **reduce fuel consumption** needed to remain in position.
- A Satellite placed in the halo orbit around the Lagrangian point 1 (L1) has the major advantage of continuously viewing the Sun without any occultation/ eclipses.
- The L1 point is home to the **Solar and Heliospheric Observatory Satellite (SOHO)**, an international collaboration project of **National Aeronautics and Space Administration (NASA)** and the **European Space Agency (ESA).**

Other Missions to the Sun

- NASA's **Parker Solar Probe's** aim is to trace how energy and heat move through the Sun's corona and to study the source of the **solar wind's acceleration**.
It is part of NASA's '**Living With a Star**' programme that explores different aspects of the Sun-Earth system.
- The earlier **Helios 2** solar probe, a **joint venture** between **NASA** and space agency of erstwhile **West Germany**, went within 43 million km of the Sun's surface in **1976**.

Source: IE