

# Aditya L1 Mission

The Aditya mission is a national effort with the collaboration of ISRO, IIA, Udaipur Solar Observatory, ARIES, TIFR and some other Indian institutions. This article shall cover all important details regarding the Aditya L1 mission launch date, objectives, challenges, etc.

## Aditya L1 Mission Objectives

Aditya L1's mission objective is to study the Corona, Chromosphere, and Photosphere of the Sun. Additionally, it will research changes in magnetic field strength and the particle flow coming from the sun.

- To understand the Coronal Heating (visual and NIR) and Solar Wind Acceleration.
- To study the particle flux emanating from the Sun.
- To research the coupling and dynamics of the Solar Atmosphere.
- To help track the storms directed towards the earth and predict their impact.
- To study the Sun's photosphere (soft and solid X-rays) and chromosphere (UV) and carry out 24/7 imaging of the Sun.

## Important Facts about Aditya L1 Mission (ISRO)

Important details regarding the Aditya L1 Mission are provided below:

- Polar Satellite Launch Vehicle (PSLV) XL was used to launch it.
- Mission Aditya L1 has fewer moving parts than past ISRO-led missions, which reduces the risk of collisions in space.
- Seven science payloads are carried by the spacecraft, which weighs 1,500 kg (3,300 lb).

A list of the payloads that were used for the mission is shown below:

- Visible Emission Line Coronagraph (VELC)
- Solar Ultraviolet Imaging Telescope (SUIT)
- Aditya Solar wind Particle Experiment (ASPEX)
- Plasma Analyser Package for Aditya
- Solar Low Energy X-ray Spectrometer (SoLEXS)
- High Energy L1 Orbiting X-ray Spectrometer (HEL1OS)
- Magnetometer

The Aditya L1 Mission's primary goal is to aid in the tracking of storms that are aimed at Earth and the prediction of their impact through solar measurements.

After launch, it will take the Aditya-L1 mission roughly 109 Earth days<sup>[16]</sup> to get to the halo orbit surrounding the L1 point, which is located approximately 1,500,000 kilometres (930,000 miles) from Earth. Aditya L1 Mission's launch date is expected to be in the year 2023. It was set to launch in the middle of the year 2022. However, it has since been delayed.

## Importance of Aditya L1 Mission

Aditya L1 Mission gives solar scientists from several institutions around the nation the chance to engage in space-based instrumentation and observations because it includes different

payloads. As a result, the improved Aditya-L1 project will help to solve some of the remaining issues in solar physics and provide a thorough understanding of the dynamical processes of the sun. Other important reasons for the mission have been listed below;

- The Sun is the parent star of our solar system. It's very important to study its weather and environment as it affects the evolution of each celestial body of the solar system.
- It will help predict the Earth-directed storms coming from the Sun.
- It is important to study the effects of variation in the Solar Weather System. The variations in the weather can change the orbits of the satellites, shorten their lives, damage onboard electronics and cause power cut-offs on Earth.

## Challenges Faced in Aditya L1 Mission

Aditya L1 Mission is India's first attempt at a solar space expedition. It comes with its fair share of challenges, they have been discussed below;

- The distance between Sun and Earth is huge (approximately 15 crore km).
- The chances of the collision of this satellite in space are high since it has moving components.
- Though Aditya L1 will be placed quite far from the Sun, the super-hot temperatures and radiations in the sunny weather can adversely affect the mission.

## Payloads of the Aditya L1 Mission

There are seven payloads that are appointed on the Aditya L1 Mission;

1. **VELC (Visible Emission Line Coronagraph):** This solar coronagraph is being developed at the IIA. Its optical lens is meant to point towards the centre of the sun at all times. Its main purpose is to study coronal heating and to understand the acceleration of CMEs.
2. **SUIT (Solar Ultraviolet Imaging Telescope):** This payload of the Aditya L1 Mission is being designed at IUCAA, Pune. Its objective is to research and assess the Photosphere and Chromosphere of the Sun.
3. **ASPEX (Aditya Solar wind Particle Experiment):** This part of the Aditya mission is being developed in PRL, Ahmedabad. Its main purpose is to study the variation of solar wind properties, focus on its spectral characteristics and follow up on its distribution.
4. **PAPA (Plasma Analyzer Package for Aditya):** The PAPA instrument is being developed at SPL, located in Thiruvananthapuram. Its main objective is to study the composition of solar wind and conduct its continuous measurement.
5. **SoLEXS (Solar Low Energy X-ray Spectrometer):** This instrument is being developed at ISAC, Bangalore. Its purpose is to monitor X-ray Flares.
6. **HEL1OS (High Energy L1 Orbiting X-ray Spectrometer):** Designed in ISAC and at PRL in Udaipur, it is meant to observe the dynamic events in the solar corona and eruptions.
7. **Magnetometer:** It is being developed by LEOS and ISAC.

The Aditya L1 Mission is an ambitious project by the ISRO. Its success is much awaited as it will add another feather to India's cap and its great contributions to space technology