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Aditya-L-1

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Why is in news? Isro's space probe to study the Sun: What is the Aditya-L1 mission, its significance

The Indian Space Research Organisation (Isro) on August 14 released images of the Aditya-L1 mission — the space agency's first attempt to study the Sun.

Although the launch date of the mission has not been announced, the satellite has reached the Satish Dhawan Space Center (SDSC) in Sriharikota, Andhra Pradesh, for its integration with the launch vehicle, PSLV.

About the mission:

Aditya-L1 Mission is **India's first solar mission** planned by the Indian Space Research Organisation (ISRO). Earlier the name was Aditya -1, which has been renamed as Aditya-L1 Mission.

It is ISRO's second space-based astronomy mission after AstroSat for a scientific expedition to study the Sun. The mission was initially named Aditya 1 which was limited to observing only the solar corona.

The Aditya-L1 will **observe the Sun from a close distance**, and try to **obtain information about its atmosphere and magnetic field**.

It's equipped with seven payloads (instruments) on board to **study the Sun's corona, solar emissions, solar winds and flares, and Coronal Mass Ejections (CMEs),** and will **carry out round-the-clock imaging of the Sun**.

The seven payloads includes Visible Line Emission Coronagraph (VELC),Solar Ultraviolet Imaging Telescope, Aditya Solar Wind Particle Experiment,Plasma Analyser Package for Aditya,Solar Low Energy X-ray Spectrometer, High Energy L1 Orbiting X-ray Spectrometer, Magnetometer.

Aditya L1 will be launched using the **Polar Satellite Launch Vehicle (PSLV)**.

The mission will be launched by ISRO to the L1 orbit which is about 1.5 million km from the Earth. The orbit allows Aditya-L1 to look at the Sun continuously.

L1 Point:

L1 refers to **Lagrangian/Lagrange Point 1**, one of 5 points in the orbital plane of the Earth-Sun system.

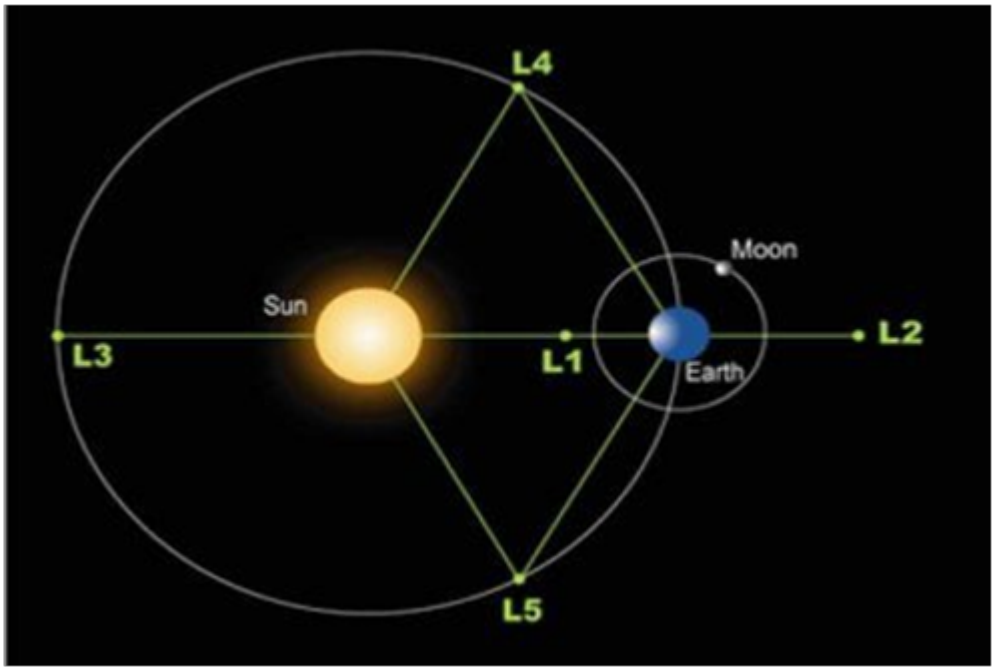
Lagrange Points are positions in space **where the gravitational forces of a two-body system** like the Sun and Earth **produce enhanced regions of attraction and repulsion**.

These can be used by spacecraft to **reduce fuel consumption** needed to remain in position.

A Satellite placed in the halo orbit around the 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).

Aditya L1 will perform continuous observations looking directly at the Sun



Why is the mission important for India?

The payload data will help **understand the effect of the Sun on the Earth and its surroundings**, especially in studying the patterns and impacts of solar flares.

The scientific studies by the satellite will **enhance our current understanding of the Solar Corona** and also provide vital data for space weather studies.

VELC will help to **observe the corona continuously** and the data provided by it is expected to answer many outstanding problems in the field of solar astronomy.

No other solar coronagraph in space has the ability to image the solar corona as close to the solar disk as VELC which can image it as close as 1.05 times the solar radius.

It can also do imaging, spectroscopy, and polarimetry at the same time, and can take observations at a very high resolution (level of detail) and many times a second.

How much heat will the Aditya-L1 face?

The Parker Solar Probe during its flyby of the Sun has faced blisteringly hot temperatures of **more than one thousand degree Celsius** and remained fully operational.

The Aditya-L1, however, will **not face such heat as it is slated to stay much further away from the Sun** in comparison with NASA's mission. But there are other challenges.

Many of the instruments and their components for this mission are being **manufactured for the first time in India**, presenting as much of a challenge as an opportunity for the country's scientific, engineering, and space communities.

Other Missions to the Sun:

NASA’s Parker Solar Probe: Its 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.

Helios 2 solar probe: It was a **joint venture between NASA and space agency of erstwhile West Germany**, went within 43 million km of the Sun’s surface in 1976.

Solar Orbiter: A joint mission **between the ESA and NASA** to collect data that will help answer a central question of heliophysics like how the Sun creates and controls the constantly changing space environment throughout the solar system.

Other Active Spacecraft Monitoring the Sun: Advanced Composition Explorer (ACE), Interface Region Imaging Spectrograph (IRIS), WIND, Hinode, the Solar Dynamics Observatory, and Solar Terrestrial Relations Observatory (STEREO).