

## EXPRESS VIEW: HERE COMES THE SUN

Relevant for: Science & Technology | Topic: Space Technology & related matters

India's space-based solar observatory, Aditya-L1, is poised to provide new insights into the dynamics of the Sun. On Saturday, ISRO inserted the spacecraft into its destination orbit, L1 or Lagrange point, a patch between the Earth and the Sun, about 1.5 million km away.

It's a place where the gravity of the planet and the Sun and the centripetal force of the satellite cancel out one another, creating a stable point for the observatory.

A spacecraft at L1 can observe the Sun without eclipses or obstructions. This is another feather in [ISRO's](#) cap — it is only the third space agency to place a spacecraft at this patch. Placing Aditya at a halo orbit in L1 was a task enormously more complicated than putting a satellite in a celestial orbit around the Earth or any other planetary body.

The conventional orbits are either circular or elliptical. The orbit at L1 is almost perpendicular to the line joining the Earth and the Sun. Scientists say that ISRO would need to carry out periodic manoeuvres to keep the spacecraft in its orbit.

So far, Indian scientists have been studying the Sun from ground-based telescopes. These enable observation of the star's visible surface but not its atmosphere. Aditya-L1 aims to observe the Sun's corona — the outermost part of its atmosphere — and understand its extreme heat.

The mission could provide clues to resolving a long-standing mystery: Why is the not-so-bright corona of the star closest to us a million degrees Celsius hot when the temperature on its surface is about 5,500 degrees Celsius? The mission could help scientists understand how the Sun's radiation, flow of particles and magnetic fields affect the Earth.

Solar flares have the potential to damage electronic equipment on satellites. About 7,000 satellites orbiting the Earth currently have a crucial role in several fields, ranging from telecommunications to weather prediction. The information gathered by India's solar observatory could help scientists find ways to understand these bursts of radiation and even predict them.

Aditya will also study "space weather" that results from solar storms using four instruments that are pointed at the star and three others that will monitor the solar wind and the effects of these storms on the sun's magnetic field. All this could enrich the understanding of climatic changes in the coming decades.

Aditya's primary mission is expected to last five years. However, the spacecraft's location at the extremely stable L1 could result in a much longer lifetime. NASA and the European Space Agency's SOHO probe, for example, was expected to last about two years. But it has operated for 27 years from L1.

The challenge, however, will be to keep Aditya-L1 in its desired configuration for the rest of its life. The coming years promise to be exciting ones for India's space research agency.

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