



FIRST RESULTS FROM ADITYA L1 MISSION - SCIENCE & TECHNOLOGY

NEWS: The Aditya-L1 mission, India's first scientific endeavor dedicated to studying the Sun, has released its first significant scientific results.

WHAT'S IN THE NEWS?

Aditya-L1 Mission Overview

- **Mission Focus:** Aditya-L1 is India's first dedicated mission for studying the Sun.
- **Launch Date:** The mission was launched by the Indian Space Research Organisation (ISRO) in September 2023.
- **Objective:** To observe solar phenomena, particularly coronal mass ejections (CMEs), and understand their impact on Earth.

Visible Emission Line Coronagraph (VELC)

- **Developed by:** Indian Institute of Astrophysics (IIAp), Bengaluru.
- **Purpose:** Designed to observe CMEs from the Sun and study their plasma characteristics.
- **First Results:** VELC predicted the onset time of a CME on July 16, marking the first scientific output from the Aditya-L1 mission.

Coronal Mass Ejections (CMEs)

- **Definition:** CMEs are massive eruptions of plasma from the Sun, considered the most powerful explosions in our solar system.
- **Impact on Earth:**
 - Can damage satellite electronics in near-Earth space.
 - Potential to disrupt radio communication networks on Earth.
- **Significance of Study:** Monitoring CMEs at their source on the Sun helps predict their behavior and potential impact on Earth.



Coronal Mass Ejection

What is a CME?

Out cast matter ejected by the Sun at 2000km/s.



Impact on Earth

Highly unlikely. Electricity and communication networks are affected. Polar lights appear at the poles.

How CME's arise

They are created by magnetic fields twisting against each other in the convection zone.



Where am I?



Magnetic field lines protruding from the Sun.

Coronal Loops

The loops reorganise and the plasma tubes detach. The plasma trapped there causes strong radiation.

Up to 10 billion tonnes of material can be emitted here.

Frequency

The frequency is linked to solar activity and sunspot frequency. It varies between 0.2 to 6 CME's daily.

Scientific Study and Publication

- **Study Contributors:** The research was conducted by scientists including R. Ramesh, V. Muthupriyal, Jagdev Singh, K. Sasikumar Raja, P. Savarimuthu, and Priya Gavshinde.
- **Publication:** Findings are set to be published in an upcoming edition of *Astrophysical Journal Letters*.

Key Observations from VELC

- **Precise Onset Time:** VELC enabled researchers to determine the exact onset time of the July 16 CME.
- **Thermodynamic Properties:** VELC is studying the thermodynamic characteristics of CMEs close to the Sun, crucial for understanding their origin.

Statements from Researchers

- **R. Ramesh (IIAp Senior Professor):** Expressed satisfaction that VELC achieved its primary goal of observing CMEs as they form on the Sun, which will provide valuable scientific data.



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- **Jagdev Singh (Co-author):** Emphasized the importance of understanding the thermodynamic properties of CMEs near the Sun to better understand their source regions.

Source: <https://www.thehindu.com/sci-tech/science/aditya-11-first-science-result-velc-coronal-mass-ejection-solar-cycle/article68825244.ece>



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