TOPIC OF THE DAY (DATE: 02.09.2023)

ADITYA L-1 MISSION

WHY IN NEWS

- Today, Aditya-L1//PSLV C -57 will be launched from the second launch pad at Satish Dhawan Space Centre at 11.50am.

Highlights of ADITYA L 1 MISSION

- Aditya-L1 is a satellite dedicated to the comprehensive study of the Sun. It has seven distinct payloads ***— five by ISRO and two by academic institutions in collaboration with ISRO — developed indigenously.***
- Following its scheduled launch, ***Aditya-L1 will stay in Earth-bound orbits for 16 days, during which it will undergo five maneuvers to gain the necessary velocity for its journey***. To achieve this, the spacecraft is packed with seven scientific instruments: The two main payloads are Visible Emission Line Coronagraph (VELC) for Corona imaging & spectroscopy studies and Solar Ultraviolet Imaging Telescope (SUIT) for Photosphere and Chromosphere imaging (narrow & broadband).
- **The spacecraft's trajectory -**Initially, the Aditya-L1 spacecraft would be placed in a low earth orbit. It would be made more elliptical and later the spacecraft will be launched towards the Lagrange point L1 by using on-board propulsion systems.
- As the spacecraft travels towards L1, it will exit the Earth's gravitational Sphere of Influence. After exit, the cruise phase will start and subsequently, the spacecraft will be injected into a large halo orbit around L1. ***It would take nearly four months to reach the intended L1 point***.

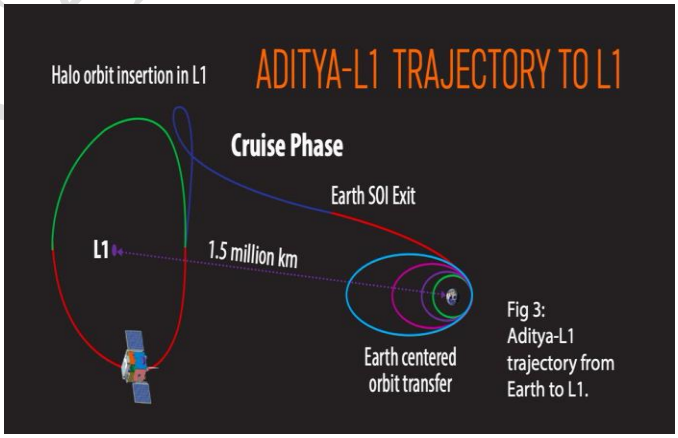
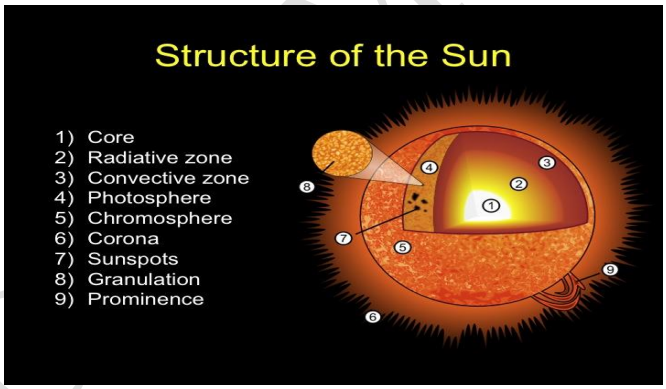


Fig 3: Aditya-L1 trajectory from Earth to L1.

- The primary payload of ***Aditya-L1 the Visible Emission Line Coronagraph would be sending 1,440 images per day*** to the ground station for analysis on reaching the intended orbit. IIA will host the VELC Payload Operations Centre (POC), which will receive raw data from ISRO's Indian Space Science Data Centre (ISSDC), process them further to make it suitable for scientific analysis, and send it back to ISSDC for dissemination.
- According to IIA officials, ***190 kg VELC payload will send images for five years***, which is the nominal life of the satellite, but it could ***last long depend on the fuel consumption, etc.***
- **₹400 crore** is the estimated cost of India's solar mission.

- Aditya L1 is expected to reach ***its L1 point in the orbit around Sun in 126 days after its launch***. However, there is ***no clear date or time announced by the ISRO till now.*** European Space Agency to provide support to Aditya-L1 mission.
- PSLV-C57/Aditya-L1 mission, India's first solar mission, ***the PSLV-XL variant will mark its 25th flight.***
- **The PSLV-XL is the 'full configuration' PSLV, fitted with six strap-on motors, the maximum for this expendable launch vehicle**. The ***XL configuration*** was first used for launching India's first lunar probe, the Chandrayaan-1, in October 2008. It has since been used for several high-profile missions, including the Mars Orbiter Mission – Mangalyaan – launched in November 2013.

What information Aditya-L1 is expected to provide?



- The suit of Aditya L1 payloads are expected to provide the most crucial information to understand the problems ***of coronal heating, Coronal Mass Ejection, pre-flare and flare activities, and their characteristics,*** dynamics of space weather, study of the propagation of particles, and fields in the interplanetary medium, etc.

What is L1 or Lagrange Point 1?

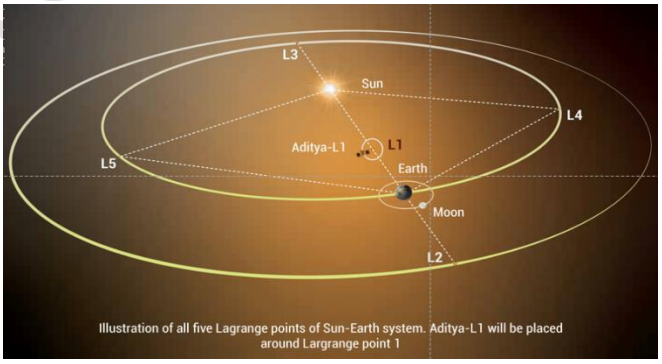


Illustration of all five Lagrange points of Sun-Earth system. Aditya-L1 will be placed around Largrange point 1

- L1 here refers to ***Lagrange Point 1 of the Sun-Earth system***. For common understanding, L1 is a location in space where the gravitational forces of two celestial bodies, such as the Sun and Earth, are in equilibrium. This allows an object placed there to remain relatively stable with respect to both celestial bodies.

How Aditya L1 is made?

- The ***seven payloads of Aditya L1 are indigenously developed*** by different laboratories in the country. Its VELC instrument is made at the Indian Institute of Astrophysics, Bangalore; SUIT instrument at Inter University Centre for Astronomy and Astrophysics, Pune; ASPEX instrument at Physical Research Laboratory, Ahmedabad; PAPA payload at Space Physics Laboratory, Vikram Sarabhai Space Centre, Thiruvananthapuram; SoLEXS and HEL1OS payloads at U R Rao Satellite Centre, Bangalore, and the Magnetometer payload at the Laboratory for Electro Optics Systems, Bangalore. All the payloads are developed with the close collaboration of various centers of ISRO.