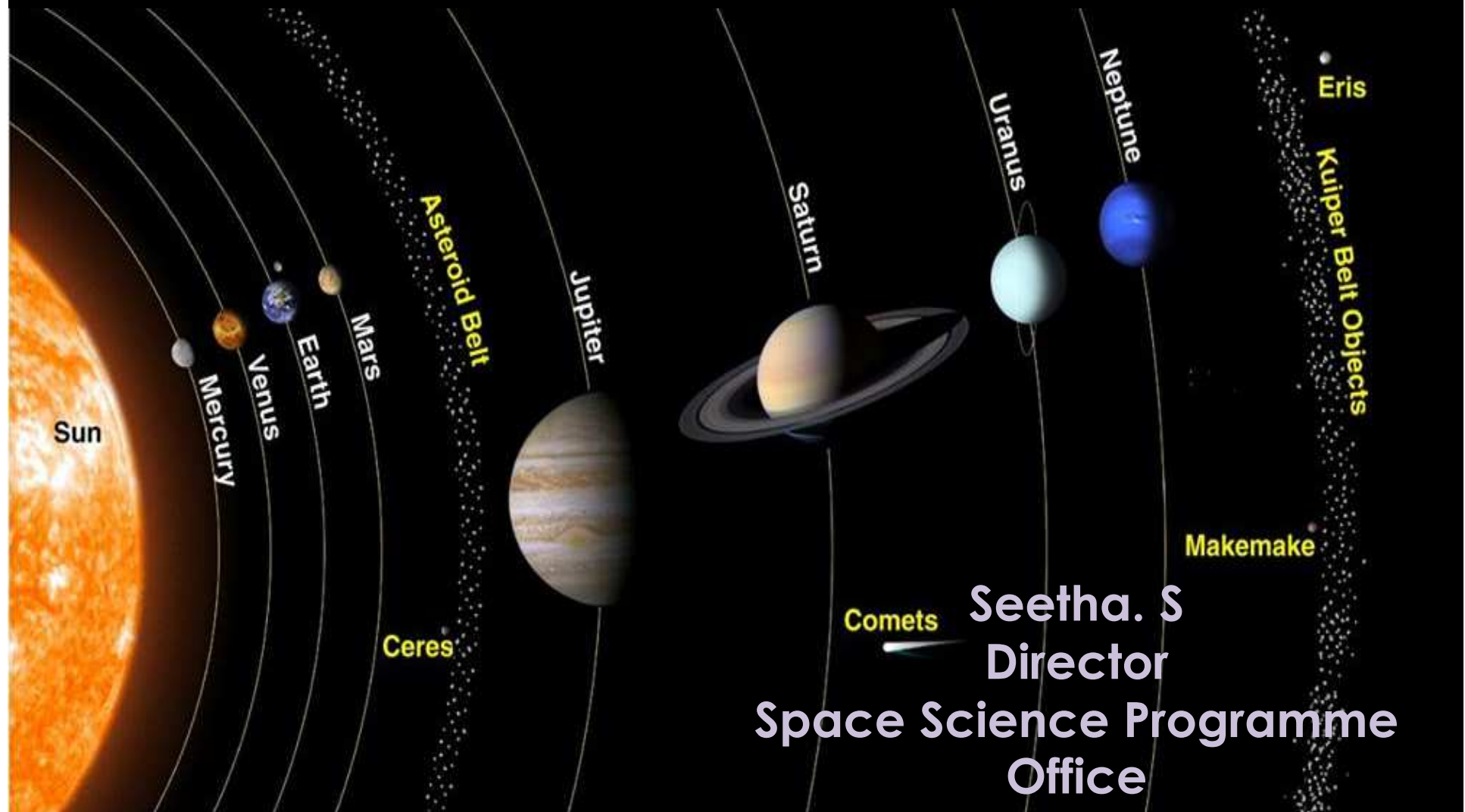


# Space Exploration program of ISRO



Seetha. S  
Director  
Space Science Programme  
Office

# CHANDRAYAAN-1 MISSION

Indian mission with significant International participation

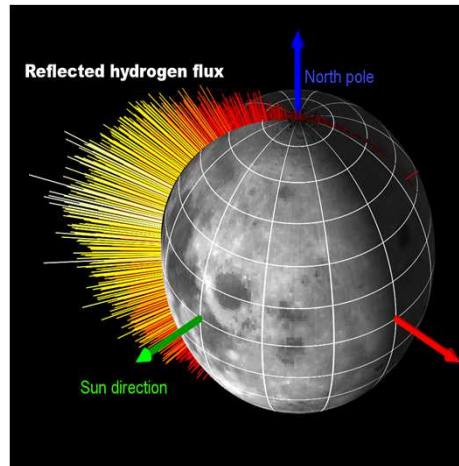


High resolution remote sensing of the Moon in visible, near Infrared, low energy and high-energy X-ray regions for 3D atlas, mineralogical and chemical mapping of the lunar surface.

- 5 Indian Payloads (1 impact probe)
- 6 Intl payloads (2 with Indian collab)
- No. of publications: 150+
- Data released to public through ISSDC. (600 users, 19 projects)



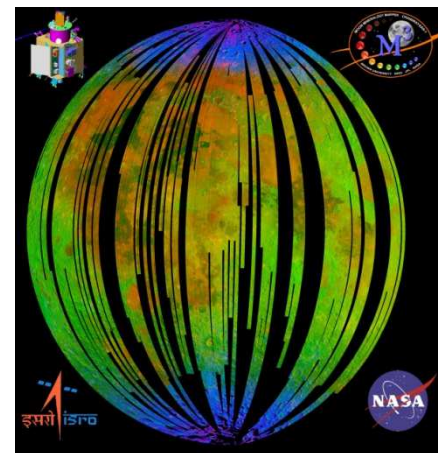
Pictures of the Moon's surface taken by MIP Camera while touch down



Solar wind-lunar surface interactions (SARA)



3D maps of lunar craters and terrain



Discovered the presence of Hydroxyl & water molecules on the lunar surface (M3)

Water molecules are also found in lunar exosphere, sub-surface and endogenic origin

Launch: 22 October 2008 by PSLV-C11; End of mission : 30 August 2009

# MARS ORBITER MISSION



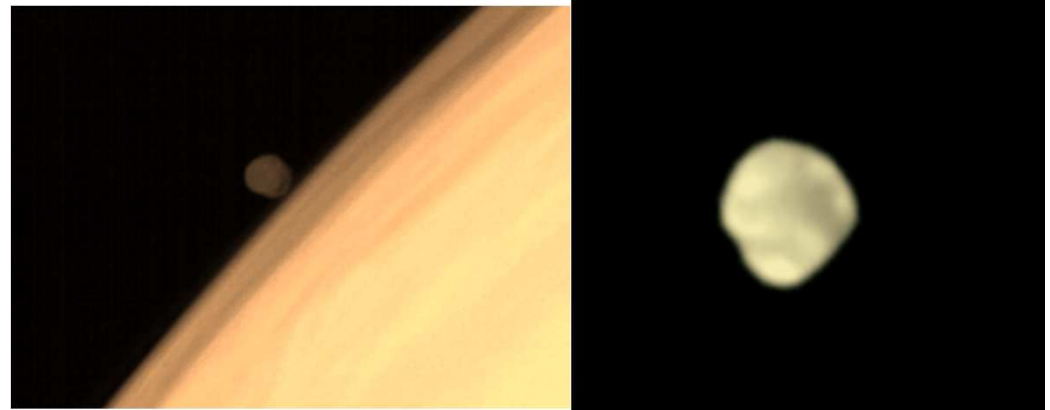
Now on an extended mission

**MOM completed three years in its orbit on Sept 24, 2017**

- The spacecraft came out of 'blackout' and 'whiteout' geometry successfully with the help of MOM's built-in autonomy.
- Images of the full Martian disc with a single snap shot. Imaged the far side of Deimos for the first time
- Acquired more than 900 images by MCC
- Published more than twenty research papers in peer reviewed journals



**Full disc image of Mars**



**Phobos**

**Deimos**

**Launch: 05 Nov 2013; MOI: 24 Sep 2014**

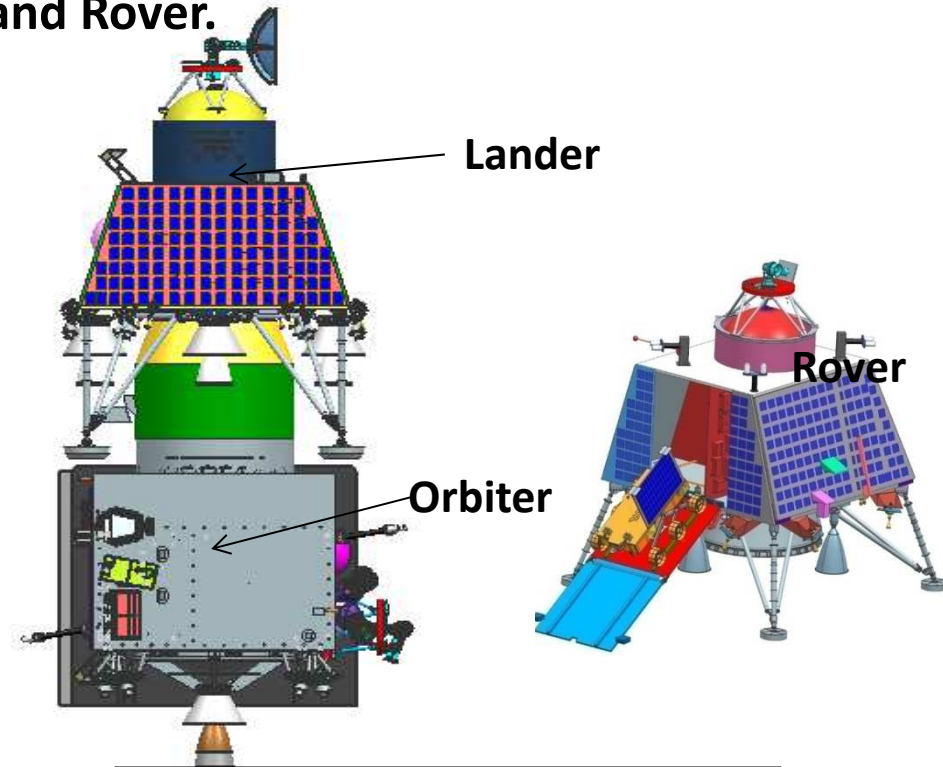
# Space Exploration

## Chandrayaan-2 Indigenous Orbiter, Lander and Rover

- ✚ Enhance the scientific objectives of Chandrayaan-1 with improved resolution.
- ✚ In-situ analysis of lunar surface using Lander and Rover.
- ✚ Develop new technologies that will be useful for future planetary missions.
- ✚ Demonstrate ISRO's capability to soft-land on the lunar surface and perform detailed observations on the Moon.

### Scientific Objective:

To improve our understanding of the origin and evolution of the Moon using instruments onboard Orbiter and in-situ analysis of lunar surface using Lander and Rover.



Launch : 2018 by GSLV Mk II

# Aditya-L1 Mission

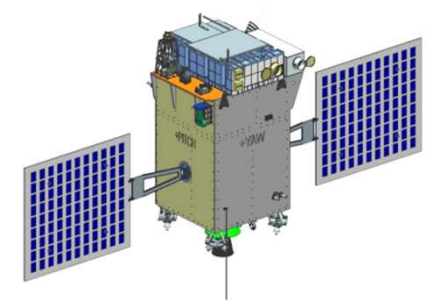


First Indian mission to study the Sun. Halo orbit around L1.

Launch: 2020 by PSLV -XL

P/I: Coronagraph, UV imager, soft and hard X-ray spectrometers, particle experiments and a magnetometer.

Estimate the in-situ particles using particle payloads and magnetic field variations.





# MARS EXPLORATION- MOM2 (under review)



- Mars Orbiter Mission-2, a proposed science driven mission
- In-depth studies of Martian surface ,subsurface and its atmosphere
- Focus on new/improved scientific measurements compared to MOM
- The satellite could be launched in a highly elliptical polar orbit of about 500 km x few 10s of thousand km.
- The orbit is planned to be brought down to a smaller orbit with the help of aerobraking.

## Orbiter Mission to Venus (under review)

- Unravel the mysteries such as the super rotation of middle atmosphere, observation of surface features to study rate of resurfacing possibly due to tectonic and volcanic activities ...
- Best Launch opportunities arise every 19 months.
- Announcement of opportunity for payload proposals

## Study for future missions

- Outer planets
- Landing mission to Mars
- Sample return from Moon, asteroids
- Exoplanets



Thank You