

ISRO: A Moon Probe: launching in July

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June 15, Bengaluru: **S. Somnath**, Chairman **Indian Space Research Organisation** (ISRO) on Thursday said that the space agency is planning to launch the Chandrayaan-3 moon mission in the middle of July.

Speaking to reporters at the **International Conference on Spacecraft Mission Operations** (SMOPS-2023), Mr. Somnath said, “Mission Chandrayaan-3 is nearing its launch. We have already moved the Chandrayaan-3 satellite from **U.R. Rao Satellite Centre, Bengaluru** to **Satish Dhawan Space Centre, Sriharikota**. The initial operations of checking the satellite — both the **Propulsion Module (PM)** and the **Orbiter Part** and the **Lander plus Rover** is going on now.”



Chandrayaan-3 satellite.

Mr. Somnath added that the LAUNCH VEHICLE for the mission, **LVM 3**, has also reached the launch port. The launcher for Chandrayaan-3 is **GSLV-Mk3**, which will place the integrated module in an Elliptic Parking Orbit (EPO) of size ~170 x 36500 km.

Chandrayaan-3 is a follow-on mission to Chandrayaan-2 to demonstrate end-to-end capability in safe landing and roving on the lunar surface. He said that following the launch, as in the case of India’s previous moon mission, Chandrayaan-2, in Chandrayaan-3 also, **the lander and orbiter will orbit the moon before touching down on the moon.**

He said ISRO has added more fuel to the lander along with new equipment and also strengthened it. He added that the Chandrayaan-3 will be going in the same path as its predecessor and will also be landing on the same landing site.

The Propulsion Module (PM) will carry the lander and rover configuration till 100 km lunar orbit. PM has Spectro-polarimetry of Habitable Planet Earth (SHAPE) payload to study the spectral and Polarimetric measurements of Earth from the lunar orbit.

PM also has one scientific payload as a value addition which will be operated post separation of Lander Module. The launcher identified for Chandrayaan-3 is GSLV-Mk3 which will place the integrated module in an Elliptic Parking Orbit (EPO) of size $\sim 170 \times 36500$ km.

Lander payloads: Chandra's Surface Thermophysical Experiment (ChaSTE) to measure the thermal conductivity and temperature; Instrument for Lunar Seismic Activity (ILSA) for measuring the seismicity around the landing site; Langmuir Probe (LP) to estimate the plasma density and its variations. A passive Laser Retroreflector Array from NASA is accommodated for lunar laser ranging studies.

Rover payloads: Alpha Particle X-ray Spectrometer (APXS) and Laser Induced Breakdown Spectroscopy (LIBS) for deriving the elemental composition in the vicinity of landing site.

The mission objectives of Chandrayaan-3 are:

1. To demonstrate Safe and Soft Landing on Lunar Surface
2. To demonstrate Rover roving on the moon and
3. To conduct in-situ scientific experiments.

To achieve the mission objectives, several advanced technologies are present in Lander such as,

1. Altimeters: Laser & RF based Altimeters
2. Velocimeters: Laser Doppler Velocimeter & Lander Horizontal Velocity Camera
3. Inertial Measurement: Laser Gyro based Inertial referencing and Accelerometer package
4. Propulsion System: 800N Throttleable Liquid Engines, 58N attitude thrusters & Throttleable Engine Control Electronics
5. Navigation, Guidance & Control (NGC): Powered Descent Trajectory design and associated software elements

6. Hazard Detection and Avoidance: Lander Hazard Detection & Avoidance Camera and Processing Algorithm
7. Landing Leg Mechanism.

To demonstrate the above said advanced technologies in earth condition, several Lander special tests have been planned and carried out successfully viz.

1. Integrated Cold Test - For the demonstration of Integrated Sensors & Navigation performance test using helicopter as test platform
2. Integrated Hot test – For the demonstration of closed loop performance test with sensors, actuators and NGC using Tower crane as test platform
3. Lander Leg mechanism performance test on a lunar simulant test bed simulating different touch down conditions.

The HUMAN SPACE MISSION: The ISRO chief said that due to the COVID-19 pandemic the space agency could not launch the Gaganyaan mission, the human space mission, in 2022 as intended. “We do not want to rush, The primary objective of the mission is ‘sure shot safe mission’. We have redefined the mission in such a way that we will achieve success in the very first attempt.

He said that the first attempt to test system-parts may happen in August and another one later this year followed by an unmanned mission possibly by the beginning of next year.

“**LVM human rating** has been successfully completed; industries are delivering **crew modules**. For me there are eight major tests and all of them are successfully happening without any glitch. So, we will be able to launch the mission in 2024-25,” he said.

The SOLAR MISSION: On **Aditya-L1** which is the first Indian space mission to observe the Sun and the solar corona, The ISRO chief said the launch window for the mission is in August and if ISRO cannot launch it by then, it will have to wait for another year.

By-- **Dr K N Mistry**