



# National Space Day 2024

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## Why in News?

Recently, India celebrated its **first National Space Day** on 23rd August 2024. It is celebrated to mark the **safe and soft landing of Vikram Lander** of [Chandrayaan-3 mission](#), on the lunar surface on **23rd August 2023**.

- Additionally, the recent findings based on **Chandrayaan-3**, represent the first analysis of the Moon's southern topsoil composition and support the hypothesis of the sea of molten material on the lunar surface.

## Why is National Space Day Celebrated?

### ▪ About:

- **National Space Day, celebrated on 23rd August**, commemorates India's space achievements, particularly Chandrayaan-3's success.
- With the launch of **Chandrayaan-3** in 2023, India became the **fourth nation to successfully land** on the Moon and the **first to reach its southern polar region**.
- It highlights India's space exploration capabilities and aims to inspire future generations to pursue careers in [science, technology, engineering, and mathematics \(STEM\)](#), contributing to India's ongoing space endeavours.

### ▪ Theme for 2024:

- The theme for **National Space Day 2024** is '**Touching Lives while Touching the Moon: India's Space Saga**'.

## What are the Recent Findings of Chandrayaan-3?

### ▪ Key Findings:

- The terrain around **Chandrayaan 3's** landing sight is fairly uniform.
- A **sea of hot, molten rock or magma** once existed under the lunar surface.
- The **Moon's crust was formed layer by layer**, which supports the **lunar magma ocean (LMO) hypothesis**.
- The **topsoil around the lunar south pole** has a greater-than-expected sprinkling of minerals which compose the lower layers of the lunar crust.

### ▪ LMO Hypothesis and Lunar Crust Formation:

- The **Moon is believed to have formed from a giant [asteroid](#) impact** with Earth about 4.5 billion years ago, creating a **molten surface** that eventually cooled.
- In this process, **heavier minerals** like **olivine and pyroxene** sank to the lower crust and upper mantle, while **lighter minerals like calcium** and sodium-based compounds **floated to form the upper crust**.

# CHANDRAYAAN 3

India's 3<sup>rd</sup> lunar mission; a successful attempt at achieving a soft landing on lunar south

## BRIEF HISTORY

Lunar Mission	Aim	Launch Vehicle	Success
Chandrayaan 1 (2008)	Create a 3D atlas of moon & Mineralogical mapping	PSLV – C11	Detection of water and hydroxyl on lunar surface
Chandrayaan 2 (2019)	Exploring lunar south pole	GSLV MKIII-M1	Lander and rover crashed but orbiter successfully collected data

## COMPONENTS

- Lander - Vikram; Rover - Pragyan (same as Chandrayaan 2)
  - ▶ Both designed to last for 14 days; not supposed to come back to the earth
- Spectro-polarimetry of Habitable Planet Earth (SHAPE)
  - ▶ An experimental payload in propulsion module
  - ▶ Study spectro-polarimetric signatures of Earth (near-infrared wavelength range)

## ASPECTS TO STUDY

- Lunar quakes
- Thermal properties of lunar surface
- Changes in plasma near the surface
- Accurately measuring distance b/w Earth and the moon

## MISSION LIFE

- 1 lunar day (~14 Earth days)

## LAUNCH VEHICLE

- LVM3 - M4



India became the 1<sup>st</sup> country to successfully land on Lunar south pole and 4<sup>th</sup> to achieve soft-landing on Lunar surface (after US, Russia and China)

## Why Chandrayaan 3 Succeeded?

- A "failure-based design", unlike the "success-based design" of Chandrayaan-2
  - ▶ Even if all the sensors failed and engines stopped, Vikram was sure to make the landing
  - ▶ Provision of multiple attempts for landing if attempt 1 failed
- Developed accordingly to rule out the scenario of crash landing
  - ▶ Expanded landing area for more flexibility to land safely
  - ▶ Equipped with more fuel to enable longer-distance travel

## Importance of Lunar South Pole

- Vastly different, more challenging terrain compared to lunar equatorial region
- Potential repositories of valuable information about early Solar System
- Impact future deep space exploration significantly
- Water may be concentrated in the moon's southern hemisphere



## What are the Highlights of Indian Space Missions in 2003-24?

- **Aditya-L1 Mission:**
  - **Aditya-L1** is the first space based observatory class Indian solar mission to study the Sun from the first Earth-Sun Lagrange point, L1.
- **Gaganyaan TV-D1 Test:**
  - ISRO conducted its **Flight Test Vehicle Abort Mission-1 (TV-D1)**, using a modified **L-40 Vikas engine** for the **Gaganyaan** human spaceflight mission.
  - The test demonstrated the **Crew Escape System (CES)** capabilities, including **separation from the test vehicle, crew module safety, and**

**deceleration** before splashdown in the Bay of Bengal. The module was recovered by the Indian Navy vessel [INS Shakthi](#).

▪ **XPoSat Launch:**

- On 1<sup>st</sup> January 2024, ISRO launched the [X-ray Polarimeter Satellite \(XPoSat\)](#), aimed at studying **radiation polarisation in space**.
- The satellite is the second space-based observatory of its kind, following [NASA's Imaging X-ray Polarimetry Explorer \(IPEX\)](#) launched in 2021.

▪ **RLV-TD Experiments:**

- ISRO conducted two landing experiments using a downscaled version of the [Reusable Launch Vehicle, Pushpak](#), in March and June 2024, at its **Aeronautical Testing Range** Challakere, Karnataka.
- These tests simulated space landing conditions, with Pushpak being dropped from a [Chinook helicopter](#) to assess landing performance.

▪ **SSLV Development:**

- In August 2024, ISRO launched the third and final development flight of the [Small Satellite Launch Vehicle \(SSLV\)](#), successfully placing the **EOS-08 and SR-0 Demosat satellites** in orbit.
- With two consecutive successful test flights, ISRO concluded the SSLV's development and transferred it to industry.

▪ **Private Space Missions:**

- In March 2024, [Agnikul Cosmos](#) successfully launched its **SoRTeD-01 vehicle**, marking the first launch of a vehicle powered by a [semi-cryogenic engine](#) as its first stage from Indian soil.
- **Skyroot Aerospace** is progressing towards its [Vikram 1 launch vehicle](#).
- **Dhruva Space and Bellatrix Aerospace** conducted experiments on the fourth stage of the [PSLV-C58](#) mission in January 2024, utilising the stage as an orbiting platform for their payloads.

Read more: [Chandrayaan 3](#)

## UPSC Civil Services Examination, Previous Year Question (PYQ)

### **Prelims:**

**Q. Consider the following statements: (2016)**

**The Mangalyaan launched by ISRO**

1. is also called the Mars Orbiter Mission
2. made India the second country to have a spacecraft orbit the Mars after USA
3. made India the only country to be successful in making its spacecraft orbit the Mars in its very first attempt

**Which of the statements given above is/are correct?**

- (a) 1 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

**Ans: (c)**

### **Mains:**

**Q. Discuss India's achievements in the field of Space Science and Technology. How the application of this**

technology has helped India in its socio-economic development? (2016)

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