



## Water Ice Beyond Lunar Poles

[Source: IE](#)

Recent [Chandrayaan-3](#)'s **ChaSTE (Chandra's Surface Thermophysical Experiment)** data suggests that **water-ice** may exist **outside the Moon's polar regions**, particularly in **high-latitude areas**.

- **ChaSTE** is a sort of a **thermometer** that measures **surface and sub-surface temperatures** near the Moon's poles.
- **ChaSTE** data suggests **shaded lunar slopes** may resemble polar regions, potentially **hiding subsurface water-ice**.
- **Colder slopes** away from the Sun may **trap water-ice**, extending its presence **beyond polar craters** for easier access in **future missions**.
- Lunar water can support **drinking, oxygen production**, and splitting it into hydrogen and oxygen enables **fuel production for deep-space missions**.
- **Chandrayaan-3** soft-landed near the **Moon's south pole** on **23rd August, 2023**, at a site later named '[Shiv Shakti Point](#)'.

# 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



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Read More: [Chandrayaan-3](#)

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