



## PSLV-C61/EOS-09 Mission

[Source: TH](#)

[ISRO's Polar Satellite Launch Vehicle \(PSLV-C61\)](#) mission failed to place the [Earth Observation Satellite-09 \(EOS-09\)](#) into its intended [sun-synchronous polar orbit](#) due to a **glitch in the rocket's third stage**.

- This was ISRO's **101st mission** and the **63rd** using the **PSLV**. The EOS-09 satellite carried a **Synthetic Aperture Radar (SAR) payload** designed to capture **all-weather Earth images**.

### Note

- A **sun-synchronous polar orbit (SSO)** is a polar orbit where a satellite passes over the **same Earth location at the same local solar time** each day, maintaining a **consistent position relative to the Sun**.

## What is PSLV?

- **About:** The [Polar Satellite Launch Vehicle \(PSLV\)](#) is a highly reliable and cost-effective **launch vehicle** developed by ISRO.
  - It is used to transport satellites into various orbits, including **sun-synchronous, geostationary, and navigation** orbits.
- **Function:** It carries satellites (payloads) into space, overcoming Earth's gravity through powerful propulsion systems. Once the desired orbit is reached, satellites are deployed from the vehicle.
- **Structure:** PSLV has 4 stages:
  - **PS1:** Solid rocket motor with 6 strap-on boosters.
  - **PS2:** Liquid engine (Vikas engine).
  - **PS3:** Solid rocket motor for high thrust post-atmospheric phase.
  - **PS4:** Two liquid-fuel engines for final orbital insertion.
- **Variants:** **PSLV-XL (with extended strap-ons)**, PSLV-DL, PSLV-QL, etc., are selected based on payload weight and target orbit.
- **Significance:** Known as ISRO's "**workhorse**" due to its versatility and high success rate.
  - Used in major missions like [Chandrayaan-1 \(2008\)](#) and [Mars Orbiter Mission \(2013\)](#).
  - Achieved global recognition by launching **104 satellites in a single mission (PSLV-C37, 2017)**.
- **Earlier Failure:** The PSLV has **failed twice in its history**. The first failure was in **1993** (PSLV-D1) due to **software issues**, causing the IRS-1E satellite to crash into the ocean.
  - The second was in **2017** (PSLV-C39), when a **heat shield separation failure** trapped the IRNSS-1H satellite, preventing its deployment into orbit.

# ISRO LAUNCH VEHICLES

## BACKGROUND

❖ First rocket developed by ISRO - **SLV** (Satellite Launch Vehicle)

❖ Successor of SLV - **Augmented Satellite Launch Vehicle (ASLV)**

## Polar Satellite Launch Vehicle (PSLV)

### ❖ About

- The **Workhorse of ISRO**
- 3<sup>rd</sup> gen, 4-Stage launch vehicle (1<sup>st</sup>, 3<sup>rd</sup> stages - solid fuel; 2<sup>nd</sup>, 4<sup>th</sup> stages - liquid fuel)

### ❖ Capacity

- Delivers **earth-observation/remote-sensing satellites**
- Used to launch satellites of lower mass (~1400 Kg)

### ❖ 4 Variants:

- PSLV-CA ● PSLV-QL ● PSLV-DL ● PSLV-XL

### ❖ Launches Satellites in

- Low inclination LEO ● Sub-GTO ● GTO

### ❖ Important Launches

- First successful launch - October **1994**
- **Chandrayaan-1** (2008)
- **Mars Orbiter Spacecraft** (2013)

PSLV is 1<sup>st</sup> Indian launch vehicle to be equipped with liquid stages



## Launch Vehicle Mark-III

### ❖ About

- Aka **GSLV Mk-III**
- 3-stage launch vehicle (2 solid propellant and 1 core stage comprising liquid and cryogenic stages)

### ❖ Capacity

- 4,000-kg of satellites into **GTO**
- 8,000 kg of payloads into LEO

### ❖ Launches Satellites in

- GTO ● Medium Earth orbit (MEO)
- LEO ● Missions to moon, sun

Mk-III versions have made ISRO entirely self-sufficient in launching its satellites



## Geosynchronous Satellite Launch Vehicle (GSLV)

### ❖ About

- 4<sup>th</sup> Gen, 3-staged launched vehicle
- Much more powerful rocket, carries satellites much deeper into space
- Has an **indigenous Cryogenic Upper Stage**

### ❖ Capacity

- Delivers **communication-satellites**
- Carries heavier satellites (~2200 kg to GTO)
- Carries 10,000-kg satellites to LEO

### ❖ Launches Satellites in

- Primarily Geosynchronous Transfer Orbit (GTO) (~36000 Km altitude)

### ❖ Important Launches:

- **Chandrayaan-2** ● Upcoming **Gaganyaan**



## Small Satellite Launch Vehicle (SSLV)

### ❖ About

- Developed specifically for **small and micro-satellites**

### ❖ Capacity

- Satellites up to 500 kg

### ❖ Launch Limit

- 500 km planar orbit (LEO) from Satish Dhawan Space Centre



## What is Earth Observation Satellite-09 (EOS-09)?

- **About:** EOS-09, also called **RISAT-1B**, is an advanced Indian **remote sensing satellite** equipped with a **C-band Synthetic Aperture Radar (SAR)** for all-weather, day-and-night Earth imaging.
  - It is designed for diverse applications including **land-use mapping, hydrology, disaster management, agriculture, forestry, and coastal security.**
- **Key Features:**
  - **All-weather capability:** SAR penetrates clouds, rain, fog, and darkness, ensuring continuous surveillance.
  - **High resolution:** Offers up to 1-meter resolution and wide swath coverage (10 to 225 km).
  - **Multiple Imaging modes:** Supports five modes like High-Resolution Spotlight and Medium Resolution ScanSAR for varied uses.
  - **Dual-use:** Supports both civilian applications and defence surveillance, including monitoring military activity and maritime security.
  - **Orbit:** Intended for a sun-synchronous polar orbit for consistent daily coverage.

**Q. With reference to India's satellite launch vehicles, consider the following statements: (2018)**

1. PSLVs launch the satellites useful for Earth resources monitoring whereas GSLVs are designed mainly to launch communication satellites.
2. Satellites launched by PSLV appear to remain permanently fixed in the same position in the sky, as viewed from a particular location on Earth.
3. GSLV Mk III is a four-staged launch vehicle with the first and third stages using solid rocket motors, and the second and fourth stages using liquid rocket engines.

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

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

**Ans: (a)**

PDF Reference URL: <https://www.drishtiias.com/printpdf/pslv-c61-eos-09-mission>

