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ISRO to launch earth observation satellite on Independence Day

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Context:

The Indian Space Research Organisation (ISRO) will commemorate Independence Day by launching an Earth Observation Satellite (EOS).

The satellite will be launched using a Small Satellite Launch Vehicle (SSLV).

About EOS-08 mission:

EOS-08 is **ISRO's latest Earth Observation Satellite**, slated for launch by the **Small Satellite Launch Vehicle (SSLV)-D3**.

The primary objectives of the EOS-08 mission include **designing and developing a microsatellite**, creating payload instruments compatible with the microsatellite bus, and incorporating new technologies required for future operational satellites.

Built on the Microsat/IMS-1 bus, EOS-08 carries three payloads:

- 1 Electro Optical Infrared Payload (EOIR),**
- 2 Global Navigation Satellite System-Reflectometry payload (GNSS-R), and**
- 3 SiC UV Dosimeter.**

The **EOIR** payload is designed to capture images in the **Mid-Wave IR (MIR) and Long-Wave IR (LWIR) bands**, both during the day and night.

§ Applications : satellite-based surveillance, disaster monitoring, environmental monitoring, fire detection, volcanic activity observation.

The **GNSS-R payload** demonstrates the capability of using **GNSS-R-based remote sensing** for applications such as ocean surface wind analysis, soil moisture assessment, cryosphere studies over the Himalayan region, flood detection, and inland waterbody detection.

The **SiC UV Dosimeter monitors UV irradiance** at the viewport of the Crew Module in the Gaganyaan Mission and serves as a high-dose alarm sensor for gamma radiation.

The spacecraft mission configuration is set to operate in a **Circular Low Earth Orbit (LEO) at an altitude of 475 km**.

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The satellite employs a miniaturized design in its Antenna Pointing Mechanisms, capable of achieving a rotational speed of 6 degrees per second and maintaining a pointing accuracy of ± 1 degree.

About Small Satellite Launch Vehicle (SSLV)

Small Satellite Launch Vehicle (SSLV) is a **three stage Launch Vehicle** configured with three Solid Propulsion Stages and a liquid propulsion-based Velocity Trimming Module (VTM) as a terminal stage.

SSLV is 2m in diameter and 34m in length with a lift-off weight of around 120 tonnes.

SSLV is capable of launching 500kg satellites in 500km planar orbit from Satish Dhawan Space Centre (SDSC).

Key Features:

Low cost,

Low turn-around time,

Flexibility in accommodating multiple satellites,

Launch demand feasibility,

Minimal launch infrastructure requirements, etc.

Earlier, the bigger satellite payloads were given importance, but as the sector grew many players emerged like Businesses, government agencies, universities, and laboratories began to send satellites.

Mostly all of them fall in the category of small satellites.

Types of orbits:

High Earth Orbit (HEO)

HEO lies **at and beyond 35,786 kilometers** from Earth's surface. It is a sort of "sweet spot" in which satellite orbit matches the rotation of the Earth.

- **Application:** A satellite in this orbit seems to stay in place over a single longitude, although it may drift north to south. This special, high Earth orbit is known as geosynchronous orbit.
- **Examples:** **GSAT series** of India's indigenously developed communications satellites, used for digital audio, data, and video broadcasting.

Medium Earth Orbit (MEO)

MEO lies between 2,000 km to 35780 km from the surface of the Earth. Two Medium Earth Orbits are the semi-synchronous orbit and the Molniya orbit. MEO satellites have orbital periods ranging from 2 to 24 hours. Satellites in MEO have an orbital period between 2 to 24 hours.

- **Application:** This is the orbit used by the Global Positioning System (GPS) satellites such as **GLONASS** (Altitude of 19,100 kilometers) and **Galileo** (Altitude of 23,222 kilometers)

Low Earth Orbit (LEO)

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LEO has an altitude between **160 km to 1000 km** above the Earth's surface. Satellites in this orbit take approximately **88 - 127 minutes** to circle Earth.

- **Applications:** This orbit is commonly used for satellite imaging, Earth observation, etc., but communicational satellites (in constellations) are also placed in this orbit
- The **International Space Station (ISS)** is placed in this orbit, traveling about 16 times around Earth per day.
- A Constellation of **36 communication satellites of OneWeb (Satellite communications company)** has been placed in LEO by ISRO.
- **Earth Observatory satellite- RISAT-2B** (Radar Imaging Earth observation satellite) of ISRO was launched in LEO for the application of the Disaster Management System.

