NISAR Satellite

Source: DTE

Why in News?

The **NASA-ISRO Synthetic Aperture Radar (NISAR) satellite**, a collaborative effort between **National Aeronautics and Space Administration (NASA)** and **Indian Space Research Organisation (ISRO)**, is scheduled to launch in **early 2025.**

- It integrates two advanced radar systems—**NASA's L-band radar** and **ISRO's S-band radar**—marking it as the first satellite to carry both.

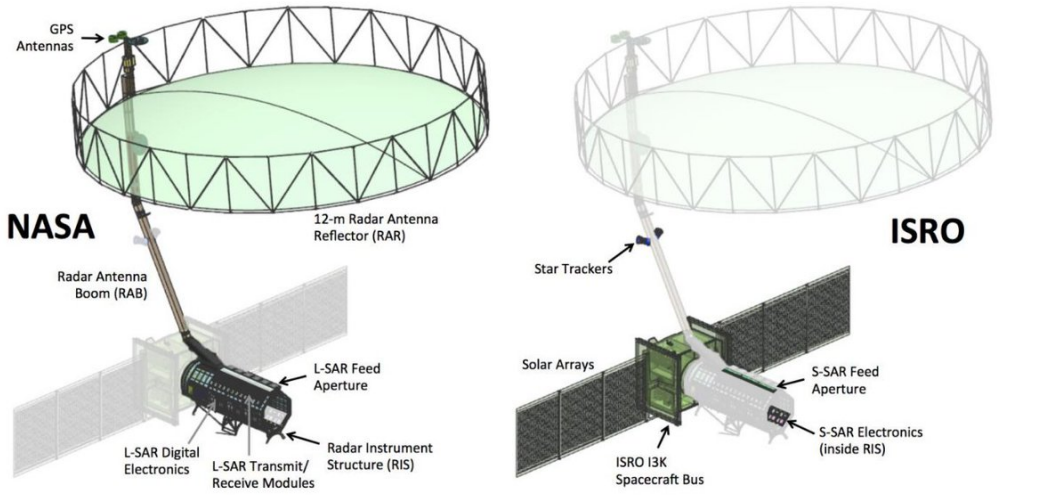
What is NISAR?

- **About:**
  - It was built in collaboration with the US and India under a **partnership agreement signed in 2014,** and is set to launch from Satish Dhawan Space Centre in Andhra Pradesh, India.
  - The satellite will be launched into **low Earth orbit** using **ISRO's Geosynchronous Satellite Launch Vehicle Mark II.**
- **Objective:** It will map the entire globe **every 12 days**, offering consistent data on ecosystems, ice mass, vegetation, sea level rise, groundwater, and natural hazards like earthquakes, tsunamis, volcanoes, and landslides.

Feature	Details
Thermal Blanketing	**Gold-coloured** thermal blankets regulate the satellite's temperature during operation.
Key Components	**Radar Payload:** Core instrument for surface observation. **Spacecraft Bus:** Provides power, communications, navigation, and pointing control for satellite operations. **Antenna and Reflector:** 12 metre diameter drum-shaped wire-mesh reflector, the largest in space, enhances radar signal focus and observation capabilities.
Technological Advancements	**Dual Radar Systems:** Combines NASA's L-band radar and ISRO's S-band radar: **L-band Radar:** Penetrates dense vegetation to measure ground motion, ideal for volcanic and seismic zones. **S-band Radar:** Improves surface monitoring precision; operates on 8-15 cm wavelength and 2-4 GHz frequency.

Applications of NISAR

- **Comprehensive Monitoring:** NISAR captures **Earth's surface movements (horizontal & vertical)** with high clarity, functioning day and night through clouds.
- **Disaster Mitigation:** Tracks seismic activities, landslides, volcanic events, and ice sheet shifts for disaster impact reduction.
- **Environmental Tracking:** Monitors forests, **wetlands, farmlands, and deforestation t**o support sustainable resource management.
- **Infrastructure Stability:** Assesses infrastructure, **monitors urbanisation, and detects oil spills for better management.**
- **Data-Driven Decision-Making:** Supports understanding tectonic movements and promotes informed, sustainable, and economic use of resources.



NISAR observatory, with NASA and ISRO contributions highlighted

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)

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)