

NISAR observation satellite

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In news— Recently, NASA has handed over the Earth observation satellite 'NISAR' to Indian Space Research Organisation (ISRO) at its Bengaluru headquarters.

About NISAR-

- The word 'NISAR' finds its origin in NASA-ISRO-SAR.
- It is **an SUV-sized satellite that is dedicatedly developed by the space agencies of the U.S and India** for studying hazards and global environmental change.
- **India and the US had agreed upon this mission** during then-President Barack Obama's visit to India **in 2015**.
- **The major scientific objectives of the NISAR mission are** to improve understanding of the impact of climate change on Earth's dynamic ecosystem, land, and coastal processes, land deformations, and cryosphere.
- **It will observe Earth's land with 12-day regularity on ascending and descending passes**, sampling Earth on average every 6 days for a baseline 3-year mission.
- The mission that is **equipped with the largest reflector antenna ever launched by NASA, will measure Earth's changing ecosystems and dynamic surfaces**, spotting warning signs of imminent volcanic eruptions on one hand, and ice masses on the other, providing information about biomass, natural hazards, sea-level rise, earthquakes, landslides, tsunamis and aid in monitoring groundwater supplies.
- NISAR's global and rapid coverage will provide unprecedented opportunities for disaster response, providing data to assist in mitigating and assessing damage, with observations before and after disasters in short time frames.
- As far as utility is concerned, ISRO has identified few areas where NISAR's findings would prove to be

beneficial. These are – Agricultural monitoring and characterization, landslide studies, Himalayan glacier studies, soil moisture, coastal processes, coastal winds, among others that are crucial for India.

- NISAR will be the first satellite mission to use two different radar frequencies (L-band and S-band) to measure changes in our planet's surface less than a centimetre across.
- Apart from S-band radar, ISRO is providing the spacecraft bus and the launch vehicle.

What is SAR?

- **SAR stands for 'Synthetic Aperture Radar' technique**, responsible for producing high-resolution images from a resolution-limited radar system that NASA has used to measure changes in Earth's surface.
- Because of the utter precision, **the radar can penetrate clouds and darkness**, which means that it is capable of collecting data in any weather and at any time in the day and in the night.
- **The NISAR spacecraft accommodates two different, fully capable synthetic aperture radar (SAR) frequencies** namely – L-band and S-band.
- The 24 cm wavelength **L-band Synthetic Aperture Radar (L-SAR) is by NASA**, while a 10 cm wavelength **S-band (S-SAR) is provided by ISRO**.
- **The SAR will measure the changes in our planet's surface less than a centimeter across**. In this way, SAR beats the resolution limits of what can physically be put in space to provide images.