NISAR and its mission

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Why is in news? Jointly developed by the National Aeronautics and Space Administration (NASA) and the Indian Space Research Organisation (ISRO), an Earth-observation satellite, called NISAR (NASA-ISRO Synthetic Aperture Radar), got a send-off ceremony at the American space agency's Jet Propulsion Laboratory (JPL) in Southern California

About NISAR

By using synthetic aperture radar (SAR), NISAR will produce high-resolution images.

The name NISAR is short for NASA-ISRO-SAR. SAR here refers to the synthetic aperture radar that NASA will use to measure changes in the surface of the Earth.

Essentially, SAR refers to a technique for producing high-resolution images. Because of the precision, the radar can penetrate clouds and darkness, which means that it can collect data day and night in any weather.

NISAR has been built by space agencies of the US and India under a partnership agreement signed in 2014.

The 2,800 kilograms satellite consists of both L-band and S-band synthetic aperture radar (SAR) instruments, which makes it a dual-frequency imaging radar satellite.

While NASA has provided the L-band radar, GPS, a high-capacity solid-state recorder to store data, and a payload data subsystem, ISRO has provided the S-band radar, the GSLV launch system and spacecraft.

Another important component of the satellite is its large 39-foot stationary antenna reflector. Made of a gold-plated wire mesh, the reflector will be used to focus "the radar signals emitted and received by the upward-facing feed on the instrument structure"

The mission is set to be launched in January 2024 from Sriharikota aboard the ISRO's Geosynchronous Satellite Launch Vehicle (GSLV).

The launch vehicle will deposit the satellite at an orbit roughly 750 km above the Earth from where it will transmit as much as 80 terabytes a day.

Significance of NISAR

Built over a period of eight years, the mission will allow scientists to map the entire surface of the Earth within a period of 12 days allowing scientists to track changes much more easily, including in places previously obscured by older satellites.

Using its dual-frequency synthetic aperture radar, the NISAR, an Earth Observation Satellite (EOS), will observe and understand natural processes on the planet.

These include ecosystem disturbances, ice-sheet collapse, and natural hazards such as earthquakes, volcanic unrest, coastal subsidence, and landslides.

The data from the mission will also help scientists better understand processes like climate change, and Earth's crust, and also help scientists with future resource and hazard management

The satellite will also measure groundwater levels, track flow rates of glaciers and ice sheets, and monitor the planet's forest and agricultural regions, which can improve our understanding of carbon exchange.

By using synthetic aperture radar (SAR), NISAR will produce high-resolution images. SAR is capable of penetrating clouds and can collect data day and night regardless of the weather conditions.