

Powerful NASA-ISRO Earth-observing satellite coming together in India

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Engineers joined the two main components of NISAR—the spacecraft bus and the radar instrument payload—in an ISRO clean room in Bengaluru, India, in June. The payload arrived from NASA's Jet Propulsion Laboratory in Southern California in March, while the bus was built at the ISRO facility. Credit: VDOS-URSC

Built on opposite sides of the planet, the NISAR satellite will deepen our understanding of climate change, deforestation, glacier melt, volcanoes,

earthquakes, and more.

Two major components of the NISAR [satellite](#) have been combined to create a single spacecraft in Bengaluru, India. Set to launch in early 2024, NISAR—short for NASA-ISRO Synthetic Aperture Radar—is being jointly developed by NASA and the Indian Space Research Organization, or ISRO, to track movements of Earth's land and ice surfaces in extremely fine detail. As NISAR monitors nearly every part of our planet at least once every 12 days, the satellite will also help scientists understand, among other observables, the dynamics of forests, wetlands, and agricultural lands.

About the size of an SUV and partially wrapped in gold-colored thermal blanketing, the satellite's cylindrical [radar](#) instrument payload contains two [radar systems](#). The S-band radar is particularly useful for monitoring crop structure and the roughness of land and ice surfaces, while the L-band instrument can penetrate denser forest canopies to study the woody trunks of trees, among other observables. The wavelengths of the S-band and L-band signals are about 4 inches (10 centimeters) and 10 inches (25 centimeters), respectively, and both sensors can see through clouds and collect data day and night.

The payload took a roundabout journey to get to this point. The S-band radar was built at the Space Applications Center in Ahmedabad in western India, then flown in March 2021 to NASA's Jet Propulsion Laboratory in Southern California, where engineers had been developing NISAR's L-band radar. At JPL, the two systems were fixed to the payload's barrel-like frame before being flown to the U R Rao Satellite Center (URSC) in the southern Indian city of Bengaluru in March 2023.

In the meantime, engineers and technicians at URSC, collaborating with teams from JPL, were busy developing the spacecraft's main body, or bus, which is covered in blue blanketing that protects it during assembly

and testing prior to launch. The bus, which includes components and systems developed by both ISRO and JPL, will provide power, navigation, pointing control, and communications for the mission.

Since the radar payload and bus were joined in a URSC clean room in mid-June, NASA and ISRO teams have been working together to route thousands of feet of cabling between them. Still to be attached: the satellite's solar panels, as well as the drum-shaped, wire-mesh reflector that will unfold from the end of a 30-foot (9-meter) boom. At nearly 40 feet (12 meters) in diameter, the reflector will be largest radar antenna of its kind ever launched into space.

The NISAR satellite is currently undergoing performance testing, to be followed by several rounds of environmental testing to ensure it can withstand the rigors of launch and meet all of its operational requirements once in orbit. Then it will be transported about 220 miles (350 kilometers) eastward to Satish Dhawan Space Center, where it will be inserted into its launch fairing, mounted atop ISRO's Geosynchronous Satellite Launch Vehicle Mark II rocket, and sent into low Earth orbit.

Provided by NASA

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