

Trailblazing new Earth satellite put to test in preparation for launch

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The NISAR satellite enters the thermal vacuum chamber at an ISRO facility in Bengaluru on Oct. 19. It emerged three weeks later having met all requirements of its performance under extreme temperatures and space-like vacuum. Credit: ISRO

NISAR, the trailblazing Earth-observing radar satellite being developed by the United States and Indian space agencies, passed a major milestone on Nov. 13, emerging from a 21-day test aimed at evaluating its ability to function in the extreme temperatures and the vacuum of space.

Short for NASA-ISRO Synthetic Aperture Radar, NISAR is the first space hardware collaboration between NASA and the Indian Space Research Organisation, or ISRO, on an Earth-observing mission. Scheduled to launch in early 2024, the [satellite](#) will scan nearly all the planet's land and ice twice every 12 days, monitoring the motion of those surfaces down to fractions of an inch. It will be able to observe movements from earthquakes, landslides, and [volcanic activity](#) and track dynamic changes in forests, wetlands, and agricultural lands.



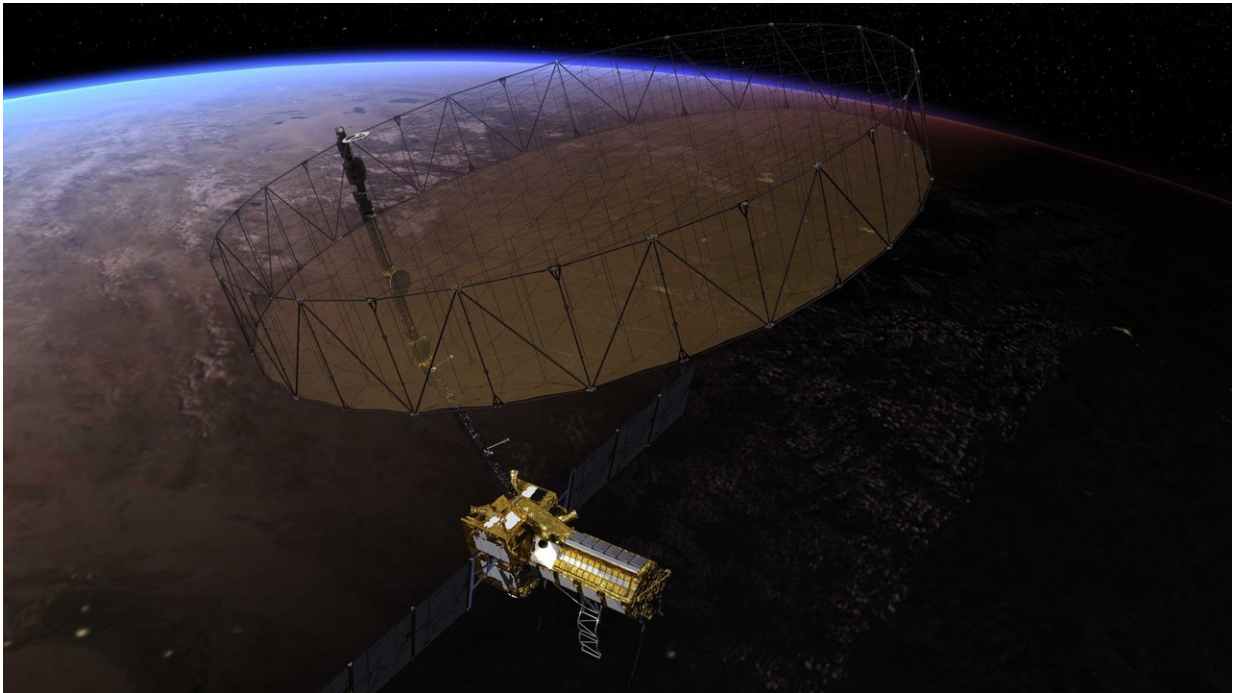
The NISAR satellite stayed in this ISRO antenna testing facility for 20 days in September as engineers evaluated the performance of its L- and S-band radar antennas. The foam spikes lining the walls, floor, and ceiling prevent radio waves

from bouncing around the room and interfering with measurement. Credit: ISRO

The thermal vacuum test occurred at ISRO's Satellite Integration and Test Establishment in the southern Indian city of Bengaluru. It's one of a battery of tests the satellite will face leading to launch. Other tests will ensure it can withstand the shaking, vibration, and jostling that it will encounter during launch.

NISAR, partially covered in gold-hued thermal blanketing, entered the vacuum chamber on Oct. 19. Over the following week, engineers and technicians lowered the pressure to an infinitesimal fraction of the normal pressure at sea level. They also subjected the satellite to an 80-hour "cold soak" at 14 degrees Fahrenheit (minus 10 degrees Celsius), followed by an equally lengthy "hot soak" at up to 122 F (50 C). This simulates the temperature swings the spacecraft will experience as it is exposed to sunlight and darkness in orbit.

ISRO and JPL teams worked around the clock during the three-week period, testing the performance of the satellite's thermal systems and its two primary science instrument systems—the L-band and S-band radars—under the most extreme temperature conditions they will experience in space.



After it launches in early 2024, NISAR will scan nearly all of the planet's land and ice twice every 12 days. In orbit, the satellite will extend its solar panels and nearly 40-foot (12-meter) radar antenna reflector, which resembles a snare drum and will unfold at the end of a 30-foot (9-meter) boom extending from the spacecraft. Credit: NASA-JPL/Caltech

This latest round of testing followed 20 days of testing in September in which engineers used ISRO's compact antenna test facility to evaluate whether the [radio signals](#) from the two radar systems' antennas passed requirements. Blue foam spikes lining the facility's walls, floor, and ceiling prevent radio waves from bouncing around the room and interfering with measurement.

With thermal vacuum and compact antenna tests successfully done, NISAR will soon be fitted with its [solar panels](#) and its nearly 40-foot (12-meter) radar antenna reflector, which resembles a snare drum and

will unfold in space at the end of a 30-foot (9-meter) boom extending from the spacecraft.

The satellite will undergo additional tests before being packed up and transported about 220 miles (350 kilometers) eastward to Satish Dhawan Space Centre, where it will be mounted atop ISRO's Geosynchronous Satellite Launch Vehicle Mark II rocket and sent into low Earth orbit.

Provided by NASA

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