



NASA ISRO Synthetic Aperture Radar (NISAR) Contamination Control Program

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- The NASA-ISRO Synthetic Aperture Radar (NISAR) mission is an Earth-orbiting dual-band (L- and S- band) radar mission jointly developed by the Indian Space Research Organization and NASA.
- NISAR will make global surface change measurements and provide a wide range of data including soil moisture, damage from earthquakes and volcanic eruptions, and coastal land loss.

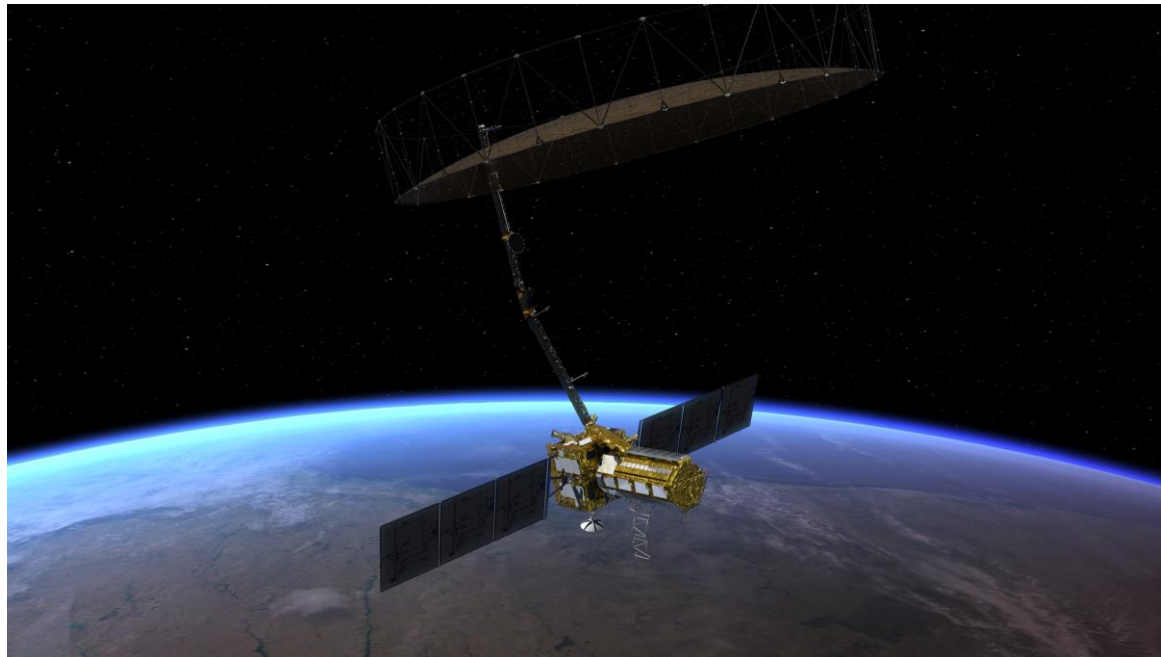


Photo courtesy
of NASA JPL

Artist Rendering of NISAR on Orbit

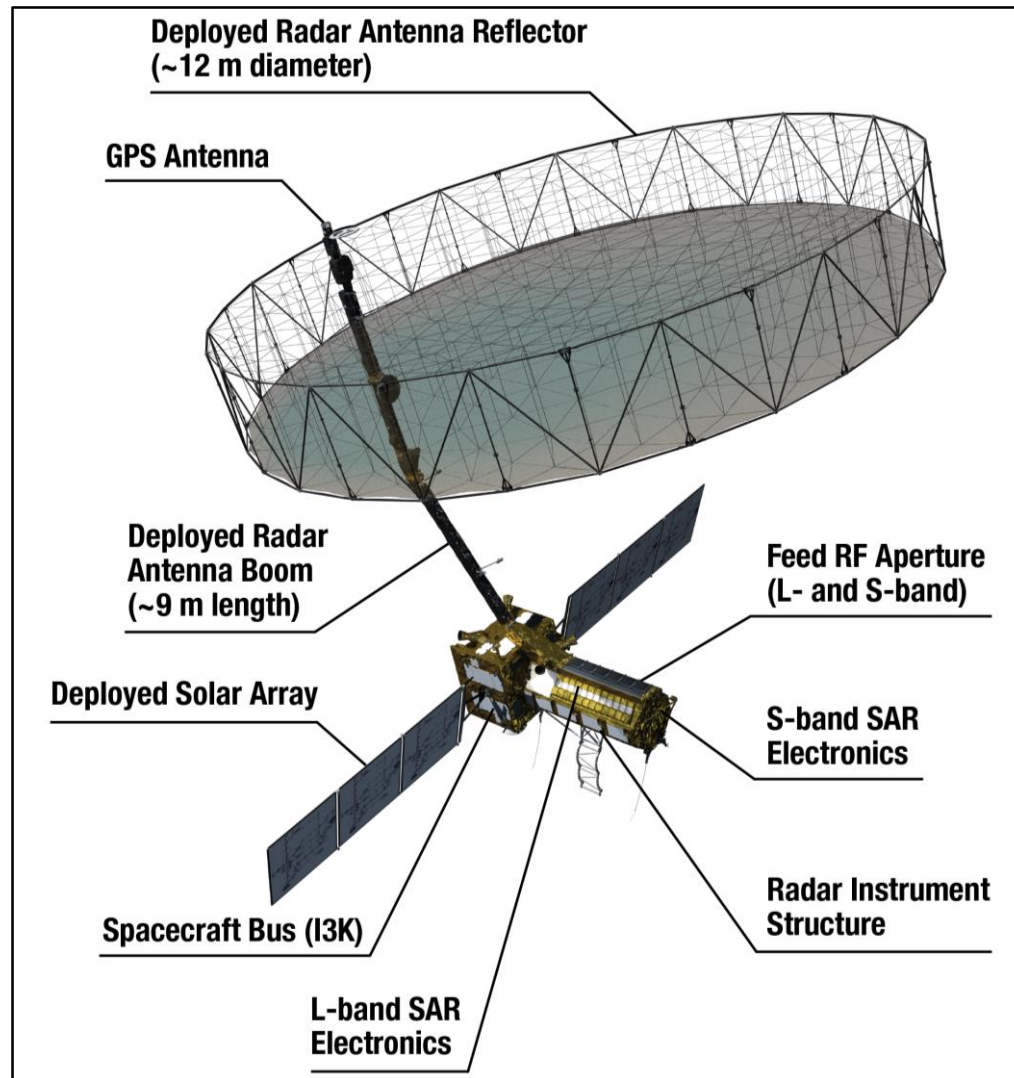


Photo courtesy of
NASA JPL

NISAR Spacecraft Diagram



NISAR Contamination Sensitivities

- The driving contamination control requirements for NISAR are the thermo-optical properties of the instrument's radiators and protecting JPL's 25ft Space Simulator from deleterious contamination during NISAR's thermal vacuum testing campaign.
- NISAR's radiator end-of-life (EOL) requirement is PCL 750 (per IEST-STD-CC1246E) and 1000 angstroms of molecular contamination.
- In order to protect JPL's 25ft Space Simulator, extensive cleaning and bakeouts were performed prior to entering TVAC. Post-test chamber bakeouts and cleaning were also performed to ensure chamber cleanliness.

NISAR Contamination Control Requirements

- All radar instrument components underwent a 72hr bakeout at their maximum allowable temperature, typically 55-70C for electronics, 105C for harnesses and MLI.
- All NISAR hardware was cleaned to Visibly Clean – Highly Sensitive per IEST-STD-1246E with spot-sampling indicating PCL 500 and molecular levels of A being achieved after cleaning.
- NISAR was processed in an ISO 8 or better cleanroom at all times (some exceptions during environmental testing) and bagged when not being actively worked on.

Photo courtesy of NASA JPL



NISAR Team Preparing for Installation of the ISRO S-SAR Instrument on the Radar Instrument Structure (RIS)

- NISAR hardware has completed 5 major TVAC campaigns in addition to the many subassembly bakeouts.
 - Dynamic Test Model TVAC (25ft Space Simulator)
 - L-Band TVAC #1 (11ft Horizontal Chamber)
 - L-Band TVAC #2 (11ft Horizontal Chamber)
 - Integrated Payload TVAC (25ft Space Simulator)
 - Science TVAC (25ft Space Simulator)
- By the end of Science TVAC the Integrated Payload reached an outgassing rate <160 hz/hr as measured with the hardware at 50C and a QCM at -30C.
- All tests were uneventful and maintained protection of the 25ft chamber except Dynamic Test model TVAC in which a chamber leak resulted in particulation of chamber blankets, but was unrelated to any NISAR hardware or test activities.

Photo courtesy of NASA JPL



NISAR Inside JPL's 25ft Space Simulator

- Schedule coordination is challenging 12.5 time zones apart (and there is such a thing as half time-zones!)
- ISRO employs different gowning protocols than NASA does. Collaboration on future optical missions will require addressing those differences.
- ISRO employs different material selection and manufacturing practices than NASA does.
- ISRO has a smaller workforce than NASA, so staffing can be limited if your mission is not launching soon.
- Need to formalize Launch Vehicle CC requirements earlier in the mission.
- NISAR shared JPL's Space Assembly Facility (SAF) with Europa Clipper which has much more stringent CC requirements. Early coordination is key for sharing spaces.

Photo courtesy
of NASA JPL





Forward Work

- NISAR's final TVAC of the science payload integrated with the ISRO spacecraft is scheduled in the next few months. JPL Contamination Control is working closely with JPL Thermal and ISRO to ensure NISAR radiators do not get contaminated during the test.
- JPL Contamination Control will support the final radiator inspection and cleaning in India early 2024.
- Launch NISAR!

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