IAF EARTH OBSERVATION SYMPOSIUM (B1)
International Cooperation in Earth Observation Missions (1)

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# NASA-ISRO SYNTHETIC APERTURE RADAR (NISAR) MISSION

**Abstract**

The NASA-ISRO Synthetic Aperture Radar (SAR), or NISAR, is a multi-disciplinary Earth-observing radar mission. NISAR will make global measurements of the causes and consequences of land surface changes for integration into Earth system models. NISAR provides a means of disentangling and clarifying spatially and temporally complex phenomena, ranging from ecosystem disturbances, to ice sheet collapse and natural hazards including earthquakes, tsunamis, volcanoes and landslides. In addition, NISAR will provide societally relevant data to inform investments to protect human life and property.

NISAR is being developed in response to the 2007 US National Research Council Committee on Earth Science and Applications from Space to provide high resolution data on solid Earth hazards, natural resources, and ice dynamics. NISAR is being implemented as a partnership between the National Aeronautics and Space Administration (NASA) and the Indian Space Research Organisation (ISRO). The mission uses dual frequency L- and S-band fully polarimetric SAR that will fly in a 747 km sun-

synchronous, repeating ground track orbit with a 12 day cycle. This allows dual-band measurements from a single radar platform, and interferometric combination of data on repeated orbit passes. NASA is providing the L-band SAR; the radar instrument structure, deployable boom and 12m deployable reflector; an engineering payload consisting of high rate Ka-band communications hardware, a Global Position System payload, a 12 Tb solid state recorder; and L-SAR ground operations and data processing. ISRO is providing the S-band SAR (S-SAR), spacecraft bus, Geosynchronous Satellite Launch Vehicle Mark II launch vehicle, and S-SAR and overall mission operations. The mission will be launched from the Satish Dhawan Space Centre, Sriharikota, India. The overall science and applications of the mission are driven by a joint NASA  ISRO Science team.

This paper provides mission and system descriptions and expected mission performance and capabilities. The team has developed interface procedures and development processes designed to manage the complexity and build teamwork literally on opposite sides of the planet. Major challenges that have been overcome and lessons learned as a result of the highly integrated NASA-ISRO design and development process are summarized. Progress and plans for the joint integration, test and verification and validation of the L- and S-SAR, engineering payload and satellite bus and observatory are described. Joint NASA-ISRO operations and data processing approach and plans to conduct integrated mission system testing and rehearsals before launch are also summarized along with the science and applications identification mechanisms.