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

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THE PROPOSED NISAR INSTRUMENT OVERVIEW: DUAL FREQUENCY (L- AND S-BAND) SAR

Abstract

The NASA-ISRO Synthetic Aperture Radar (NISAR) mission would observe dynamic changes on Earth centered on three science disciplines: 1) solid earth, 2) ecosystems, and 3) cryospheric sciences. The NISAR data would also support for many other science and applications areas. In order to meet a broad set of requirements, NISAR's dual frequency, polarimetric SAR would need to sample all Earth's land and ice-covered surfaces on a near-weekly basis over the life of the mission. Therefore, the instrument would require a wide-swath imaging capability to track rapid changes wherever they occur, with sufficient sensitivity and resolution the science demands. The "SweepSAR" scan-on-receive imaging technique would be implemented to enable a swath larger than 200 km at full SAR resolution. A combination of a 12-m deployable mesh reflector and a feed array with transmit/receive modules would be used to implement SweepSAR with a dramatically reduced amount of hardware relative to a system of comparable capability. In order to maintain reasonable data volume (24 Tbits/day), both L- and S-band radar electronics would perform on-board, digital beam forming on receive. The dual frequency radar would be capable of measuring polarimetric responses from Earth surfaces. In addition, the NISAR observatory would be designed to collect repeat pass interferometric data in order to estimate earth surface motions. To maintain high correlation between interferometric data pairs, the observatory would have challenging pointing and orbit maintenance requirements. The NASA-ISRO joint science team is developing a science observation plan that includes radar operation modes optimized for science objectives. In this paper, we will present the NISAR science objectives, the dual frequency SAR architecture, radar operation modes, and technical challenges.