NASA's NISAR Mission and Surface Topography and Vegetation (STV) Observable

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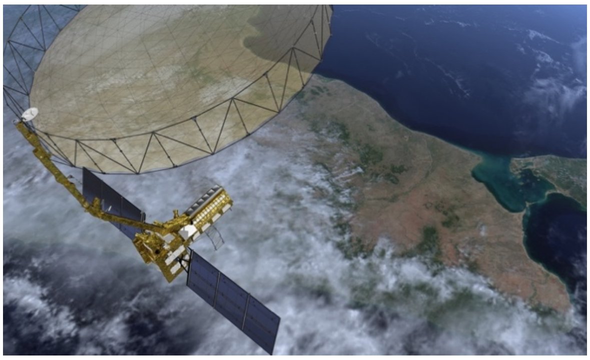
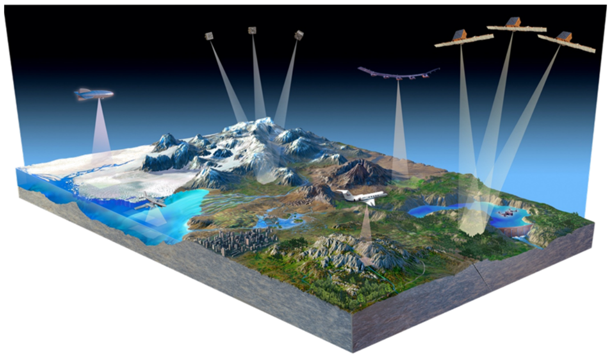
Crustal deformation and surface topography provide insights into earthquake processes. The NASA–ISRO Synthetic Aperture Radar (NISAR) mission, a collaboration between the National Aeronautics and Space Administration (NASA) and the Indian Space Research Organization (ISRO), will provide measurements of deformation over Earth's tectonically active areas. Surface Topography and Vegetation (STV) is a NASA targeted observable being matured into an observing system. STV will provide repeat measurement of bare Earth topography and vegetation structure globally.





Left) NISAR mission will provide broad area all weather measurement of crustal deformation. Right) STV is envisioned as a combination of orbital and suborbital assets that will provide global measurement of bare Earth topography and change over time.

NISAR will provide pre-, co-, and post-seismic measurements of ground deformation along faults and fault systems. NISAR will provide all-weather, day/night imaging repeated 4-6 times per month. NISAR's L- and S-band radars will image at resolutions of 5-10 meters. Products are expected to be available 1-2 days after observation, and within hours in response to disasters, providing actionable, timely data for many applications. Deformation measured with NISAR will help in mapping and identifying characteristics of fault zones and systems around the world. NISAR will identify earthquake ruptures and measure the amount that the ground slipped along the faults, mapping the length of the rupture and providing an indication of damage extent. NISAR will be used to locate areas of damage to roads, buildings, and other structures, and provide information about other disasters triggered by the earthquake.

Once an observing system, STV will provide a baseline map of bare Earth topography followed by repeat measurements over Earth's deforming regions. Past earthquake behavior is written in the landscape as geomorphic features, such as offset streams, sag ponds, lineations identifying faults, and fabric indicating stress directions. Pre-event imagery will provide a baseline to measure coseismic offsets and distributed fracture patterns due to earthquakes.

A combination of topographic change and crustal deformation measurements can be modeled to identify fault behavior at depth. These measurements and models will contribute to earthquake hazard assessment. The combine measurements will more clearly identify the partitioning of aseismic and seismic deformation or slip, any propagation or dissipation of stress, and location of active faults.