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InSAR: A New Space-Based Imaging Geodetic Tool

We describe an L-band interferometric radar mission addressing a number of Earth Science research priorities in the context of the EarthScope initiative. These include in particular transformations of the Earth's surface due to tectonic deformations, and variability of the Earth's ice cover and its impact on sea level. The primary scientific goals are to:

- Understand and model strain changes leading to and following major-earthquakes
- Characterize three-dimensional magma movements to predict volcanic eruptions
- Assess the impact of ice sheet and glacier system dynamics on sea-level rise

The proposed mission would build time series of three-dimensional surface displacements of Earth's tectonically active areas and cryosphere with mm accuracy. Our main purpose is to quantify processes such as strain accumulation along fault systems and magma migration, and to estimate the variability of ice discharge and its impact on sea level. However, other major applications would include the mapping of surface deformations associated with withdrawal of injection of fluids in the shallow crust, erosion and landslides, as well as changes in land cover. Of particular interest are innovations in orbit control and ground system design which would result in efficient, timely data distribution and usage.