



Proposed NASA-ISRO SAR Mission

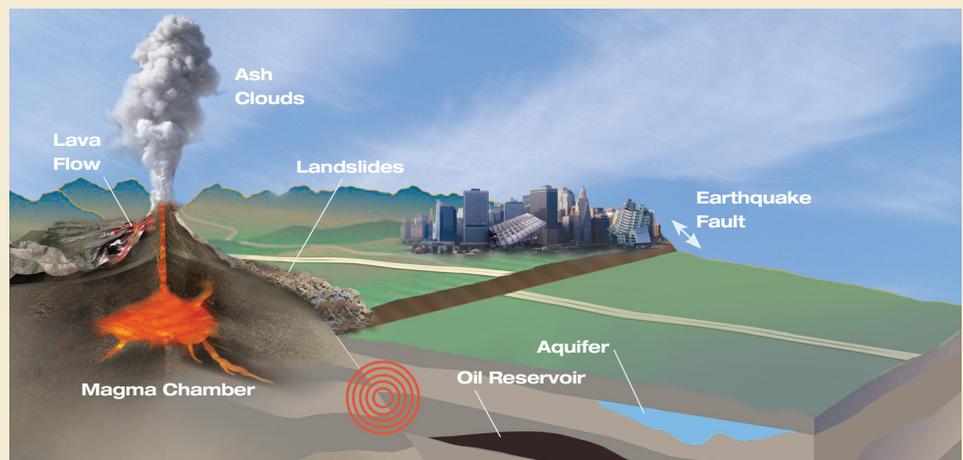


Illuminating Earth's Dynamic Surface and Interior

NISAR would measure surface deformation to determine the likelihood of earthquakes, volcanic eruptions, and landslides, and monitor groundwater, hydrocarbon, and sequestered CO₂ reservoirs.

Earth's Hazards and Resources

Why does our planet sometimes threaten us with earthquakes or volcanic eruptions? Can I depend on fresh water to flow from my tap each morning? Do we have the best possible information needed to manage our resources and potential disasters? We are often reminded that disasters occur unexpectedly, but extraordinary measurements of processes leading to disasters would help us address these questions, prepare for natural disasters, and sustainably manage Earth's resources.

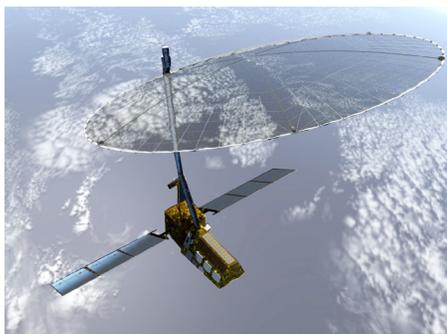


Addressing an Increasing Exposure to Natural Disasters

Society's exposure to natural hazards is rapidly increasing. Overdue large earthquakes will be costly and threaten densely populated regions on the U.S. western coast, home to about 50 million citizens. Volcanic eruptions also endanger many areas of the Earth and often disrupt air travel. Water is an increasingly scarce resource, and water storage and distribution systems must be safe and resilient for current and increasing needs.

Many hazards subtly change and deform the land surface preceding catastrophic events such as earthquakes and volcanic unrest. The best way to properly prepare for, mitigate, and respond to nature's disasters is to detect, measure, and understand these slow-moving processes before they either trigger a major disaster or compromise our natural resources. This requires relevant, comprehensive, detailed, and accessible observations collected over time of subtle but detectable motions.

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Artist's concept

The Proposed NISAR Mission — All-Weather Day and Night Imaging

Orbiting radar captures the movements of the Earth over time and with enough detail to reveal what is happening below the surface. Radar penetrates clouds and operates day and night. It produces images with resolution to see local changes and has broad enough coverage to measure regional events. The proposed NASA-ISRO Synthetic Aperture Radar (NISAR) mission, a collaboration between the National Aeronautics and Space Administration (NASA) and the Indian Space Research Organization (ISRO), would acquire images of surface changes globally with millimeter accuracy and meter-scale resolution. Rapid sampling over years to decades would allow for understanding processes leading to disasters and for rapid response following them. NISAR's unprecedented coverage in space and time would reveal forces acting within the Earth and on its surface far more comprehensively than any other measurement method. The detailed observations would reveal information about the evolution and state of the Earth's crust, allowing us to better manage resources and prepare for and cope with hazards.

Mitigating Disasters and Sustaining Resources

Natural disasters often occur abruptly and without notice. Earthquakes, volcanoes, and landslides are sudden events that can cause billions of dollars in damage and extensive loss of life. Subsidence from water, oil, or gas withdrawal, faulting, or underground dissolution of limestone can have major impacts on agriculture, levees, and our built environment.

Forces deep within the Earth drive motion of the tectonic plates, causing earthquakes and volcanoes while shaping our landscapes. Withdrawal, injection, and movement of fluids at depth also cause small but detectable motions of the Earth's surface.

It is crucial for our society and economy to mitigate losses from disasters. We need informed decisions in order to carry out effective mitigation and make the most of our resources sustainably and economically. By measuring motions and other changes of the Earth's surface, we can understand processes occurring at depth and disentangle other impacts.

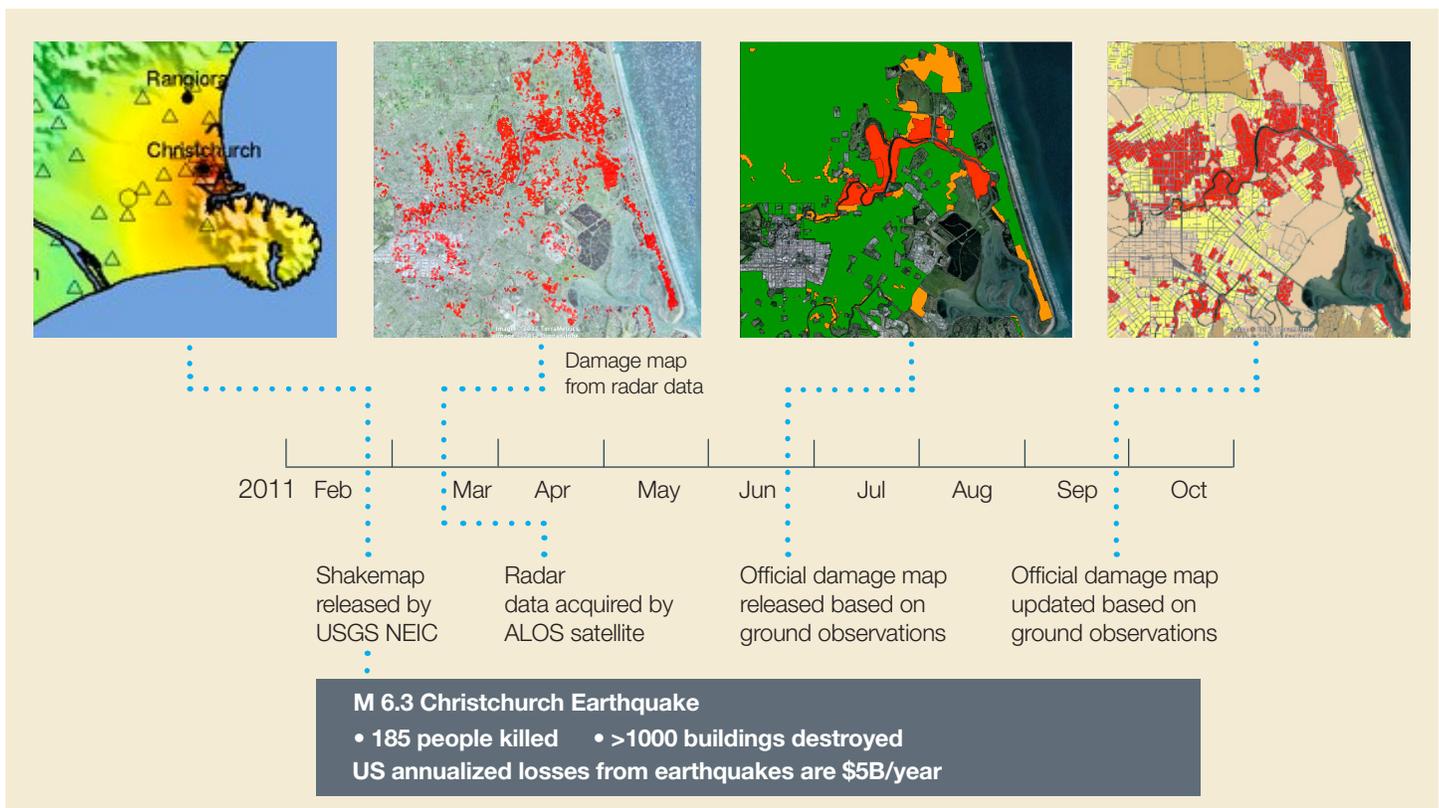
Benefiting Forecasting, Response, and Resource Management

Natural hazards will continue to threaten densely populated regions of our country. NISAR's global and rapid coverage would provide unprecedented opportunities to mitigate or assess widespread damage. Detecting Earth surface motions of our planet and its resources would help illuminate the processes occurring deep within.

A mission with open access to data adds flexibility to meet far more scientific, societal, and commercial goals. Science-based management and storage of fresh water and energy sources would allow us to use the available resources more efficiently and sustainably.

Rapid Building-Scale Damage Assessment

Following the February 2011 earthquake in Christchurch, New Zealand, a damage map was produced by comparing before and after radar images from the Japanese Advanced Land Observing Satellite (ALOS) satellite. This method detected building damage, liquefaction, and a small landslide. The results compare favorably to official maps, which were produced later. NISAR maps would allow initial damage estimates to guide ground inspection damage assessment.



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For more information, visit: <http://nisar.jpl.nasa.gov>

Proposed Mission — Pre-decisional — For Planning and Discussion Purposes Only