National Aeronautics and Space Administration

NISAR

NASA-ISRO Earth Science & Applications Mission

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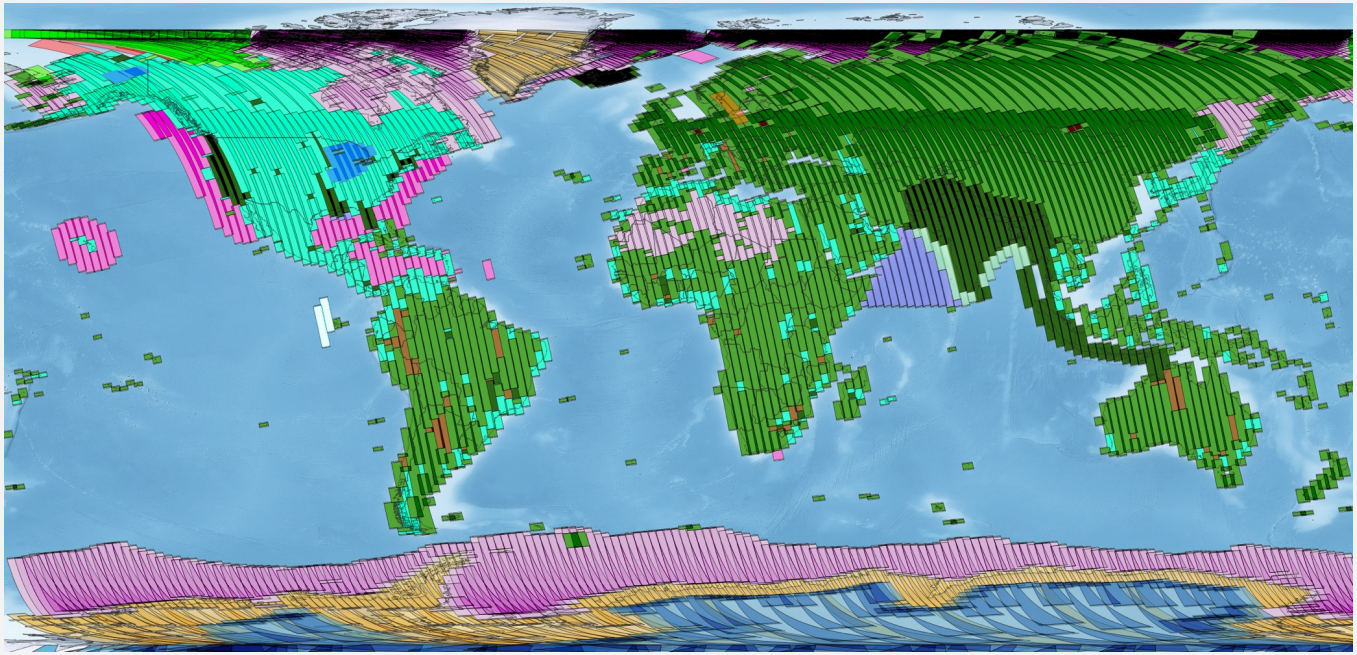
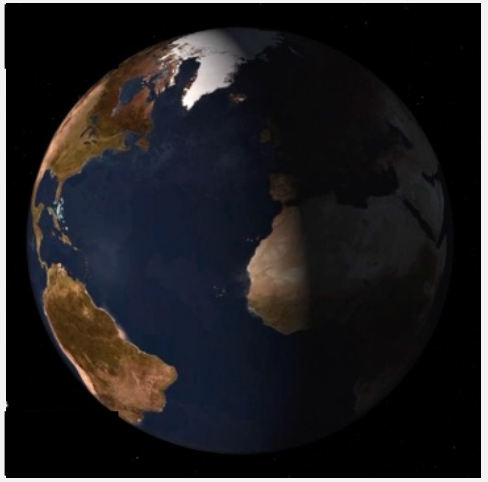
Western States Water Council, San Pedro, CA
September 25, 2025

National Aeronautics and Space Administration

Complete Coverage in 12 days

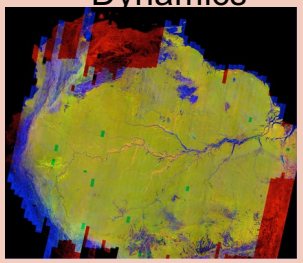
Land and ice-covered surfaces, oceans around the U.S.





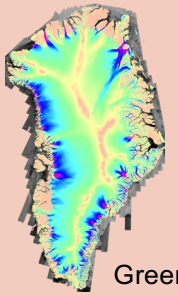
NISAR Mission – Monitoring the Dynamic Earth

Global Biomass Dynamics



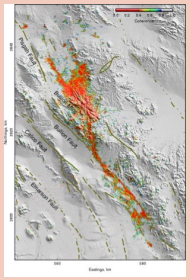
Amazonia

Global Ice Dynamics

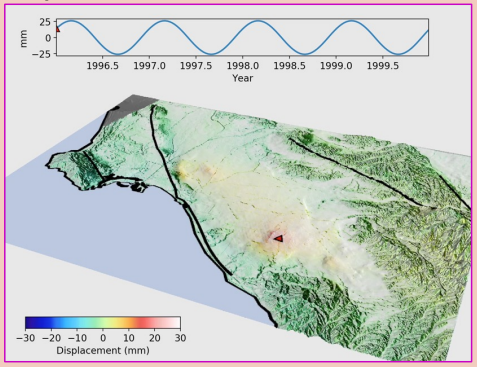


Greenland

Global Hazards



Aquifer Health



Agriculture

Earth Surface Deformation & Geohazards

- Earthquakes & fault creep
- Landslides
- Subsidence
- Volcanoes
- Critical Infrastructure monitoring

Ecosystems and Biomass Change

- Agriculture
- Forests
- Wetlands

Hydrology & Marine Hazards

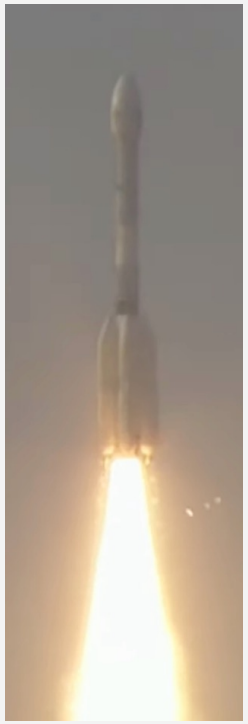
- Flooding & surface water extent
- Soil moisture
- Groundwater withdrawal
- Ocean winds
- Oil spills

The Cryosphere

- Permafrost
- Sea Ice
- Glaciers & major ice sheets

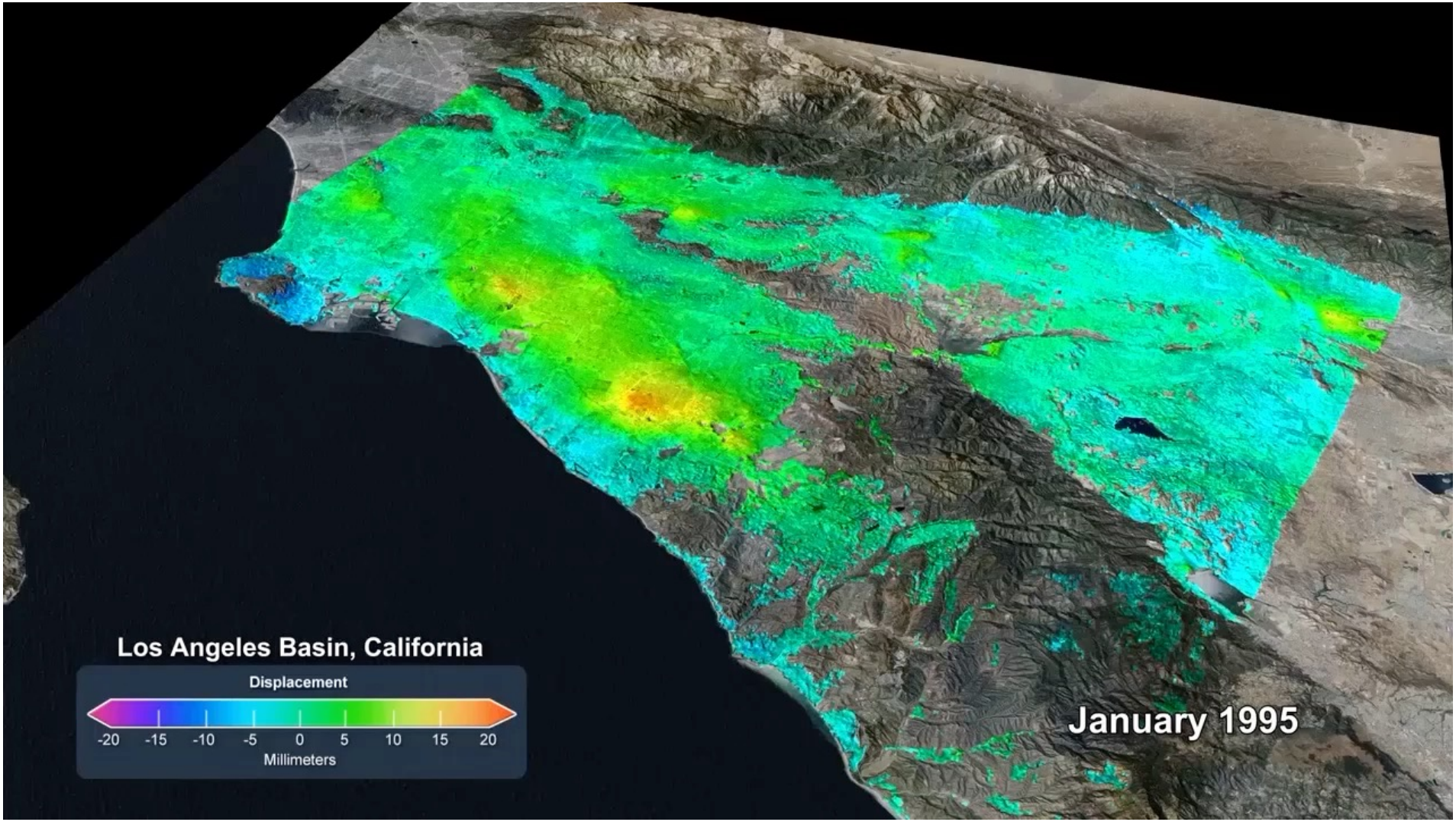
NISAR Is In Orbit!

July 30, 2025
India's Sriharikota
Launch Facility



- Launch July 30, 2025
- First light images acquired; calibration underway
- Science operations 3 months after launch
- Global products to Level 2 will be fully and openly available to the global community
- Broad scientific and applied uses
- Cloud-based data, tools and services will facilitate access and use

Global systematic, all-weather, day-night, analysis-ready, time-series measurements of surface deformation and change

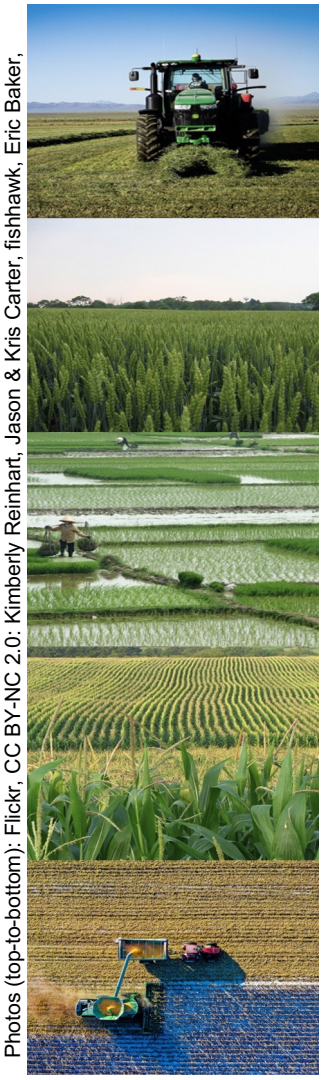

Los Angeles Basin, California
Displacement
-20 -15 -10 -5 0 5 10 15 20
Millimeters
January 1995

PRACTICAL APPLICATIONS FOR THE WESTERN UNITED STATES

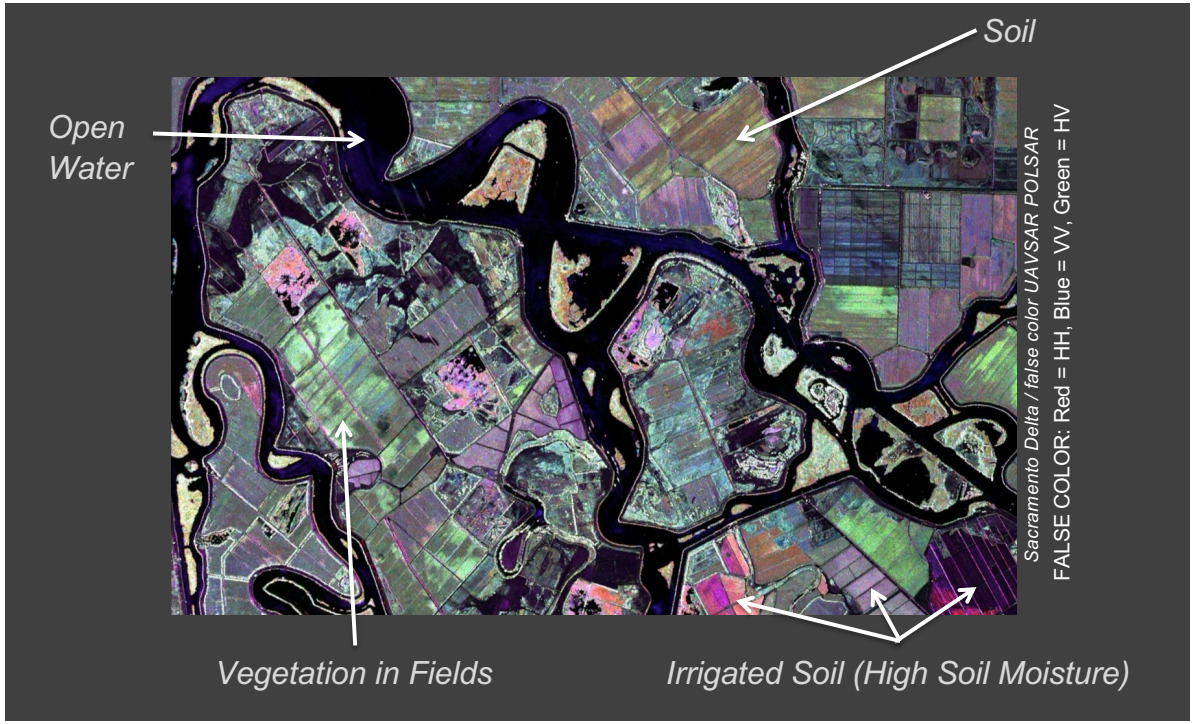
Geohazards
Agriculture
Hydrology
Subsidence
Infrastructure
Permafrost
Ecosystems
Natural Resources
Disaster Management

Agriculture & Soil Moisture

NISAR will provide maps of land use/land cover on a global basis every two weeks. Observations will be uninterrupted by weather and provide up-to-date information on the large-scale trends that affect food security and safety of life and property.



Photos (top-to-bottom): Flickr, CC BY-NC 2.0: Kimberly Reinhart, Jason & Kris Carter, fishhawk, Eric Baker,

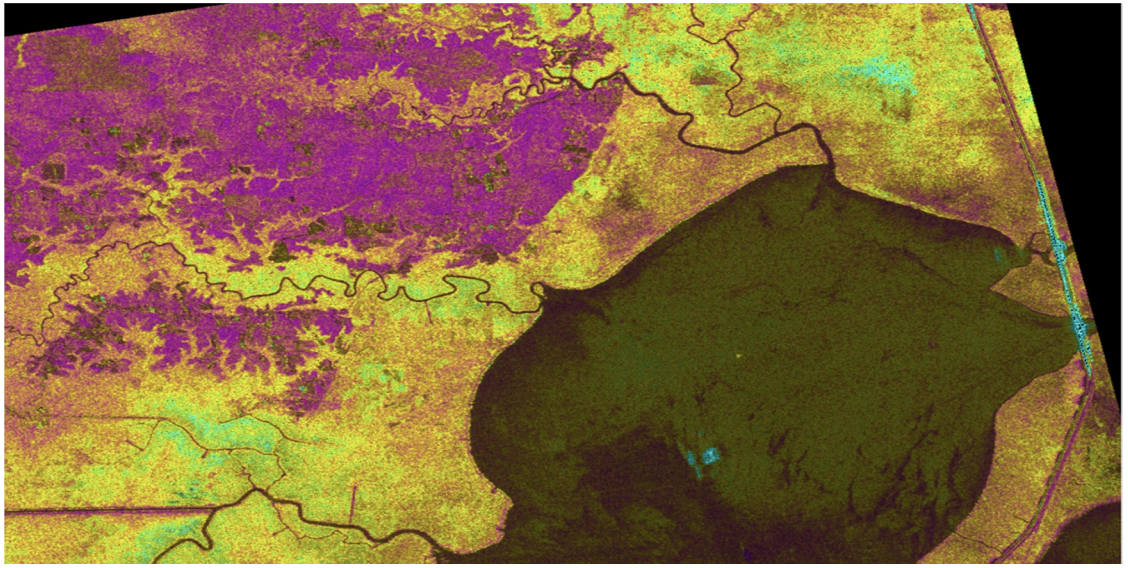


NISAR

Maps of Flooding

NISAR will be able to map flooding events across the globe twice every 12 days. Observations will be uninterrupted by clouds and can provide timely information for flood responders. Even flooding hidden beneath forest canopies will be visible.

Dual polarization radar image of the Maurepas Lake and surrounding swamp in Louisiana. This image was acquired from space by the Japanese ALOS-2 L-band Radar. In this false color image, yellow areas are flooded Cypress Tupelo swamp, pink are unflooded areas, orange areas are degraded swamp marshes, and dark areas are open water. Image (c) JAXA 2016.



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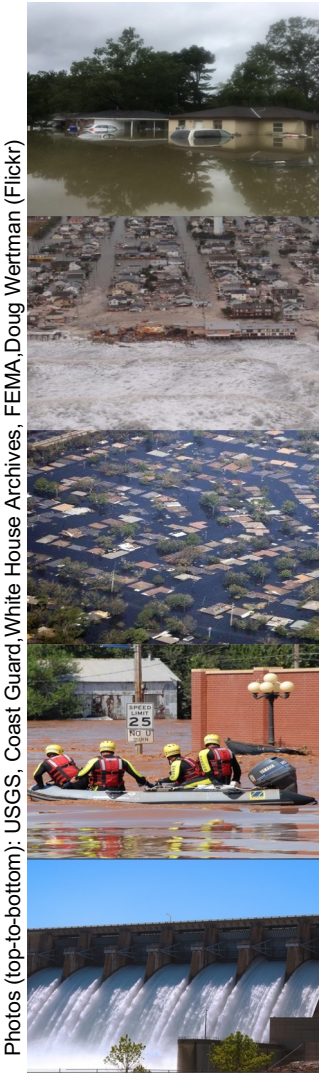


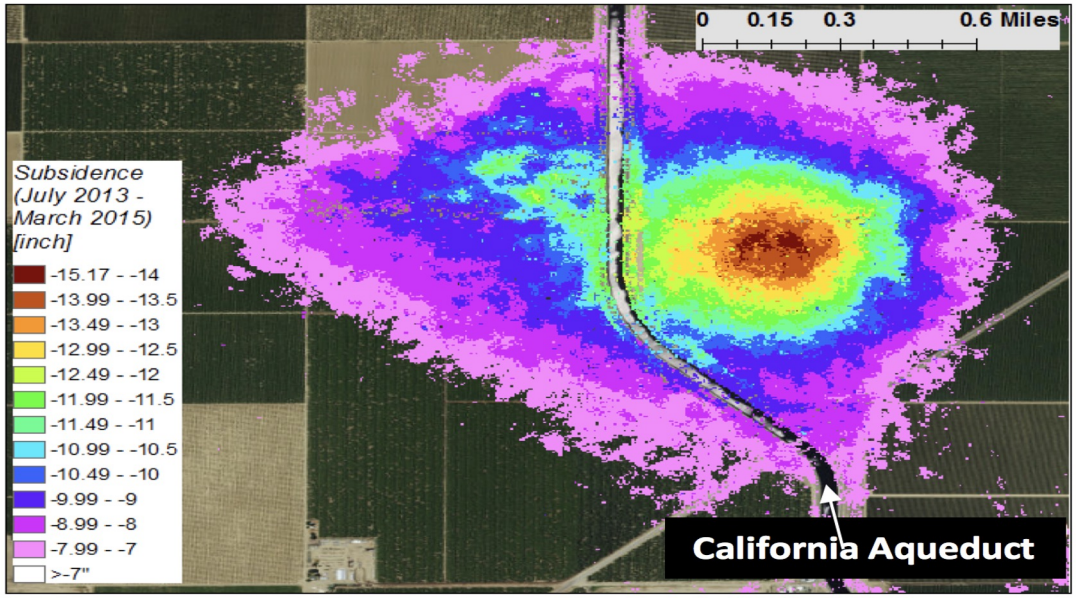
Photos (top-to-bottom): USGS, Coast Guard,White House Archives, FEMA,Doug Wertman (Flickr)

Subsidence & Groundwater Withdrawal

Photos (top-to-bottom): Ca. Dept. of Water Resources, Ca. Dept. of Water Resources, USGS, Va. Water

Droughts are becoming more common, extensive, and long-lasting. They reduce the amount of surface water that is captured and available for use, which results in more groundwater withdrawal. This can cause ground subsidence potentially impacting infrastructure and even exacerbate future flooding in the very areas hardest hit by the drought.

SAR-derived map of ground subsidence in the Central Valley, California, associated with groundwater pumping [Farr et al., 2015].



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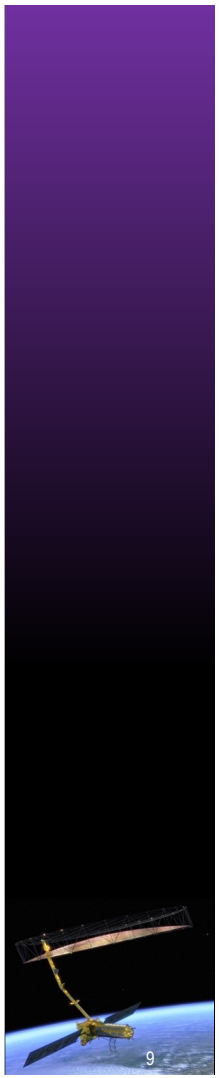
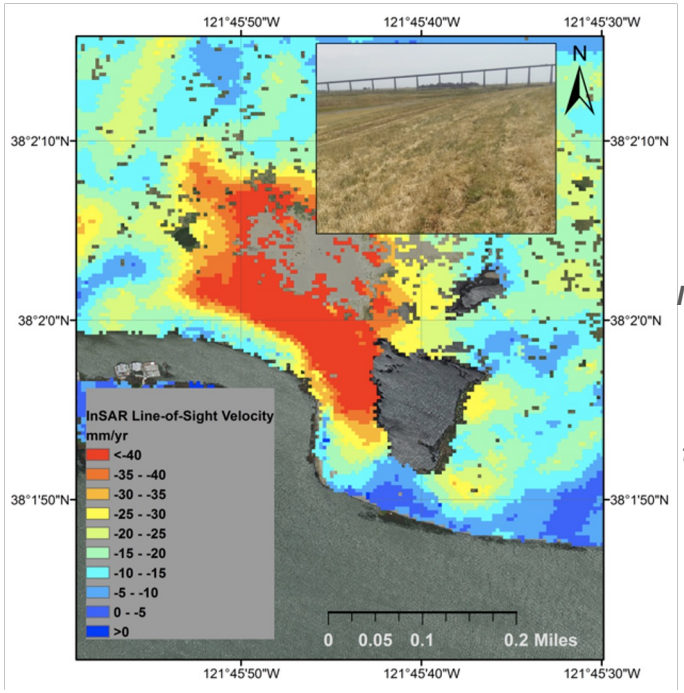


Levees and Dams

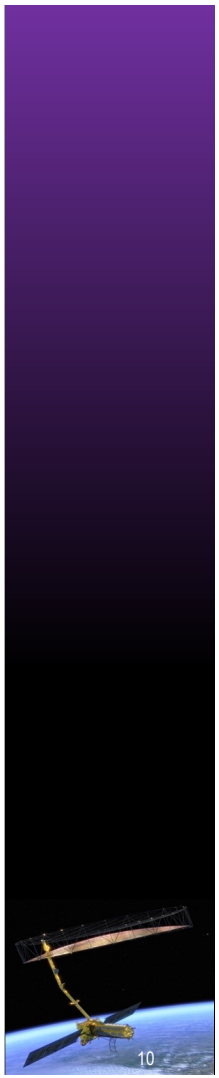
A vast network of dams and levees protect communities throughout the U.S. from floods. Maintaining these structures is absolutely critical and requires constant vigilance. Radar remote sensing with NISAR can provide early warning of movement and seepage in time to prevent disaster.

Photos (top-to-bottom): NOAA, Texas A&M Forest Service, NOAA, FEMA, Tom Fisk (Pexels)



Map showing rate of ground movement along one of the levees that prevents flooding of an island in the Sacramento-San Joaquin Delta [Deverel et al., 2016]. The inset photo shows a view looking east towards the area of most rapid movement.

NISAR

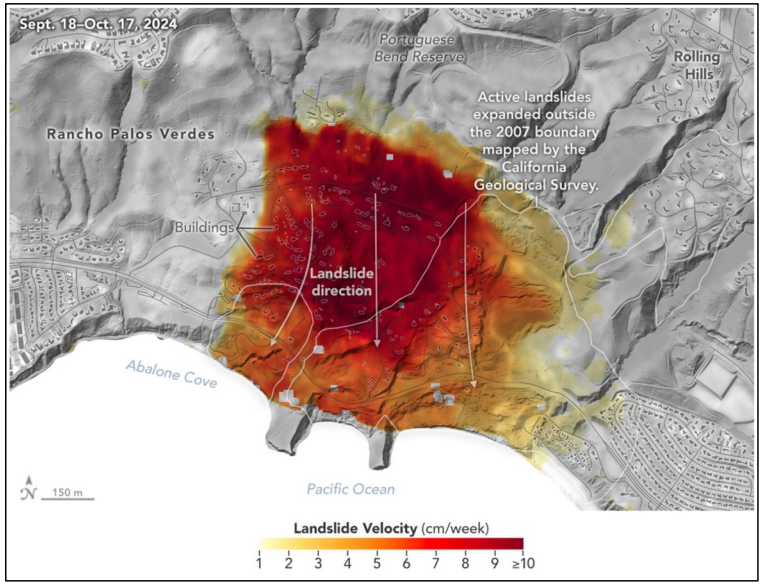


Landslide Hazards

Landslides and other geologic hazards kill dozens of people and cause several billion dollars of damage every year in the United States. Landslides can also cause significant environmental damage and societal disruption. NISAR will enable detection of slow-moving landslides, so damage can be avoided, and potentially provide forewarning of rapid landslides prior to their catastrophic failure.

Photos (top-to-bottom): USGS, USGS, USGS, USGS, NOAA, FEMA

The City of Rancho Palos Verdes used JPL/UAVSAR SAR data to communicate landslide risk impacting residents after heavy rain



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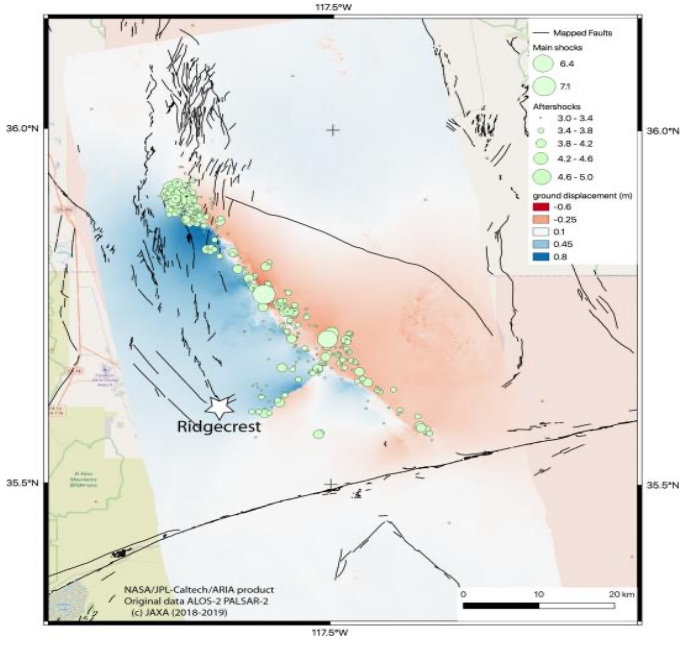
Earthquakes

Photos: USGS

NISAR can provide measurements of ground deformation along faults sometimes before an earthquake occurs, then from the earthquake itself and in the time following. This is all key information for understanding where and why earthquakes occur. The before-to-after images will support emergency response and recovery.



Radar-derived map of ground movement near Ridgecrest, California, following magnitude 6.4 and 7.1 earthquakes in July 2019. Areas west of the main fault rupture (blue) moved northwest while areas east of the fault (red) moved southeast. Black lines show mapped faults.

Ross et al., Science, 2019
Fielding et al., Seismological Res. Lett, 2020

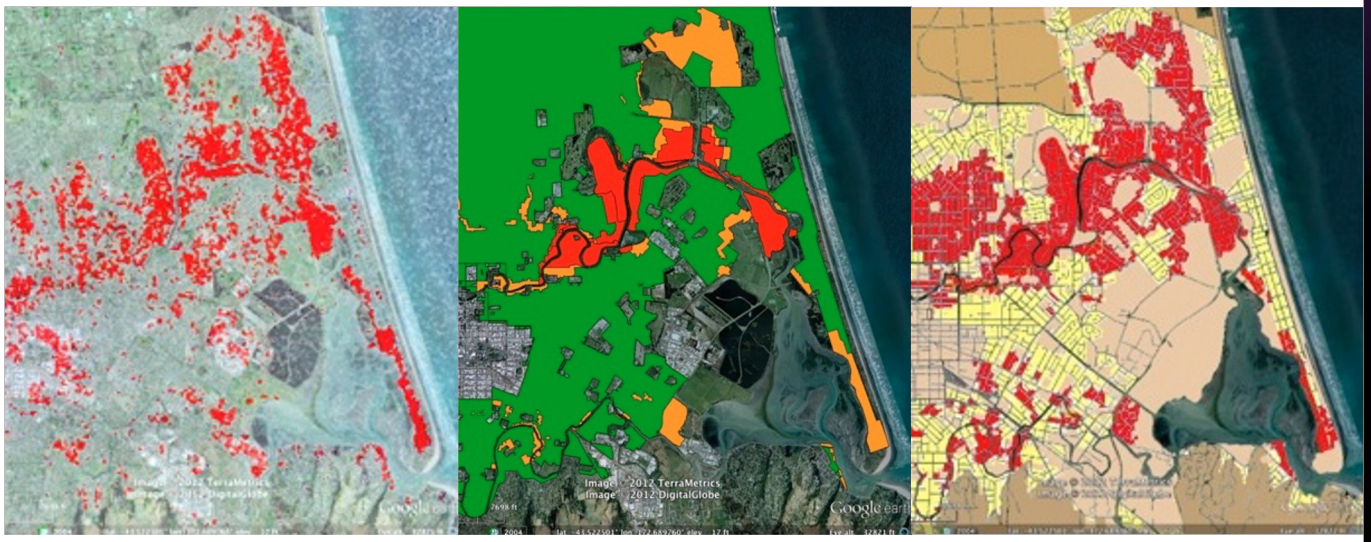
NISAR

Rapid Damage Assessment

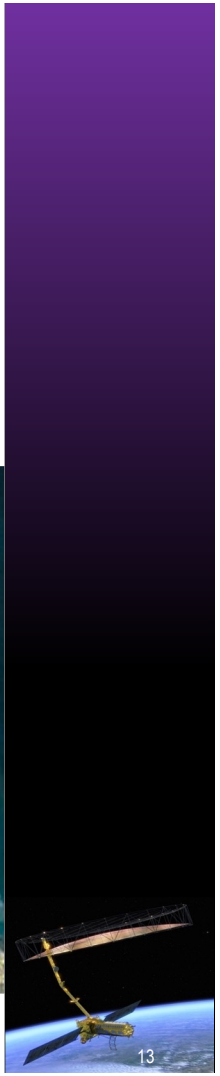
Within hours to days of natural disasters like major earthquakes, hurricanes, tsunamis, and landslides, the NISAR satellite mission can provide maps of the damage that occurred.

The left panel shows a damage proxy map derived from radar data acquired three days after the M7 Christchurch earthquake by the Japanese ALOS satellite. Four months after the earthquake, the New Zealand government released the first version of damage zone map (middle panel) based on ground observations by hundreds of geotechnical engineers. Eight months after the earthquake, an updated version of the government damage map was released (right panel). [Yun et al., SRL, 2015]

Photos (top-to-bottom): NASA, MAXAR NextView License, 2020, USGS, USGS, US DOT



NISAR



Photos: NOAA

Oil Spills

Emergency responders protect people and the environment from hundreds of oil and chemical spills every year. Rapid identification of oil slicks along coastlines and in the open ocean is key to minimizing damage from oil spills. Radar remote sensing, which can image through clouds, provides all-weather information for this job, day or night.

Synthetic aperture radar (SAR) image of oil from the Deepwater Horizon spill near the Louisiana coast, June 2010.

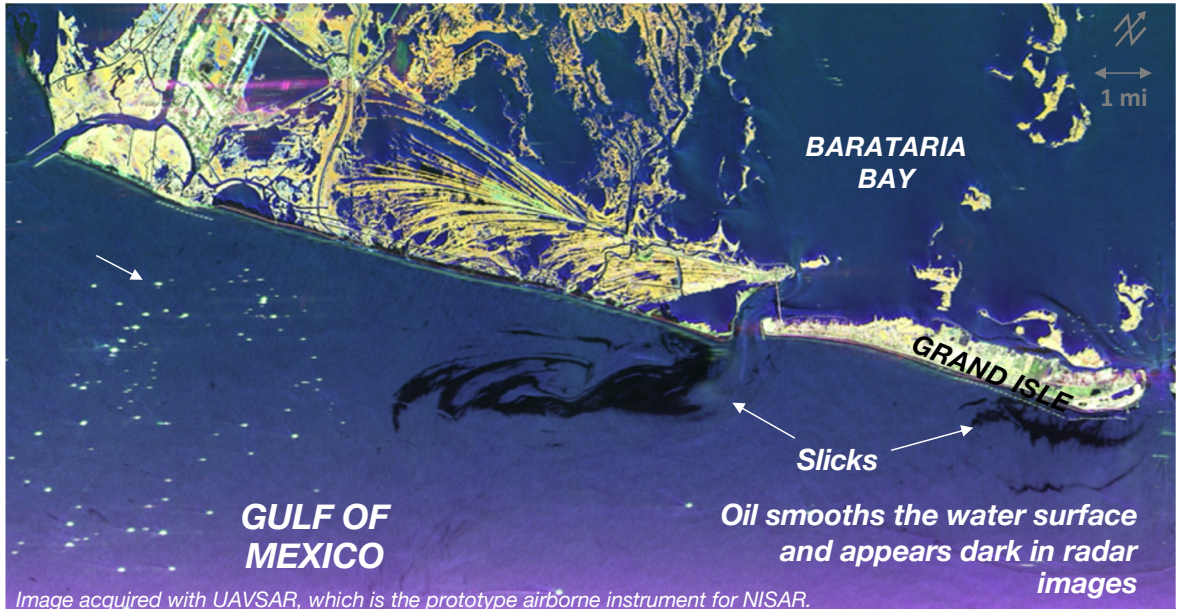


Image acquired with UAVSAR, which is the prototype airborne instrument for NISAR.

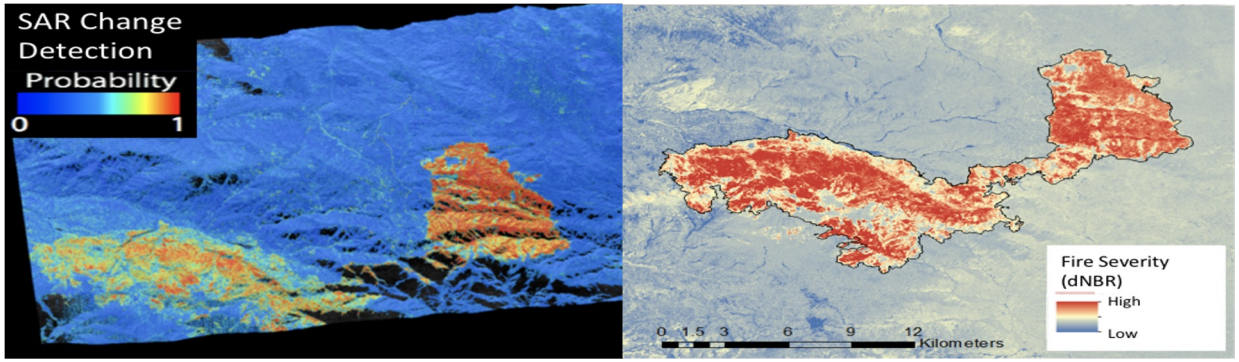
NISAR

Fires

Fires are crucial to many ecosystems, yet often threaten developed urban areas, protected lands and regional air quality. Categorizing fire danger, detecting fires, identifying area burned and quantifying the severity of fires is critical for mitigating the impacts of fire. NISAR mission will address fire management needs through a dependable observing strategy that will collect high resolution synthetic aperture radar (SAR) images over 90% of the Earth's land surfaces throughout the year.

Photos (top-to-bottom): USFS/Mike McMillan, NASA/JPL-Caltech, USDA, Flickr: Lisa, CC BY-NC 2.0, Pixabay

Shown at right is the fire burn scar of the 2015 Lake Fire in San Bernardino National Forest, California. The image on top shows probability of change derived from interferometric radar (InSAR) using 14 pre-event images and one post-fire image from an overpass on June 29, 2015, using the airborne UAVSAR radar instrument, which is a testbed for NISAR. For comparison, the plot shown at right is the differenced Normalized Burn Ratio (dNBR) fire severity map obtained from Landsat. The radar is able to identify the more severely burned areas.

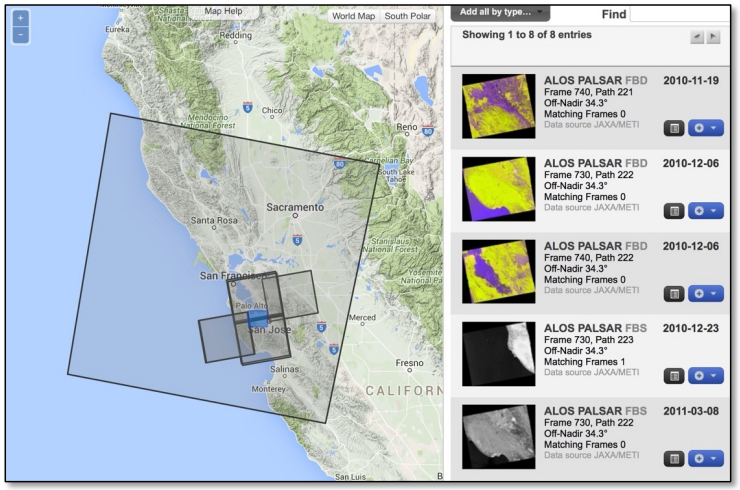


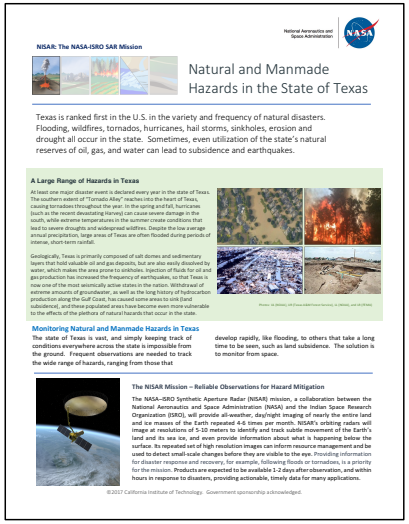
NISAR

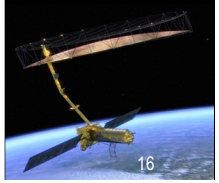
Access More Information

- Alaska Satellite Facility (ASF; asf.alaska.edu) and Earthdata (earthdata.nasa.gov) have facilities to interactively explore and download data.
- Educational resources and computational envrionments available via these websites.

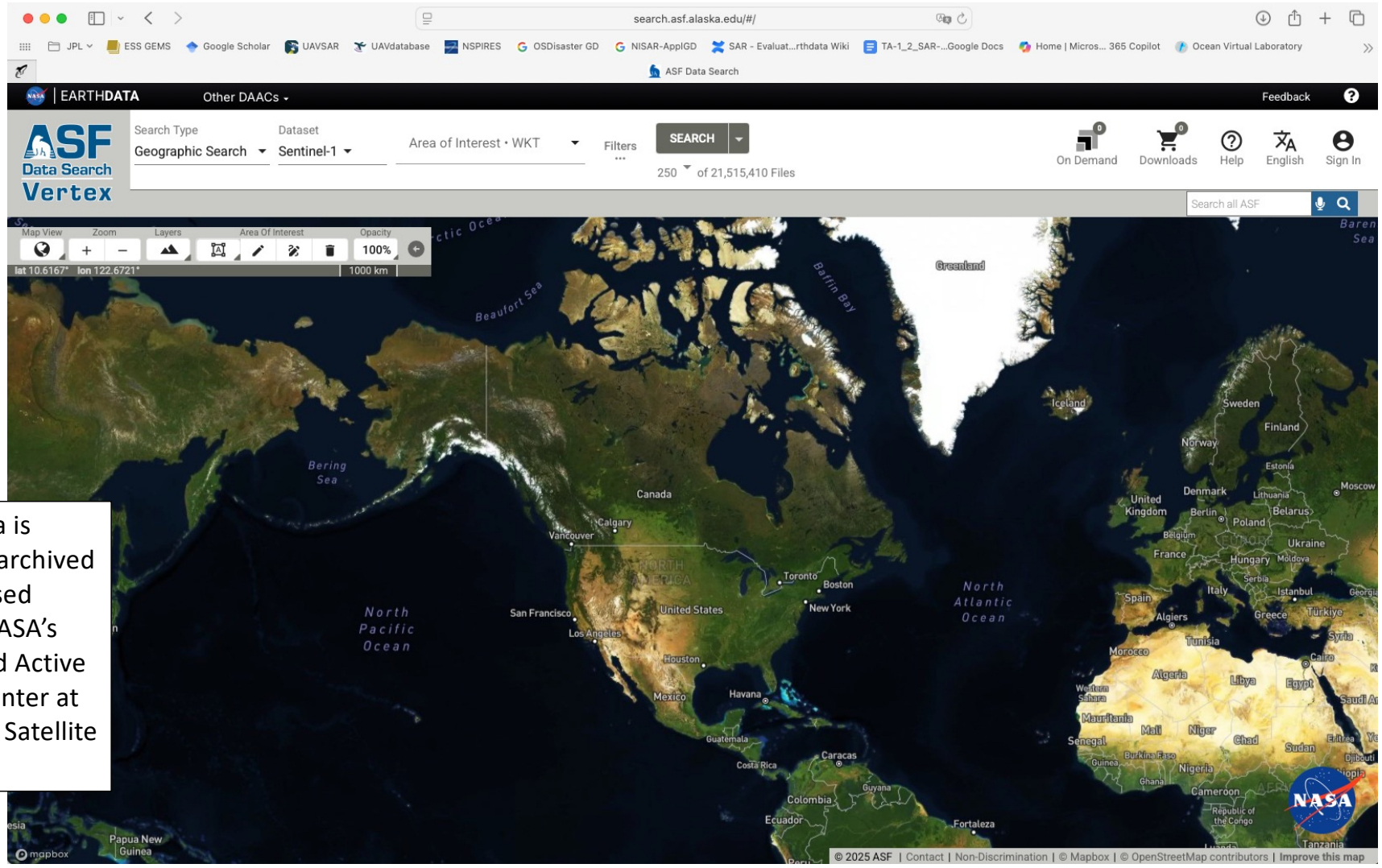
- NISAR resources for learning and exploring applications (nisar.jpl.nasa.gov)
- White papers - 1-page flyers with information about specific applications (science.nasa.gov/mission/nisar/documents/)





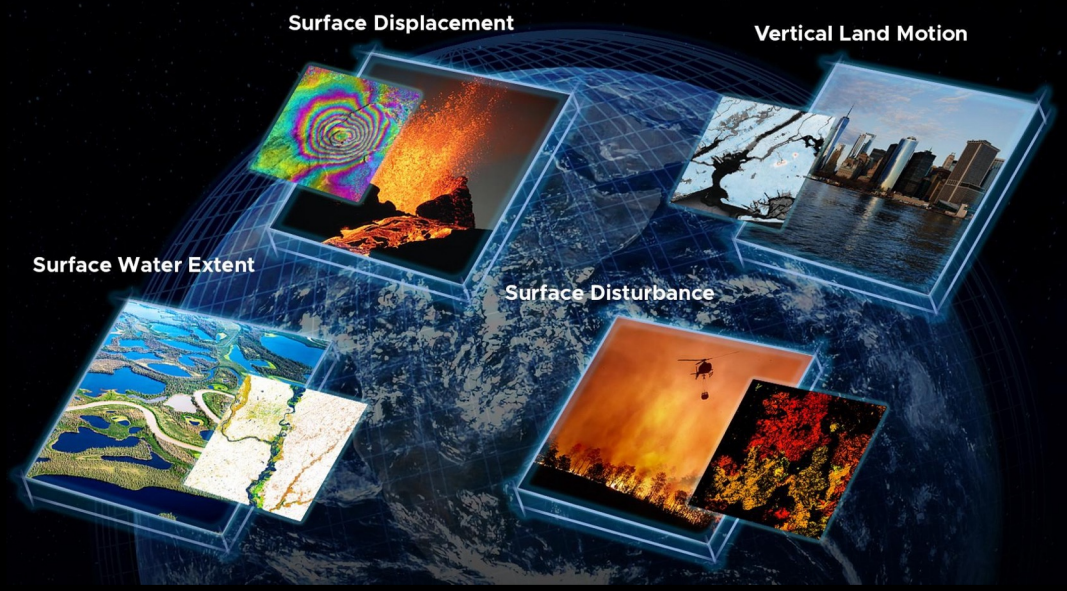


NISAR data is currently archived and accessed through NASA's Distributed Active Archive Center at the Alaska Satellite Facility



OPERA Enabling End-Users to Take Action

Observation Products for End-users from Remote Sensing Analysis



- Four product suites:
  - Surface Water Extent (DSWx) ✅
  - Surface Disturbance (DIST) ✅
  - Surface Displacement (DISP) ✅
  - Vertical Land Motion (VLM) 2028
- Up to 30-meter resolution
- N. America to near-global coverage
- GIS Friendly, Analysis Ready Data Products

OPERA has developed a scalable production model that goes beyond a single mission (Landsat 8/9, Sentinel-1/2, NISAR) to create ready-to-use data products

NISAR
Take Home Messages

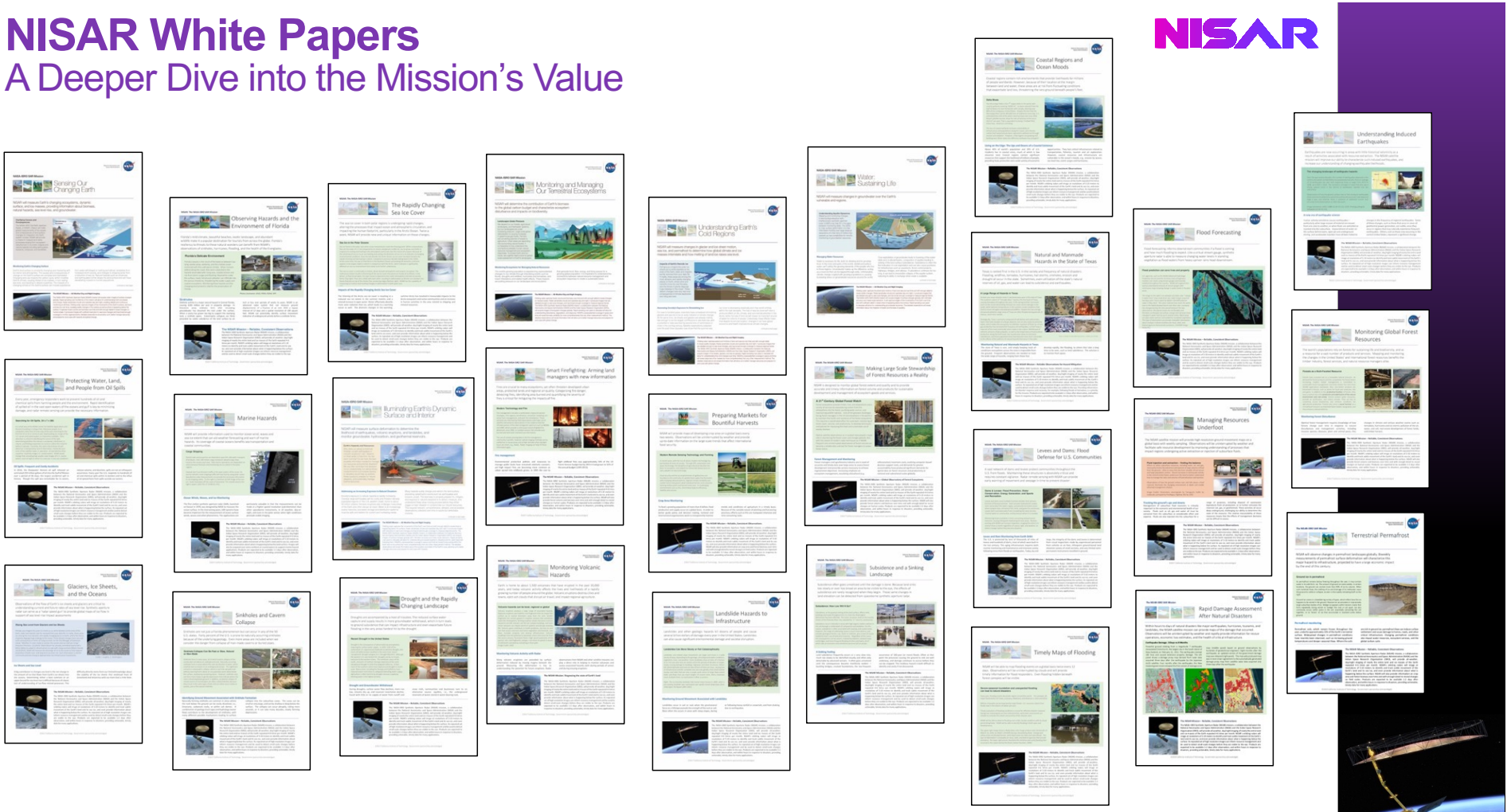
- The NISAR mission launched on July 30, 2025 & is in commissioning now
- NISAR's data is relevant to numerous issues re. land, hydrology, water
- Data will be publicly available ~November 2025 (delayed to later because of gov't shutdown)
- Mapping resolution is 10 m (32') for North America and 20 m (65') globally
- 240 km (~150 mi) swath, collected over all land surfaces, globally, two times every 12 days
- The volume of the data will be large (35 Tb/day), which presents both a challenge and opportunity

- Opportunity: NISAR will create new pathways to support decision making on critical issues facing the western U.S. Data like NISAR's have not been available before for this purpose.

- Challenge: Working with large data sets, continually updated, will push data to and algorithms to be executed in the computing cloud.

NISAR White Papers

A Deeper Dive into the Mission's Value



C. E. Jones – NISAR Applications Lead

https://science.nasa.gov/mission/nisar/societal-benefits/

Western States Water Council, Sept. 2025