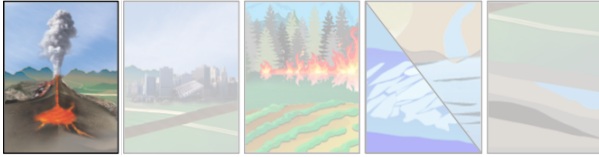**NISAR: The NASA-ISRO SAR Mission**

Timely Maps of Flooding

NISAR will be able to map flooding events on a global basis twice every 12 days. Observations will be uninterrupted by clouds and will provide timely information for flood responders. Even flooding hidden beneath forest canopies will be visible.

Severe seasonal inundation and unexpected flooding can lead to natural disasters

Every year, flooding events devastate regions around the world.   For example, 18 major flood events hit Texas, Louisiana, Oklahoma, and Arkansas in 2015 and 2016.

Millions of people can be impacted by major floods. U.S. insurance claims from floods total in the billions of dollars per year.

Timely evaluation of flooding conditions is crucial for effective disaster response. Saving lives and property are the initial priorities, while later assessments are needed to evaluate the extent and severity of the disaster zone.

NISAR will be able to observe flooding even under cloudy conditions with its cloud penetrating Radar. NISAR will be able to identify flooding in both open and forested areas.

The upper right image shows a Radar false color image product near Farmerville LA (March 13, 2016, by NASA's UAVSAR) during a devastating flood. Orange and yellow areas are flooded forests, while black areas are lakes and open floods. This type of information is invaluable for local, state, and federal agencies that provide assistance. The lower right picture illustrates the immense and costly flooding that occurred in this region during this flood. (James Fountain, USGS)
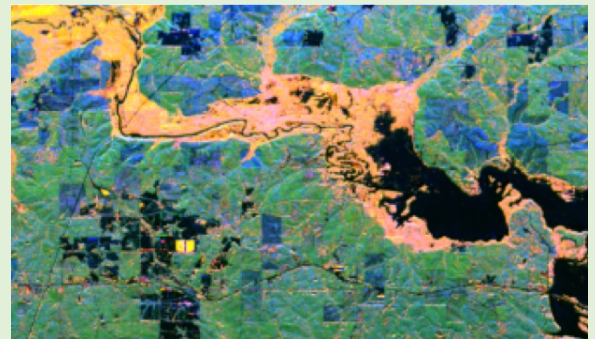
The NISAR Mission – Reliable, Consistent Observations

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 all-weather, day/night imaging of nearly the entire land and ice masses of the Earth repeated 4-6 times per month. NISAR's orbiting radars will image at resolutions of 5-10 meters to identify and track subtle movement of the Earth's land and its sea ice, and even provide information about what is happening below the surface. Its repeated set of high resolution images can inform resource management and be used to detect small-scale changes before they are visible to the eye. 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.

Among the organizations that respond to flooding disasters are state and local agencies, as well as federal agencies, such as Federal Emergency Management Agency (FEMA), the National Oceanic and Atmospheric Administration (NOAA), and the United States Geological Survey (USGS). International aid in the event of natural disasters caused by flooding often includes data sharing arrangements to help our allies respond to the humanitarian crises that flooding can cause. During natural disasters, these first responders often look to NASA to provide timely and valuable information to assist their work to mitigate damage and assess destruction by these common tragic events.

Many federal agencies and university researchers that study wetlands have difficulty evaluating the health of our waterways and wetlands due to lack of information regarding the ebb and flow of flood waters during normal and extreme seasonal inundation. Radar instruments such as NISAR are known for their ability to penetrate through clouds and vegetation, and their day/night imaging capability. NISAR imagery will provide near weekly observations that complement optical data, imaging through clouds and below the canopy. This capability makes NISAR's imaging of wetland areas valuable to management authorities, scientists, and local planning agencies.

NISAR can meet the diverse needs of the community responding to floods and maintaining waterways through its dependable observing strategy that will collect high resolution data over 90% of the Earth's land surface. The use of actively generated microwave signals (L- and S-band, or equivalently 24 cm and 10 cm wavelength) by the satellite means that observations can be reliably planned, collected, and distributed. NISAR will provide invaluable new and independent information regarding flooding events in disaster scenarios, as well as data to develop unique seasonal evaluations of wetland dynamics.

Monitoring Inundation with Radar

Monitoring inundation of marshes, swamps or other flooded areas is not an easy task: on the ground, these areas can be treacherously difficult to navigate, while from above, vegetation, clouds, and weather can make the water difficult to observe. But the extent and duration of inundation has a heavy influence on fish and other wildlife habitats, vegetation health, and other important parameters of ecosystem health.

NISAR will allow uniquely detailed monitoring of the seasonal ebb and flow of flood waters in the Earth's wetland areas.

The NISAR all-weather and forest-penetrating radar can detect not only the open water areas, but also the areas where trees are surrounded by water. The unprecedented NISAR observing capability can provide this measurement twice every 12 days for the duration of the mission for the entire globe.
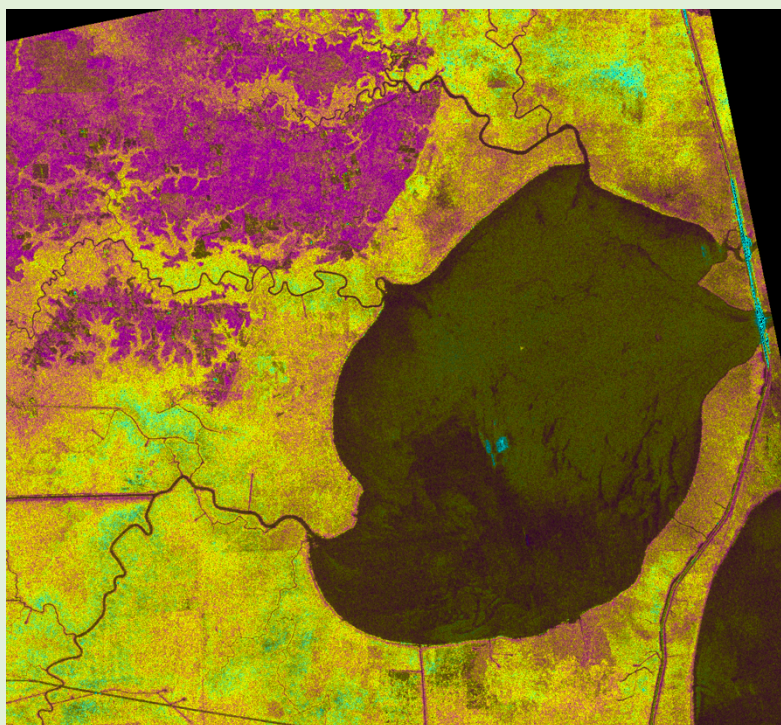
Dual polarization radar image of the Maurepas Lake and surrounding swamp in Louisiana. This image was acquired from space by the Japanese ALOS-2 L-band Radar. In this false color image, yellow areas are flooded Cypress Tupelo swamp, pink are unflooded areas, orange areas are degraded swamp marshes, and dark areas are open water. Image (c) JAXA 2016.

National Aeronautics and Space Administration

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

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