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ARIA DISASTER RESPONSE ALGORITHMS, SYSTEMS, AND PRODUCTS

Abstract

The Advanced Rapid Imaging Analysis (ARIA) team at NASA's Jet Propulsion Laboratory and California Institute of Technology, in collaboration with the Earth Observatory of Singapore, is developing algorithms and systems for rapid and automatic generation of damage and flood extent maps using satellite Synthetic Aperture Radar (SAR) observations. Following major earthquakes, hurricanes, wildfires, volcanic eruptions, and floods, our semi-automatically generated maps were delivered to and used by responding agencies around the world. Here we showcase some recent damage and flood maps created with our state-of-the-art algorithms and systems. Our cloud-based system enables a timely implementation of our computationally expensive multi-temporal SAR analyses.

In response to the M6.4 January 7, 2020 earthquake in Puerto Rico, we were able to implement our multi-temporal analysis algorithm and rapidly produce damage maps using SAR data acquired by the Copernicus Sentinel-1 satellites, operated by the European Space Agency. The maps were quickly shared with FEMA, the USGS, the US Air Force, and the US Army Corps of Engineers. Also, for the first time in response mode, we used multi-temporal analysis of SAR amplitude data to generate a flood extent map of the flash flooding in Jakarta, Indonesia, caused by heavy rains. The map, derived from Sentinel-1 SAR data acquired before and during the flooding on January 2, 2020, was rapidly calibrated using crowdsourced ground observations collected by PetaBencana.id. The map was delivered to the AHA Centre (ASEAN Coordinating Centre for Humanitarian Assistance on Disaster Management) for assessing the number of affected people and supply needs.