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Automatic near-real-time flood detection using Suomi-NPP/VIIRS data

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Near real-time satellite-derived flood maps are invaluable to river forecasters and decision-makers for disaster monitoring and relief efforts. With the support from the JPSS (Joint-Polar Satellite System) Proving Ground and Risk Reduction Program (JPSS/PGRR), a flood detection package has been developed using SNPP/VIIRS (Suomi National Polar-orbiting Partnership/ Visible Infrared Imaging Radiometer Suite) imagery to generate daily near real-time flood maps automatically for National Weather Service (NWS)-River Forecast Centers (RFC) in the USA. In this package, a series of algorithms have been developed including water detection, cloud shadow removal, terrain shadow removal, minor flood detection, water fraction retrieval and flooding water determination. The package has been running routinely with the direct broadcast SNPP/VIIRS data since 2014. Flood maps were carefully evaluated by river forecasters using airborne imagery and hydraulic observations. Offline validation was also made via visual inspection with VIIRS false-color composite images on more than 10,000 granules across a variety of scenes and comparison with river gauge observations year-round and NOAA flood outlook and warning products. Evaluation of the product has shown high accuracy, and the promising performance of the package has won positive feedback and recognition from end-users.

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STEREO as a "Planetary Hazards" mission

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ASA's twin STEREO probes, launched in 2006, have advanced the art and science of space weather forecasting more than any other spacecraft or solar observatory. By surrounding the Sun, they provide previously-impossible early warnings of threats approaching Earth as they develop on the solar far side. They have also revealed the 3D shape and inner structure of CMEs—massive solar storms that can trigger geomagnetic storms when they collide with Earth. This improves the ability of forecasters to anticipate the timing and severity of such events. Moreover, the unique capability of STEREO to track CMEs in three dimensions allows forecasters to make predictions for other planets, giving rise to the possibility of interplanetary space weather forecasting too. As human activity expands into the solar system, the need for accurate space weather and space climate forecasting is expanding, too. Space probes are now orbiting or en route for flybys of Mercury, Venus, Earth and the Moon, Mars, Vesta, Ceres, Saturn, and Pluto. Agencies around the World are preparing to send robotic spacecraft into interplanetary space. Each of these missions (plus others on the drawing board) has a unique need to know when a solar storm will pass through its corner of space or how the subsequent solar cycle will behave. Ultimately, astronauts will follow, traveling beyond Earth orbit, and their need for interplanetary space weather and climate forecasting will be even more compelling. STEREO is one of those rare missions for which "planetary hazards" refers to more than one World. The STEREO probes also hold promise for the study of comets and potentially hazardous asteroids.

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