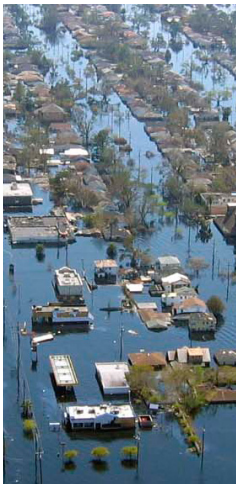
Revised July 2011

GOES-R Land Products
Flood/Standing Water



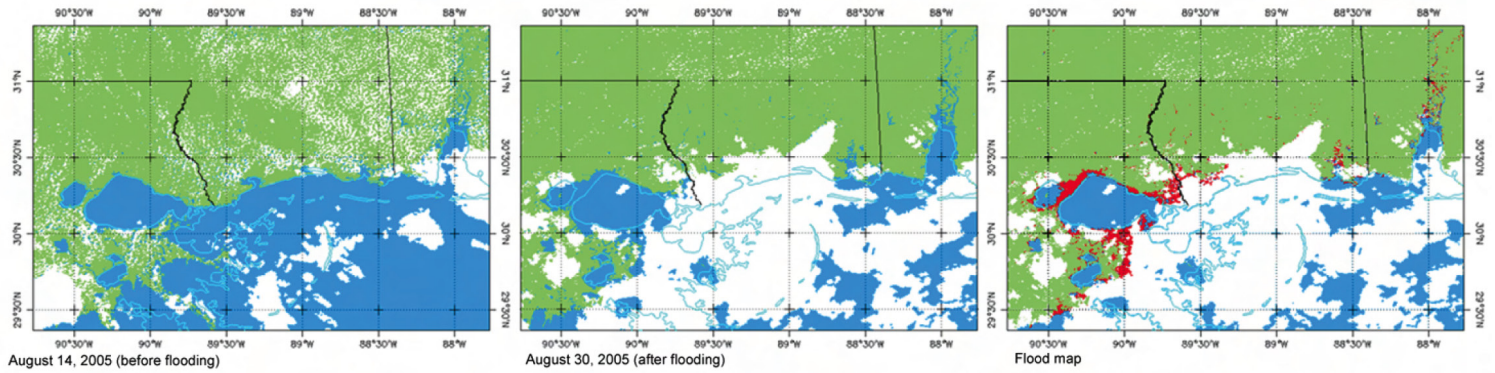
What Is GOES-R?

The Geostationary Operational Environmental Satellite - R Series (GOES-R) is the next generation of National Oceanic and Atmospheric Administration (NOAA) geostationary Earth-observing systems. Superior spacecraft and instrument technology will support expanded detection of environmental phenomena, resulting in more timely and accurate forecasts and warnings. The Advanced Baseline Imager (ABI), a sixteen channel imager with two visible channels, four near-infrared channels, and ten infrared channels, will provide three times more spectral information, four times the spatial resolution, and more than five times faster temporal coverage than the current system. Other advancements over current GOES capabilities include total lightning detection (in-cloud and cloud-to-ground flashes) and mapping from the Geostationary Lightning Mapper (GLM), and increased dynamic range, resolution, and sensitivity in monitoring solar X-ray flux with the Solar UV Imager (SUVI). GOES-R is scheduled for launch in 2015.

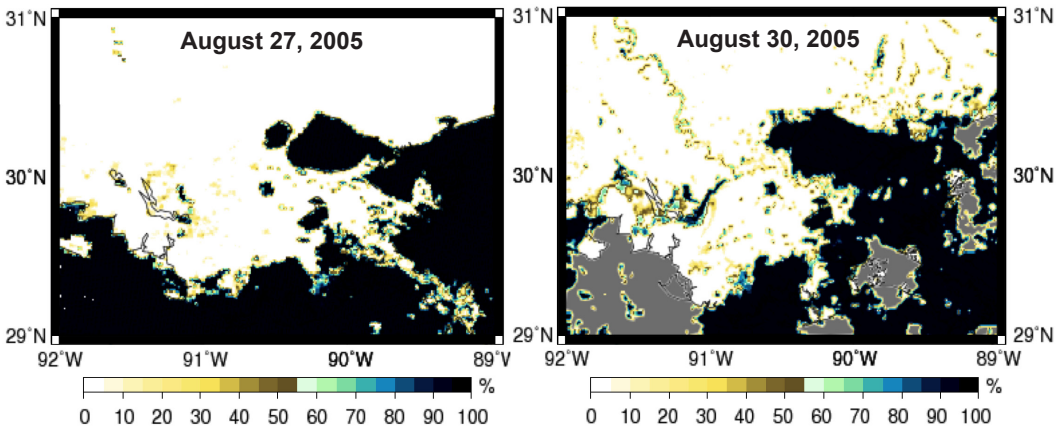
Severe flood in New Orleans in August 2005, caused by Hurricane Katrina. The storm killed more than 1,000 people with total economic damage exceeding $50 billion.

Why Is Flood Detection Important?

A flood is the inundation of a normally dry area caused by an increased water level. There are three types of floods: flash floods caused by rapid rise of water along a stream or low-lying area; river floods caused by excessive rainfall or persistent thunderstorms, combined rainfall and snowmelt, or ice jam; and tropical cyclones. In the long term, floods kill more people in the United States than any other type of severe weather. Floods can damage cars, tear out trees, destroy buildings and bridges, and pose significant threat to human lives. The worst natural disaster in the United States, in terms of loss of life, was caused by a storm surge and associated coastal flooding from the great Galveston, Texas, hurricane of 1900. At least 8,000 people died as a result of that storm. In 2005, Hurricane Katrina caused inundation of New Orleans and more than $50 billion in economic damage. Accurately predicting and monitoring



In August 2005, Hurricane Katrina caused severe flooding in New Orleans, LA. Using proxy satellite data, the GOES-R Flood Detection algorithm generated a flood map (right) based on the differences between the water map after flooding (center) and that before flooding (left). Figures illustrate spatial distributions of water (blue), no water or land (green), cloud (white) and flooding (red) over time.



Right: *Water fraction maps derived from the Decision Tree algorithm for the New Orleans flood case due to Hurricane Katrina in August of 2005.* ***Bottom Right:*** *flood map on August 30, 2005 shown as the water fraction difference between August 30 (after flooding) and August 27 (before flooding).*

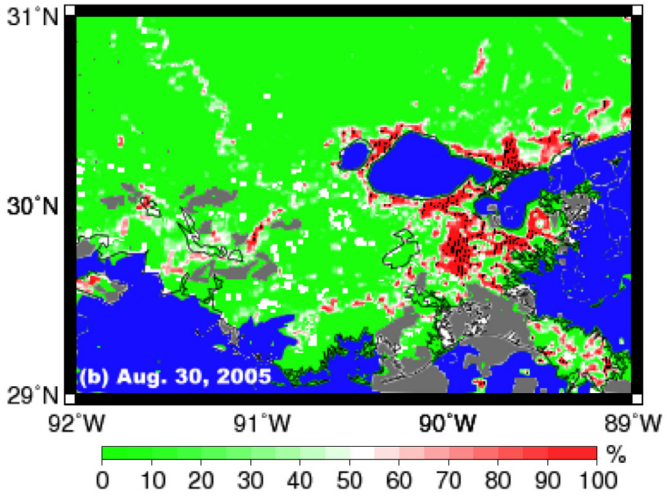
floods is essential for minimizing life and property loss in such disaster events.

How Will GOES-R Address This Hazard?

Flood/Standing Water (FSW) provides basic binary yes/no detection of water accumulation over 5 cm vertical depth as well as estimation of water fraction within a satellite pixel. The **FSW** data is produced every 60 minutes during the daytime, with 30% error tolerance. Spatial resolution of the **FSW** product is 1 km, which is comparable to the resolution of **FSW** products from polar-orbiting satellites.

How Does This Product Work?

The GOES-R ABI receives the land surface visible, near-infrared, and shortwave infrared signals, which are processed into water/land classification and water fraction estimates quantitatively. Cloudless conditions are necessary for such derivation since cloud blocks the visible and infrared signal. Based on the difference of water/land classification and water fraction estimates before and after the flooding, the resulting flood map can be generated. GOES-R will use this information to estimate potential flooding and alert the forecasting and warning community to potential hazards.



What Are the Benefits?

Satellite-derived flood maps in near-real time are an invaluable resource for disaster monitoring and relief efforts. Precise mapping of floods and standing water is crucial for detecting deficiencies in existing flood control and for damage claims. The advanced observational capabilities available from GOES-R will enable forecasters to more accurately recognize flood potential, develop a plan, and be prepared when a threatening flood approaches.

Contributors: Donglian Sun—George Mason University, Yunyue Yu—NOAA/NESDIS

Research and Development Partners for Flood/Standing Water Product

- NOAA National Environmental Satellite, Data, and Information Service, Center for Satellite Applications and Research (NESDIS/STAR)
- George Mason University (GMU), Fairfax, VA
- I. M. System Group, Inc. at Camp Springs, MD

On the Web

http://www.star.nesdis.noaa.gov/smcd/emb/lst/index.php

For More Information, Contact:

GOES-R Program Office
Code 417
NASA Goddard Space Flight Center
Greenbelt, MD 20771
301-286-1355

Jim Gurka, james.gurka@noaa.gov

Steve Goodman, steve.goodman@noaa.gov