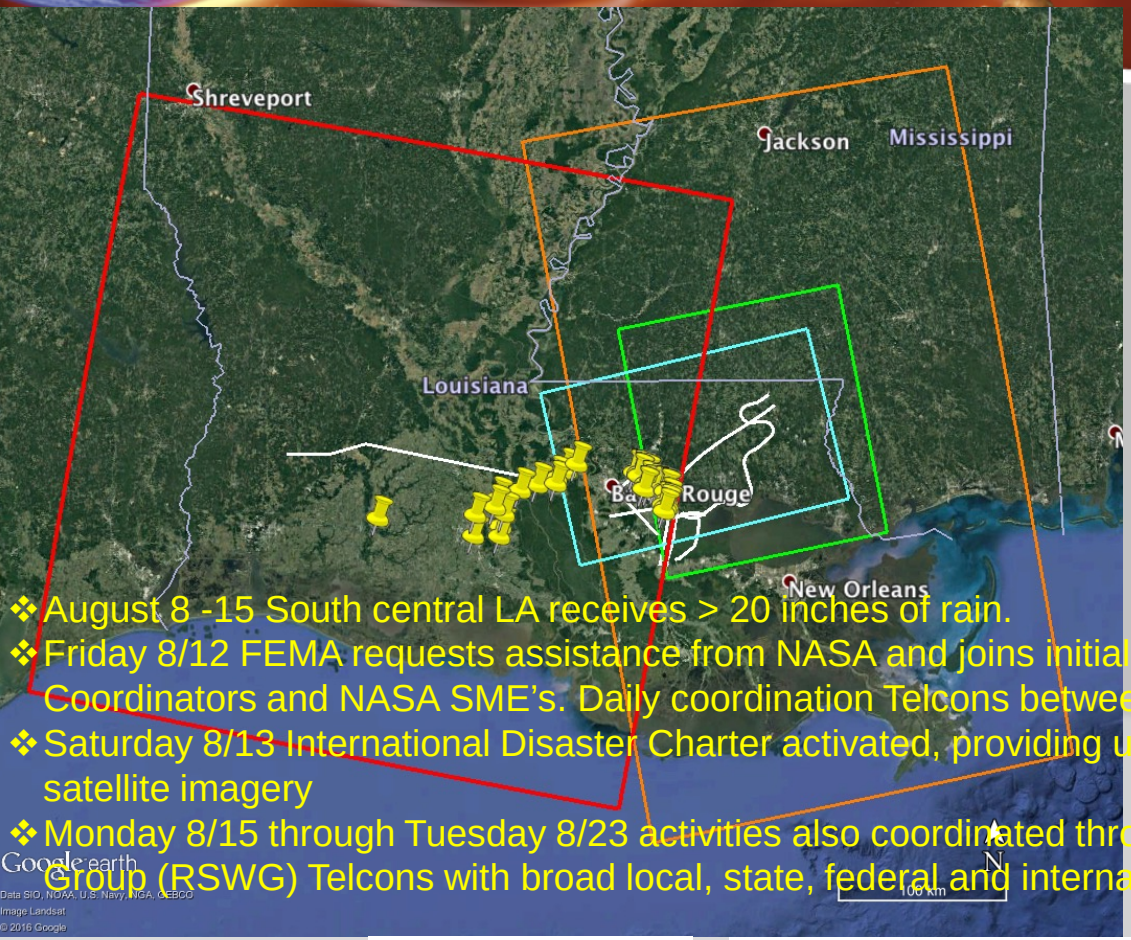
NASA Applied Sciences Disasters Program Support Timeline for Historic Louisiana Floods



FEMA

USGS
science for a changing world

- August 8 -15 South central LA receives > 20 inches of rain.
- Friday 8/12 FEMA requests assistance from NASA and joins initial rapid assessment call with NASA Disaster Coordinators and NASA SME's. Daily coordination Telcons between NASA and FEMA's Geospatial Office begin
- Saturday 8/13 International Disaster Charter activated, providing unprecedented access to SAR data and satellite imagery
- Monday 8/15 through Tuesday 8/23 activities also coordinated through USGS lead Remote Sensing Working Group (RSWG) Telcons with broad local, state, federal and international participation

STATE OF LOUISIANA
UNION · JUSTICE · CONFIDENCE

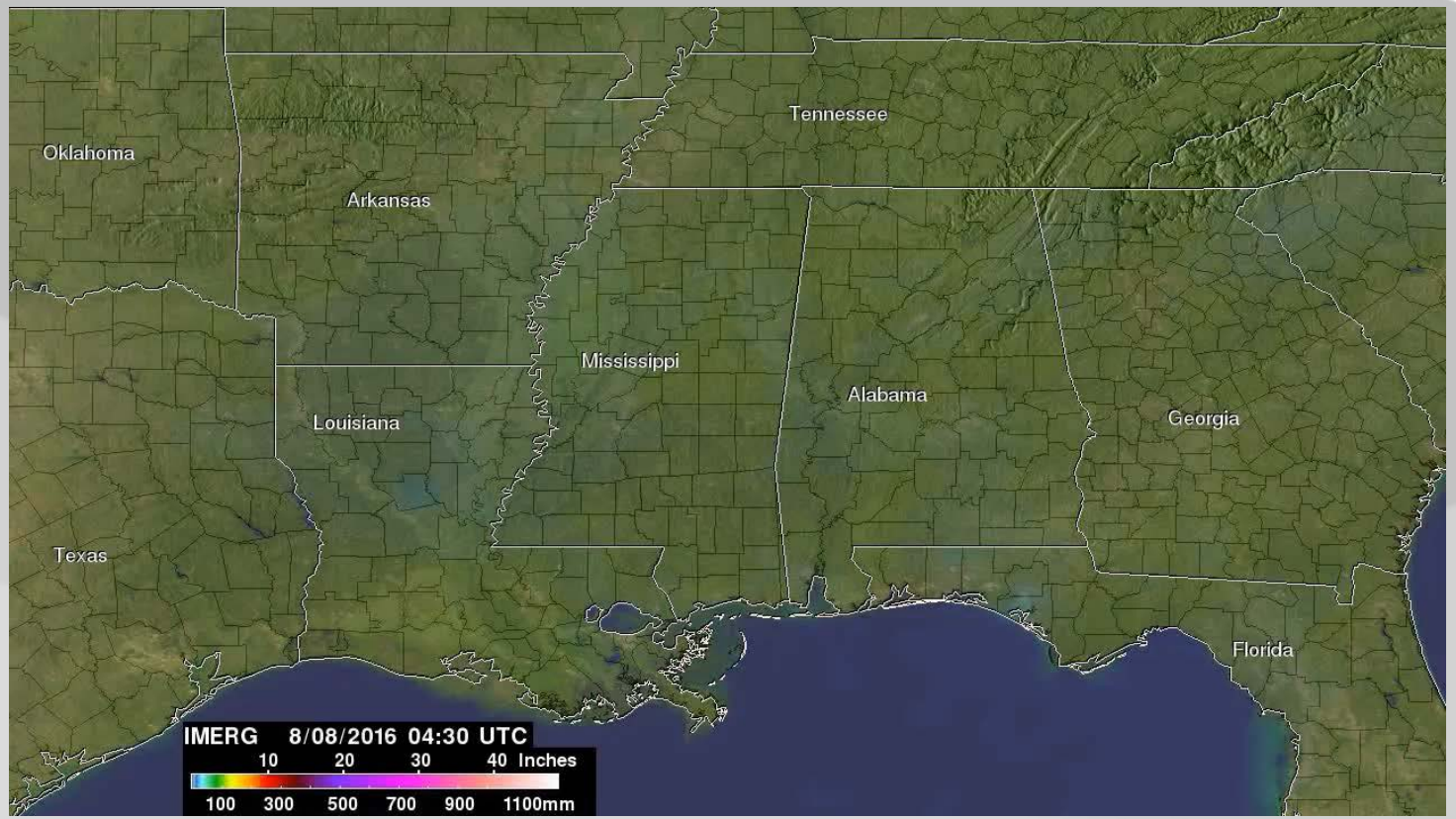
LOUISIANA NATIONAL GUARD
ALWAYS READY ALWAYS THERE

USDA

International Charter Space & Major Disasters
Charte Internationale Espace et Catastrophes Majeures

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NOAA
U.S. DEPARTMENT OF COMMERCE

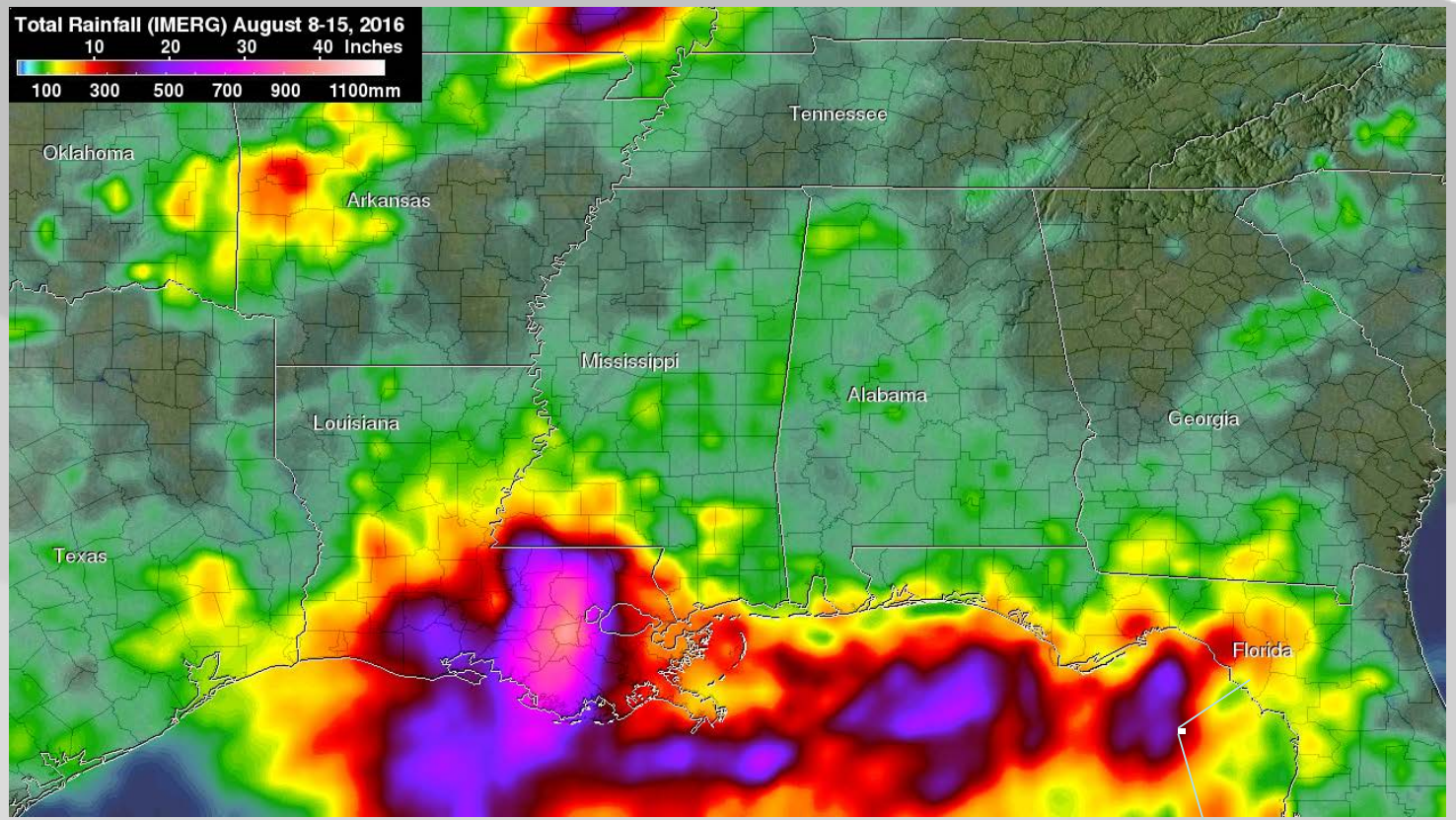
NASA Observes Historic Rainfall in Louisiana



NASA's IMERG data from Aug. 8 to Aug. 15, 2016 showed over 20 inches (508 mm) of rainfall was estimated in large areas of southeastern Louisiana and extreme southern Mississippi. Even greater rainfall totals of 30 inches (762 mm) were indicated in a small area of Louisiana west of Lake Pontchartrain.

Credits: NASA/JAXA, Hal Pierce

NASA Global Precipitation Mission – GPM IMERG



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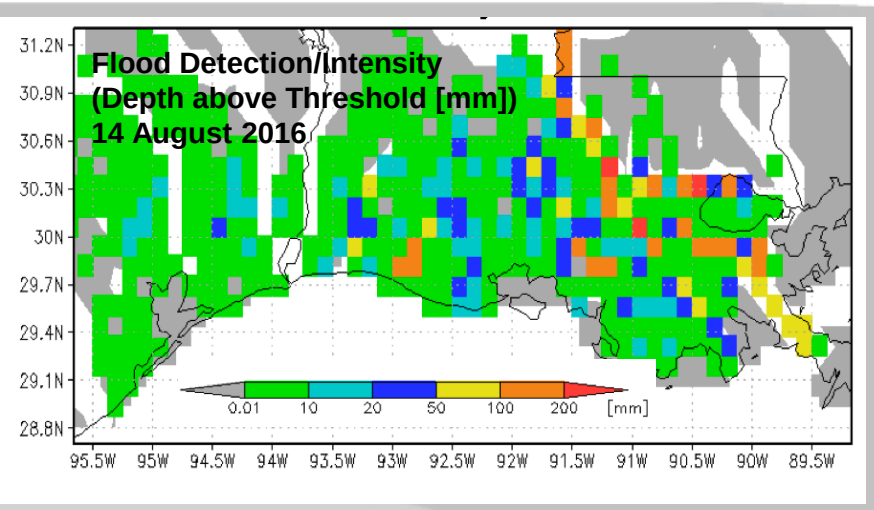
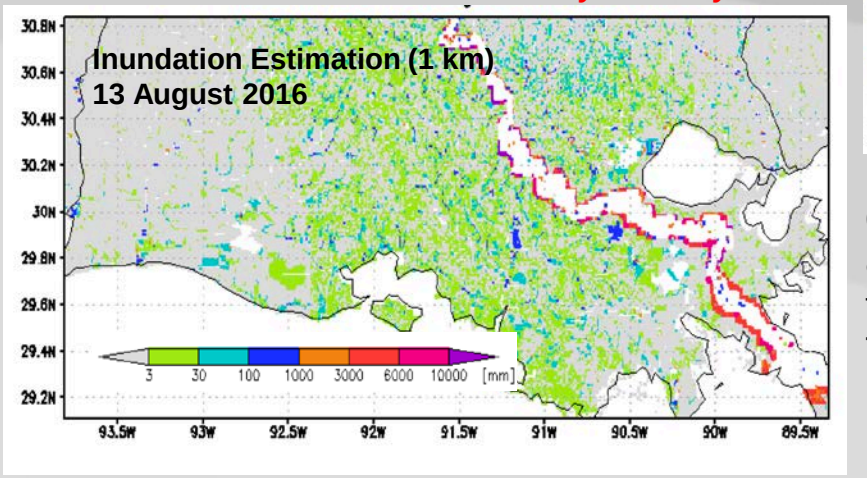
Global Flood Mapping System – GFMS

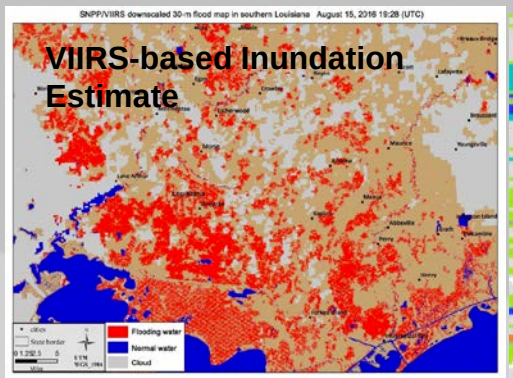


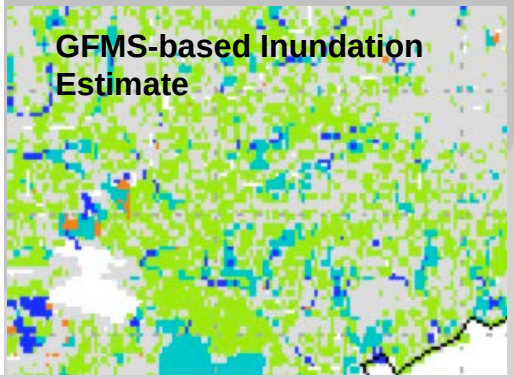
Global Flood Monitoring System (GFMS)
Adler/Wu University of Maryland



Credit: Bob Adler and Huan WU, UMD

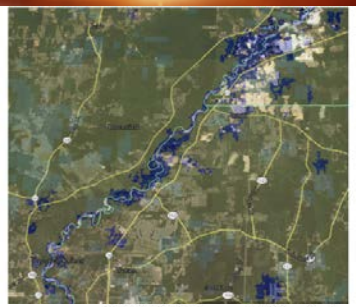
Satellite precipitation estimates merged via the GPM product are utilized as a key Input into the Global Flood Monitoring System (GFMS) utilizing land surface and routing models at 12 and 1 km resolution to estimate the occurrence and intensity of floods. The hydrological calculations are extended into the future (out to five days) using GEOS-5 rainfall predictions.

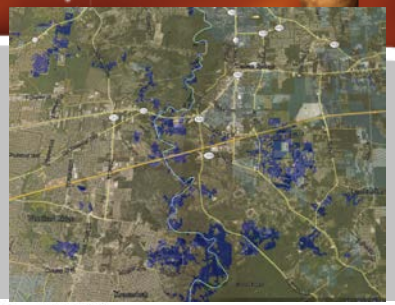




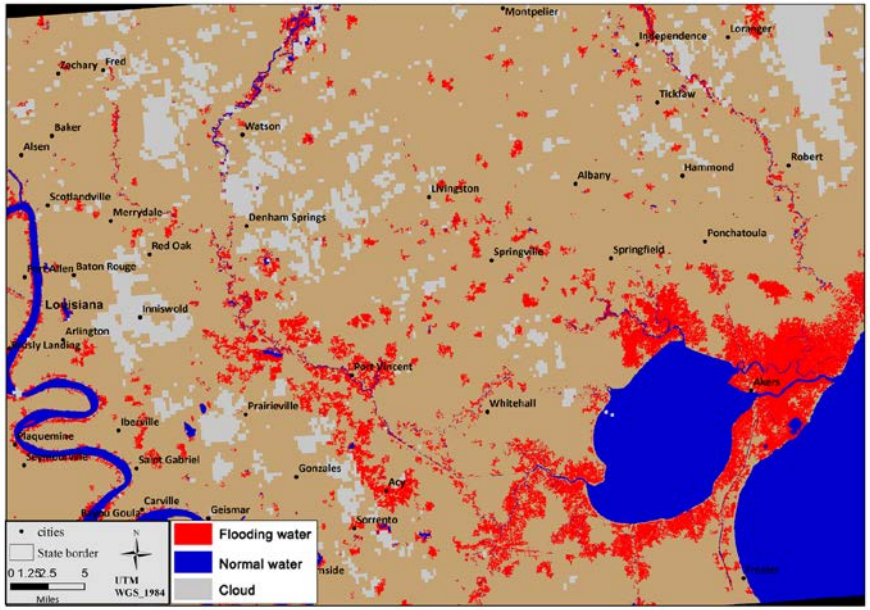
During the Louisiana floods in August GFMS images and data were provided showing large-scale current conditions and forecasts as in upper left image (3-hr resolution). The forecasts were used by FEMA to help plan their response. The 1-km resolution inundation estimates from GFMS (example in lower left) were downloaded by FEMA and used to estimate number of structures and homes impacted. The GFMS inundation estimates were also used to compare with those from optical and SAR data, when available (see above).

NPP Suomi VIIRS Flood Maps

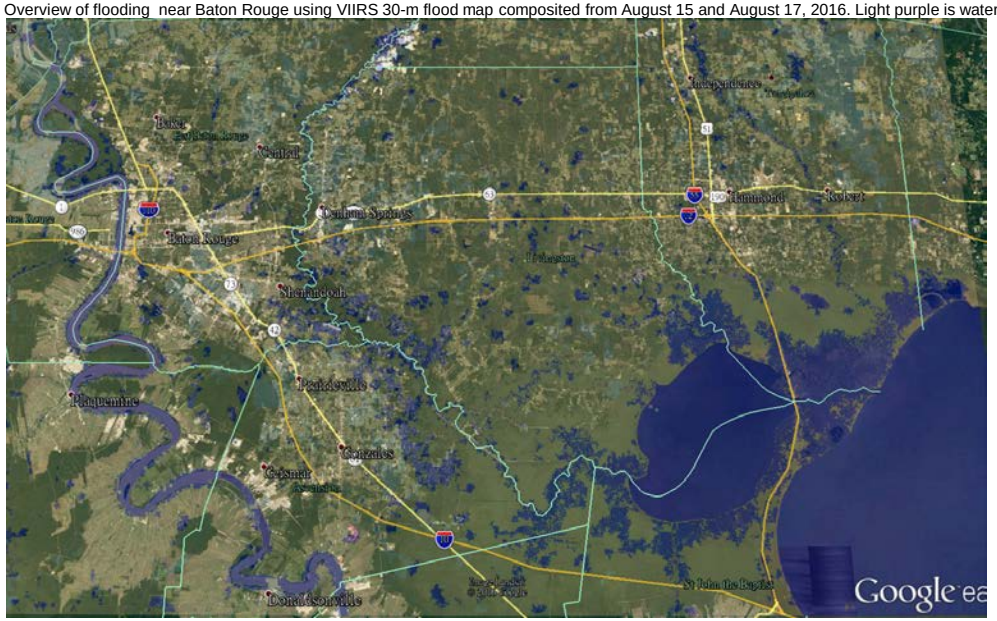




SNPP/VIIRS downscaled 30-m flood map near Baton Rouge, Louisiana August 15 and August 17, 2016



Overview of flooding near Baton Rouge using VIIRS 30-m flood map composited from August 15 and August 17, 2016. Light purple is water.

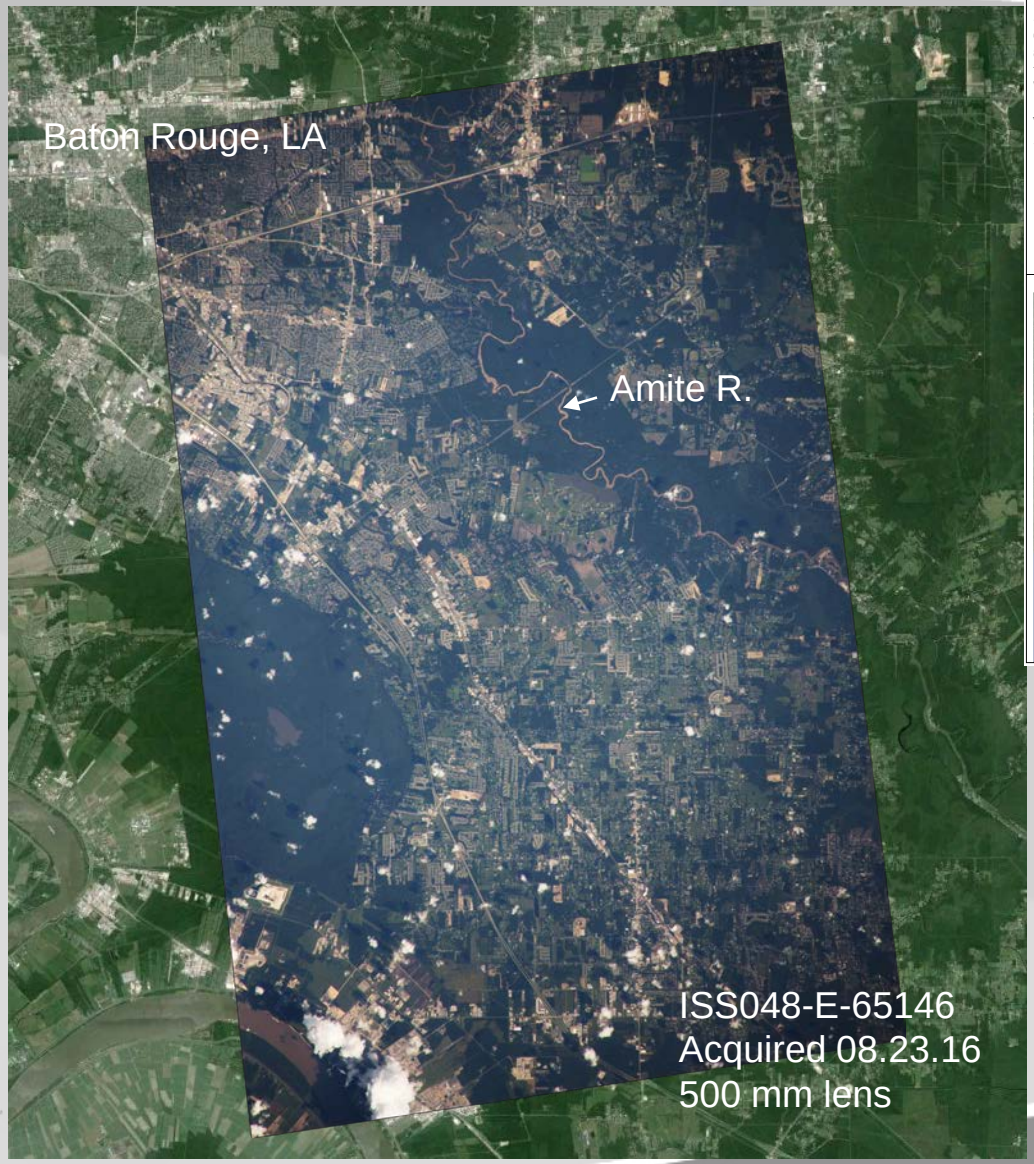


August 15-17, 2016 VIRRS Flood maps courtesy of Sanmei Li, GMU.

NASA Hyperion (EO-1) Imagery

August 16, 2016 15m EO-1 imagery courtesy of Stu Frye, NASA GSFC.

ISS Handheld Digital Camera Photography



Credit: Will Stefanov, NASA JSC

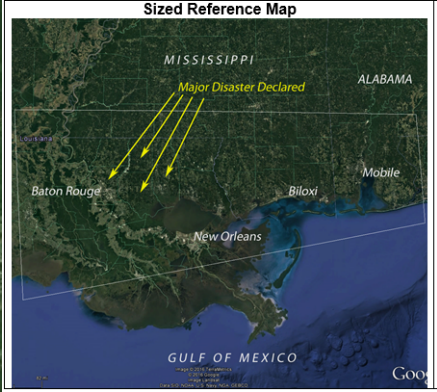
Site Plan Information

Site objective: Document any visible evidence of the extent of flooding in eastern Louisiana and southern Mississippi and Alabama, especially the area of the four parishes where the Major Disaster has been declared.
Window: Any available
Lens: 50-180mm oblique, 400-1200mm near nadir
Viewing angle: Near Vertical, Oblique
Season: 13AUG16 through 23AUG16
Maximum clouds: 50%
Frequency: As visible

Nugget

More than 20,000 people have needed rescue following massive floods that swept across the state of Louisiana. Residents are being warned it's going to get worse before the flood waters recede. President Barack Obama declared a major disaster in the hard-hit parishes of East Baton Rouge, Livingston, St. Helena and Tangipahoa, freeing up federal funding for flood-related assistance. The heavy rainfall started on Friday, where some areas received more than 17 inches (43cm) of rain. The neighboring states of Alabama and Mississippi are also experiencing severe weather. More than 1,700 rescue personnel had been mobilized and nearly 170 high-water vehicles had been tasked or staged. The Coast Guard was also assisting in the rescue efforts, using helicopters to help residents from their rooftops, cars and trailers.

Sized Reference Map

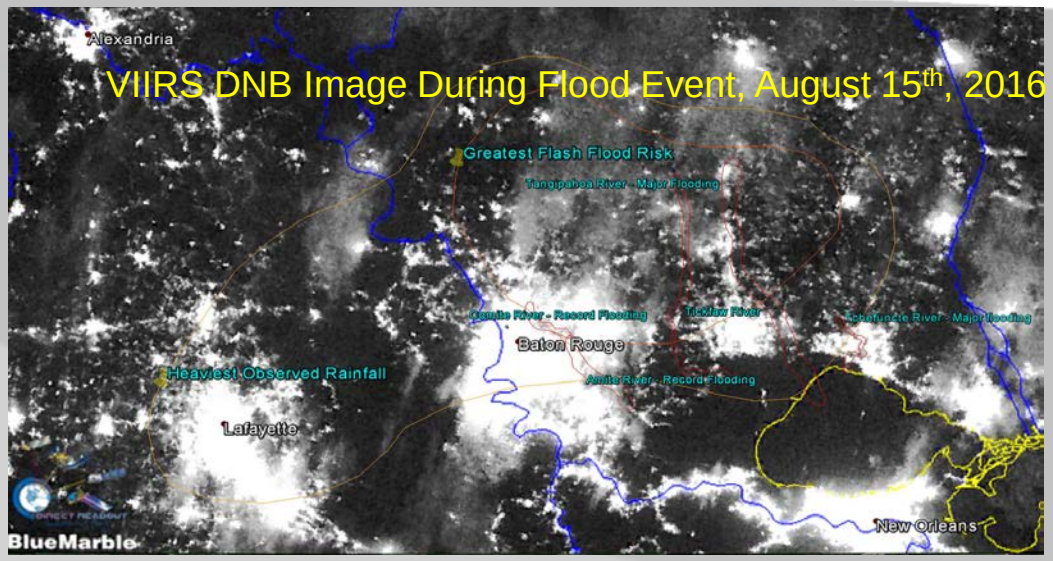


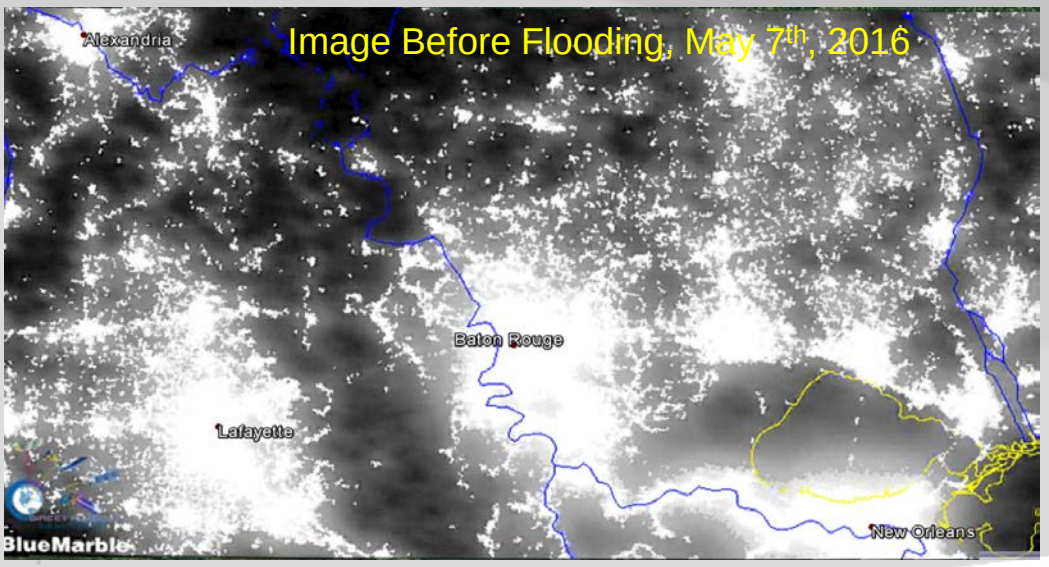
Recommended Site Coordinates:

Type: Box Coordinates:
29.3N 92.1W
30.1N 87.3W
31.2N 87.4W
31.3N 92.2W

- ISS USOS crew acquired imagery of flooding area on Aug 16, 17, 23 in response to target requests from JSC Crew Earth Observations ops team (example of targeting information above)
- Downlinked imagery reviewed and manually georeferenced prior to delivery to USGS HDDS team
- Data potentially useful for validation of SAR and flood extent model products

Suomi NPP VIIRS Day-Night Band Detects Power Outages



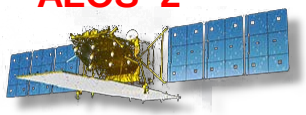


Credit: Dalia Kirschbaum and Miguel Roman, NASA GSFC

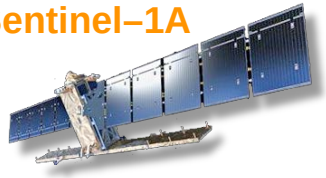
NASA GSFC Disaster Team utilized a new algorithm for producing night time optical data, which was used as one of the assets for assessing impact of the Louisiana floods at the request of FEMA. In this case, the data was used for determining power outages as a means of mapping impact zones. (NASA Direct Readout Lab). **Top-L:** During flood event, Aug 15th, 2016; **Bottom-L**: Before event, May 7th, 2016. A similar product developed by NASA MSFC to difference images such as these was first provided by NASA Disasters to DHS/FEMA to support efforts to restore power after Hurricane Sandy.

NASA Coordinates Synchronized Space-Air-Ground Observations for Historic Floods in Louisiana

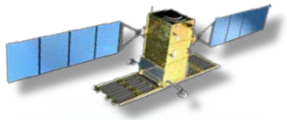
ALOS–2



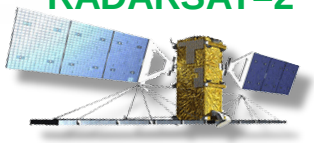
Sentinel–1A

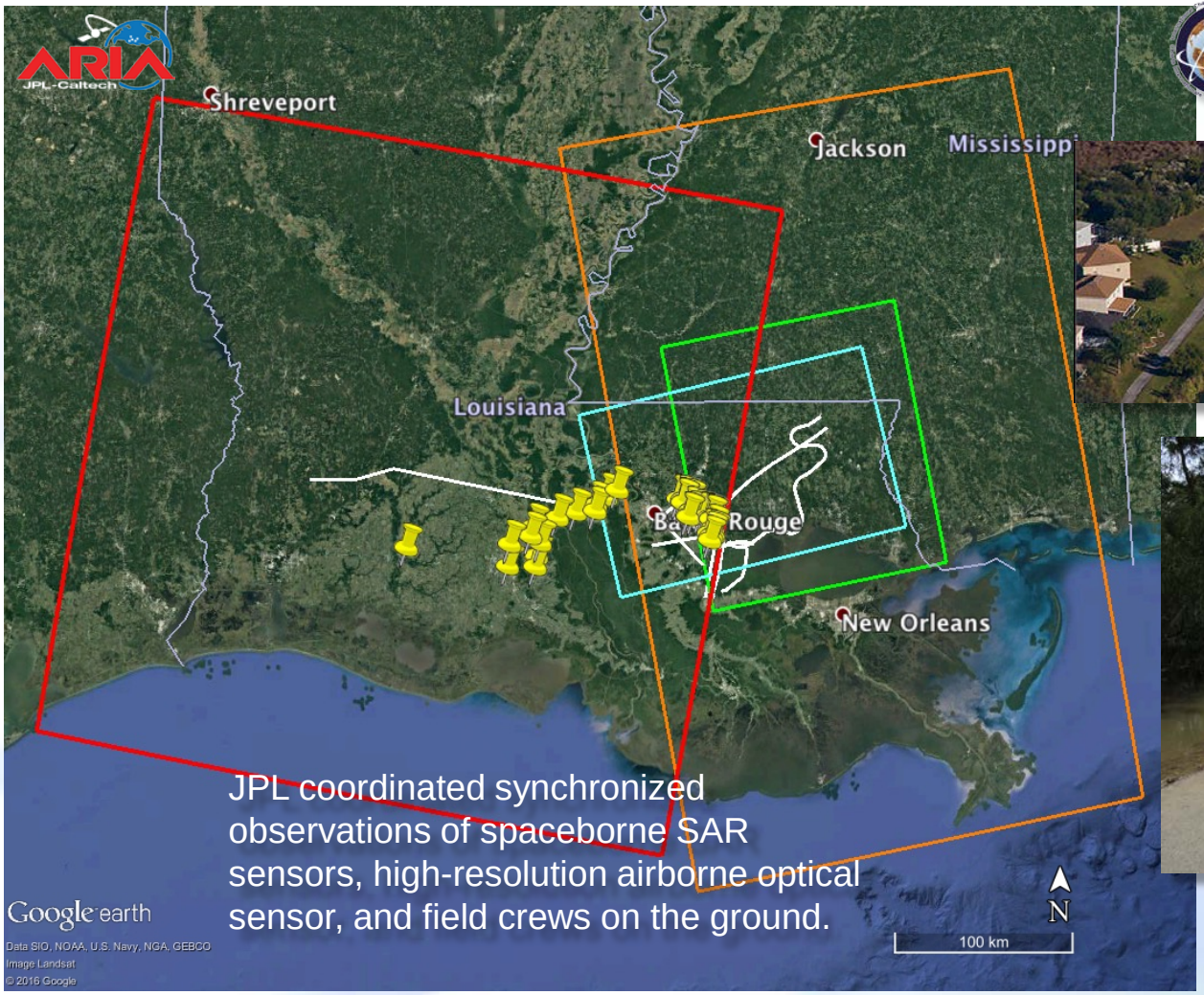


COSMO-SkyMed



RADARSAT–2

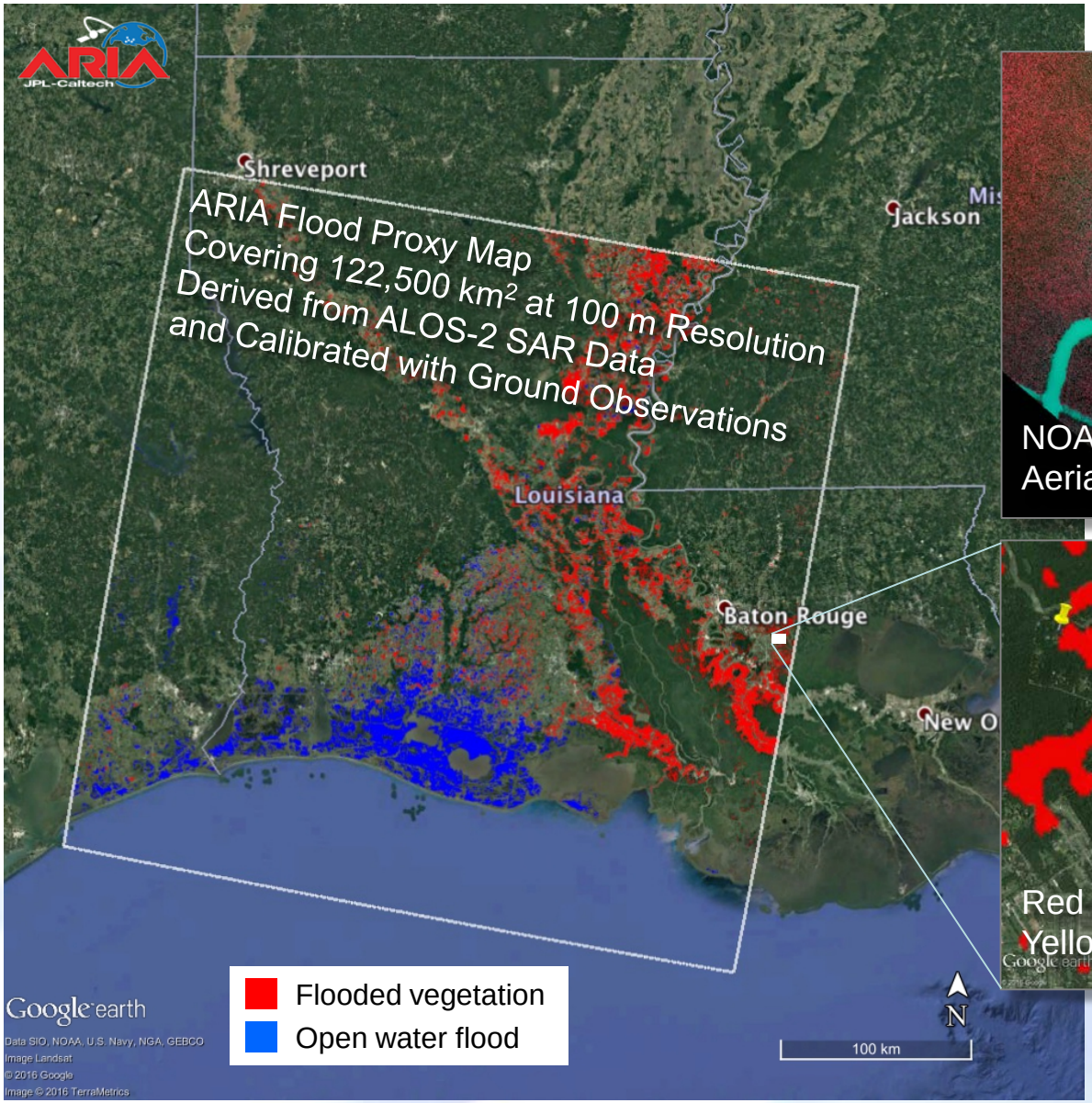


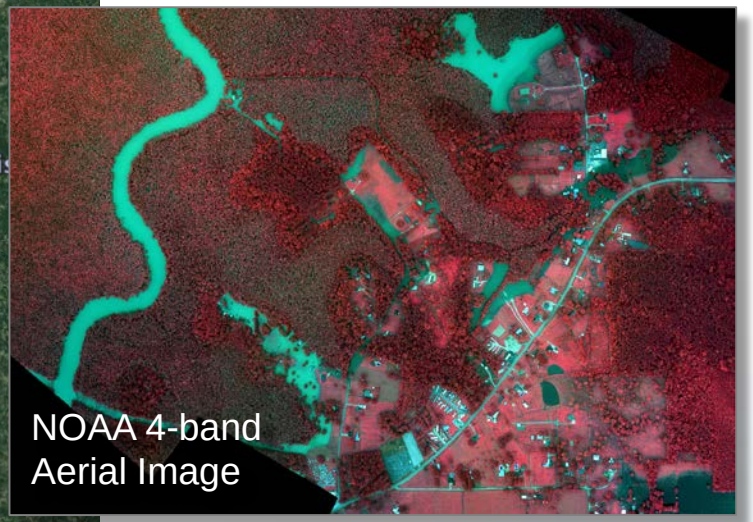


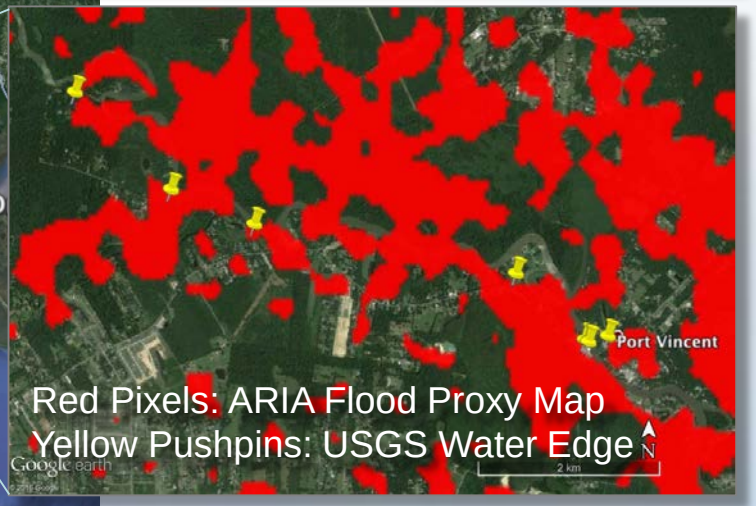
FEMA

DISASTERS
NASA's Earth Science

Small Number of Ground Observations Calibrate a Wide Swath Flood Map Derived from Satellite SAR Data

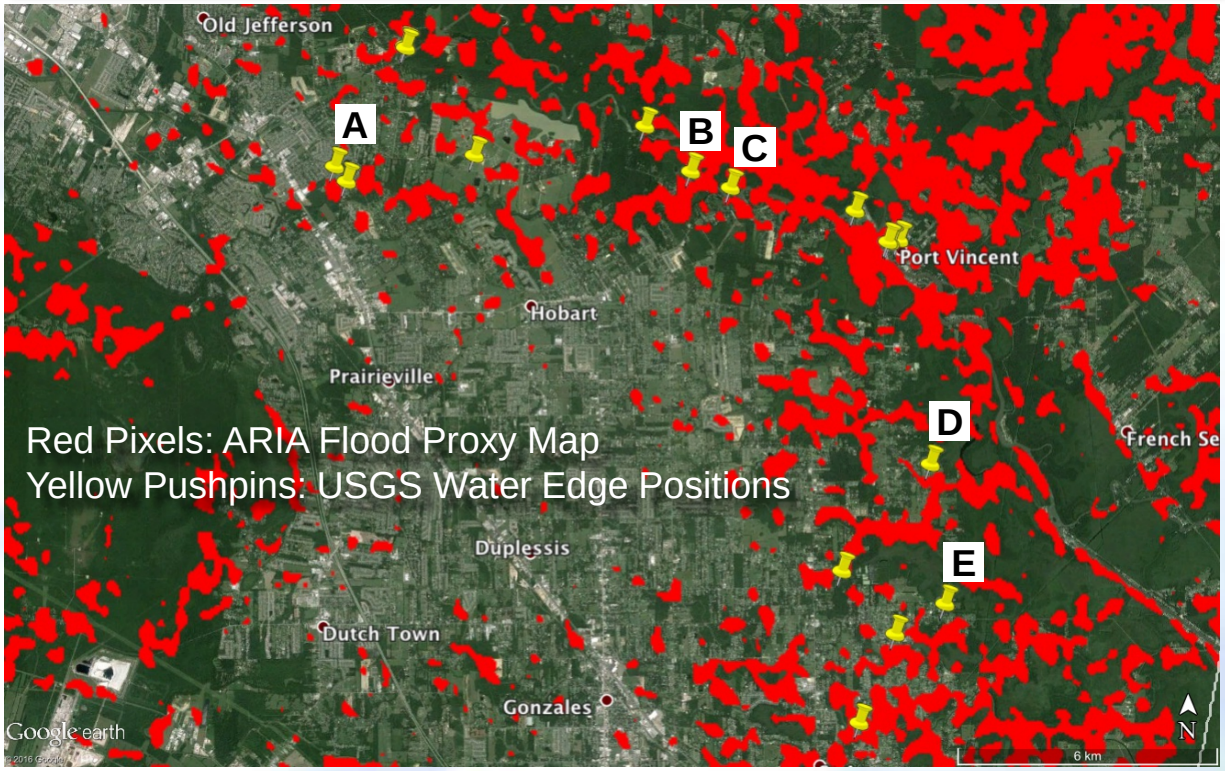






DISASTERS
NASA's Earth Science

Satellite SAR Data Validate Well with Ground Observations



Questions?