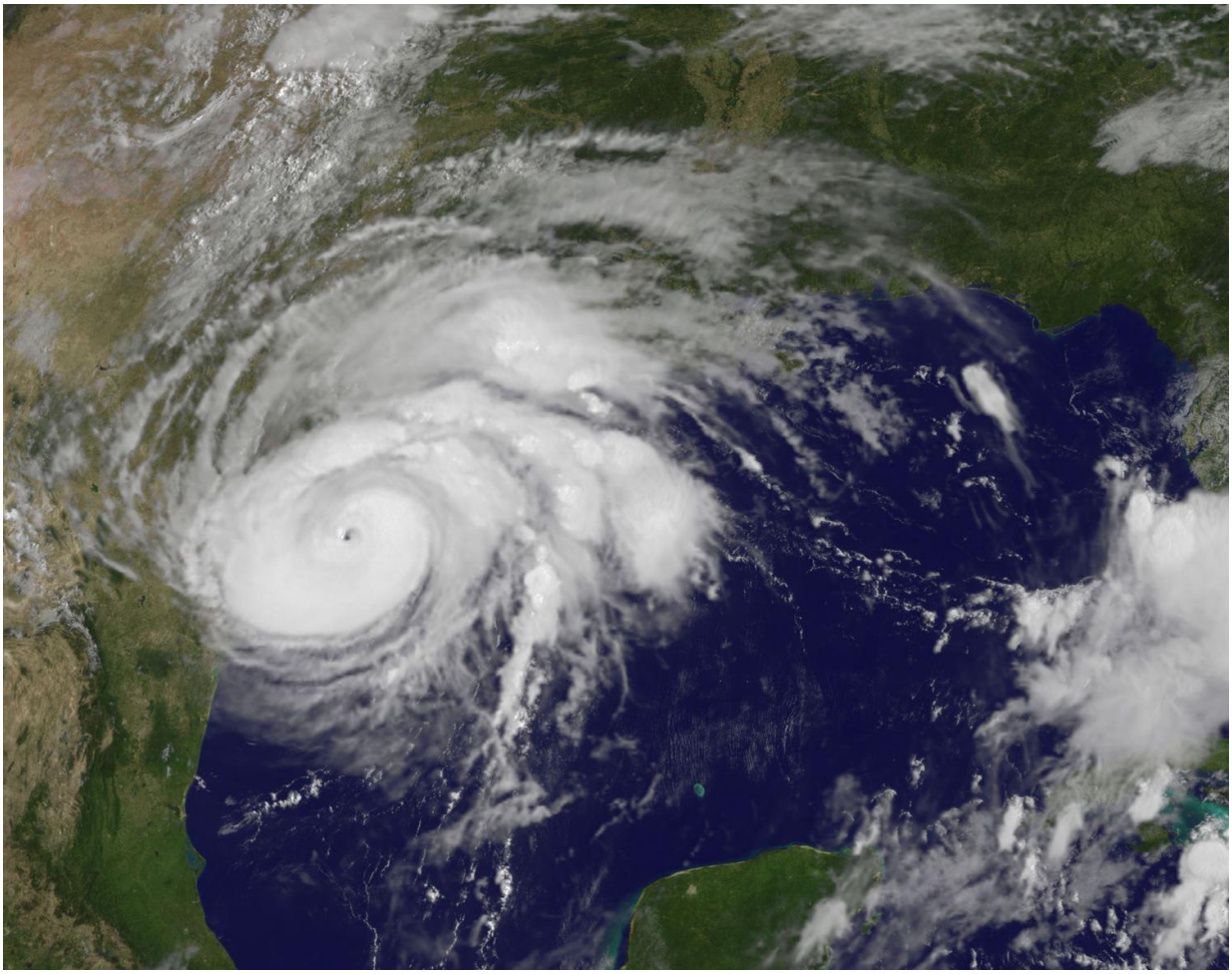
NASA gets an in-depth look at intensifying Hurricane Harvey

August 25 2017, by Hal Pierce



This visible image of Hurricane Harvey taken from NOAA's GOES East satellite on Aug. 25 at 10:07 a.m. EDT (1407 UTC) clearly showed the storm's eye as the storm nears landfall in the southeastern coast of Texas. Credit: NASA/NOAA GOES Project

As Hurricane Harvey continued to strengthen, NASA analyzed the storm's rainfall, cloud heights and cloud top temperatures. NASA's GPM and Aqua satellite provided information while an animation of GOES-East satellite imagery showed Harvey's progression toward the Texas coast.

Harvey's intensification has been aided by movement through an environment that includes low vertical wind shear and the warm waters in the Gulf of Mexico.

Analyzing Harvey's Rainfall

The Global Precipitation Mission (GPM) core observatory satellite flew almost directly above intensifying Hurricane Harvey on August 24, 2017 at 6:30 p.m. EDT (2230 UTC) when maximum sustained winds had increased to about 86 mph (75 knots). GPM's Microwave Imager (GMI) instrument peered through dense storm clouds to reveal the location of intense rainfall bands near the center of the hurricane. The Goddard Profiling Algorithm (GPROF), using GMI data, indicated that powerful storms in the hurricane were dropping rain at a rate of over 2.1 inches (54 mm) per hour. GPM is a joint mission between NASA and the Japan Aerospace Exploration Agency, JAXA.

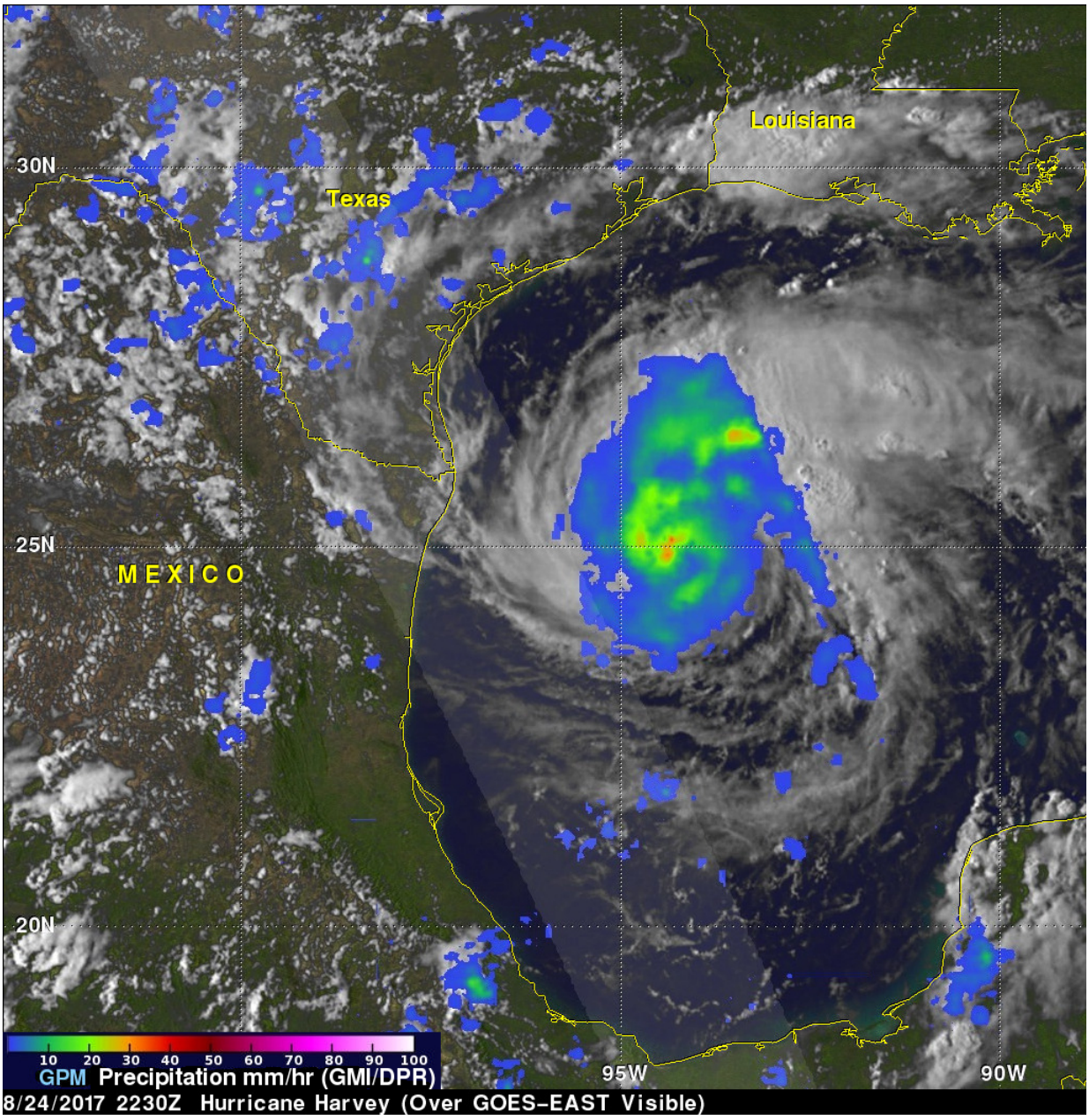
Animating Harvey's Track and Development

An animation of NOAA's GOES-East satellite infrared and visible imagery from August 23 to August 25 showed the redevelopment and movement of Hurricane Harvey in the western Gulf of Mexico. By today, Aug. 25, Harvey had moved along the coast of southeastern Texas.

Infrared Data Shows Location of Powerful Storms

The Atmospheric Infrared Sounder or AIRS instrument that flies aboard NASA's Aqua satellite analyzed Harvey in infrared light on Aug. 25 at 3:59 a.m. EDT (0759 UTC). AIRS data showed Harvey had a strong circular area of powerful thunderstorms around the center of circulation. A thick band of powerful thunderstorms were located north to east of the center.

In both the center and the band, AIRS detected strong thunderstorms high into the troposphere with very cold cloud top temperatures. Some of the coldest cloud top temperatures exceeded minus 81 degrees Fahrenheit (minus 63 degrees Celsius). Storms with temperatures that cold are high in the troposphere and NASA research has shown they have the ability to generate heavy rain. That heavy rain is in the forecast for Texas and Louisiana, according to the National Hurricane Center (NHC).



The GPM satellite flew almost directly above intensifying Hurricane Harvey on August 24, 2017 at 6:30 p.m. EDT and indicated that powerful storms in the hurricane were dropping rain at a rate of over 2.1 inches (54 mm) per hour. Credit: NASA /JAXA, Hal Pierce

National Hurricane Center: Harvey's Location and Status

At 8 a.m. EDT (1200 UTC) on Aug. 25, the National Hurricane Center (NHC) noted the eye of Hurricane Harvey was located by Air Force Reserve reconnaissance aircraft and NOAA Doppler radar near 26.3 degrees north latitude and 95.8 degrees west longitude.

Harvey is moving toward the northwest near 10 mph (17 km/h), but its forward speed is expected to decrease significantly during the next couple of days. Maximum sustained winds are near 110 mph (175 kph) with higher gusts. Some strengthening is possible, and Harvey is expected to become a major hurricane before it reaches the middle Texas coast. Hurricane-force winds extend outward up to 35 miles (55 km) from the center, and tropical-storm-force winds extend outward up to 140 miles (220 km).The minimum central pressure reported by the Air Force plane was 950 millibars.

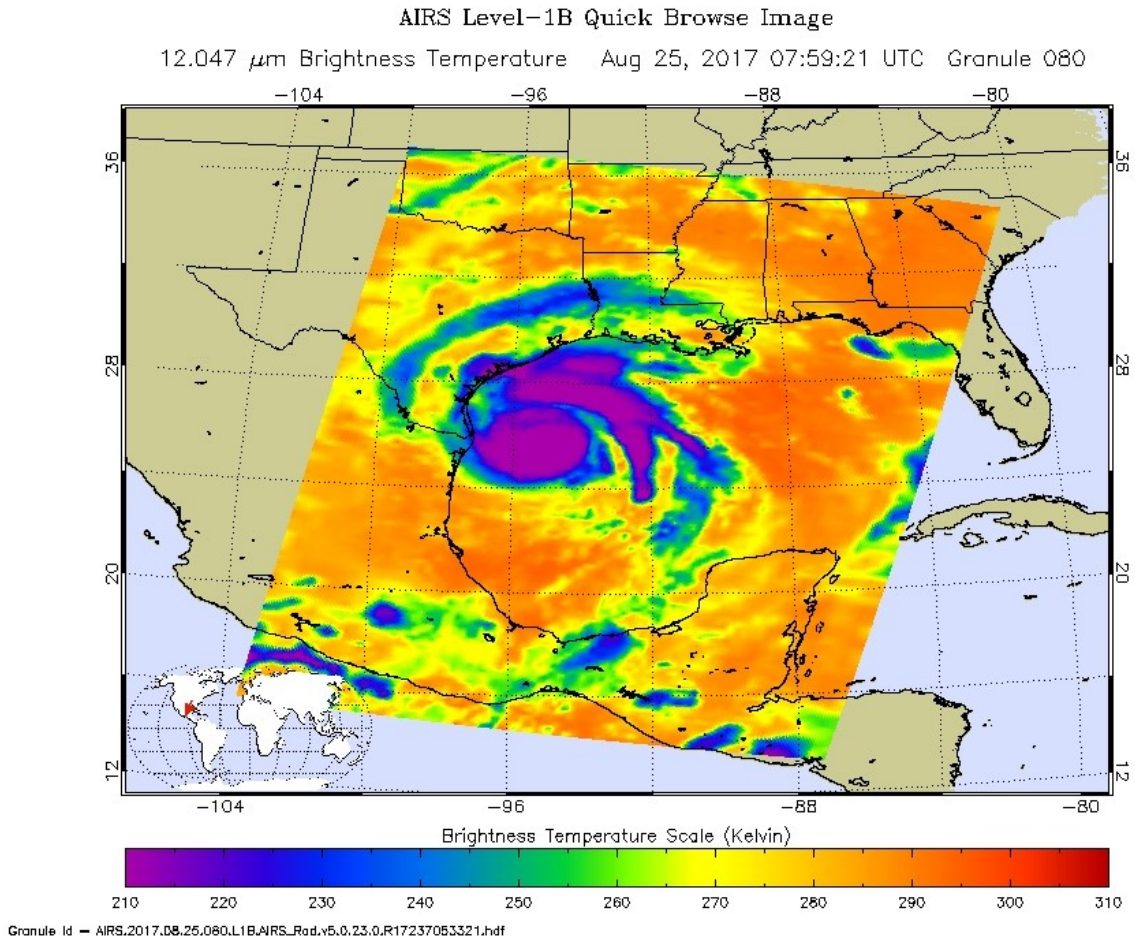
NHC Forecast: Rainfall, Storm Surge, Wind, Surf and Isolated Tornadoes

The National Hurricane Center forecast at 8 a.m. EDT on Aug. 25 outlined the threats of rainfall, storm surge, wind, surf and isolated tornadoes:

Rainfall

Harvey is expected to produce total rain accumulations of 15 to 25 inches and isolated maximum amounts of 35 inches over the middle and upper Texas coast through next Wednesday. During the same time period Harvey is expected to produce total rain accumulations of 7 to 15 inches in far south Texas and the Texas Hill Country eastward through central and southwest Louisiana, with accumulations of up to 7 inches

extending into other parts of Texas and the lower Mississippi Valley. Rainfall from Harvey will cause devastating and life-threatening flooding.



The AIRS instrument that flies aboard NASA's Aqua satellite analyzed Harvey in infrared light on Aug. 25 at 3:59 a.m. EDT (0759 UTC). AIRS data showed Harvey had a strong circular area of powerful thunderstorms (purple) around the center of circulation. A thick band of powerful thunderstorms were located north to east of the center. Credit: NASA JPL/Ed Olsen

Storm Surge

NHC said, the combination of a dangerous storm surge and the tide will cause normally dry areas near the coast to be flooded by rising waters moving inland from the shoreline. The water is expected to reach the following heights above ground if the peak surge occurs at the time of high tide...

- N Entrance Padre Island Natl Seashore to Sargent...6 to 12 ft
- Sargent to Jamaica Beach...5 to 8 ft
- Port Mansfield to N Entrance Padre Island Natl Seashore...5 to 7 ft
- Jamaica Beach to High Island...2 to 4 ft
- Mouth of the Rio Grande to Port Mansfield...2 to 4 ft
- High Island to Morgan City...1 to 3 ft

The deepest water will occur along the immediate coast near and to the northeast of the landfall location, where the surge will be accompanied by large and destructive waves. Surge-related flooding depends on the relative timing of the surge and the tidal cycle, and can vary greatly over short distances.

Winds, Hurricane Conditions

Hurricane conditions are likely within the hurricane warning area later on Aug.25 (today and tonight), with tropical storm conditions expected to first reach the coast in the hurricane warning area later in the morning. These conditions are likely to persist into Saturday in portions of the hurricane and tropical storm warning area.

Surf, Dangerous Swells, Rip Currents

Swells generated by Harvey will begin to affect the Texas, Louisiana, and northeast Mexico coasts later this morning. These swells are likely to cause life-threatening surf and rip current conditions

Isolated Tornadoes

Isolated tornadoes are possible across portions of the middle and upper Texas coast today.

On the forecast track, Harvey will make landfall on the middle Texas coast tonight or early Saturday. Harvey is then likely to meander near or just inland of the middle Texas coast through the weekend.

Provided by NASA's Goddard Space Flight Center