NASA sees Tropical Storm Matthew form over the Windward Isles

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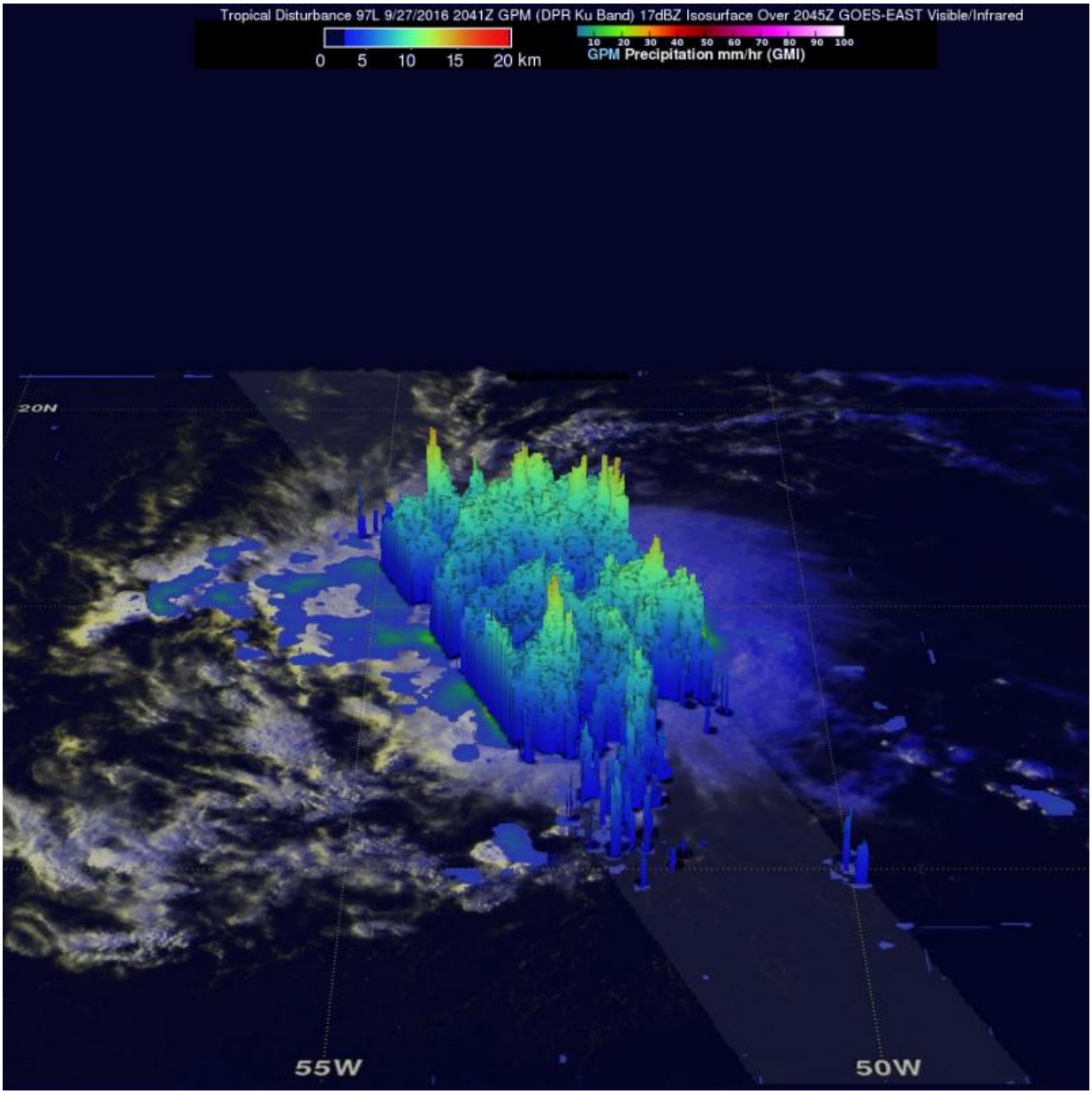

GPM captured an image of the wave on Sept. 27 at 4:41 p.m. EDT as it was approaching the Windward Isles. The data showed rain rates derived from GPM's GMI microwave imager (outer swath) and dual-frequency precipitation radar or DPR (inner swath) overlaid on enhanced VIS/IR data from the GOES-East satellite. The wave contains a broad area of light rain (blue areas) with several embedded bands of moderate rain (green areas) containing relatively scattered areas of heavier rain (dark red areas). Credit: NASA/JAXA, Hal Pierce

A fairly strong tropical wave that had been making its way westward across the Central Atlantic over the past several days has now finally organized itself into a tropical storm, Tropical Storm Matthew, the 13th named storm of the season, while passing through the Windward Islands. The Global Precipitation Measurement mission or GPM core satellite provided a look inside the tropical cyclone as it was developing.

A Tropical Storm Warning is in effect for Guadeloupe and Martinique, St. Lucia, Dominica, Barbados, St. Vincent, and the Grenadine Islands. NOAA's National Hurricane Center (NHC) said interests in Bonaire, Curacao, Aruba, and elsewhere in the Lesser Antilles should monitor the progress of Matthew.

The storm is poised to intensify as it enters the eastern Caribbean. The tropical wave leading to Matthew's formation emerged off of the coast of Africa back on the 23rd of September. However, despite having a robust level of convective thunderstorm activity, the wave did not acquire a closed low-level circulation until it reached the Windward Islands as the wave's convection was dispersed over a relatively broad area, impeding its ability to consolidate a center of circulation.

GPM captured an image of the wave on Sept. 27 at 4:41 p.m. EDT (20:41 UTC) as it was approaching the Windward Isles. The rain rates derived from GPM's GMI microwave imager (outer swath) and dual-

frequency precipitation radar or DPR (inner swath) provided an entire picture of rain rates throughout the storm. At NASA's Goddard Space Flight Center in Greenbelt, Maryland, that data was overlaid on enhanced visible and infrared data from NOAA's GOES-East satellite to show rain within the entire storm. GPM is a joint mission between NASA and the Japanese space agency JAXA.

The rain distribution showed that the wave contains a broad area of light rain with several embedded bands of moderate rain containing relatively scattered areas of heavier rain. These bands are distributed throughout the system and show only slight evidence of curvature, which indicates that a well-defined cyclonic circulation is still lacking. A 3-D view of the wave from the DPR showed hot towers, some reaching as high as 9.3 miles (15 km) and though loosely organized into bands, are scattered throughout the wave.

A "hot tower" is a tall cumulonimbus cloud that reaches at least to the top of the troposphere, the lowest layer of the atmosphere. It extends approximately 9 miles/14.5 km high in the tropics. These towers are called "hot" because they rise to such altitude due to the large amount of latent heat. Water vapor releases this latent heat as it condenses into liquid. Those towering thunderstorms have the potential for heavy rain. NASA research shows that a tropical cyclone with a hot tower in its eyewall was twice as likely to intensify within six or more hours, than a cyclone that lacked a hot tower.

These towers are coincident with the areas of heavy rain in the previous image and indicate areas of active deep convection (rising air that condenses and forms the thunderstorms that make up a tropical cyclone) that are releasing heat into the system. However, because they are not concentrated together, the wave was slow to organize into a tropical storm.

The heavy rainfall seen by GPM is expected to affect the Windward Islands. NOAA's NHC said "Matthew is expected to produce total rainfall accumulations of 4 to 8 inches across the Windward Islands and southern portions of the Leeward Islands through Thursday. These rains may produce life-threatening flash floods and mud slides. Rainfall totals of 1 to 2 inches are expected farther to the north into the northern Leeward Islands, including the United States and British Virgin Islands and Puerto Rico."

At 2 p.m. EDT (1800 UTC) the center of Tropical Storm Matthew was located near 13.6 degrees north latitude and 61.3 degrees west longitude. Matthew is moving toward the west near 20 mph (31 kph). NHC said that a westward motion with some decrease in forward speed is expected during the next couple of days. On the forecast track, the center of Matthew will move away from the Windward Islands through this evening, and be over the eastern and central Caribbean Sea through Friday, Sept. 30.

Maximum sustained winds are near 60 mph (95 kph) with higher gusts. Gradual strengthening is forecast during the next couple of days, and Matthew could become a hurricane by Friday. Tropical-storm-force winds extend outward up to 205 miles (335 km) primarily to the northeast of the center. Winds of 39 mph (63 kph) were recently reported on Barbados, and a weather station on Martinique recently observed sustained winds of 47 mph (75 kph) with gusts to 60 mph (97 kph). The minimum central pressure estimated from recent reconnaissance data is 1008 millibars.

Over the next few days, the National Hurricane Center is forecasting Matthew to intensify into a hurricane, the fifth of the season, and to continue its westward track into the central Caribbean. After which, the storm is expected to take a more northerly track in the direction of Jamaica.

Provided by NASA

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