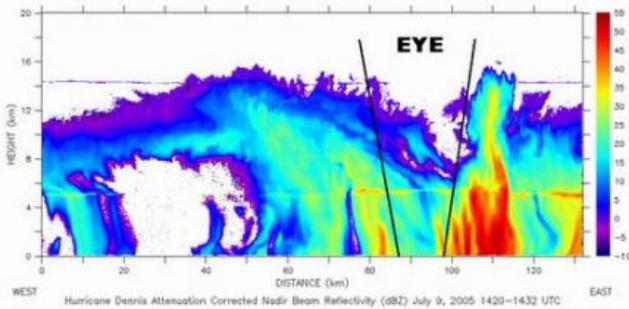


NASA Aircraft Captures Windy Details in Hurricane's Ups and Downs

13 December 2006



A vertical slice through the center of Hurricane Dennis shows the rainfall structure across the entire storm, as measured by NASA's ER-2 Doppler radar on July 9, 2005. Warm colors indicate the presence of heavy rainfall and ice within the storm while cool colors show lighter rain. The feature at about 110 kilometers (68 miles) is an intense cloud called a "hot tower" with strong winds throughout the core. The approximate location of the eye is marked by slanted black lines. Credit: Florida State University

Researchers employing some of the world's most sophisticated weather research equipment recently captured details on winds and other conditions in a rapidly intensifying hurricane. This data will help to advance the understanding of these complex storms.

While meteorologists have made considerable strides in forecasting a hurricane's track, intensity predictions have remained a more elusive challenge. Part of the difficulty is that the many factors that control intensity, particularly the speed, direction and spin of air throughout the atmosphere, are constantly changing and tricky to measure. Aircraft are able to gather detailed, precise measurements of winds in a hurricane that can help researchers understand what is going on inside the storm, allowing better forecasts to be

made.

In July 2005, Hurricane Dennis experienced several periods of rapid intensity fluctuations, providing for several excellent opportunities to learn about tropical cyclone behavior. Dennis reached hurricane strength on July 7, 2005, in the eastern Caribbean Sea, and rapidly strengthened into a category 4 storm before making landfall in Cuba on July 8. After weakening considerably as the storm moved over Cuba, Dennis attained category 4 hurricane status again with a pressure drop of 11 millibars in under two hours, indicative of rapid intensification. A typical low-pressure system in the United States might intensify that much over the course of an entire day.

Flying over Hurricane Dennis with NASA's ER-2 aircraft and the National Oceanic and Atmospheric Administration's (NOAA) P-3 aircraft, scientists gathered data on the storm's internal structure, including the distribution of winds, rainfall, temperature and moisture. The aircraft information has provided insight into the evolution of a hurricane's warm inner core; one of the many factors that impact storm development.

The research flights were conducted as part of the Tropical Cloud Systems and Processes (TCSP) mission in Costa Rica, a NASA field experiment with cooperative participation from NOAA and several universities. This experiment was aimed at studying the birthing conditions for tropical storms and hurricanes and identifying the factors that cause them to strengthen or weaken.

"This campaign was particularly unique because two types of aircraft provided measurements on different atmospheric variables," said Joe Turk of the Naval Research Laboratory, Monterey, Calif. "The information is also being used to determine how accurately satellites capture storm details."

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measurements with a level of detail far superior to current weather satellites. During the mission, the NASA ER-2 aircraft flew over Dennis at 65,000 feet while taking scientific measurements that probed downward through the cloud layers. At times, the NOAA P-3 flew identical and coordinated patterns, but from an altitude of 12,000 feet, probing the storm from the inside.

As the hurricane fluctuated in intensity, flights into the storm continued, taking critical measurements of wind, temperature, and moisture. "The erratic nature of the storm and the timing of the research mission allowed scientists to pierce through the core of the hurricane at many stages of its life cycle and for the first time map a hurricane's entire evolution," said Steve Guimond of Florida State University, Tallahassee, Fla.

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Source: by Mike Bettwy, Goddard Space Flight Center

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