Department of Atmospheric Sciences M.S. Defense Announcement

Department of Atmospheric Sciences, S.O.E.S.T., University of Hawai'i at Mānoa
2525 Correa Road, HIG 350; Honolulu, HI 96822 ☎956-8775

The Collapse of Hurricane Felicia (2009)

Mr. Brandon Bukunt
Atmospheric Sciences MS Candidate
Department of Atmospheric Sciences, S.O.E.S.T.
University of Hawaii at Manoa

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Time: 3:30pm
Location: Marine Sciences Building, MSB 100 Auditorium

Abstract:

In early August 2009 Hurricane Felicia threatened the Hawaiian Islands. The Central Pacific Hurricane Center in Honolulu requested NOAA to conduct synoptic scale surveillance missions around the hurricane to ascertain environmental winds, with the primary objective to improve track forecast. The NOAA G-IV ferried out to the islands on 7 August and then conducted two circumnavigations, approximately 3 degrees latitude from the center of Felicia, on 8 and 9 August. During the ferry and the two subsequent circumnavigations, the G-IV crew deployed 72 Global Positioning System dropwindsondes (GPS sondes). Over these 3 days Felicia collapsed, with a minimum central pressure rising from 955 to 995 hPa.

The GPS sondes jettisoned from above 200 hPa provide a rare opportunity to investigate the role of two environmental factors that impact hurricane intensity, the vertical shear of the horizontal wind (VWS) and the presence of dry air in the midlevels. Near the Hawaiian Islands at this time of year climatological studies reveal that there is a tropical upper tropospheric trough (TUTT) which alters the location and strength of the subtropical jet stream (STJ). The STJ produces a region with strong VWS often located near or over the islands, and is thought of as the primary "defense" against strong landfalling hurricanes approaching from the east. The sea surface temperature (SST) gradients are aligned north-south and thus have far less impact on intensity than is commonly thought.

The GPS sondes are used to map the location of the TUTT, the STJ, and the hurricane. The dataset allows us to determine when the STJ first interacts with the anticyclonic outflow channels of Felicia, and subsequently we can estimate when the STJ reaches the inner core of the hurricane. The GPS sondes deployed in the circumnavigation portions of the two flights are also used to examine the role of dry mid-level air associated with the Pacific High. Ultimately, this study is an exploration to determine the value of the G-IV reconnaissance flights for forecasts of intensity change, in addition to their proven value for track forecasts.