CPEX 2017: Utilizing NASA's Airborne Doppler Aerosol WiNd (DAWN) Lidar and Dropsondes for Convective Process Studies

Thursday, 19 April 2018

Champions DEFGH (Sawgrass Marriott)

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During 25 May – 24 June 2017, NASA conducted the airborne 2017 Convective Processes in the Tropics Experiment (CPEX) which utilized the Doppler Aerosol WiNd lidar (DAWN), dropsondes and other remote sensing instruments aboard a NASA DC-8 aircraft to study and improve our understanding and modeling of convective processes in the tropics. Sixteen NASA DC-8 airborne missions were flown into the Gulf of Mexico (GoM), Caribbean Sea and the Atlantic Ocean where a comprehensive set of observations (particularly winds from DAWN and the dropsondes) were taken near isolated, scattered, and organized deep convection during all phases of the convective life cycle.

DAWN is NASA's most capable airborne wind-profiling lidar with a 2-micron laser that pulses at 10 Hz. DAWN has previously participated in NASA GRIP (2010) and Polar Winds (2014-15) airborne campaigns. The DAWN can provide high resolution (4 -12 km in the horizontal and 35 – 150 m in the vertical) wind measurements in clear as well as partly cloudy conditions. The overall performance of DAWN in these conditions will be presented.

During the CPEX missions, the NASA DC-8 flew a series of "boxes" with 100 Km sides over the GoM and Caribbean Sea under conditions varying from totally cloud free to isolated convection as well as organized deep convection. Using an aircraft coordinate system, we have computed mass divergence budgets through the vertical column of these boxes under the varying convective states. The methodology and the results for the "cloud free" case will be presented. We will also provide comparisons between the DAWN mass divergence budgets and those computed from model forecasts provided by the University of Utah WRF and the University of Miami Coupled Model.