P42 Hurricane-induced ocean cooling on storm structure and intensity in a coupled WRF-HYCOM model

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Ocean cooling produced by the quasi-stationary movement of Hurricane Ophelia (2005) and its impact on the storm's structure and intensity is investigated. Ophelia's convoluted storm track and slow forward speed allowed persistence of the circulation over cold, storm-upwelled waters with a significant impact on both the strength and organization of the tropical cyclone. Using an atmosphere-ocean coupled model employing WRF-ARW 3.6.1 coupled to the Hybrid Coordinate Ocean Model (HYCOM) 2.2.98, we verify storm track, intensity, and sea surface temperature for the period 9 – 14 September with Navy P3 aircraft, radar, and satellite observations taken during the Hurricane Rainband and Intensity Change Experiment (RAINEX) field campaign. Model simulations are initiated on a 12-km horizontal domain with 36 vertical levels and two 4-km and 1.33-km nested grids, using 6-hourly 0.5° resolution final analysis from the National Center for Environmental Prediction (NCEP FNL). Analysis wind field nudging and vortex relocation are shown to greatly improve the storm track, and the observed cold sea surface temperatures upwelled by Ophelia are well captured by the model. Since ocean cooling served to prevent intensification, coupling the atmosphere and ocean is essential to reproducing the actual storm. By contrast, decoupling (atmosphere only) produces a vortex that greatly overestimates the true storm size, depth and intensity.