

## An HWRf-based ensemble assessment of the land surface feedback on the post-landfall intensification of Tropical Storm Fay (2008)

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**Abstract** While tropical cyclones (TCs) usually decay after landfall, Tropical Storm Fay (2008) initially developed a storm central eye over South Florida by anomalous intensification overland. Unique to the Florida peninsula are Lake Okeechobee and the Everglades, which may have provided a surface feedback as the TC tracked near these features around the time of peak intensity. Analysis is done with the use of an ensemble model-based approach with the Developmental Testbed Center (DTC) version of the Hurricane WRF (HWRf) model using an outer domain and a storm-centered moving nest with 27- and 9-km grid spacing, respectively. Choice of land surface parameterization and small-scale surface features may influence TC structure, dictate the rate of TC decay, and even the anomalous intensification after landfall in model experiments. Results indicate that the HWRf model track and intensity forecasts are sensitive to three features in the model framework: land surface parameterization, initial boundary conditions, and the choice of planetary boundary layer (PBL) scheme. Land surface parameterizations such as the Geophysical Fluid Dynamics Laboratory (GFDL) Slab and Noah land surface models (LSMs) dominate the changes in storm track, while initial conditions and PBL schemes cause the largest changes in the TC intensity overland. Land surface heterogeneity in

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