Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

Hurricane Formation in Diabatic Ekman Turbulence DAVID SCHECTER, TIMOTHY DUNKERTON, NorthWest Research Associates — This study numerically examines the evolution of Diabatic Ekman Turbulence (DET) under various conditions. DET is quasi 2D turbulence that is modified by surface friction and parameterized cumulus convection. The self-organization of DET is here simulated in a 3-layer troposphere. In our primary model, winds over the ocean elevate the moist entropy of boundary layer air, whose convergence may then generate deep convection. After an incubation period, the influence of deep convection can supercede ideal 2D processes such as vortex merger. A strong cyclone-anticyclone asymmetry can develop, with relatively intense cyclones dominating the system. "Hurricanes" form at sufficiently high values of the sea-surface temperature (SST), the Coriolis parameter, and the surface-exchange coefficient for moist entropy C_E. Increasing the momentum exchange coefficient C_D shortens the incubation period, but decelerates the subsequent intensification of an emerging hurricane. Increasing C_E or the SST accelerates all stages of hurricane genesis. As in more complex models, DET hurricanes can exhibit mesovortices and eyewall cycles. Moreover, their intensities increase with the SST and the ratio C_E/C_D. In some regions of parameter space, low-level noise can evolve into a hurricane *or* a synoptic scale circulation. The effects of using different representations of cumulus convection or surface friction will be discussed. Supported by NSF-ATM-0750660.

David Schecter
NorthWest Research Associates

Date submitted: 03 Aug 2008 Electronic form version 1.4