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RAL/MMM SEMINAR SERIES

Speaker: **Ben Green, Penn State University**

Date: January 23, 2015

Time: 1:30pm – 2:30pm

Place: FL 2 – Rm 1022

Title: **Sensitivity of Tropical Cyclone Simulations to Air-Sea Flux Parameterizations, Implications for Parameter Estimation, and the Future of Fully-Coupled Earth System Modeling**

Abstract:

Tropical cyclones (TCs) are fueled by large fluxes of sensible and latent heat from the air-sea interface. These fluxes (as well as momentum fluxes) cannot be explicitly resolved by numerical weather prediction (NWP) models and therefore must be parameterized. Unfortunately, there is a great deal of uncertainty as to the behavior of air-sea surface fluxes, especially under strong (hurricane-force) winds. Thus, the numerous NWP parameterizations of surface fluxes introduce model error into TC forecasts, which limits the accuracy of predictions of TC intensity. In this talk, the sensitivity of WRF-ARW simulated TCs to parameterizations of the surface exchange coefficients for drag (C_d) and moist enthalpy (C_k) is examined. In agreement with theory, increased C_k yields a stronger TC both in terms of minimum central pressure and maximum 10-m wind speed. The impacts of C_d are not as straightforward: increased drag does reduce the maximum 10-m wind speed (in agreement with theory), but also deepens the minimum central pressure (opposite of what is predicted by theory) – in other words, C_d changes the pressure-wind relationship of simulated TCs. C_d also profoundly impacts TC structure, such that increased drag yields a more compact primary circulation. The implications of these findings for using data assimilation to estimate model parameters related to C_d and C_k are described in conjunction with preliminary results from an Observing System Simulation Experiment (OSSE). Finally, there will be a discussion on how data assimilation can be leveraged to significantly advance the modeling of coupled Earth systems.

NcastFL2_1022 (Large Auditorium) Webcast link

<http://www.fin.ucar.edu/it/mms/fl-live.htm>