



Sensitivity of the Simulated Structure of Tropical Cyclones to Parameterized Radiation-Cloud Interaction

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Evidence that has emerged from recent numerical studies indicates that the model-simulated structure of tropical cyclones is sensitive to parameterized cloud-radiation forcing. The simulated intensification of tropical cyclones is also shown to be sensitive to vertical distribution of latent heat release due to phase changes in cloud hydrometeor generation, which in turn is impacted by the cloud-radiation forcing. This presentation highlights major results from a series of numerical experiments with the Advanced Research WRF (ARW) model that were carried out for the purpose of comparing and evaluating the sensitivity of the simulated structure of tropical cyclones to various radiation schemes and cloud microphysics schemes. We will first compare the sensitivity of the ARW-simulated intensification of an idealized tropical cyclone to the radiation and microphysics schemes. We will then compare the radiational heating profiles associated with permutational combinations of the radiation and microphysics schemes. Finally, using the results from the sensitivity experiments, we will discuss the issues and challenges that the research community is facing in improving the representation of the cloud-radiation forcing in operational tropical cyclone prediction models.