

***HIGH RESOLUTION SIMULATION OF THE SUCCESSION OF HURRICANES IN
2008: GUSTAV, HANNA, AND IKE***

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ABSTRACT

The succession of Atlantic hurricanes in August-September 2008 is used to assess the ability of the Weather Research and Forecasting model to simulate the simultaneous development of multiple tropical storms and their interactions. Convection is explicitly resolved for a large nested domain spanning the entire tropical Atlantic basin and the eastern United States. The succession of the hurricanes in observation developed from either local depression or from easterly waves. The simultaneous developments of the hurricanes are very well simulated, though the initiation, intensification, and tracks deviate from the observation to some extent. The causes for the deviation are investigated by focusing on the sensitivities to microphysics parameterization, domain configuration, and initial ambient conditions, and the interactions between the hurricanes. The interactions between the hurricanes are further studied by numerical experiments with the inclusion of the simultaneous hurricane development and with choices on filtering of the hurricane induced influences on the large scale inflow. Downscaling of short-term forecasts by the global climate model CAM are also experimented with the same WRF configuration to examine if the instabilities embedded in initial large scale flow are sufficiently preserved to drive the development of the succession of hurricanes, and examine the minimum requirement on the resolutions. Furthermore, the benefit of using a two-way coupled WRF/CAM system for simulating the same succession of hurricanes is evaluated, particularly for the initiation of the hurricanes. The effectiveness of the coupled system for simulating such extreme development of intense tropical storms would suggest a high potential for seasonal and climate predictions of tropical weather with great details.

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