A NUMERICAL SIMULATION OF HURRICANE HUGO

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Results of a simulation of Hurricane Hugo are presented. The numerical model used in this study is the Colorado State University Regional Atmospheric Modeling System (RAMS). The model contains a full set of non-hydrostatic compressible dynamic equations, a thermodynamic equation and a set of microphysics equations for water- and ice-phase clouds and precipitation. There are parameterizations for longwave and shortwave radiation, surface fluxes and subgrid-scale fluxes. The model has a two-way interactive multiple nested grid capability which makes it possible to resolve cumulus convection in the convectively active region of the tropical cyclone. The fine grid used to resolve convection in the simulation has a horizontal grid increment of 3 km and a width of 300 km. The nested grids move with the low pressure minimum in order to keep the convection within the center of the fine grid. Convectively explicit simulations using an Atlantic hurricane season sounding (Jordan, 1958) and of Hurricane Andrew have show that the model is able to produce a realistic hurricane structure and life cycle (Nicholls and Pielke, 1995; Eastman, 1995).

Hurricane Hugo was a devastating storm which made landfall on the mainland U.S. in the Charleston, South Carolina area on the 22 September, 1989. It moved rapidly inland causing significant damage even 200 miles from the coast. The results of the numerical simulation are compared with observations with particular emphasis on the surface winds and the mesoscale processes occurring in the eyewall as the hurricane moved inland.

References

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