

# Numerical Simulation of the Inner Core Structure of Hurricane Isabelle (2003)

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Hurricane Isabelle formed from a tropical wave that moved westward from the coast of Africa on 1 September 2003. It strengthened to a Category 5 hurricane on 11 September with maximum sustained winds estimated at 74 m/s at 1800 UTC. After this peak, the maximum winds remained in the 65-70 m/s range and the storm maintained a major hurricane status, with a notable large eye (60-80 km diameter) and eyewall. A high-resolution simulation of Isabelle using the Penn State/NCAR MM5 model was performed. The track and intensification of the storm from September 7 to September 13 were simulated using a 3-domains (54km x 18km x 6km) and two way nested configuration. NCEP reanalysis data were used to generate the initial fields and lateral boundary conditions. In addition to the standard meteorological initial and boundary conditions, a bogus vortex was inserted in the initial fields on 00 UTC September 7 using the vortex relocation technique of Liu et al. (1997). The results showed that, relative to the best track analysis, the simulation reproduces the storm track and intensity very well. The coarser resolution (6km) simulation cannot resolve the fine scale structures. However, when nested to a resolution of 0.67 km, many features depicted in high resolution satellite picture of Isabelle were reproduced. They include the smaller vortices in the eyewall of the hurricane and the polygonal eyewall. The mechanism responsible for these fine scale structures is analyzed and will be reported.