EMS8/ECAC7 Abstracts,
Vol. 5, EMS2008-A-00450, 2008
8th Annual Meeting of the EMS / 7th ECAC

Analysis of the Re-Intensification of Tropical Cyclone Erin over Land with the Numerical Model MM5

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On the 19^{th} of August 2007 the weakened remnants of tropical cyclone Erin suddenly re-intensified over Oklahoma (U.S.A.). The winds picked up from 30 km/h to maximum sustained winds of 95 km/h and wind gusts of up to 130 km/h. Extreme rainfall amounts of over 300 mm were observed in Oklahoma. Several homes were flooded, and strong winds damaged some mobile homes and downed several trees and power lines, Also, seven people were killed. The re-intensification of a tropical cyclone over land is a rare phenomenon, and not very well documented and understood. Therefore, it is interesting to analyze and understand this situation with the mesoscale weather forecast model MM5. Further understanding of this case study may contribute to improved forecasting and on time warning for equivalent future weather systems.

The aim of this study is to investigate and understand the physics behind the re-intensification and to do a sensitivity analysis with the weather model MM5. For the sensitivity analysis 2 different moisture schemes, 2 different planetary boundary layer schemes and 2 different cumulus schemes will be used. This is a total of 8 runs to be able to investigate the influence of every different schemes and possible interactions between different schemes.

MM5 is able to reproduce the re-intensification of Erin for all runs, although $\sim$150 km more south than observed. Also, the simulated system is smaller than observed from radar images. Model results differ substantially for different boundary layer schemes. The ETA scheme produces more precipitation than MRF, because the intensification starts earlier in time with ETA than with MRF. The weaker turbulent transport in ETA than in MRF causes a larger specific humidity in the boundary layer, and subsequently

larger CAPE, resulting in deeper convection.

A sensitivity study to the use of different moisture schemes shows small differences in forecasted precipitation, although the results are inconsistent, likely because of interaction between the moisture schemes and PBL schemes. Next, a sensitivity study to the convection schemes and large scale synoptic forcing will be reported.