Joint Hurricane Testbed (JHT) Program

For the
Environmental Modeling Center/National Centers for Environmental Prediction
5200 Auth Rd
Camp Springs, Md. 20746

Hurricane Model Transitions to Operations at NCEP/EMC

Robert E. Tuleya, Weixing Shen, and Hua-Lu Pan (EMC/NCEP)

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This proposal calls for the continuation of funded work on the GFDL hurricane model upgrades as well as the initiation of a prototype Hurricane forecast system. The second area of work is the commencement of the transition from the GFDL to WRF model that is scheduled to become the next operational hurricane model in ~2006. The progress toward these tasks and goals are indicated in bold italic directly in the original Time Line given for this project. Some of these results were presented at EMC at the modeling workshop in early December. The results will be given in more detail at the upcoming 58th IHC meeting.

Time Line

Year One: July to December, 2003

1) Code and begin to test bulk microphysics packages in collaboration with GFDL. ***Code has been implemented into GFDL system for the Ferrier scheme. We will work with GFDL(Bender) in making comparisons with the Lin scheme which may be more complicated. We anticipate problem areas of how to blend the microphysics package with other convective parameterizations and also with large scale concdensation. The basic programming approach to handle microphysics in the GFDL model has been designed and coded by Bender and Tuleya over the last two years. Bender has already upgraded an earlier version to successfully run the Lin micrpphysics.***

2) Run parrallel version of GFDL model with NOAH LSM for 2003 season for significant landfalling storms. Identify and address problem areas. Also run historic cases from 1995 to present. ***Weixing has successfully coded and run the Noah LSM for several cases of 2003 including Isabel. In addition some 2002 cases were also run. One complication is that the operational GFDL model code has changed , so the Noah LSM code had to be integrated into the 2003 GFDL model which includes new physics and increased vertical***

resolution. These problems have been rectified so that the GFDL model can be run with the NOAH LSM using the 2003system . Basically results have shown some improvements in the quality of the forecast especially precipitation. The LSM has led to less spurious low rainfall amounts away from the storm center. Historic cases are also planned in order to get a more compete picture of the skill of the LSM. We now have initial conditions for ~25 landfalling cases from 1995-2002 with the 2003 GFDL initial condition. The initial land condition will be taken directly from a separate land analysis system run at EMC, the LDAS. Coding is underway to allow the use of LDAS as a land condition for the GFDL model system.

3) In collaboration with GFDL install test versions of GFS surface parameterizations into GFDL model and run several real data cases. ***This project has been delayed with more emphasis on an early start of Hurricane WRF task item sl***

4) ***ated for the second half of year one and year two. EMC has assigned additional personnel for this task. A prototype Hurricane WRF system has been initiated. This system includes the same NMM-WRF dynamic core that will be used for the extratropical mesoscale forecasts that will replace the ETA model. The NMM WRF code has been assimilated into the WRF software structure and includes the traditional pre-prossessing and interpolation of model initialial conditions (i.e. WRF SI) and WRF model integration. Some integrations have already been performed, including cases of Isabel and Claudette.***

5) In collaboration with URI and GFDL, investigate the feasibility of using updated topography and land-use data set. Insure land-sea masks for ocean, land, and atmospheric model are consistent. ***New in-house topographical data sets have been identified at EMC. We are presently comparing them to the present GFDL topography field. It is hoped that the new data will resolve islands that were not resolved in the GFDL model like the Bahamas. The design of this upgrade was discussed at a recent EMC meeting and Tuleya indicates that this can be handled in the pre-processing step before the GFDL model system is started. These new high resolution global fields can be redefined based on the new topography.***

Year One: January to July, 2004

6) Investigate feasibility of installing test versions of GFS shallow convection and radiative packages into GFDL model. Continue to test and evaluate the upgrades started in first half-year.
7) Install WRF physics packages into GFDL model and compare results with operational codes.
8) Begin to design and develop Hurricane WRF forecast system by linking proto-type model to GFDL initial conditions.
9) In collaboration with Bender determine whether and which model upgrades should be made operational for 2004 season.

Year Two: July 2004 to July 2005

1) Run bulk microphysics packages for test suite to test forecast performance
2) Evaluate Hurricane WRF proto-type model and forecast system. Compare Hurricane WRF to GFDL model with WRF physics packages.
3) Begin testing nested and movable nest WRF model when available.
4) In collaboration with Bender, determine feasibility of installing GFDL model upgrades into the 2005 operational suite.<
5) Determine the feasibility of running operationally a Hurricane WRF proto-type forecast system for the 2005 season.