NOAA Joint Hurricane Testbed (JHT): TARGETING STRATEGIES TO IMPROVE HURRICANE TRACK FORECASTS

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Achievements So Far

The 1° resolution NCEP ensembles up to 84h are now available daily at EMC (soon to be available up to 180h). The ECMWF ensembles of the same resolution are being archived at EMC (from January 2004). Both these high-resolution ensembles will be used for developing and testing the ETKF targeting strategy during the 2004 hurricane season. It is also possible that the Canadian Meteorological Centre ensemble will be available at EMC by this time. The 2.5° resolution ECMWF ensembles have recently been archived at EMC for the tropical cyclones of interest in 2003. (Toth, Holland and EMC personnel)

The scripts that are used to run the GFS and GFDL models with and without targeted observations are now complete. They were used during the 2003 hurricane season. The corresponding script for the SHIPS model is also ready. (Aberson)

The Ensemble Transform Kalman Filter (ETKF) targeting software on the IBM SP at EMC has been completely rewritten in Fall 2003. The efficiency of producing the ETKF targeting maps is improved, and it also provides a unified software framework for targeting during Winter Storm reconnaissance and Tropical Cyclone reconnaissance. This unified framework will smooth the transition to operations, and its operational use on the IBM SP supercomputer at NCEP. It also means that one can now easily insert the extra subroutines that are necessary for tropical cyclone targeting, without disrupting the rest of the software. The new code has been tested extensively during the recent Atlantic THORPEX Observing Systems Test (ATOST), and it can now be run for any arbitrary number of ensemble forecasts, at any resolution. Hence, there is much greater flexibility in the new ETKF software, compared with its predecessor which had been written specifically for Winter Storm targeting. (Majumdar)

Now that the software architecture is well-organized, work is ongoing to develop and run the ETKF strategy using 2.5° resolution NCEP and ECMWF ensembles, for the following tropical cyclones in which targeted dropwindsonde observations were collected during 2003: Claudette, Erika, Fabian, Isabel, Odette, Dujuan and Melor. Methods to

reduce the possibility of spurious correlations in the ETKF are being investigated. Synoptic assessments are being performed concurrently. Results will be presented at the upcoming Interdepartmental Hurricane Conference in March 2004, and a detailed description will be given in the Annual Report in May 2004. Results will be made available on a Website which will be continuously updated, to ensure clear and rapid communication among all University, AOML, EMC and TPC personnel. (Majumdar, Etherton, Aberson)

Remaining work for Year 1:

The immediate priority is to have a satisfactory version of the ETKF targeting strategy in use. (*Work to be done between Jan-May 04*)

In addition to its present "norm" of wind speed, the ETKF software will be extended to test verification norms of track and intensity (*May-Aug 04*)

Using the scripts that are already in use to run parallel analysis-forecast cycles with and without the targeted observations, the ability of the ETKF to predict reduction in forecast error variance will be evaluated. This will be done with the 2.5˚ ensembles for the 2003 tropical cyclones, and the 1˚ ensembles for the 2004 tropical cyclones (*May-Nov 04*)

Deliverables:

Reliable ETKF sensitivity maps for planning of synoptic surveillance missions.

Year 2

The plan for Year 2 remains the same as that outlined in the proposal:

1. Combine ETKF with flight track design software (*January 2005*)
2. Transfer ETKF software to operations at NCEP (*January - July 2005*)

Deliverables:

ETKF products that select the best feasible flight track for synoptic surveillance.
Training of personnel at NCEP to run the final version of the tropical ETKF code, and interpret the products.