Geophysical Research Abstracts
Vol. 14, EGU2012-5018, 2012
EGU General Assembly 2012

Further development of NCEP's Multi-scale Eulerian NMMB model

Z. Janjic (1) and R. Vasic (2)

(1) NOAA/NWS/NCEP, Camp Springs, MD, USA (zavisa.janjic@noaa.gov, 001 301 763-8545), (2) UCAR/NCEP, Camp Springs, MD, USA (ratko.vasic@noaa.gov, 001 301 763-8545)

Development of the unified Non-hydrostatic Multi-scale Model (NMMB) has continued at NCEP. The horizontal differencing employed in the model preserves important properties of differential operators and conserves a variety of basic and derived dynamical and quadratic quantities. Among these, conservation of energy and enstrophy improves the accuracy of nonlinear dynamics. The nonhydrostatic dynamics were designed in such a way as to avoid overspecification. The global version is run on the latitude-longitude grid, and the regional version uses rotated latitude-longitude grid in order to reduce variation of the grid size. In the global limit, conservative polar boundary conditions are used, and the polar filter selectively slows down the waves that would otherwise be unstable. The physical package was developed from the standard WRF NMM's physics. Major updates have been introduced into the parameterizations of radiation, turbulence, and moist convection. The entire physical package of NCEP's Global Forecasting System (GFS) is also available. Some of its components can be used separately as well.

The global NMMB is run twice a day in order to test and tune it. The system is initialized and verified using the spectral analyses of NCEP's Global Forecasting System (GFS). This is not fully satisfactory since the spectral model data cannot be perfectly converted into grid point model data. Nevertheless, the performance of the NMMB has been comparable to that of other major medium range forecasting systems. Incremental improvements of the model have been tested in parallel runs. However, it is not clear how long the parallel runs should be in order to provide a robust statistically significant result. A change bringing a noticeable improvement in one season may be detrimental in the other. Since the resources are limited and the parallel runs cannot be too long, a supplementary strategy was developed. A set of 105 cases over one year at three and a half day intervals has been created. Note that in this way both 00Z and 12Z initial data are about equally represented. Since the cases are chosen randomly, it is expected that test results over this set of cases would be reasonably close to test results over a year. In addition, a shorter "quick-look" set of cases with 35 members was created taking every third case from the full set. These data sets are used for preliminary testing of candidates for parallel runs. A number of initial data conversion algorithms, resolution settings and physical parameterization sensitivity studies have been carried out using this approach. Some of the test results will be discussed.

The regional version of the NMMB replaced the WRF NMM as the main NCEP's operational short range forecasting model for North America (NAM), as well as in a number of high resolution nested runs. The NCEP's operational "Hurricane WRF" is planned to be upgraded to the NMMB dynamics by 2014.