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The NCEP Eulerian Non-hydrostatic Multi-scale Model (NMMB)

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The development of the unified Non-hydrostatic Multi-scale Model (NMMB) has continued at NCEP. The model dynamics preserve a number of important properties of differential operators and conserve a variety of first order and quadratic quantities. The nonlinear dynamics is controlled by conserving energy and enstrophy in case of non-divergent flow. Over-specification of vertical velocity is avoided. The physical package was developed from the WRF NMM's physics, but other physics options are also available.

The regional version of the NMMB is run operationally as the main deterministic North American short-range forecasting model (NAM) and in a number of other applications. The global NMMB also has been run over the last few years experimentally in order to assess its capabilities and develop it further. In terms of large scale metrics, the performance of the global NMMB in medium range weather forecasting has been generally comparable to that of other major medium range forecasting systems. Its computational efficiency satisfies and exceeds the current and projected operational requirements.

Recently, the transition has started of the operational hurricane forecasting system HWRF from the WRF NMM dynamics to those of the NMMB. This system involves the use of a hierarchy of 2-way interactive telescoping moving nests.

The work on the interaction between clouds and radiation has continued. Extended range forecasts showed large sensitivity to the method for representing clouds. With the clouds represented by optical properties of their microphysics species, the results depend on the microphysics scheme used. Taking into account the impact of convective clouds remains a challenge with this approach.

Development of an indigenous data assimilation system for the global NMMB has commenced. The system is based on the hybrid ensemble Kalman filter/3DVAR technique. It is believed that the potential of the NMMB can be better assessed using its own dedicated data assimilation procedure.

Numerous sensitivity studies of physical parameterizations have been carried out as well. The relevant results will be presented and discussed.