Geophysical Research Abstracts
Vol. 15, EGU2013-8217, 2013
EGU General Assembly 2013
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NCEP's multi-scale NMMB model in the Hydrometeorological Service of Serbia: experiences and recent model developments

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In recent years, the unified Non-hydrostatic Multi-scale Model (NMMB) developed at NCEP has been used for a number of operational and research applications in Hydrometeorological Service of Serbia (HMSS). The NMMB can be run as a global model on the latitude-longitude grid, and as a regional one on rotated latitude-longitude grid. The main characteristics of the model dynamical core are that horizontal differencing preserves many important properties of differential operators and conserves a variety of basic and derived quantities including, energy and enstrophy. The novel implementation of the nonhydrostatic dynamics ensures that overspecification of the nonhydrostatic system of equations is avoided. Two different physical packages are available. The regional version of the NMMB recently 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.

Over the last three years the NMMB has been used at the HMSS for operational and research activities. Starting from January 1, 2011, the global version of the model has been run once a day in an operational mode in order to produce global medium range weather forecasts up to ten days. The model is initialized by remapping NCEP's global spectral analyses to the NMMB grid. In order to illustrate the performance of the model, relevant objective verification scores over the last two years will be presented and discussed.

For selected forecast cycles, the NMMB was run starting from both NCEP's and ECMWF's initial data. In this way an attempt was made to assess the impact of different initial conditions on the quality of the medium range forecasts. The initial data indeed had a profound impact on the forecasts, but still could not explain all the differences between the forecasts produced by the NMMB and NCEP's and ECMWF's models. .

During the last year, in addition to the WRF NMM, the regional high resolution version of the NMMB has been run operationally over Europe in order to produce short range weather forecasts. The performance of this NMMB implementation will be addressed, too.

Finally, in support of the activities of the South-East European Virtual Climate Change Center (SEEVCCC) hosted by the HMSS, the NMMB has been coupled with the Princeton Ocean Model (POM). The coupled system is intended for operational long-term (seasonal) forecasting and climate research. Preliminary results obtained using the coupled system in extended runs will be reviewed.