Geophysical Research Abstracts, Vol. 9, 02031, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-02031

Diagnosis of parameterization schemes in the MM5 model

J.Palamarchuk (1), S.Ivanov (2)

(1) Black and Azov seas forecast center, (2) Odessa state environmental university (svvivo@te.net.ua/+38-048-746-7339)

The objective of this study is to focus on capabilities of various parameterizations in the MM5 model in order to select the optimal set of schemes providing smaller error growth rates in simulations of the atmospheric circulation all the way from the short range to the medium range and beyond. Combinations of schemes include a few parameterizations for each category, namely, microphysics, PBL, cumulus and radiation. The major topics are addressed to evaluate the spatial structure and scales of model error for various atmospheric fields on different levels; determining geographical regions where model errors are largest; defining particular atmospheric patterns contributing to the fast and significant model error growth. Results are presented for geopotential, temperature, relative humidity and horizontal wind components fields on standard surfaces over the Atlantic-European region with the coarse resolution during winter 2002. The model fields are verified against ERA40 reanalysis. Results show that under the same initial and boundary conditions, model error varies in magnitude as well as horizontal and vertical distributions depending on the particular scheme. Moreover, it was found that although optimal sets of schemes exist in general, they may not be optimal for a particular atmospheric variable at a particular level. For example, the leading set includes the mixed phase Reisner for microphysics, Kain-Fritsch for cumulus, MRF by Hong-Pan for PBL, and CCM2 for radiation. This set is also optimal for geopotential height fields. However, optimal simulation of the humidity fields in the low and middle troposphere as well as precipitation, the Anthes-Kuo scheme for cumulus and the Eta scheme by Mellor-Yamada for PBL are preferable.

Acknowledgement: This study has been supported by NATO Science for Peace grant #981044. The MM5 modelling system used in this study has been provided by UCAR. ERA-40 re-analysis data have been obtained from the ECMWF data center.