THE FIRST STEPS OF OPERATIONAL RUNNING OF NON-HYDROSTATIC MESOSCALE MODEL ATMOSPHERE COSMO-RU

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The **Co**nsortium for **S**mall-scale **Mo**deling (COSMO, http://www.cosmo-model.org/) was formed in October 1998. It is general goal is to develop, improve and maintain a non-hydrostatic limited-area atmospheric model COSMO, to be used both for operational and for research applications by the members of the consortium.

In September 2007 Federal Hydrometereology and Environmental Monitoring Service of Russia has entered to consortium COSMO for joint development and using mesoscale model COSMO with members of a consortium (services Germany, Greece, Italy, Poland, Romania and Switzerland).

The configuration COSMO-RU (40 levels, rotated system coordinate with rotated north pole with geographical latitude 35^0 and longitude 215^0, territory of the European part of Russia: grid spacing 0.125^0 (14 km) with 168 x 300 grid points, time step 80 s) of model COSMO (version 4.3) is chosen and adapted to computing systems on the basis of Intel 64-bit processors Xeon and Itanium processors not only for preparation for planned reception in 2008-2009 of the super computer, but also realization of daily 78 h forecasts for territory of the European part of Russia.

For demonstration of an opportunity of the forecast of the dangerous phenomena with the help of model COSMO-RU the forecast of storm in Kerch strait on the data for 10.11.2007.00 is carried out. The analysis which has shown high efficiency of model COSMO-RU is spent.

Mesoscale model COSMO-RU with the grid step of 14 km is adapted to the weather technological line of the Hydrometeorological centre of Russia and release of forecasts meteoelements on 78 h on the European territory of Russia in an quasi-operative mode on the current initial data and conditions on borders is organized two times in day (00 and 12 hours UTC) on 1 node (2 processors Xeon 5345, 2.33GHz, with 4 cores each and 32 Gb operative memory on node, 64-bit, OS - RHEL5 (Red Hat Enterprise Linux 5), Intel C++ 10.0.26, Intel Fortran 10.0.26, Intel MPI 3.0). For these forecasts the HMC of Russia receives by *ftp* GME data from DWD and produces the forecasts for 78 h for the European part of Russia. Time of the run with 8 cores (1 x 8 - topology) is 3h 35 min. Examples of skill of T_{2m} forecasts for different cities of Russia (26.07.2008-13.08.2008) see on fig.1.

Are carried out adaptation mesoscale model COSMO-RU to removed (taking place on territory of USA) computing system ALISA and numerical experiments (with use up to 256 cores) for a choice of optimum cartesian topology for model COSMO-RU on a basis 78 h of forecasts at the choice of effective decomposition of area of the forecast for minimization of time of the account with the help of package MPI. Similar work is spent for 448 cores of the new super computer ALTIX 4700 of Federal Hydrometereology and Environmental Monitoring Service given in an experimental mode. Time of the run with 448 cores (14 x 32 - topology) is 267 s = 4 min 27 s. The estimation of the received acceleration speaks about high quality of the parallel algorithm, used in models COSMO-RU.

It raises confidence on fast development of opportunities of the new super computer of Federal Hydrometereology and Environmental Monitoring Service for preparation and to application in an operative mode of system COSMO-RU for grids for almost whole Europe with steps of 7 km and for direct modeling deep convection with grid step of 2.8 km.

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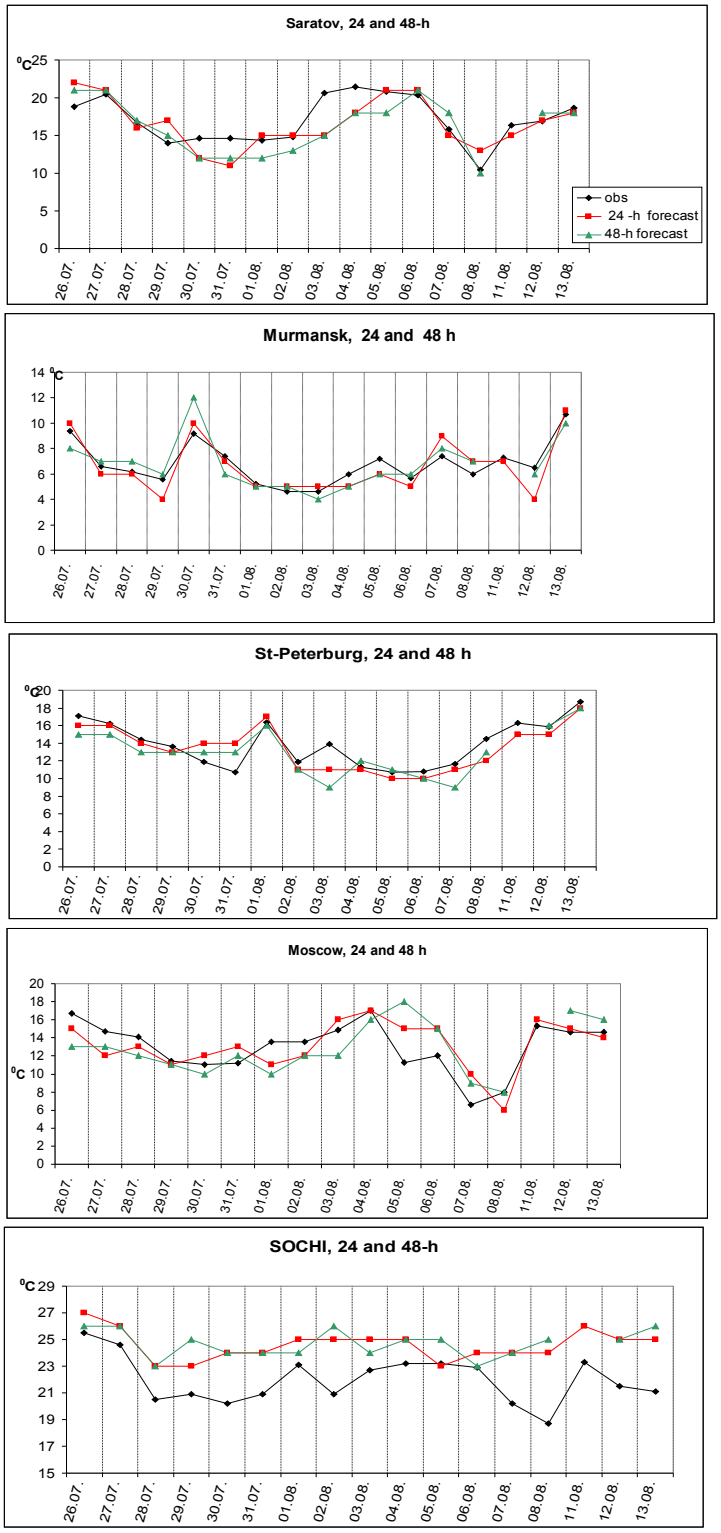

Fig.1. Examples of skill of T_{2m} forecasts for different cities of Russia (26.07.2008-13.08.2008)