Research and developments in Romania
July – December 2004

1. The implementation of cycle 28T3 on SUN E4500 and Linux cluster platforms (Cornel Soci)

SUN platform

The implementation has been performed using the explicit interfaces generated on VPP5000. Minor problems, specific to the SUN *Forte 6* compiler, have been encountered.

Linux cluster

The platform was designed and built in our institute. It is based on Intel XEON processor. There are 6 nodes with 2 processors per node. The cluster is going to be upgraded with 6 more nodes.

ALADIN model was implemented using *gmkpack*, Intel compiler and *mpich* library. We are grateful to Jure JERMAN, Andrey BOGATCHEV, Ryad ELKHATIB and Stjepan IVATEK-SAHDAN for their kind support.

2. Dynamical adaptation of the wind using the ALADIN NH (Steluta Alexandru)

See the report of Steluta ALEXANDRU "High resolution dynamical adaptation of the wind forecast using the non-hydrostatic version of the ALADIN model", in this Newsletter.

3. The flash flood event of 28th of August 2004 (Doina Banciu and Cornel Soci)

On August 28 south-eastern Romania (Dobrogea and eastern part of Muntenia) was affected by a Mediterranean origin cyclon evolving over the western basin of the Black Sea. The convective activity intensified over the sea during the night of August 27/28. During the day, the intense convective cells coming from the sea towards the shore and after that onto the land generated tornadic winds (waterspouts), intense electric activity, sporadic hail and an exceptional amount of precipitation: 190 l/m^2 at Constanta (on the shore, cumulated in 12 h), 318 l/m^2 at Pantelimon (in land, cumulated in 24 h).

The operational ALADIN (AL15) forecast indicated large areas of high precipitation in the south and north-eastern part of Romania but completely failed in predicting the severe weather event which occurred in the vicinity of the Black Sea coast.

For the case study two types of experiments have been carried out :

- The operational integration domain (100×100×41, Δx=10 km) was enlarged (160×120×41) for better covering the western basin of the Black Sea.
- The horizontal resolution was increased up to 2.5 km for a domain covering only the south-eastern Romania (216×216 points).

For both series of experiments the non-hydrostatic version of the ALADIN model, cycle 28T3, was used. Another difference with respect to the operational suite was the usage of the linear grid and the absence of orography envelope. For the experiments at 2.5 km the initial and boundary conditions were provided by the simulations at 10km resolution (coupling frequency 3 hours).

The results showed that the precipitation amount was increased and the convective system over the sea was more structured (especially for the simulation at 2.5 km) but there were deficiencies in positioning of the precipitation cores. The case is still under study.

We would like to thanks to Radmila BROZKOVA for her advices in running the non-hydrostatic version of the ALADIN model. and to Gwenaëlle HELLO for providing us an AROME simulation for this case.

4. The common ALADIN verification project (Simona Stefanescu)

From this summer Romania has joint the common ALADIN verification program.

The data extraction procedure, developed by the Slovenian colleagues has been installed on a SUN workstation without any problem, using the PALADIN package. The surface and upper-air parameters forecasted by the ALADIN-Romania model for the established list of stations are sent by e-mail to Ljubljana to be inserted into the central database.

5. First test on EPS ALADIN-Romania (Mihaela Caian)

a) The integration area (the coupling domain) was regionalized in sub-domains of similar response to initial conditions perturbations; these sub-domains were identified computing a baroclinic instability diagnostic (the average rate of conversion of available potential energy of the mean flow to eddy potential energy), maximal values indicating areas with increased potential for maximal perturbation growth. An example of the separation in sub-domains of response to initial conditions perturbations is shown in Figs 1 (showing the index at 850, 550, 300 hPa). Preliminary results indicate areas of maximal sensitivity in inner-Carpathian and SV regions in the lower troposphere (as expected emphasizing with a westward tilt on the vertical). A maxima over the Black Sea at higher levels shall be further analysed in connection with local diabatic sources. The higher troposphere is characterized by a mainly dipolar structure for the tested period, with a higher sensitivity in the western region that will be also analysed further.

b) The use of SLAF (Scaled Lagged Average Forecast) method: the method is preliminary used for 6 hours lag, leading to 2 to 4 ensembles with analysis as initial conditions, depending on the comparison time; hourly ranges are compared and the error spread is analysed in connection with regions determined at a).

6. Verification of spectral coupling method on daily basis (Raluca Radu)

A verification chain of spectral coupling is performed against operational ALADIN (cycle 15). Daily and monthly scores fill daily a database for August 2004. The scale-sensitivity diagnostic tool is under development. In order to determine the impact of the spectral coupling scheme on temperature and mean-sea-level (MSLP) fields, daily and monthly distribution scores (BIAS and RMSE) maps have been realized. The results are indicating generally, an increased forecast performance when using spectral coupling.

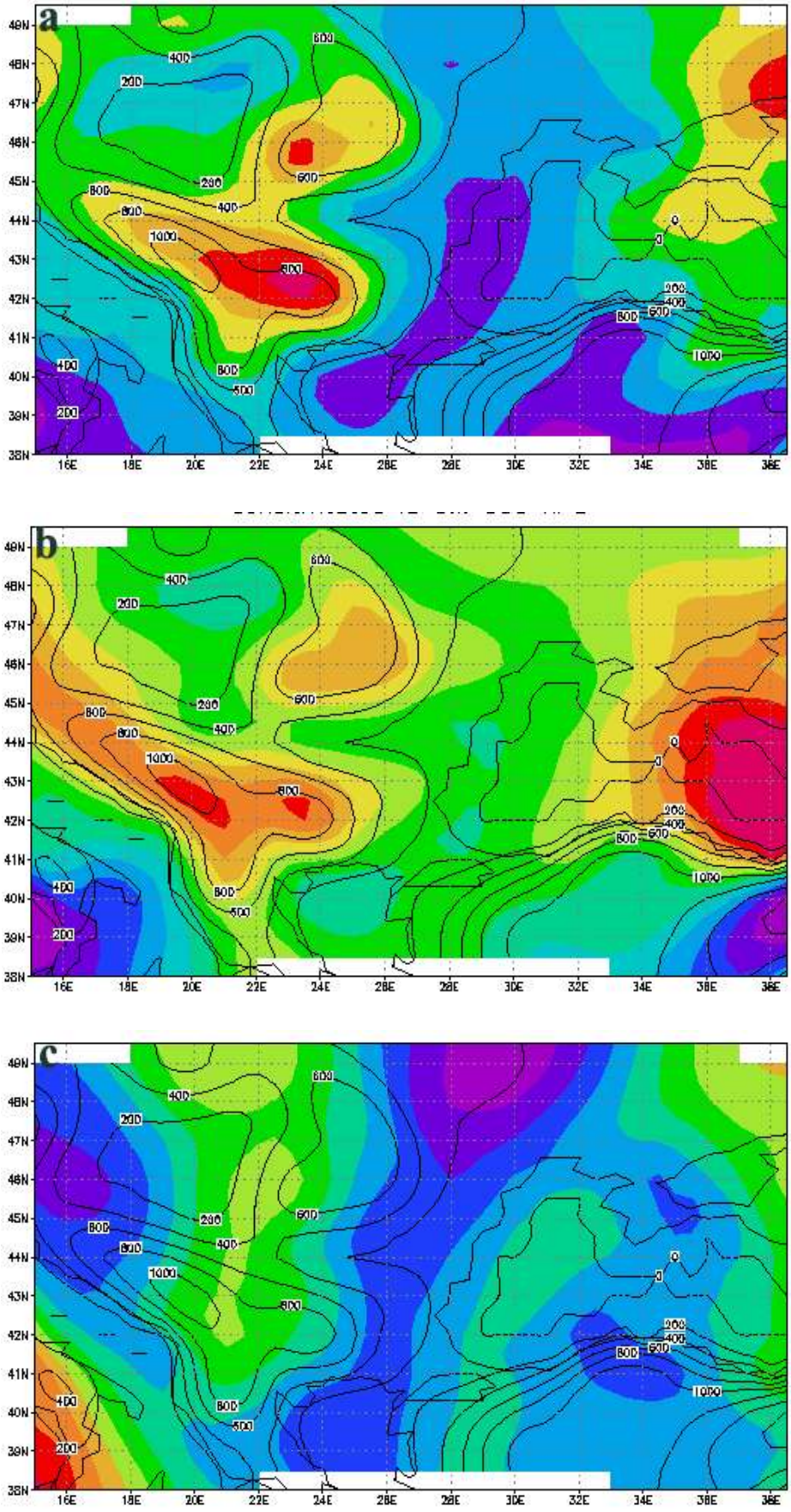

Figure 1 : Instability index at 850 (a), 550 (b) and 300 hPa (c)

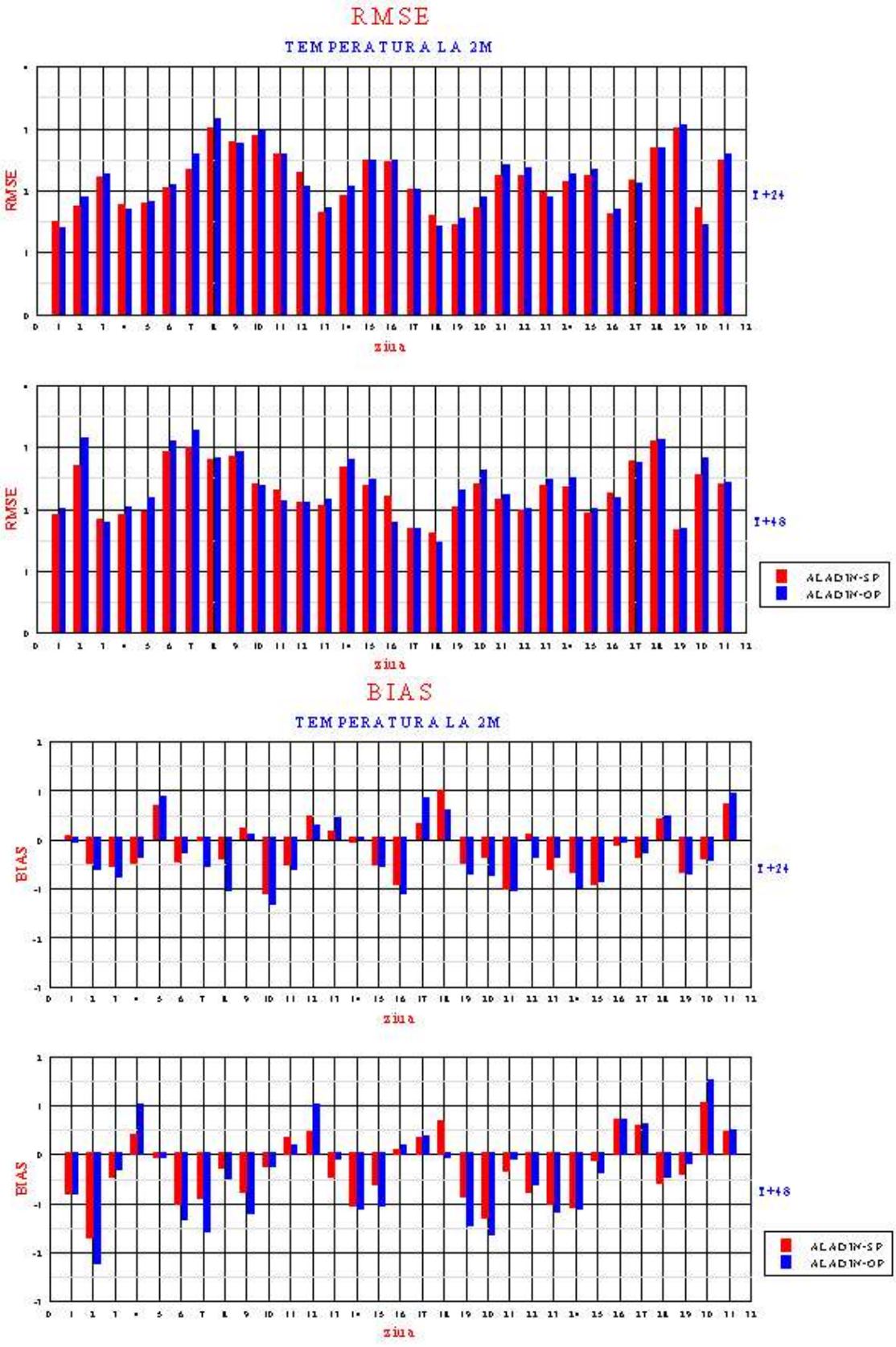

Figure 2 : RMSE and BIAS daily scores for temperature using ALADIN operational without/with spectral coupling method

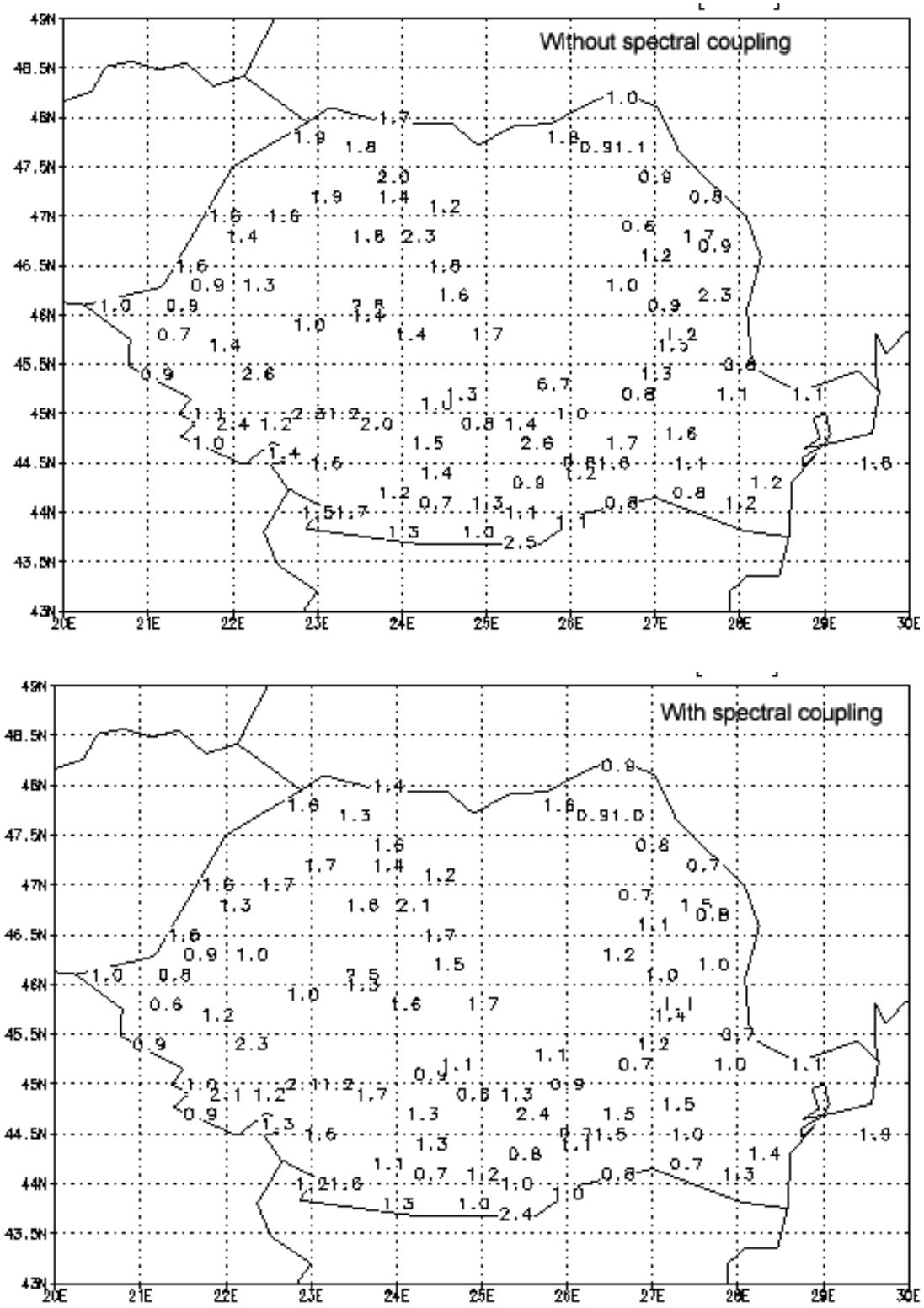

Figure 3 : Monthly RMSE distribution for MSLP using ALADIN operational without/with spectral coupling method

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