Research and developments in Romania

January – June 2004

1. The implementation of the high-resolution dynamical adaptation for the forecast of the surface wind (Steluta Alexandru)

In order to apply the dynamical adaptation of the forecast for wind field at kilometric scale (Mark Zagar' s method) two different domains of touristic interest have been selected : one covers a mountain region, and the other one the Romanian Black Sea coast. The climatic files were created for these domains. The chosen resolution is 2.5 km, while the resolution of the operational ALADIN/Romania model is 10 km.

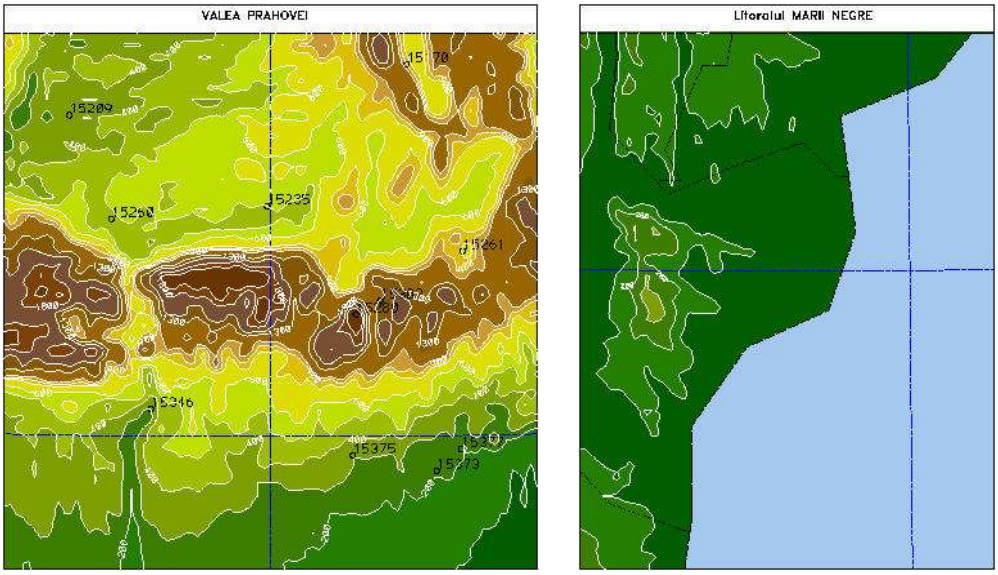

Figure 1 : Orography of the domains chosen for the dynamical adaptation

In order to study the impact of the increasing resolution for the wind field, the snow storm of 22nd - 23rd of January 2003 has been selected; it affected mainly the sea coast and the eastern part of Romania. The dynamical adaptation forecast showed an improvement both in direction and intensity of the wind :

- for the coastal zone (Fig. 2), over the land the speed was increased up to 7.5 m/s (usually in such situation the wind speed is underestimated by the operational model)
- in the mountain area (Fig. 3) the improvements concerned mainly the wind direction.

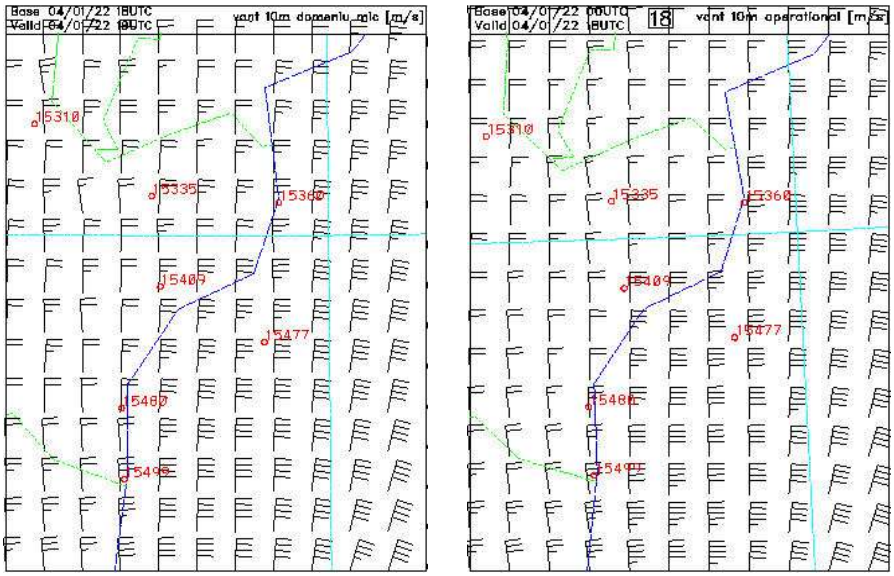

Figure 2 :10 m wind field obtained by operational integration of the model ALADIN (right) and by dynamical adaptation (left) over the Black Sea coastal area.

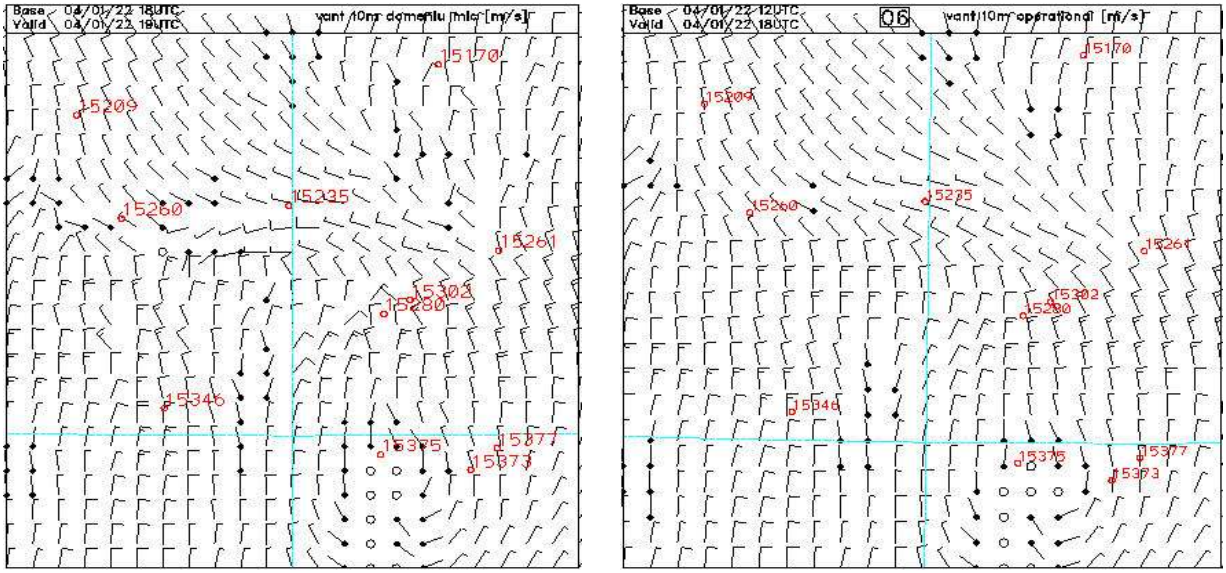

Figure 3 : 10 m wind field obtained by operational integration of the model ALADIN (right) and by dynamical adaptation (left) over the mountainous area.

2. New fields from the outputs of the ALADIN model transmitted in GRIB format (Steluta Alexandru, Simona Stefanescu)

Besides the already existing fields in the post-processing procedure like Convective Available Potential Energy (CAPE), Moisture Convergence (MOCON), Convective Inhibition Energy (CIN), Wind Gusts (U, V), new fields for the estimation of the atmospheric instability are computing using the ALADIN model outputs : Total Totals Index (TTI), K-Index (KI), Vertical Totals Index (VTI), Cross Totals Index (CTI). These parameters are available in GRIB format

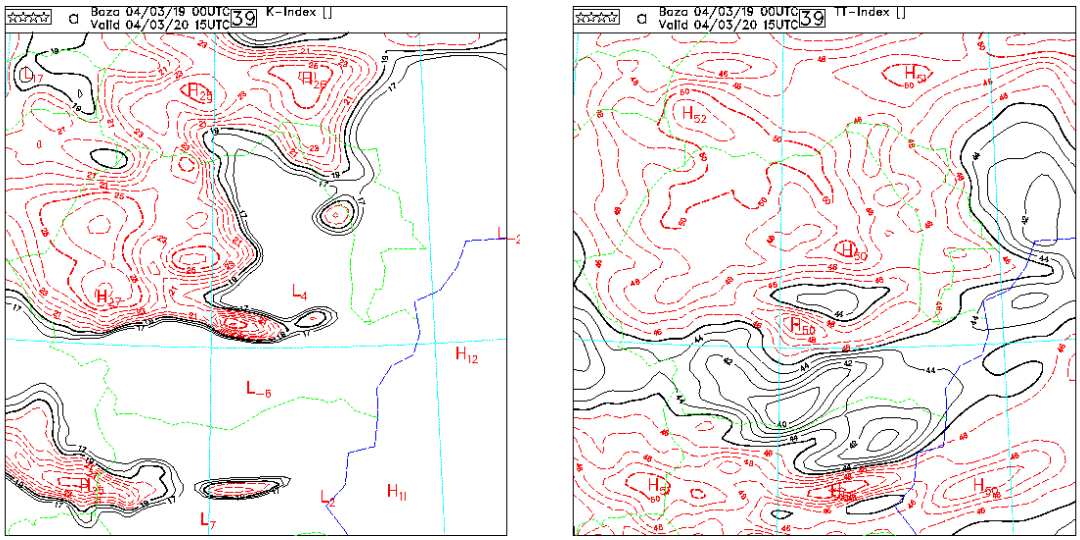

Figure 4 : K-index (left) and Total Totals index (right), valid on March 20, 15 UTC, based on March 19, 00 UTC

3. Verification of spectral coupling results (Raluca Radu, Rodica Dumitrache)

Going further on the spectral coupling validation topic, an objective verification was carried out for the period June-July 2004 using AL15_04 operational version. The daily statistical measures (BIAS, RMSE) with anticipation for 24h and 48h are calculated for forecast of the operational model and for forecast of model using spectral coupling scheme, with the following settings for the namelist parameters: NEK0=2, NEK1=10, TSTARTSC=0.5, BETAEXP=4 (see previous ALATNET reports). The compared fields are mean-sea-level pressure and temperature. Note that we had to cancel from our verification the stations with errors in measured data.

In the pictures is represented the evolution of the RMSE and BIAS data with time. It is observed that in general the models are behaving quite similar, but it is noticed a better BIAS when using spectral coupling scheme and a quite smaller RMSE as well. This indicates that the model which uses the spectral coupling scheme seems to perform slightly better in some cases.

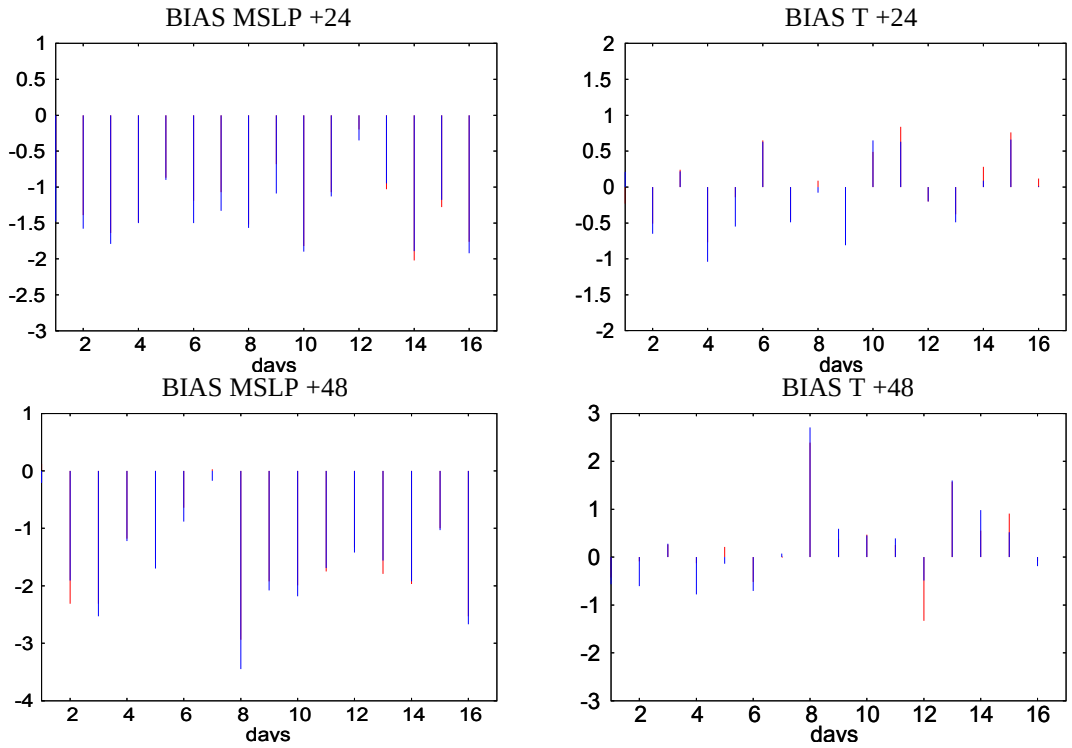

Figure 5 : Evolution of mean-sea-level pressure (MSLP) and temperature (T) BIAS scores with time (red line : ALADIN using spectral coupling scheme, blue line : operational ALADIN)

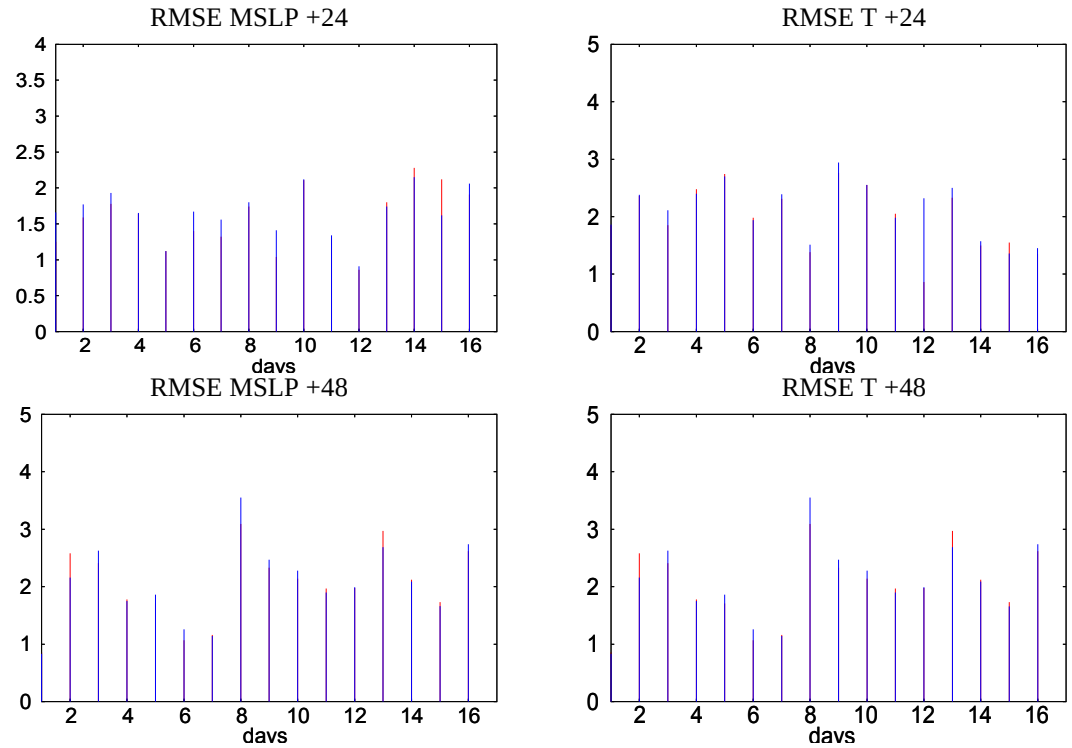

Figure 6 : Evolution of mean-sea-level pressure (MSLP) and temperature (T) RMSE scores with time (red line : ALADIN using spectral coupling scheme, blue line : operational ALADIN)

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