

Report of stay

**Combination of ARPEGE/EPS and ECMWF/EPS downscaling**

Location: Central Institute for Meteorology and Geodynamics (ZAMG), Vienna  
1-30 iunie 2008

Simona Tascu

National Meteorological Administration-Romania, Bucharest

The work carried out during this stay concerned the generation of an ensemble prediction system based on the ECMWF and ARPEGE EPSs, over the same domain i.e LAEF domain with 18 km horizontal resolution and 37 vertical levels (NLAT=225, NFPGUX=214, NLON=324, NFPLUX=313, RLONC=2.75, RLATC=48) and for post-processing: NLAT=110, NLON=196, RLATC=46.77, RLONC=17.17, RDELX/Y=0.15 .

### **1. The system used are :**

- a) the global model ECMWF with 18 members : the first 16 members of ECMWF/EPS, the control forecast and the deterministic forecast;
- b) the global model ARPEGE - ARPEGE/EPS is running operational only for 18 UTC, for 10 members;
- c) the limited area model ALADIN. The ALADIN model coupled with ECMWF is running operationally for 00 UTC and 12 UTC. Only the 00 UTC run was used in tests. The ALADIN model was integrated for 66h, using the initial and boundary conditions from ARPEGE/EPS (on tori), with cycle 32, for 40 days (from 17 of May to 25 of June 2008).

### **2. The combined system:**

In order to combine these different EPS, two system are chosen:

- one system (notated with LAEF in figures) was computed from 18 members of ECMWF/EPS (from 00 UTC);
- the second system (notated with LAEFcombi in figures) was computed from 28 members : 18 members from ECMWF/EPS (the forecast ranges between 00 to 54h, from 00UTC) + 10 members from ARPEGE (the forecast ranges between 06 to 60h, from 18 UTC).

The combined system skill was evaluated for the test period by using the verification package developed in the aim of RC-LACE (see reports of Alexander Kann - 2007, Edith Hagel - 2006 and Richard Mladek – 2006). The verified parameters used are for surface : msl-pressure, 2m temperature, wind and precipitation at different thresholds.

The results show that the is better than the combined LAEFcombi system (based on 28 members: 18 from ECMWF and 10 from ARPEGE) is in generally better than the system LAEF (based only on ECMWF):

- the usage of the both ECMWF and ARPEGE EPS lead to an increase of spread for all surface parameters (see figures 1, 2, 3, 4);
- bias, RMSE (figures 1, 2, 3, 4), Brier Score and Brier Skill Score (figures 5 to 11) are almost better for LAEFcombi, exception is the temperature at 12 and 36 forecast ranges ( see figures ;
- Percentage of outliers (figure 12) and ROC diagram (figure 13) show that the forecasts are better in case of LAEFcombi

### 3. Further work:

The generation of the combined system for a longer period is foreseen. Following the verification (including upper levels parameters ) a bias correction is to be applied.

### 4. Acknowledgements

I would like to thank all the colleagues from ZAMG for their hospitality and for their assistance and support, specially to Mr. Wang Yong, Christoph Wittmann and Alexander Kann.

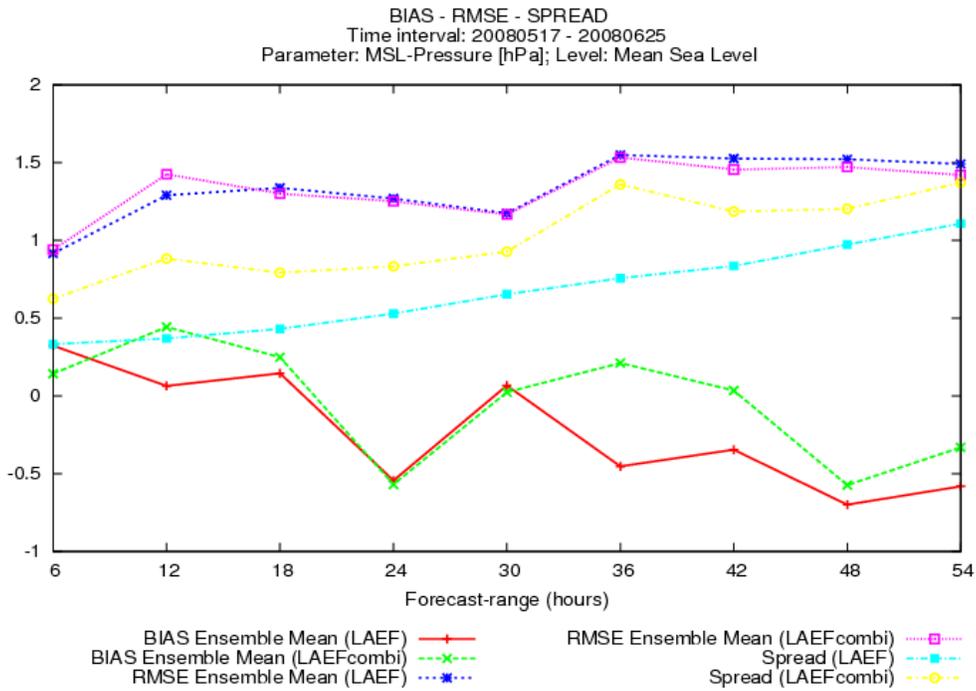


Figure 1

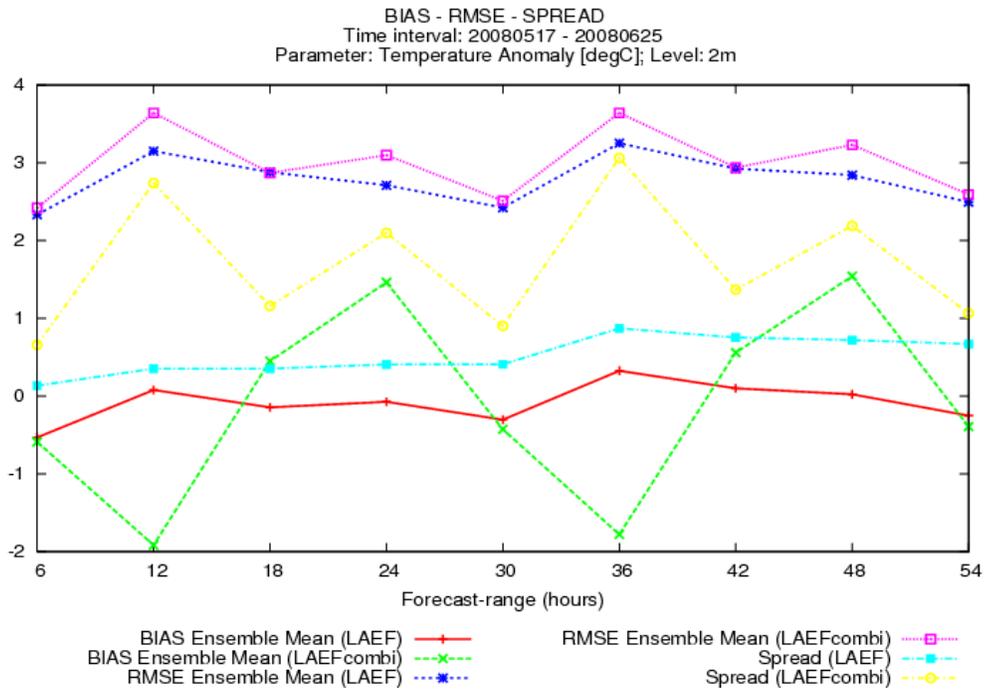


Figure 2

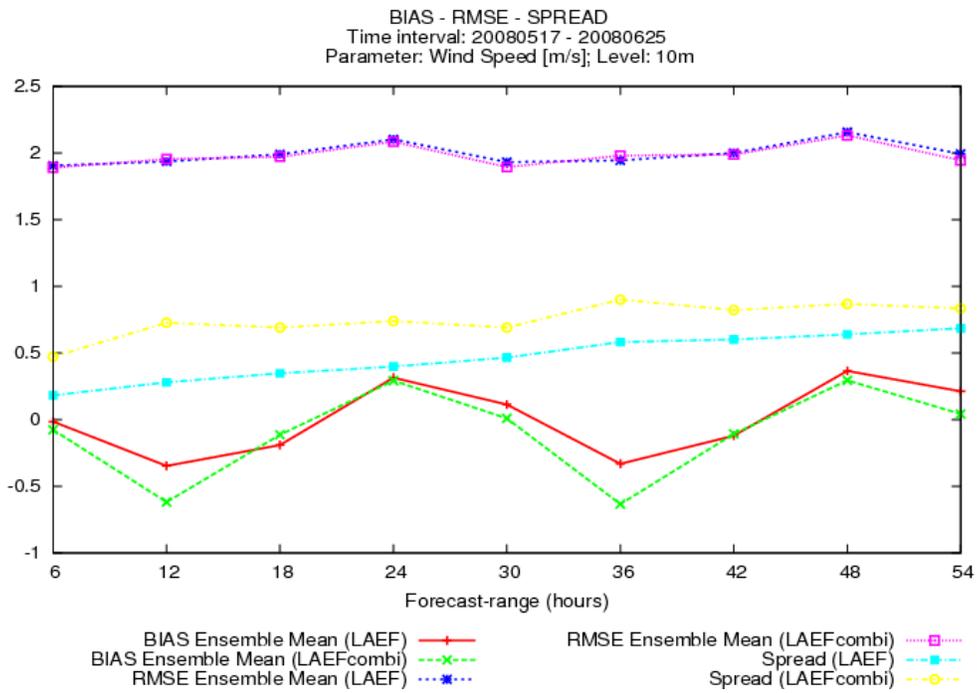


Figure 3

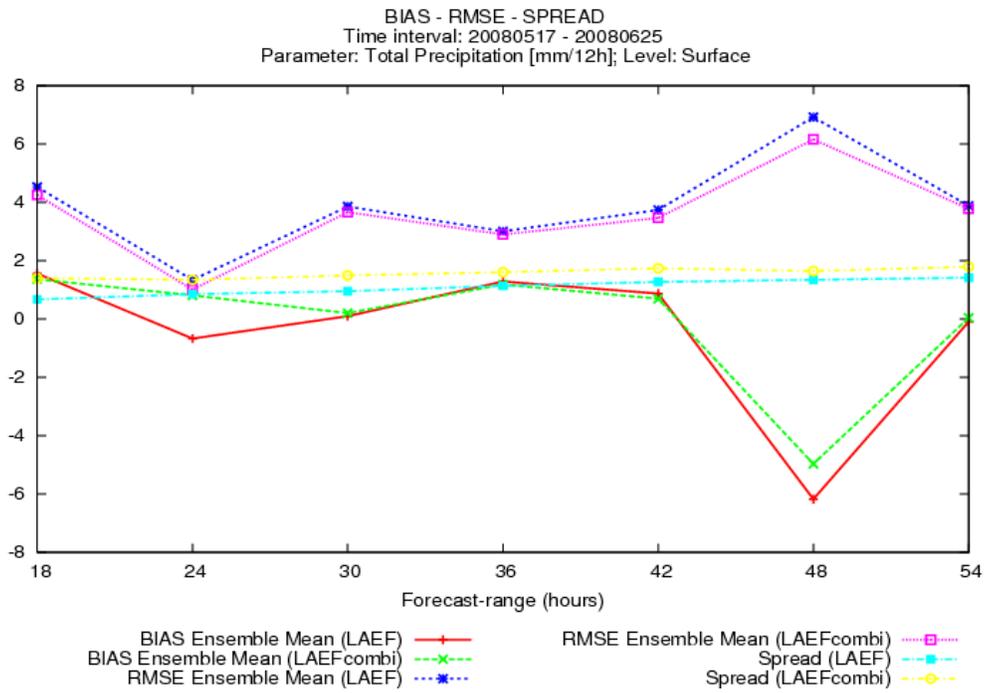


Figure 4

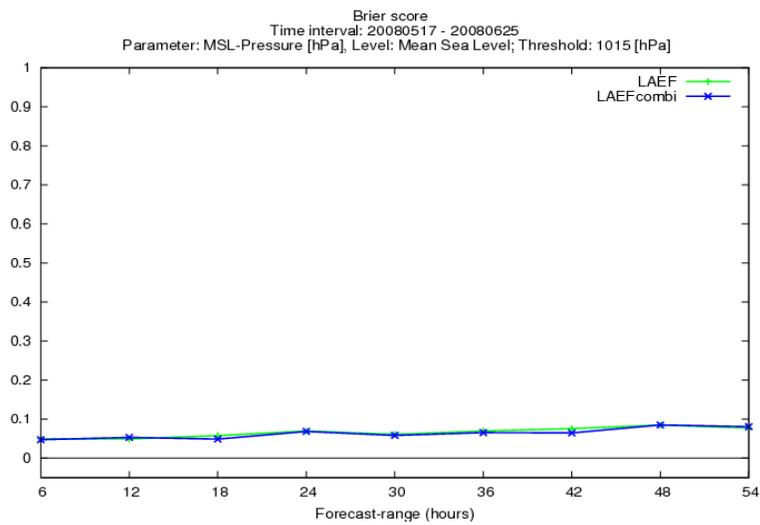


Figure 5

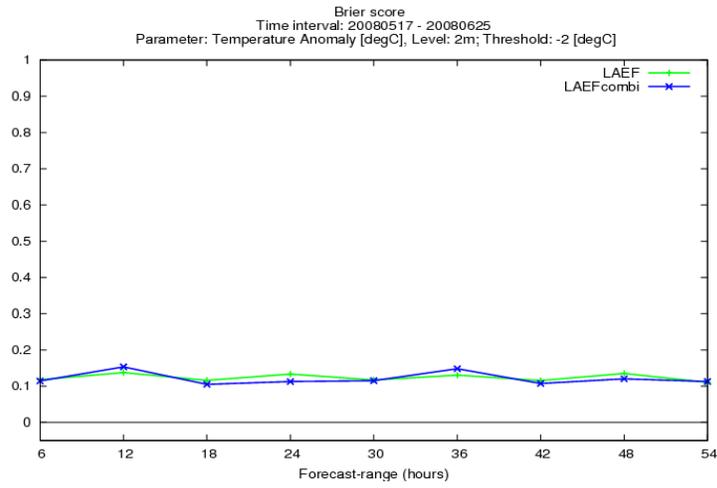


Figure 6

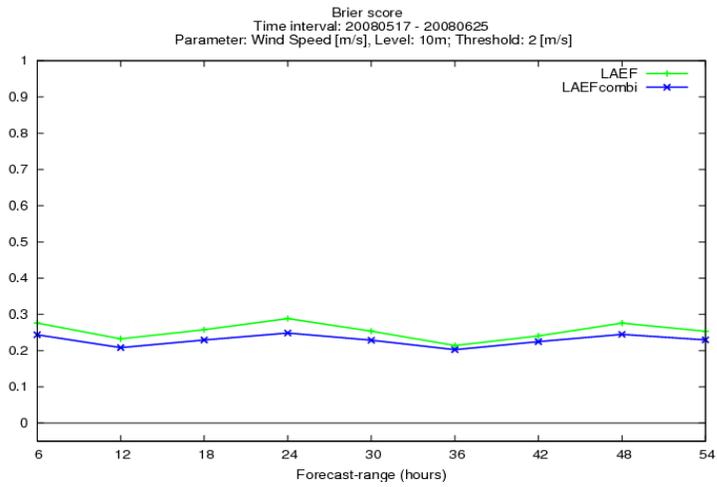


Figure 7

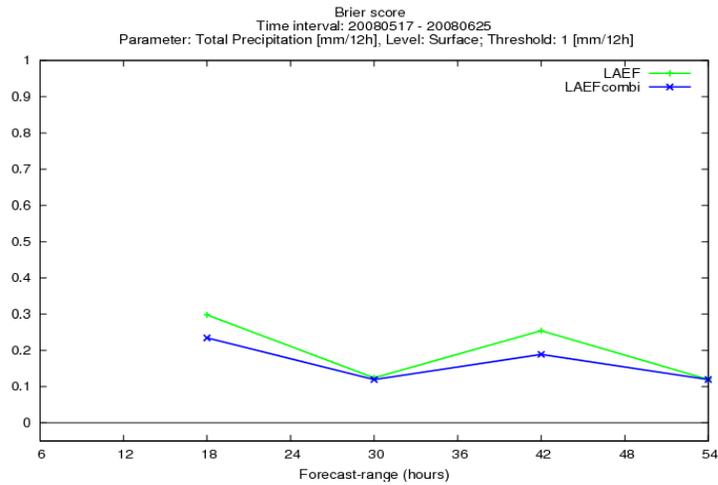


Figure 8

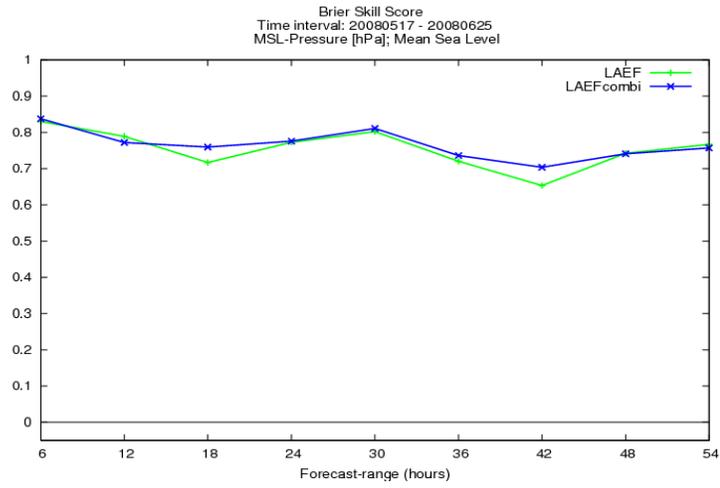


Figure 9

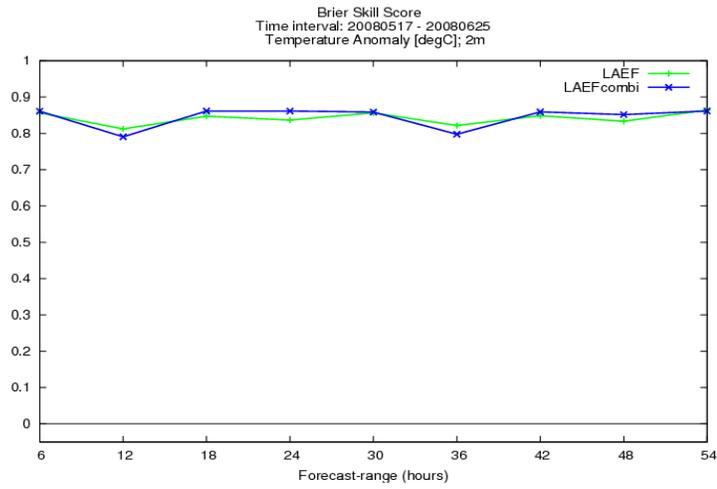


Figure 10

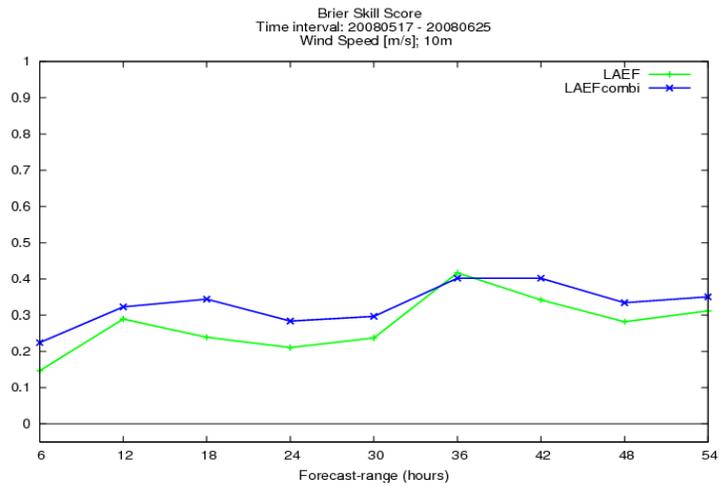


Figure 11

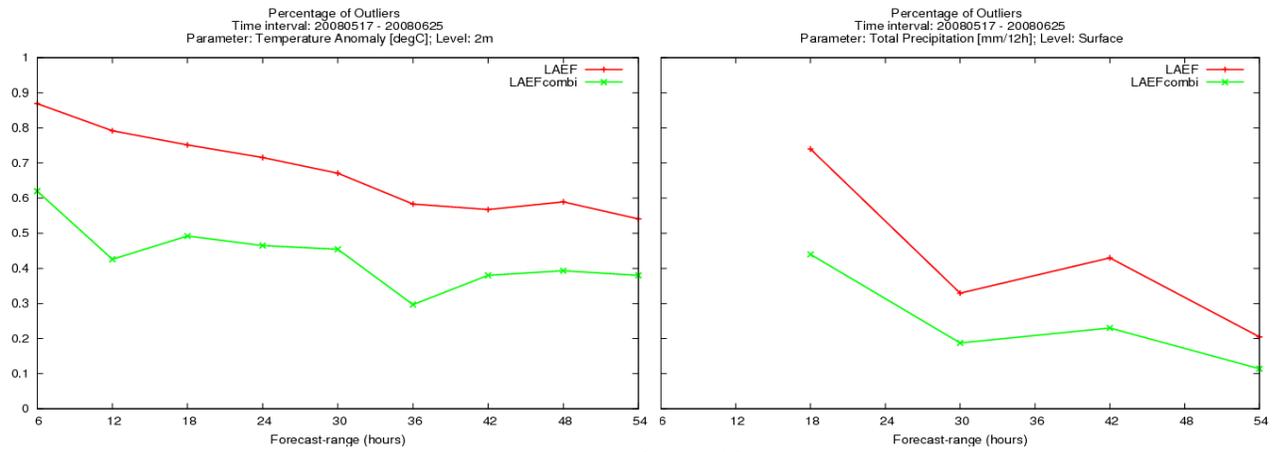


Figure 12

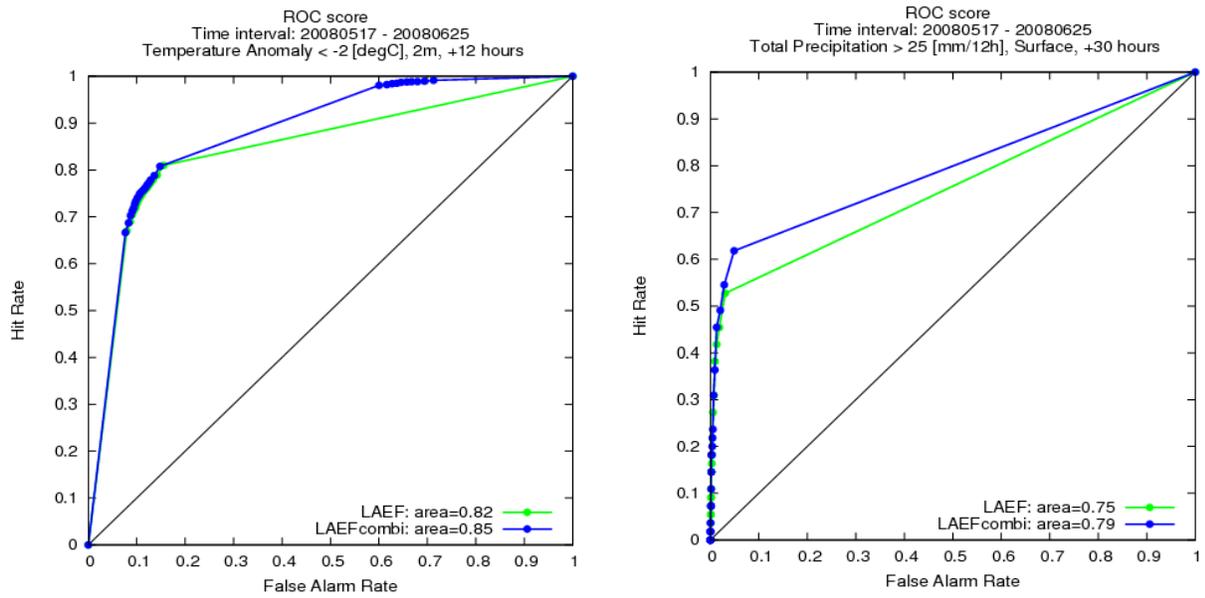


Figure 13