ALADIN related activities at SHMI

31th EWGLAM and 16th SRNWP Meetings
28th Sept -1st Oct 2009, Athens, Glyfada, Greece

NWP staff:
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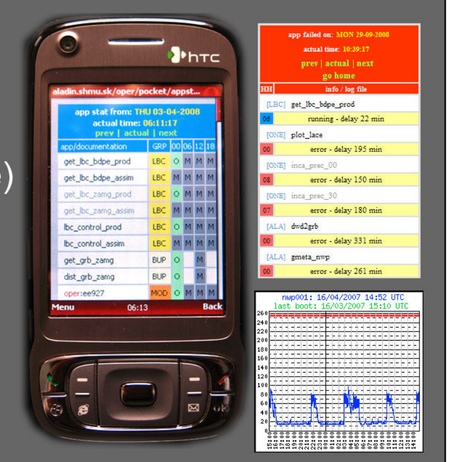
ALADIN/SHMU - computer and model characteristics:

IBM p690 Regatta & Slovak nwp team

HPC: IBM p690 Regatta, 32 CPUs POWER 4+ 1.7 GHz, 32 GB RAM, 1.5 TB IBM FAST Storage Server, OS AIX 5.2, Queueing system LoadLeveler
ARCHIVE: IBM Total Storage Tape Library 24 TB, SW: IBM Tivoli Storage Manager
MODEL: AL32T1, ALARO+3MT , SLHD,envelope orography, blending
DOM: LACE, 9km dx, 37 vlev, 3h coupling, 72h forecast length

Operational suite monitoring - basic features:

=> application status browser
=> application log files browser
=> automatic alerts via email/SMS
=> application finish time charts
=> full application documentation (search engine)
=> application deadlines implemented
=> data transfer monitor
=> current loading under oper user
=> LoadLeveler status monitor
=> full remote control via GSM/EDGE device and password protected internet
=> read/write/search diary messages
=> handy online point verification (T, N, FF)



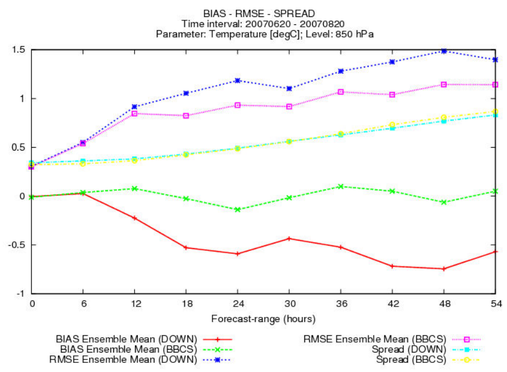
Pocket monitoring tools

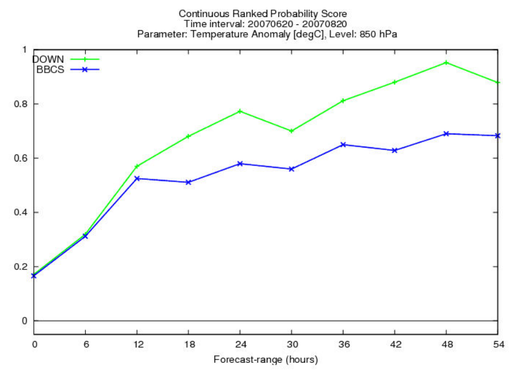
Main operational highlights since last EWGLAM workshop:

17-06-2009 New gribex000370 implementation into suite
21-09-2009 obs files downloaded oper. from OPLACE
20-08-2009 Upgrade of meteogram WWW interface
03-08-2009 Fullpos - grib production for electricity company
28-07-2009 probability forecast for energy company
28-07-2009 processing of multigribs from ECMWF
15-07-2009 optimization of oper suite
03-07-2009: Diag convective indexes (grib_index)
24-04-2009: decoding of ecmwf bufr data operational
18-03-2009: statistical adaptation of T2M for gas company
05-02-2009: aplication for electric company, 3 day prediction from ALADIN
21-01-2009: run_app system upgrade (REPAIR feature added)
23-09-2008: ALADIN data for GII operational

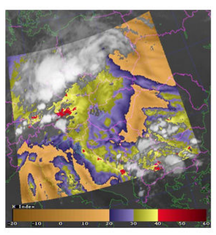
RC LACE stay in Vienna, M. Bellus, 02.-03/2009
Initial conditions for LAM EPS by breeding-blending cycle

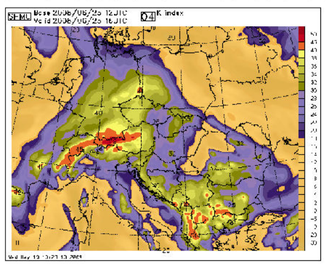
The blending in NWP is the combination of large scale features resolved by global model analysis with the small scale features provided by limited area model. This procedure is commonly known and largely used in deterministic NWP systems as the pseudo-assimilation method. However, we try to use the similar technique in completely new application.
Since the global model perturbations (ECMWF EPS) are based on singular vector technique, while LAM (ALADIN) generated perturbations by breeding are physically very different, there is inconsistency between such LAM initial conditions and driving global EPS boundary conditions.
With spectral blending technique applied within breeding cycle, we can produce physically consistent initial conditions ready for consecutive LAM EPS integration. Such LAM EPS initial states can profit from containing large scale uncertainties originated by singular vector technique, while still keeping the small scale perturbations resolved by LAM. Our experiments with differently prepared initial conditions (for two months period driven by ECMWF EPS consisting of 16 members) show the advantages of breeding-blending method over the pure breeding approach. Significantly better results can be achieved if additional surface perturbation (none-cycled one) is used together with breeding and upper air spectral blending cycle. Such strategy for obtaining perturbed initial conditions for LAM EPS gives already better results than simple downscaling of global EPS (see verification charts with BIAS, RMSE, SPREAD and CRP Scores for Temperature anomaly and Relative Humidity at 850 hPa level).





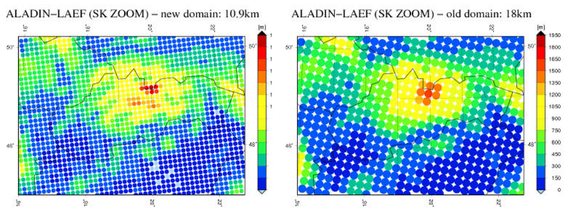
Global Instability Indices (GII) software developed at EUMETSAT was implemented in our oper suite. It is used for nowcasting purposes to predict mainly summer thunderstorms. The input fields from ALADIN model to GII software are 3D temperature and rel. humidity (34lev), surface pressure, surface temperature, temperature at 2m. The core of the method is implementation of Kalman filter on temperature and humidity profiles with used of EUMETSAT satelite data. For comparision the K-indices computed from model and with used of GII method are showed on figures below.





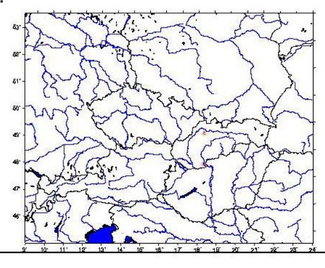
RC LACE stay in Vienna, M. Bellus, 09-10/2009
Setting up new ALADIN-LAEF domain and retuning of blending ratio accordingly

ALADIN LAEF domain is being enlarged. New blending ratio according to the higher target resolution and the whole operational breeding-blending cycle for the new ALADIN-LAEF domain is currently under testing procedure. Additional research will be done to answer the question, whether more profit would be gained from such high resolution ensemble (∆x=10-12km) or rather from increased number of ensemble members at the new domain but necessarily with coarser horizontal resolution (currently the “old” operational setup reads 16 members at ∆x = 18km). Zooms over Slovak High Tatras show ALADIN-LAEF topography improvement within the new domain.



New INCA SK domain

Hi-resolution precipitation analyses every 15 min with 1x1km resolution from radars and non-GTS data from SHMU, ZAMG, IMGW. Nowcasting tool still in development .

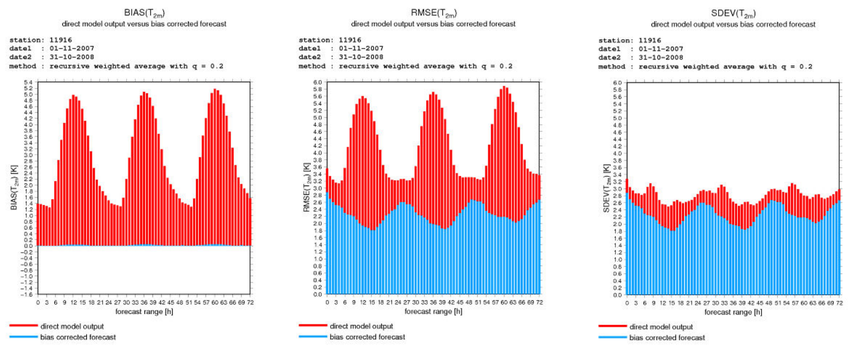


Diploma work at Comenius University Bratislava

Lukáš Braun: Evaluation of CAPE for prediction of convective precipitation, CAPE from ALADIN versus CAPE from TEMP, investigation of correlation between predicted CAPE field and high-resolution analysis of precipitation from INCA system

J.Mašek, BIAS correction of ALADIN T2m forecast

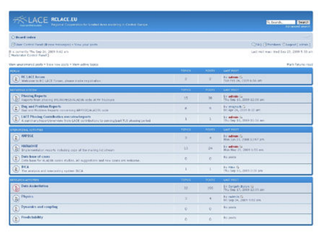
Several methods for BIAS correction of model T2m forecast were evaluated. They used running window combined with arithmetic average, median or BES (Best Easy Systematic) estimator to evaluate actual BIAS estimate. Optimal window length and method were searched for. Testing on one year time series showed that it is sufficient to use 5 day window. Finally, implementation reasons lead to use of recursive weighted average, which performs comparably to fine tuned representatives of running window methods. Algorithm is following: <BIAS(d+1)> = q.BIAS(d) + (1 – q).<BIAS(d)>. Angle brackets denote BIAS estimate (unbracketed value is actual BIAS) and index d denotes day. Optimum value of weight q is somewhere around 0.2, but the minimum of RMSE is rather flat. Correction is applied independently for every point and forecast range. Next step will be implementationof dynamically estimated weight q. Operational model T2m forecast will be BIAS corrected against INCA analysis. In this way it is possible to get unbiased forecast on whole INCA domain, not only for observation points. Operational implementation is in progress. Attached figures show T2m BIAS, RMSE and SDEV of DMO and bias corrected forecast, computed for one year period. Two points are shown – Bratislava (11816), where model scores are very good and Chopok (11916), which is mountain peak station with very large model representativness error. For both places BIAS is almost completely removed and in case of Chopok this has significant influence on RMSE reduction. Slight improvement in SDEV is visible.



Scores for mountain station Chopok 11916.

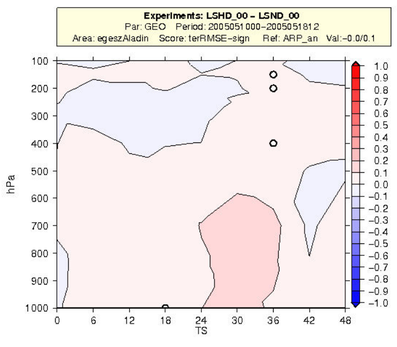
Development and maintenanceof RC LACE WWW page and forum, RC LACE ASC, O. Španiel

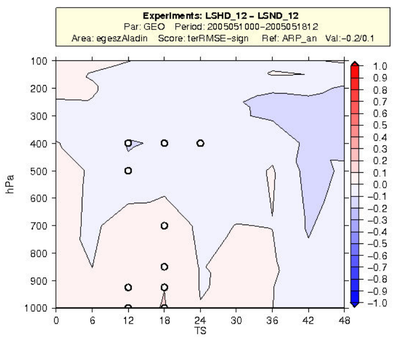
www.rclace.eu www.rclace.eu/forum



RC LACE stay, M. Neštiak, 06/2009
Investigation of the use of non-GTS SYNOP reports in the ALADIN/HU CANARI + 3D-VAR system

The aim of work was to assess the impact of non-GTS SYNOP reports reports from LACE countries in data assimilation. Experimental period was from 10 to 20 May 2005. ALADIN CY30T1 was used. Scores are generally very neutral near the surface. There some differences on higher levels. The diferrences can be found for temperature and humidity scores but the impact is not relevant. For some levels and variables LSND is slightly better for some others it is worse. Scores against the ARPEGE analysis show some improvement for LSND for almost all the variables for the 00 UTC runs. But practically no differences. For the 12 UTC run, the impact is not clear and it looks like quality of 42-48 hour forecast is even worse. Because it is only 10 days comparison it is not possible to draw definitive conlusions. Bigger impact of surface assimilation is expected during winter and spring, where the wrong snow coverage have big impact on ground temperature.





Verification against ARPEGE analysis: RMSE difference in geopotencial between forecast with only GTS data (LSHD) and also with local LACE Non-GTS data (LSND). Red is improvement and blue is degradation of forecast for the pressure level and time. White circles show that the difference is significant on a 90% confidence level.

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