REPORT

Downscaling ECMWF EPS for ALADIN

Stay in ZAMG, February 2007

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Introduction

Subject of the stay in Vienna was downscaling of ECMWF EPS members. It was decided that integration domain will be LAEF, covering Europe and Atlantic Ocean with 18 km horizontal resolution and 37 vertical levels (NLAT=225, NFPGUX=214, NLON=324, NFPLUX=313, RLONC=2.75, RLATC=48.00). Same domain was used for EPS experiments in ZAMG and SHMI.

Post processing and products domain is NLAT=100, NLON=221, RLONC=6.5, RLATC=47.5, RDELX/Y=0.15. And finally coupling files exist for LACE coupling domain. The result of the stay is to have a prepared script for almost time critical application, implementation of SMS is needed to have the complete time critical application.

Scripts, namelist etc. :

Scripts are on hpce directory /home/ms/at/kah/EPS/scr

- OPER-LAEF-op.sh - T799 ECMWF operational deterministic forecast;
- OPER-LAEF-cf.sh - EPS-control forecast;
- OPER-LAEF-pf.sh - EPS-perturbed forecast for first 16 members.

Namelists are on hpce in directory /home/ms/at/kah/EPS/nam

- e901_ct.nml – 901 for all resolutions
- e001_31t1.LAEF – e001 for Aladin 31t1 –checked by MF,
- T799-e001_31t1.LAEF – e001 for Aladin 31t1 for T799 O3 & aerosols are missing;
- e927.nml.LAEF, T799-e927.nml.LAEF – 927 for LAEF integration domain;
- e927.nml.TELE, T799-e927.nml.TELE – 927 for LACE coupling domain.

Jobs are at the moment submitted via ECMWF ecaccess service job submissions almost like time critical jobs (Web interface https://ecaccess.ecmwf.int/ecmwf/ecaccess/Jobs/Submit). OPER-LAEF-op.sh is waiting for 72 hours operational deterministic forecast of ECMWF. Scripts OPER-LAEF-cf.sh & OPER-LAEF-pf.sh are waiting for 10 days Ensemble Prediction forecast to finish, since, at the moment, an earlier Event for triggering does not exist.
Scripts are automatically updated and submitted every day.

Climatological files

During the testing of climatological files production it was proved that there is no compatibility between climatological files produced in Toulouse and Reading, finally all climatological files were produced in Meteo-France.

Difference in minimization of orography in 923 in MF and EC (cy31t1):
Before minimization norms are almost identical

```
MFtls: SURFGEOPOTENTIEL : 0.272176342597310E+04 0.379885609771994E+03
    0.172214676659027E+01 0.249905404696169E+04 -.173067911168964E+02
ECMWF: SURFGEOPOTENTIEL : 0.272176342597310E+04 0.379885609771993E+03
    0.172214676659027E+01 0.249905404696170E+04 -.173067911168965E+02
```

but after minimisation they are different

```
MFtls: SURFGEOPOTENTIEL : 0.265495664877849E+05 0.374109387426606E+04
                          -.165236888241937E+03
ECMWF: SURFGEOPOTENTIEL : 0.265495676634656E+05 0.374109409715573E+04
                          -.165236541518148E+03
```

This difference in norms causes some strange spots near the surface where land-sea mask is changed from 0 to 1. Sandor did some forecast experiments with T511 prepared in MF and ECMWF. The verification scores were almost identical, but the forecasts using climatological files prepared in ECMWF contained well localized "anomalies" near the surface.

Following Climatological files were produced:
- T799- cy31t1-Deterministic EC resol. new climatology (from 02.2006.);
- T511- cy24t1-Old deterministic EC resol. old climatology (until 02.2006.);
- T511- cy31t1- Old deterministic EC resol. new climatology (from 02.2006.);
- T399-EPS- cy31t1-Probability EC resol. new climatology (from 02.2006.);
- LL-LAEF-31t1- lat-lon for LAEF post processing new climatology (from 02.2006.).

Scripts for preparation of climatological files are on tora:
- for T799 cy31t1 - ~mrpm620/ECMWF/T799/job_923_T799_CY31T1.sh ;
- for T511 cy24t1 - ~mrpm620/ECMWF/T511/NEW-job2_CY24T1_923_511.job ;
- for T511 cy31t1 - ~mrpm620/ECMWF/T511/job_923_T511_CY31T1.sh ;
- for EPST399cy31t1- ~mrpm620/ECMWF/T399/job_923_T399.job ;
- for lat-lon LL-LAEF-31t1- ~mrpm620/e923/LAT-LON31t1 .

Examples of scripts for preparation of integration domains:
- for Lambert domain linear grid - ~mrpm620/e923/FR31t1t ;
- for Lambert domain quadratic grid - ~mrpm620/e923/LACE31t1 .

All climatological files are stored on ECFS (ECfilesystem) in the following directories:
- ec:/cr8/CLIMDIR/T399-31t1 ;
- ec:/cr8/CLIMDIR/T511_CY24T1 ;
- ec:/cr8/CLIMDIR/T511-31t1 ;
- ec:/cr8/CLIMDIR/T799-31t1 ;
- ec:/kah/CLIMDIR/AUSLAEF_forecast_q ;
- ec:/cr8/CLIMDIR/LACE_telecom-31t1 ;
- ec:/cr8/CLIMDIR/LL-LAEF-31t1 .

Configuration 901

For T399 new version of addArpClim program was prepared by Sandor Kertesz in Hungary and afterwards transferred on hpce /ms_perm/spfrcoup/addArpClim_al28t3_stjep.x. In this version, more extra fields are added to file (Ozone and aerosols). With this change, coupling files contain all fields as coupling files retrieved from Toulouse do. A version of addArpClim program for adding only O3 and aerosols from clim files to the coupling files is on hpce /ms_perm/spfrcoup/bin/addArpClim_al28t3_stjep_v1.x. This version is working with T799.
There are some minor problems with conf 901, but I think that it is solved by Radmila in newer version than we are using in ECMWF. Problem is in checking of month of climate file

and month for input file. At the moment in 901 climatological file from start of integration must be used. For forecast range 24 hours start last day in the month it should use climatological files for next month, with 901 exe available in EC this is not possible.
Probably it is possible to solve writing of O3 and aerosols fields inside configuration 901. Possibility for writing ECMWF micro physics fields should be studied, maybe it could be useful to have this field just in initial file.

Configuration 927

For T399 2 domains are used: LAEF-forecast and LACE coupling. Data are temporarily stored on ecgate /scratch/ms/cr/cr8/ECMWF_LBC/YYYYMMDD_TE as it is a case for MF LACE coupling files. LACE group on ecgate has permission to read files, permission form ZAMG is needed for usage of those products; Yong will inform LACE community when data will be available. Files have exactly the same characteristics as it is for files from Toulouse.
For T799 at the end of February O3 and aerosols fields were missing in coupling files and following lines in namelist for 927 were commented:

```
! NVCLIA=4,
! LVGSN=.TRUE.,
! LO3ABC=.TRUE.,
! CFPPHY(25)='SURFA.OF.OZONE',
! CFPPHY(26)='SURFB.OF.OZONE',
! CFPPHY(27)='SURFC.OF.OZONE',
! CFPPHY(28)='SURFAEROS.SEA',
! CFPPHY(29)='SURFAEROS.LAND',
! CFPPHY(30)='SURFAEROS.SOOT',
! CFPPHY(31)='SURFAEROS.DESERT',
! CFPPHY(32)='SURFDENSIT.NEIGE',
! CFPPHY(33)='SURFALBEDO NEIGE',
! CFPPHY(34)='SURFALBEDO.SOLNU',
! CFPPHY(35)='SURFALBEDO.VEG',
```

Configuration e001

Difference in namelist if Ozone and aerosols fields are not available, the following 3 lines in your namelist for e001 should be commented:

```
! NVCLIA=4,
! LVGSN=.TRUE.,
! LO3ABC=.TRUE.,
```

French physical package is used in integration job.
To have some 2 m Humidity field in lat-lon post processed file, climatological file must be available, just land/sea mask is used but it is needed.

Some useful programs

PALADIN tools **frodo**, **decdate**, **wgrib** and **aft_time** are available on **hpce** and **ecgate** in directory /home/ms/cr/cr8/bin .

Products

Products are temporary stored on scratch disk on ecgate.ecmwf.int /scratch/ms/cr/cr8/ECMWF_LBC/YYYYMMDD_TE as it is a case for MF LACE coupling

files. LACE group on ecgate have permission to read files permission form ZAMG is needed for usage of those products, Yong will inform LACE community when data will be available.
Available products are:
- Coupling files from deterministic forecast, frequency 3 hours.
- Coupling files from probabilistic forecasts; control run plus 16 members, frequency 6 hours.
- ALADIN 54 hours downscaled forecast for deterministic run, and control run of probabilities forecast and 16 members of probabilistic forecast on LAIF lat-lon post processing domain, frequency 3 hours.

Some solved problems

During the submission of multi steps jobs via ECaccess job submission caused some problems, hopefully they are now fixed with help of Paul Dando, ECMWF User support:

1. /scratch was replaced by /hpce/tmp
2. Set of system variable OMP_NUM_THREADS were not correctly from the #@environment LoadLeveler directives so you do not need to set it explicitly in the script. (In fact, the second problem occurred because "job steps" were used with the various set-ups of the "environments".)