

## **DA activities at ZAMG in 2016**

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### ALARO 4.8km/LAEF 11km (0 man month):

No changes, both run with CANARI cy36t1 in case of LAEF observations are perturbed,

### AROME (0.5 man month):

New operational version started (former E-Suite) since 20 June 2016. 3D-Var remained unchanged (still cy36t1 export, upgrade to cy40t1 is planned as soon as possible first half of 2017?). SOIL: Now CANARI-OIMAIN inline cy40t1 + MESCO settings for T2m/RH2m is used, SNOW is modified by satellite product and snow model (SNOWGRID) output. Temperature of Lake Constance is replaced by Measured value - no Flake.

### AROME-Nowcasting (Testversion):

#### Switch to cy40t1 (2 man month)

AROME-Nowcasting completely switched to cy40t1 including 3D-Var and latent heat nudging. Main reason for former problems in 3D-Var (Screening, B-Matrix reading) was usage of old create\_ioassign. This was the outcome of WEB-Meeting with HIRLAM people in spring. With new version taken from sourcecode cy40t1 "odb/scr" it is OK. Single obs experiments with conventional observations delivered good agreement with cy36t1 except humidity (where differences were already found in cy38t1 by CZ). PREP offline is used to interpolate soil from operational AROME (works only since both are cy40t1), before ALARO soil was interpolated by 927, no separate soil assimilation.

### MODE-S (0 man month)

Slovenian MRAR data are regularly used in AROME-Nowcasting, for KNMI EHS a time averaging script (python) was written, tests with these data are envisaged in the near future. We expect to get Austrian MODE-S test data soon (2017?) for a project together with Austrian ATC Austrocontrol.

### OPLACE AMDAR Humidity (0 man month)

OPLACE AMDAR humidity was tested in AROME-Nowcasting. There are around 200 OBS every hour inside AROME domain. Screening blacklist and minimization namelist had to be modified. Increments look fine. There is no objective verification yet.

### 1.2km Version and B-Matrix (2 man month)

A B-Matrix for 1.2km Version of AROME-Nowcasting was calculated based on downscaling of 2.5km-AROME-EPS ensemble method. New FEMARS, FESTAT, FEDIACOV was used including grib difference files instead of former fortran

binaries. FEMARS needs still to be adapted to AROME GP-humidity. 1.2km assimilation is working.

#### RADAR-Assimilation and CONRAD (1.5 man month)

Changes in Austrian HDF5-Files caused significant problems: CONRAD included too many hard coded assumptions not valid anymore and the distinction between “no data” and “undetected-dry” was also not quite clear leading to a strong degrading of the RADAR analysis. Therefore HARMONIE HDF5-reader was installed with some adaptations to Austrian format (sign of Doppler wind, file reading). HDF5 reader requires a pre-thinning of the data to avoid memory problems. A simple C routine was written (might be replaced by HARMONIE superobs script later). Test of 2 week period was successful (better precipitation scores). Access at ZAMG to OPERA data available now, but foreign radars were not tested yet.

latent heat nudging (1.5 man month) Case studies are promising, longer verification is envisaged, tuning is probably needed. One month of LH tendencies (EZDIAG) was saved for climatological profiles. Stay report is finished. Right now 5min INCA analyses are used up to +25min and INCA forecasts up to +45min in AROME-Nowcasting.

#### surface assimilation (Stefan Schneider) (7 man month)

##### Soil moisture:

Build-up of a processing chain for EKF soil moisture assimilation, based on CY40T1 (AROME forecasts), SURFEX 7.3 (offline part) and SODA 8.0 (EKF assimilation). Tests are ongoing, no presentable results so far. The soil moisture data set used here is the new SCATSAR SWI (combination of ASCAT and Sentinel-1; 1km grid) from TU Wien.

##### Soil temperature:

New project started on Sept 1<sup>st</sup>, 2016. Sentinel-3 LST shall be assimilated in SURFEX.

S. Schneider joined the HARMONIE Surface Working Week (April 2016; Oslo)

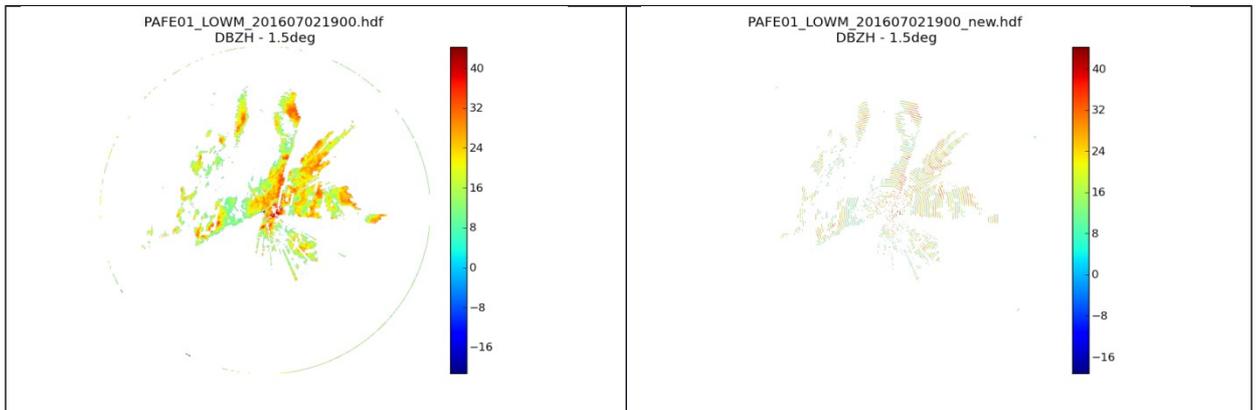
#### GPS refractivity assimilation (Xin Yan, 2 man month)

See last report

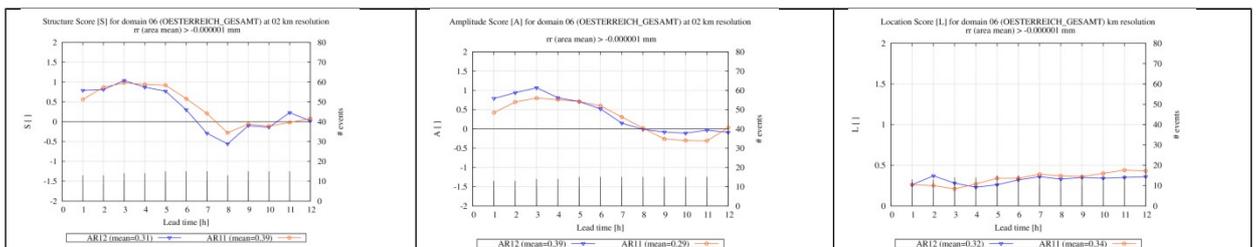
##### Conclusions:

- After some break, EKF assimilation has been revived at ZAMG with new code version SURFEX7.3/SODA8.0. Scientific work will start soon.
- Switch to cy40t1 is still on going, but all components seem to work quite well.

- 1.2km 3D-Var version of AROME-Nowcasting including new 1.2km B-Matrix (cy40t1 FEMARS, FESTAT) is working for case studies (promising results). However, near real time runs are too costly on current HPC
- RADAR: adapted HARMONIE HDF5-reader seems to be OK, this might avoid some of the problems with CONRAD.
- MODE-S will be investigated more detailed next year
- Latent heat nudging: scripts and code is ready to run it regularly with 1.2 or 2.5km, case studies show some potential, longer verification period is envisaged.
- In the near future we will test (HARMONIE) cloud masking



Pre-thinning of RADAR data for usage with the HDF5 reader: Before (left) and after (right) application of the routine. RADAR-Feldkirchen (Salzburg) volume scan elevation 1.5° 2nd July 2016 19 UTC.



SAL-Score 20160630-20160715 12 UTC runs: AROME-Nowcasting with RADAR-CONRAD (blue) vs RADAR HDF5 reader (orange)