Regional Cooperation for
Limited Area Modeling in Central Europe

LACE
nwp central europe

Data assimilation status in Austria

Florian Meier, Xin Yan

outline

- Operational settings
- Problems in operational cycle
- cy38t1 status at ZAMG
- Additional activities in DA: GPS+RADAR+IDFI

Operational model versions: ALARO 4.8km/L60

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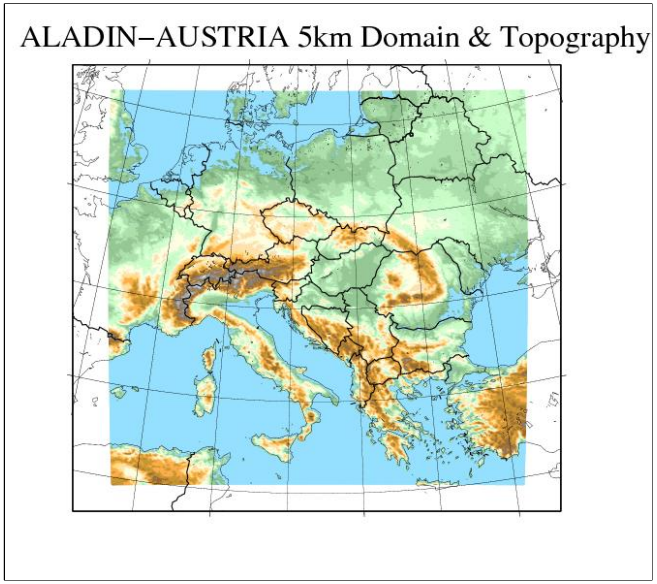
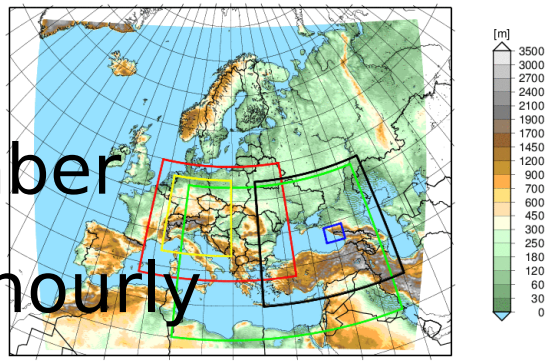
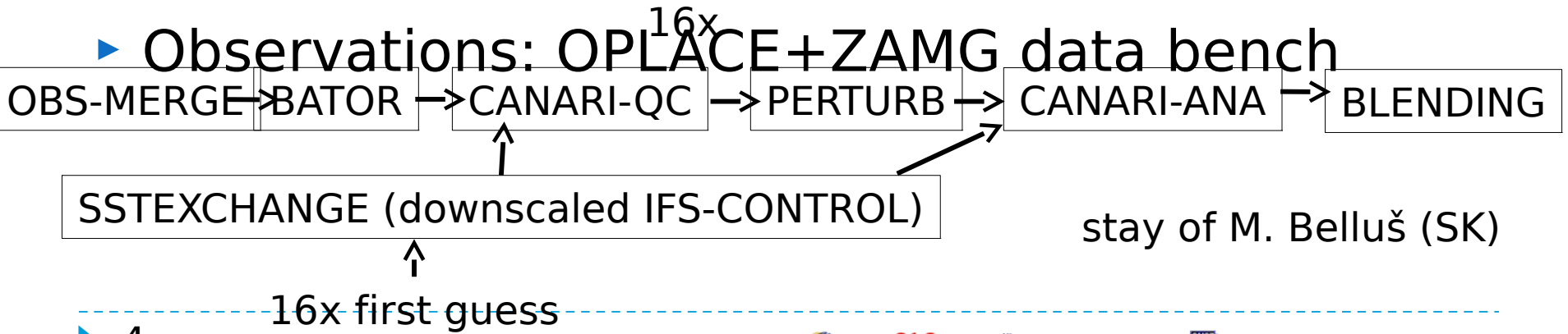


- Nothing new
- cy36t1 export
- 6-hourly up to +72h
- lagged coupled with ECMWF-IFS (3 hourly)
- Atmosphere: dynamical downscaling (IFS)
- Soil: CANARI standard + some additional snow melting
- Observations: OPLACE+ZAMG data bench
- no national OPLACE yet

Operational model versions: LAEF 11km L45

- Nothing new; transfer to new EC-HPC
- cy36t1 export
- 12 hourly up to 72h; 16+1 Member
- Lagged coupled with IFS-EPS 6 hourly
- Atmosphere: Breeding blending
- Soil: CANARI standard with perturbed OBS
- Observations: OPLACE+ZAMG data bench





stay of M. Belluš (SK)

Operational model versions: AROME 2.5km L60->L90

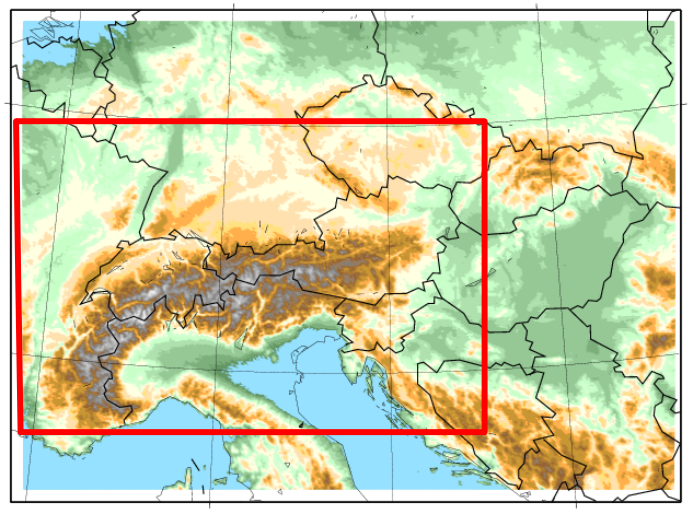
- **Operational since 1st January 2014; since 18th August 2014**

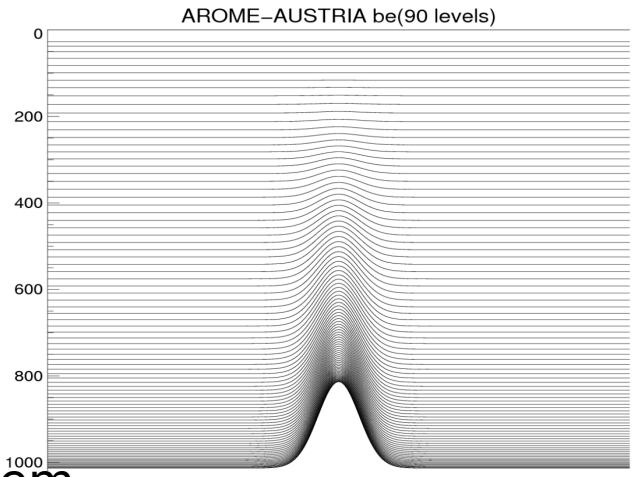
  larger domain, L60->L90, +30h->+48h

- cy36t1 export, production cy37t1op1, OIMAIN cy36t1op2 (unchanged)
- 3 hourly (8/day) up to 48h
- Lagged coupled with IFS 3 hourly
- Atmosphere: 3D-Var, B-Matrix from LAEF-Ensemble
- Soil: CANARI+OIMAIN offline with modified background error correlation function, snow modified with modis 1km data
- Observations: OPLACE+ZAMG data bench
- Linear grid, mean orography (GTOPO30)

Operational model versions: AROME 2.5km L60->L90

Observation Type	Parameter
SYNOP/TAWES	T2,RH2,Z,U10m,V10m
AMDAR	U,V,T
TEMP/PILOT	U,V,T,Q,Z
MSG AMV	U,V
NOAA16/18/19	AMSU-A,B,MHS,HIRS
METOP-A,-B	AMSU-A,B,MHS,HIRS
METOP-A	IASI radiances
METOP-A	ocean winds
MODIS	1km snow cover
MSG-SEVIRI	VW radiances





METOP-B IASI, windprofiler, national OPLACE
technically working, but not in operational system

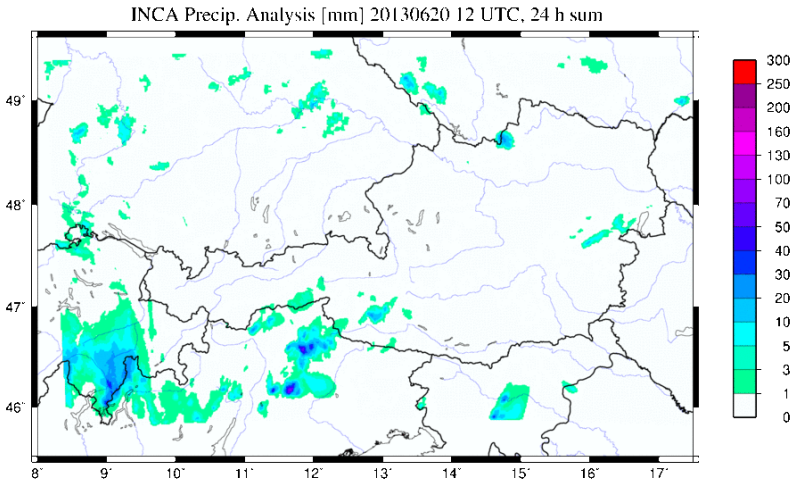
Problematic issues in operational AROME

- Bug in cy36t1 in hradpad.F90 fixed to get 90L version satellite assimilation running (cy38t1 is OK)
- Rare crashes in Screening/Minimization due to RH2m obs (automatic land stations) -> cost function NaN not caused by single corrupt station
- Several crashes due to NOAA 19 HIRS in Screening summer 2014 (for example 20140805 00)

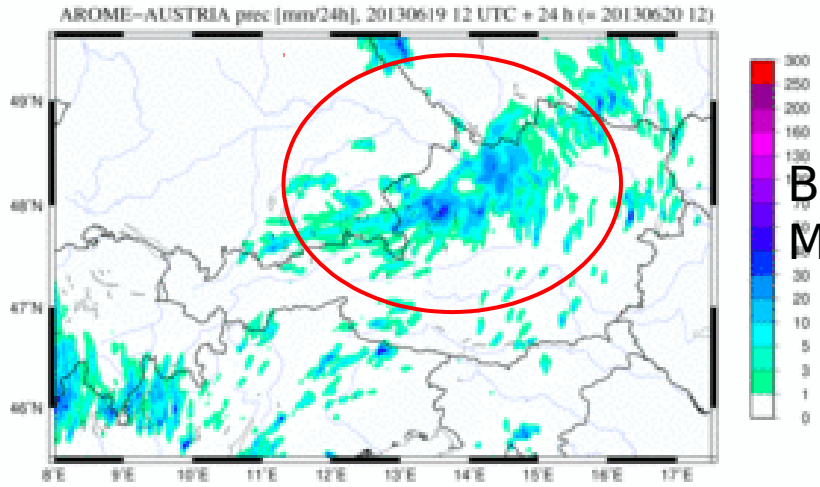
  -> NOAA 19 HIRS blacklisted

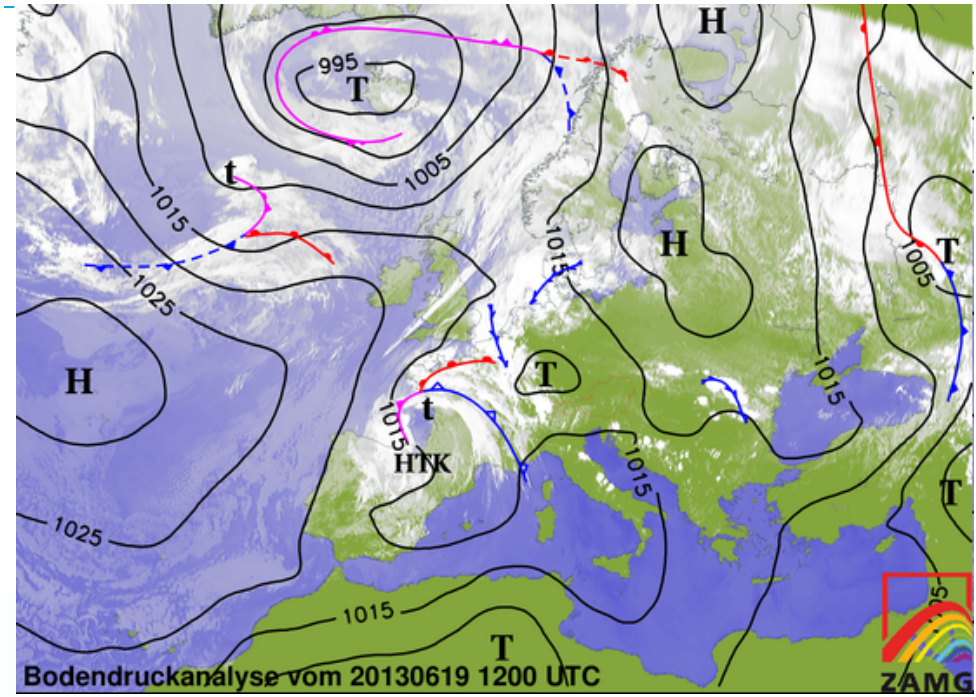
Assimilation problem with SYNOP still not solved

INCA analysis (radar+rain gauges)



AROME-OPER

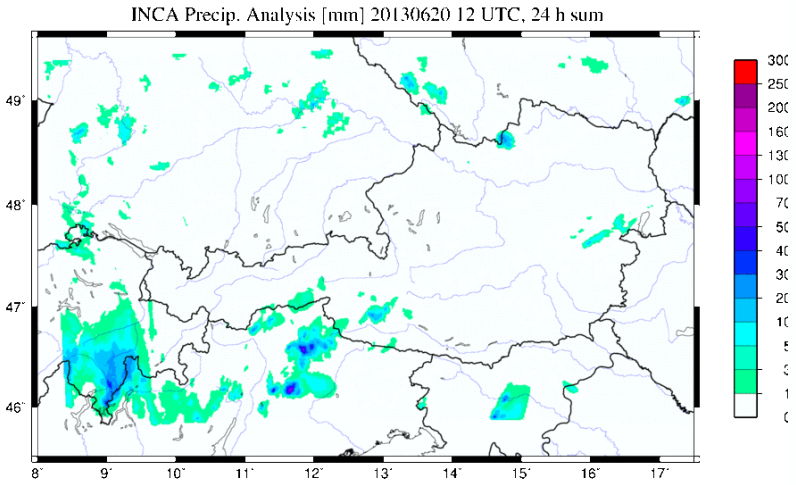




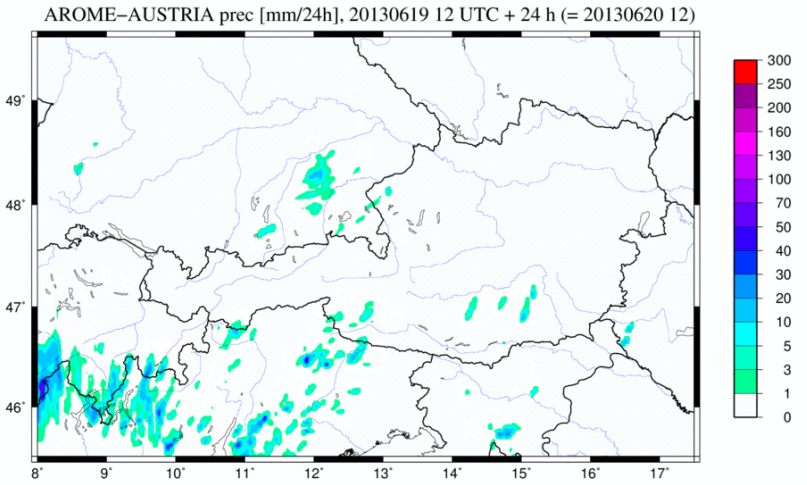
Blacklist all SYNOP?
Modification of fist guess check for SYNOP

Assimilation problem with SYNOP still not solved

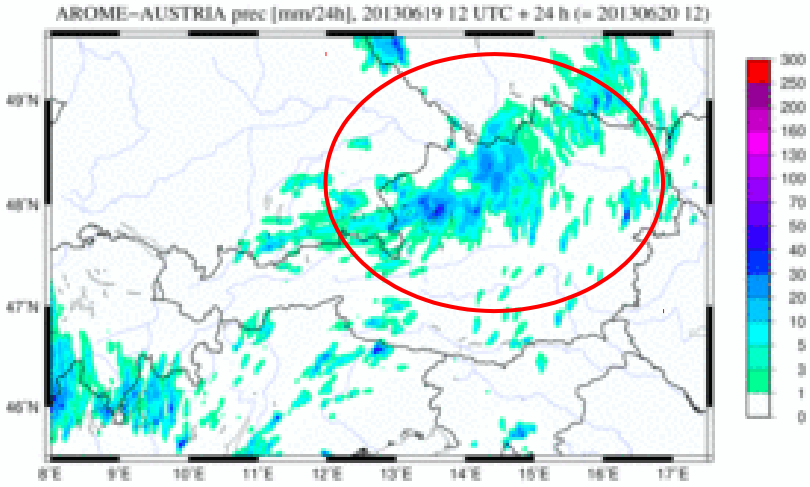
INCA - reference

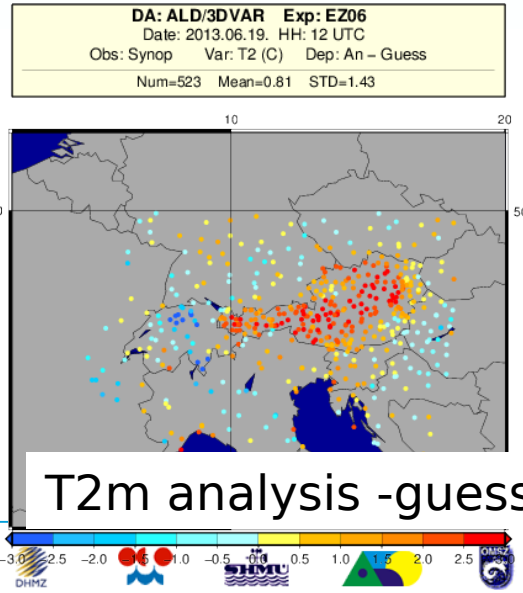


AROME without T2m/MSLP SYNOP in 3D-Var



AROME-OPER





T2m analysis -guess

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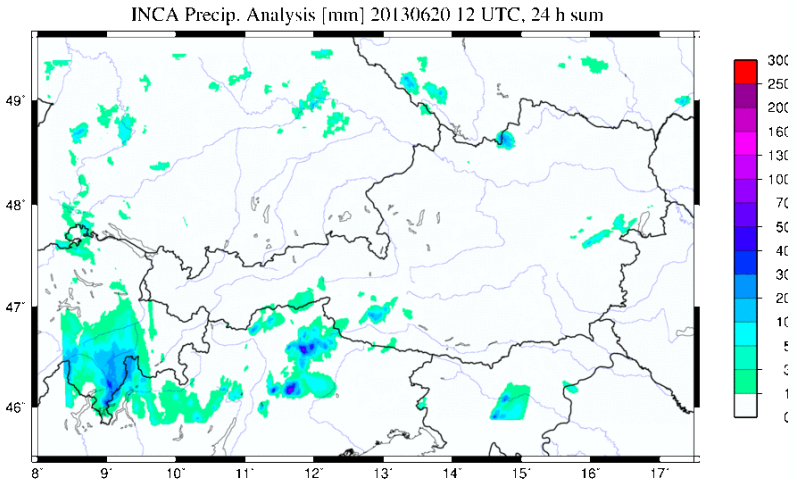
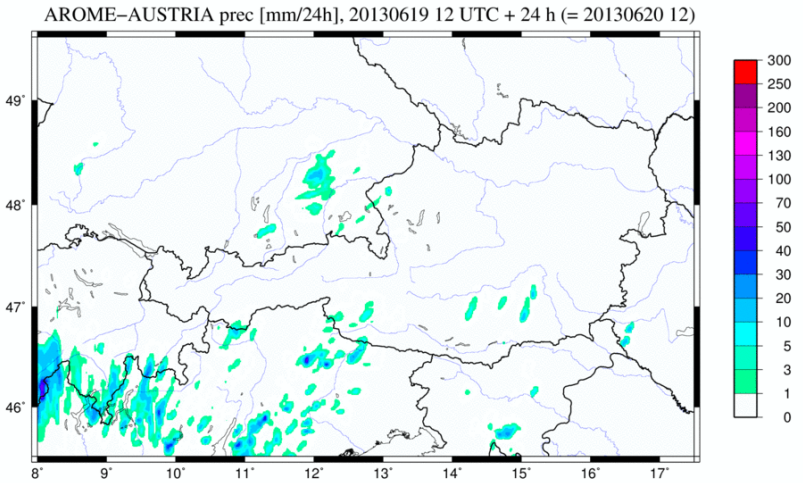
Assimilation problem with SYNOP still not solved

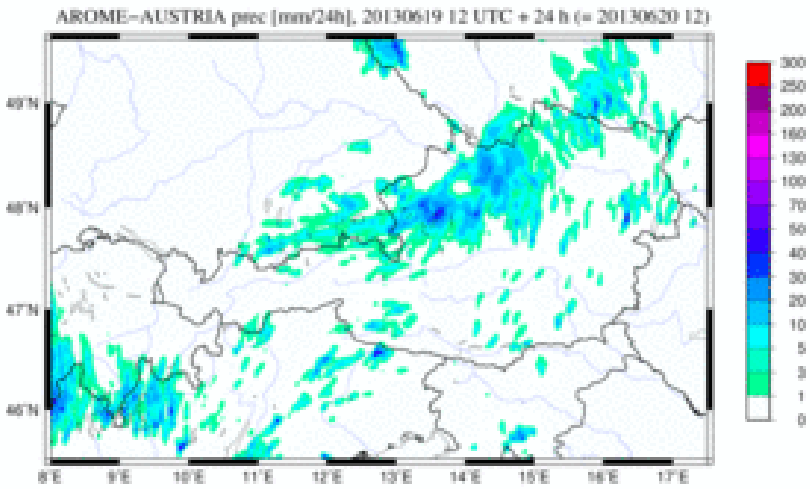
INCA - reference



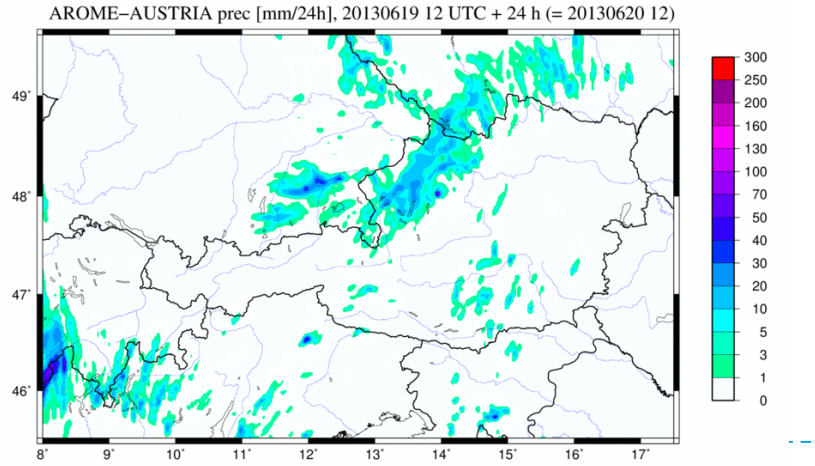
AROME without T2m/MSLP SYNOP in 3D-Var



AROME-OPER



AROME thinned SYNOP



Status of upgrade to cy38t1 export

- All binaries could be produced
- Most local code changes implemented in cy38t1
- BLENDSUR, ADDSURF evaluated -> OK
- Technically working: PGD, IOASSIGN,927, 001, FPOS SCREENING (conv), CANARI+OIMAIN inline, ECMA ->CCMA in SCREENING, BATOR(conv, sevb, amsua, amsub, hirs, ascat)
- Not yet working: BATOR (geowind, radar, windprofiler, iasi: control bufrtype warning template inconnu), BATOR-SHUFFLE, MINIMIZATION (cost function: background error=RMDI)
- Cy38t1 E-Suite for AROME planned -> high priority

CANARI-OIMAIN in cy38t1

- AROME soil with FA-files: new kind of 927surf (2steps->PGD-FA/Fasoil init)
- SNOW modification by MODIS data/offline SNOW model has to be treated differently in OIMAIN inline -> SNOW modified before CANARI by blendsur-like code
- Vertical background error correlation function for T2m/RH2m was added to cy38t1-CANARI code, new option MESCAN
r

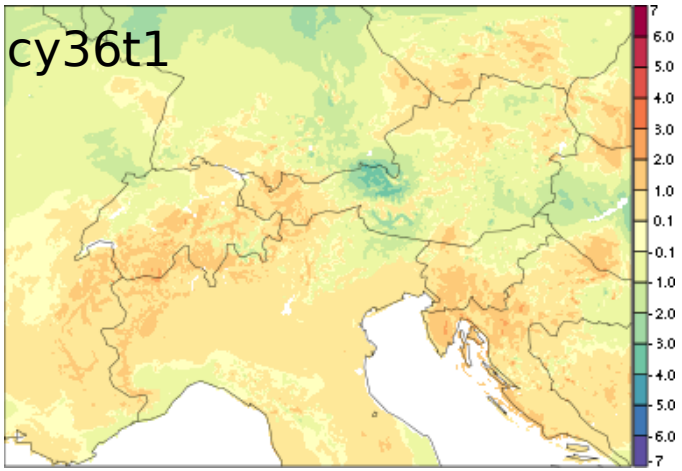
LCORRV: $df_d(r)g_p(z) = e^{-0.5\sqrt{\frac{r^2}{d^2}}}e^{-0.5\frac{z^2}{p^2}}$ standard CANARI

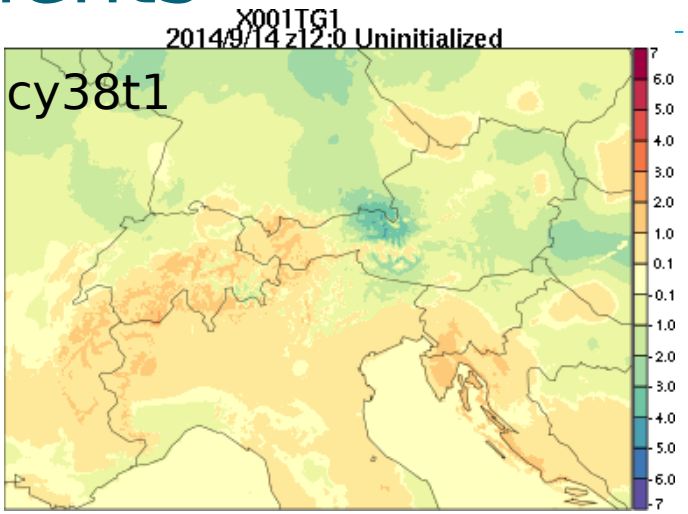
d,p: namelist switches

LMESCAN: $df_d(r)g_p(z) = 0.5(e^{-\sqrt{\frac{r^2}{d^2}}} + 1 + 2\sqrt{\frac{r^2}{d^2}})e^{-2\sqrt{\frac{r^2}{d^2}}}ZPC(z)$

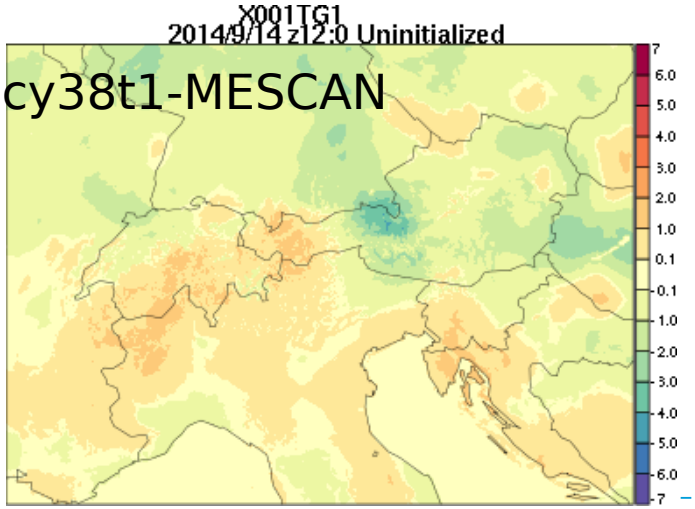
$$ZPC(z) = (1 - MIN(0.5, k_1 DIFF\_LSM))(1 - MIN(0.5, k_2 z)$$

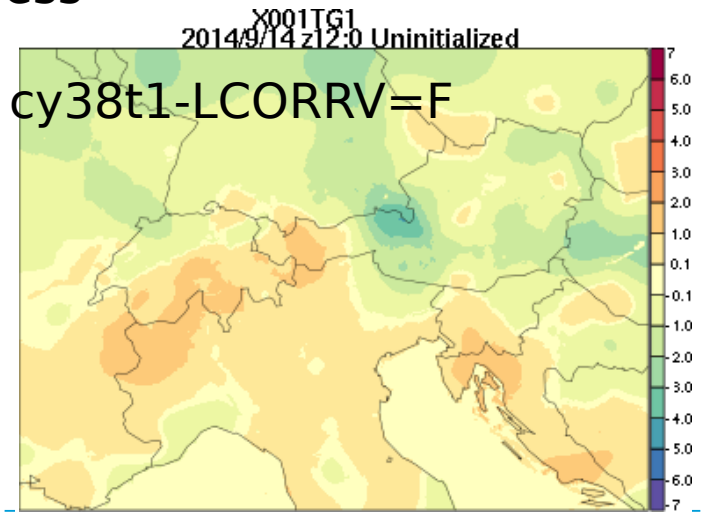
CANARI-OIMAIN increments



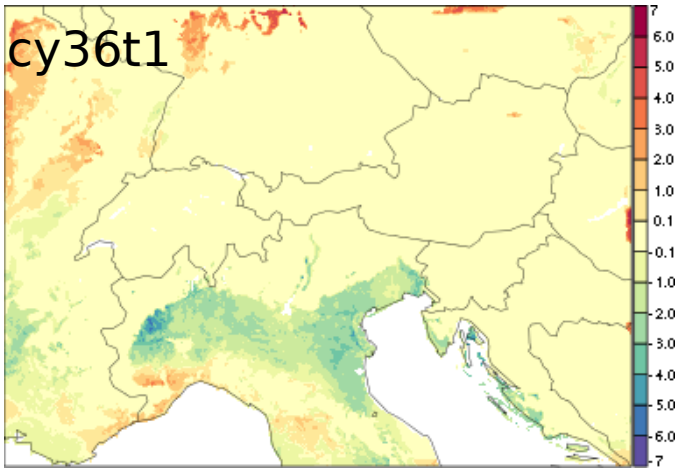


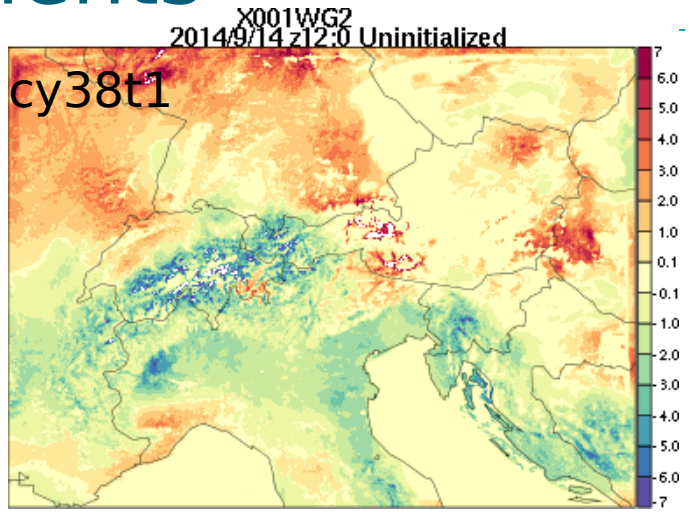
TG1: 20140914 12 UTC
analysis – first guess



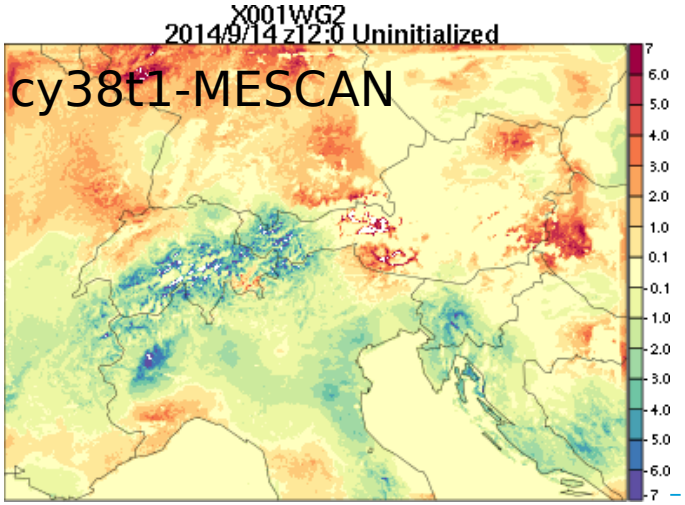


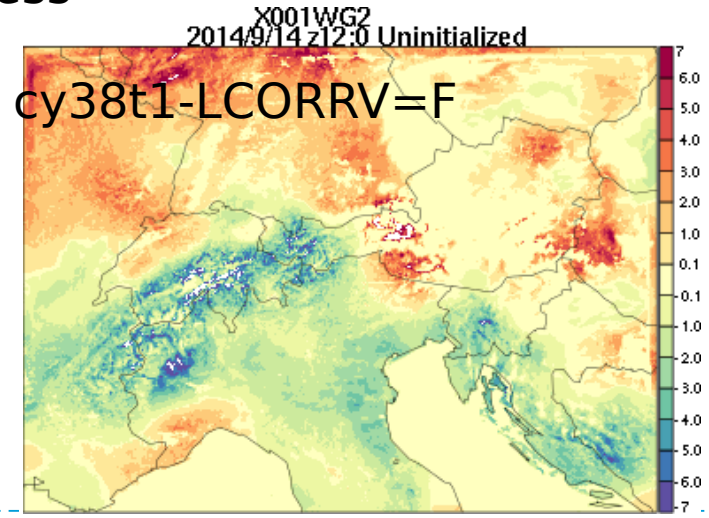
CANARI-OIMAIN increments





1000.*WG2: 20140914 12 UTC
analysis – first guess

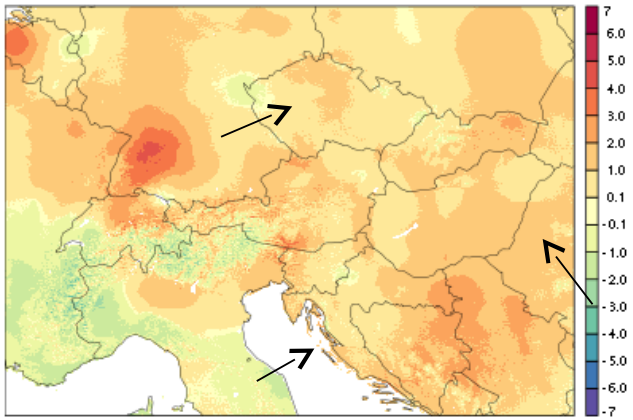




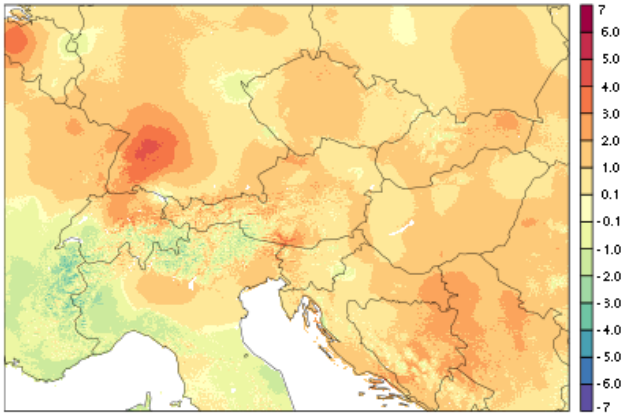
OPLACE-NATIONAL-DATA

TG1: 20140918 12 UTC
analysis – first guess

Without additional national stations



With additional national stations



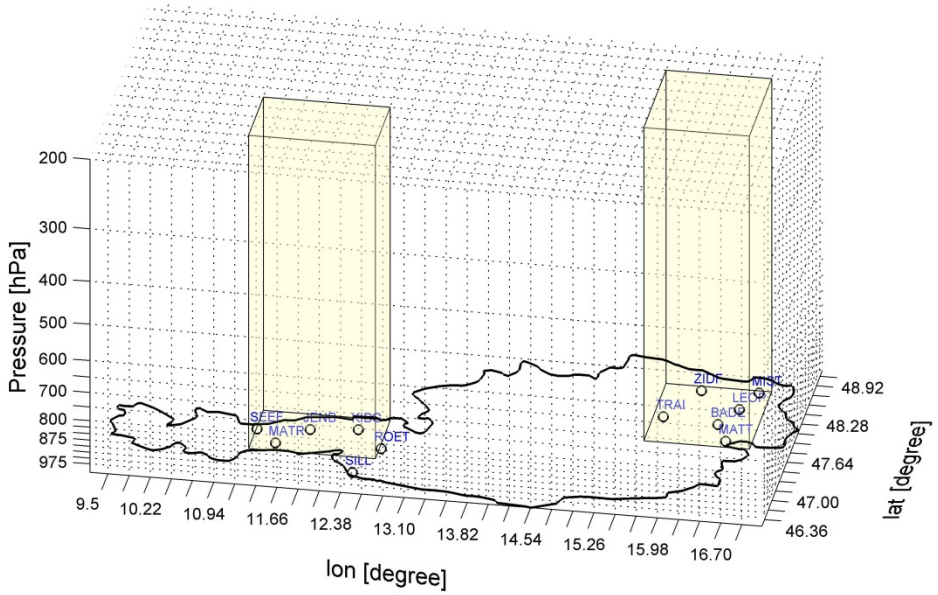
Other activities in DA at ZAMG

- GPS: 2 weeks stay in July at Météo France (Xin/Patrick Moll) (refractivity index) and in Budapest (GPS-VARBC)
- IDFI/1h-cycling: works in principal, IDFI crashes quite often
- RADAR -> extra talk
- PREP-offline: AROME soil -> AROME soil 2,5->2,5km OK
- New orography data: ASTER and SRTM data for SURFEX available, tests should start soon
- SAF HR-AMV: Data stored at ZAMG; experiments should start soon

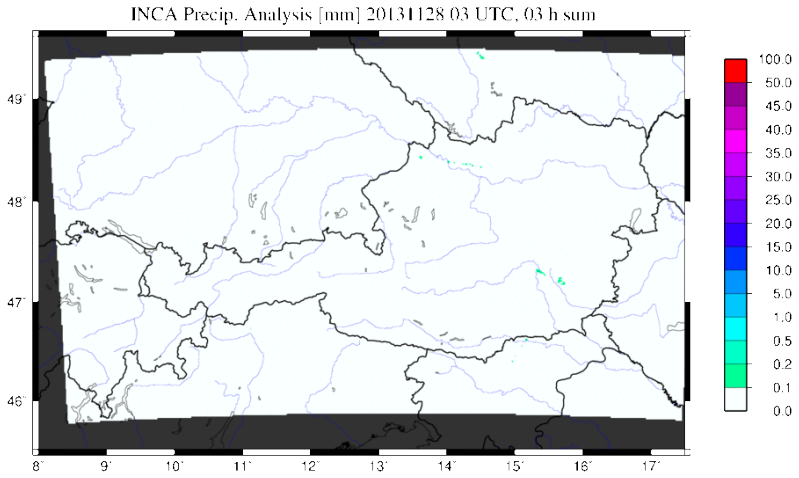
GPS refractivity index

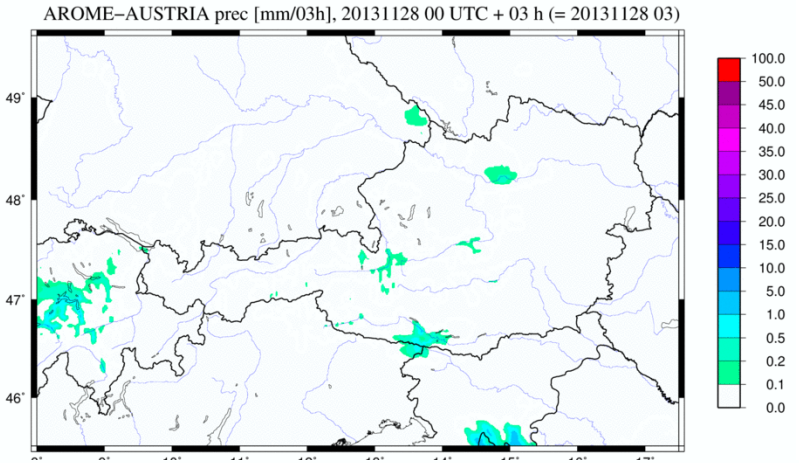
- Observation operator built (cy38t2) also TL/AD
- MF works on pre-processing (BATOR)

$$ZTD_1 = 10^{-6}\sum_{k_b}^{k_{top}}(k_1\frac{p(k)}{T_v(k)}(z(k-1)-z(k))+10^{-6}\sum_{k_b}^{k_{top}}(k_2^{'}\frac{e(k)}{T(k)}+k_3\frac{e(k)}{T(k)^2})(z(k-1)-z(k))$$

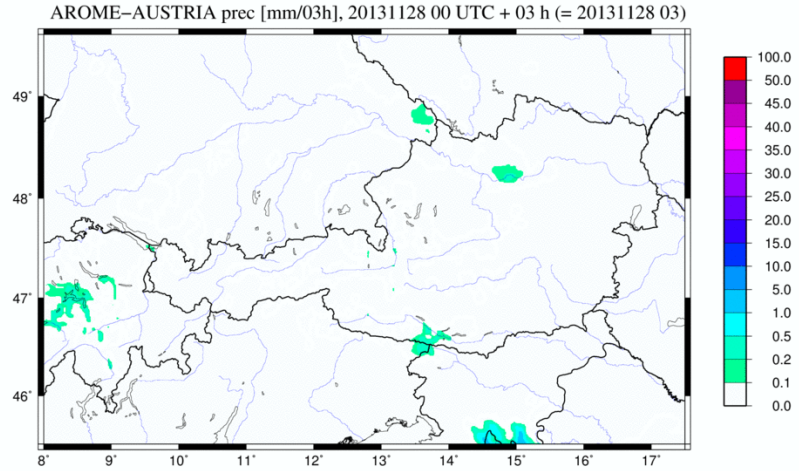


IDFI: (28th November 2013 00UTC+3h)

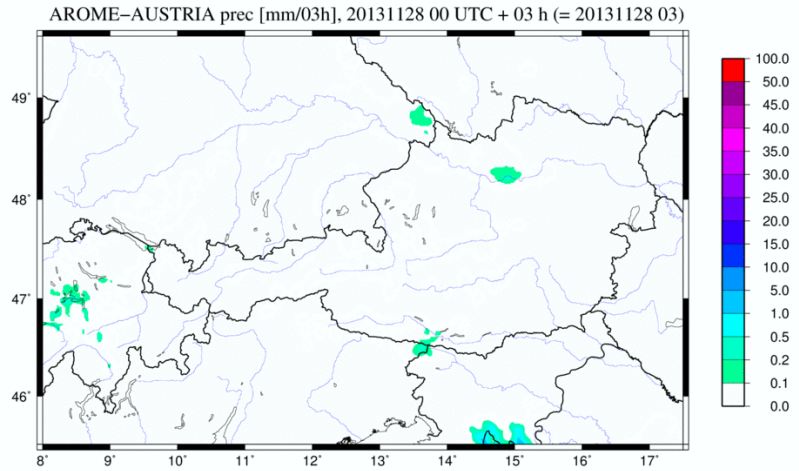




INCA reference



AROME-OPER



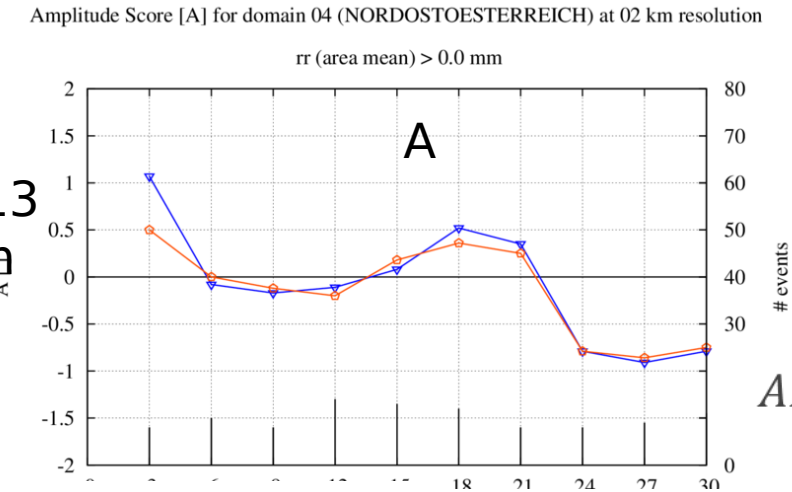
AROME+IDFI: NSTDFI=11; TAUS=1,5h

AROME+IDFI: NSTDFI=22; TAUS=1h

IDFI

AROME
9/29/14

SAL- score
10th-30th July 2013
threshold: 0.0mm
NE-Austria



AROME-OPER
AROME-IDFI

$$ANA_{IDFI} = FG + \overline{ANA} - \overline{FG}$$