

Status of data assimilation in Austria

Florian Meier



Configurations at ZAMG and ECMWF

Operational:

- ▶ ALARO 4.8km deterministic 4x/day +72h (CANARI soil)
- ▶ ALARO-LAEF (ECMWF) 11km ensemble (CANARI soil+atmos. breeding-blending 16 member 2x/day +72h)
- ▶ AROME 2.5km deterministic 8x/day +48h (3D-VAR+CANARI-OIMAIN soil)

test versions:

- ▶ AROME-EPS 2.5km (pure downscaling)
- ▶ AROME-Nowcasting 2.5/1.2km testversion 24x/day +12h (testversion; 3D-Var + downscaling soil)

- Update of AROME-OPER to cy40t1, except 3D-Var (still cy36t1)
- Work on LAEF 5km version
- AROME-Nowcasting: switch to cy40t1, Radar+LHN, 2.5km/1.2km B-Matrix

Operational ALARO 4.8km/I60

Regional Cooperation for
Limited Area Modeling in Central



- ▶ ~~cy36t1 export CANARI+PRODUCTION~~

- ▶ fullpos cy38t1

- ▶ 6-hourly up to +72h

- ▶ lagged coupled with ECMWF-IFS
(3 hourly)

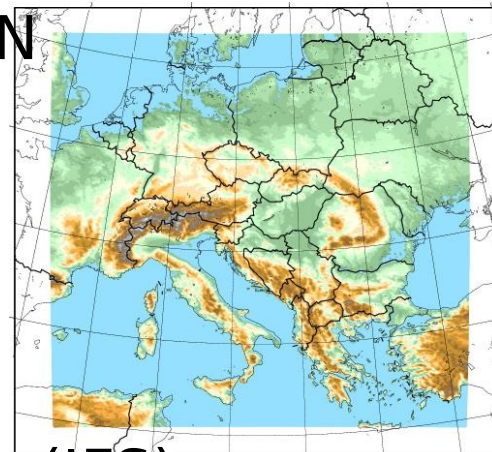
- ▶ Atmosphere: dynamical downscaling (IFS)

- ▶ Soil: CANARI standard + SST from IFS (2x blendsur)+
some additional snow melting if snow<0.7 then
snow=0

- ▶ Observations in CANARI: OPLACE+ZAMG data bench

- ▶ no national OPLACE yet **->no changes since last year**

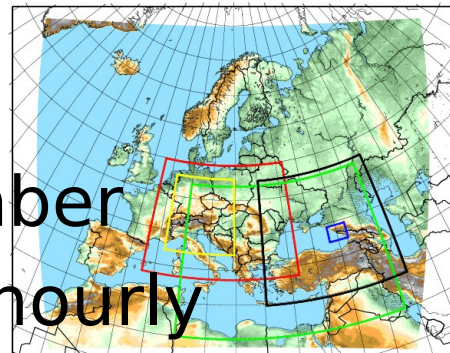
ALADIN-AUSTRIA 5km Domain & Topography



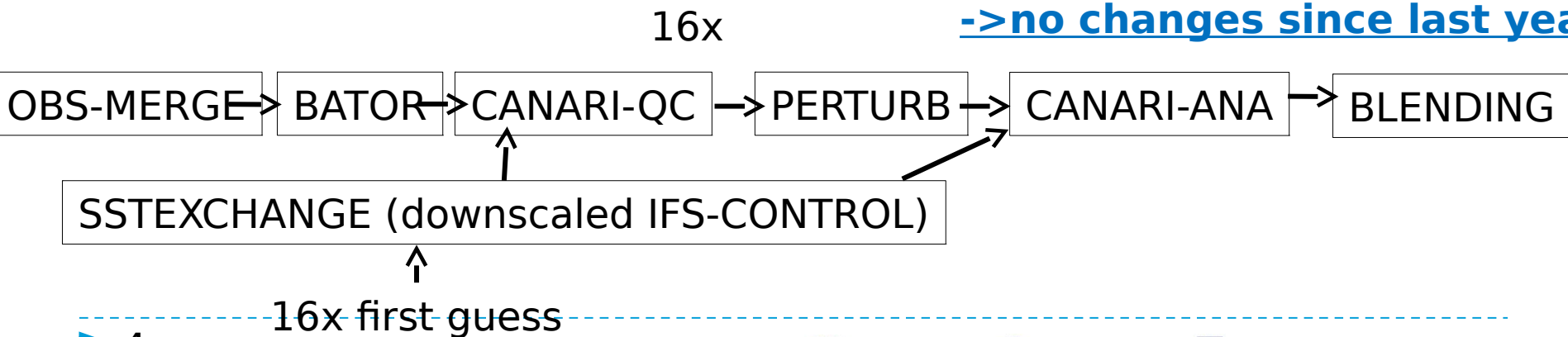
REF_A=60km, REF_S_T2=3.0,REF_S_H2=0.2,RCLIMCA=0.045,RCT2SY=5.0,
RCH2SY=2.5 OROLIM=2900.,ORODIF=950

Operational LAEF 11km L45

- ▶ 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
- ▶ tests with 5km resolution cy40t1 export

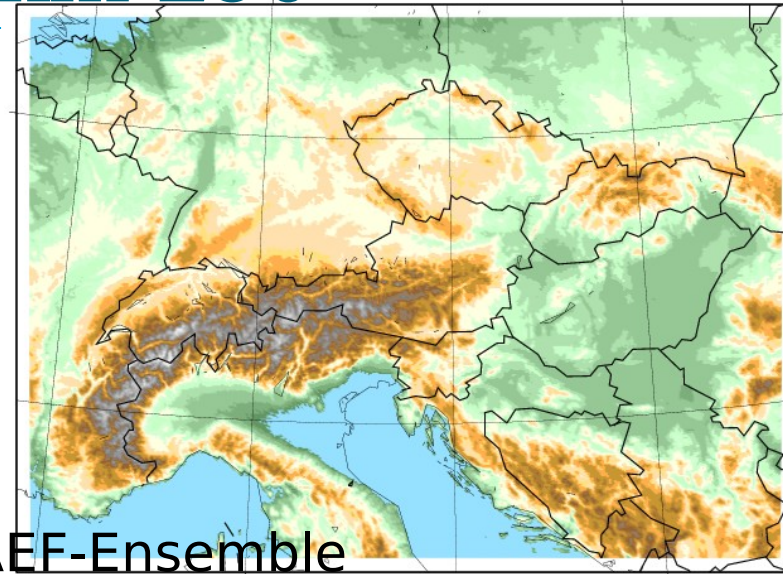


->no changes since last year



Operational AROME 2.5km L90

- ▶ New version since 20th June 2016:
- ▶ cy40t1 export except 3D-Var (still cy36t1 export)
- ▶ 3 hourly (8/day) up to 48h
- ▶ Lagged coupled with IFS 3 hourly
- ▶ Atmosphere: 3D-Var, B-Matrix from LAEF-Ensemble
- ▶ Soil: CANARI+OIMAIN inline cy40t1+MESCAN settings (FA format in SURFEX)
- ▶ T Lake Constance interpolated from Measurements (in OI-main)
- ▶ snow modified with MODIS 1km data and SNOWGRID offline snow model
- ▶ Observations: OPLACE+ZAMG data bench
- ▶ Linear grid, mean orography (GTOPO30), ECOCLIMAP I



Observations used:

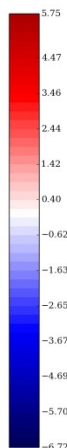
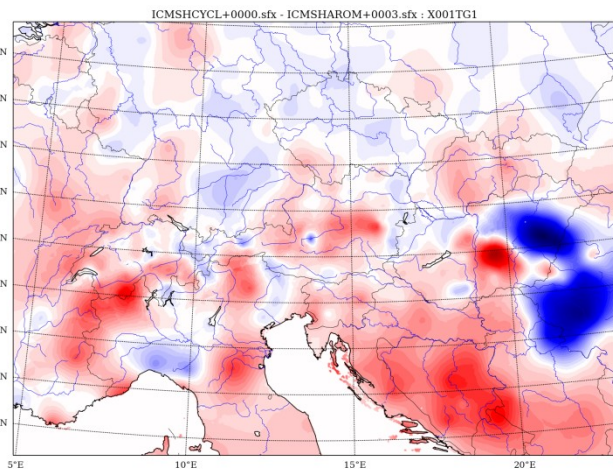
Obstype	Parameter
Synop+Tawes+Ship	U10m,V10m, RH2m,T2m, Z
AMDAR	U, V, T
GEOWIND	U, V (WVCL1/2,WVMW1, IR3, VIS3)
TEMP	U, V, T, Z, Q
PILOT	U, V
MSG	WV radiances
NOAA18/19/MetOp-A,-B	AMSU-A, AMSU-B, MHS, HIRS
MetOp-A	IASI
MetOp-A	U10m, V10m ASCAT ocean winds 25km

T_LAKE from Lake Constance from measurement interpolated inside OIMAIN

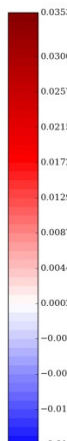
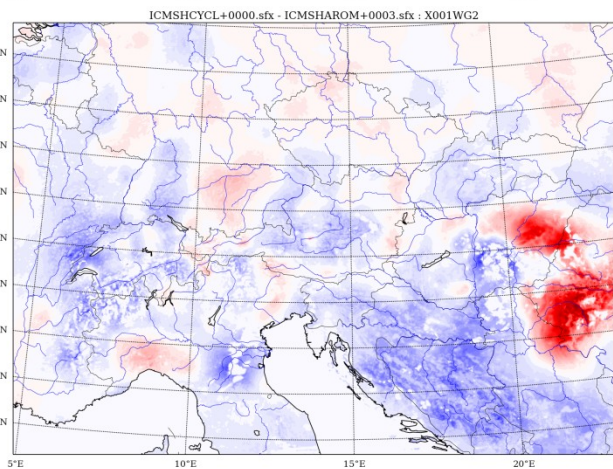
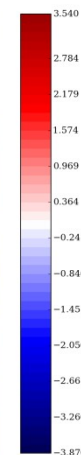
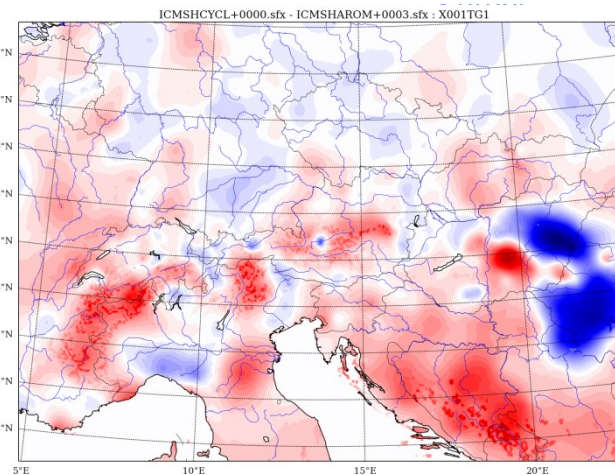
REF_A=190km, LVARSIGO=F, LMESCAN=T, LCORRF=T
REF_S_T2=5.0,REF_S_H2=0.3,RCLIMCA=0.045,RCT2SY=3.9,
RCH2SY=2.5

ORGLIM=3800.,ORODIF=1650.

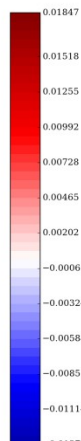
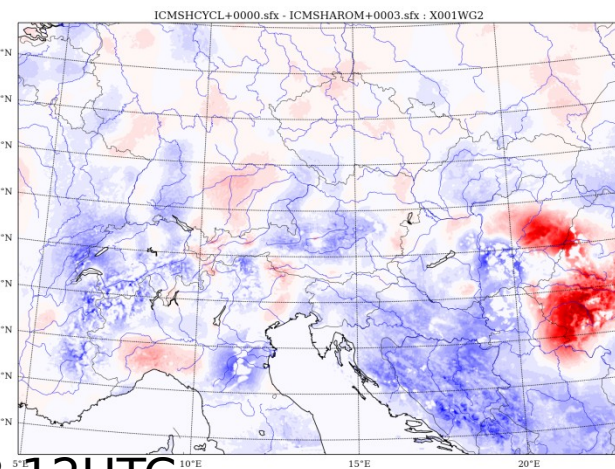
CANARI vs CANARI-MESCAN



TG1



WG2

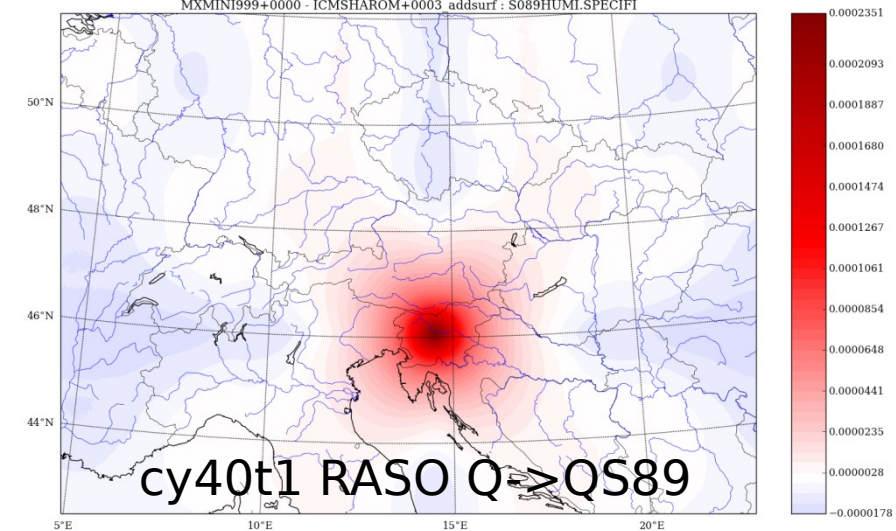
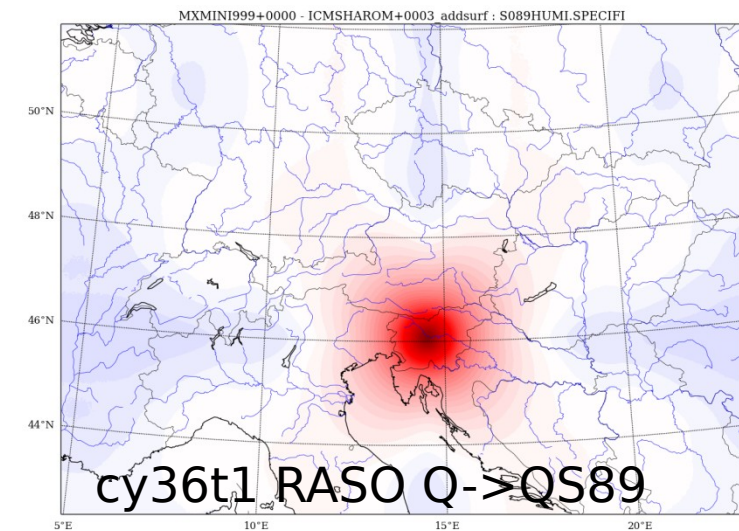
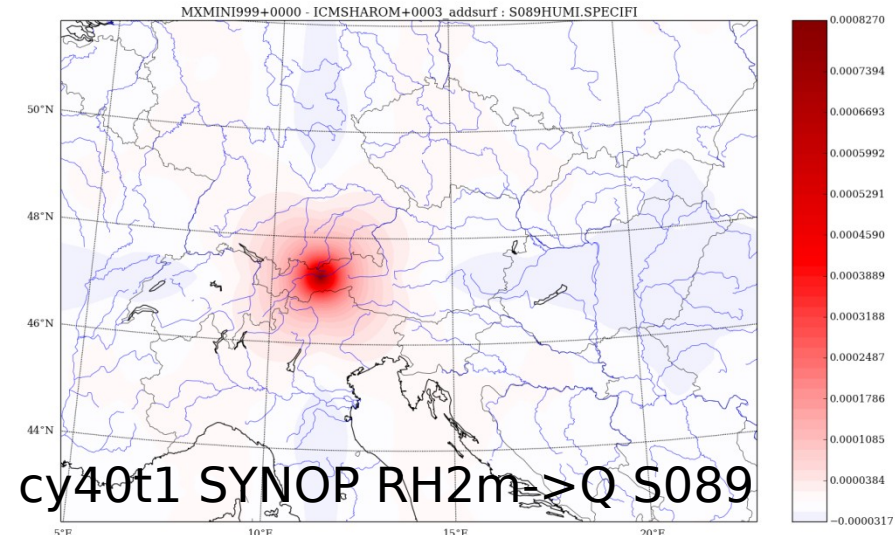
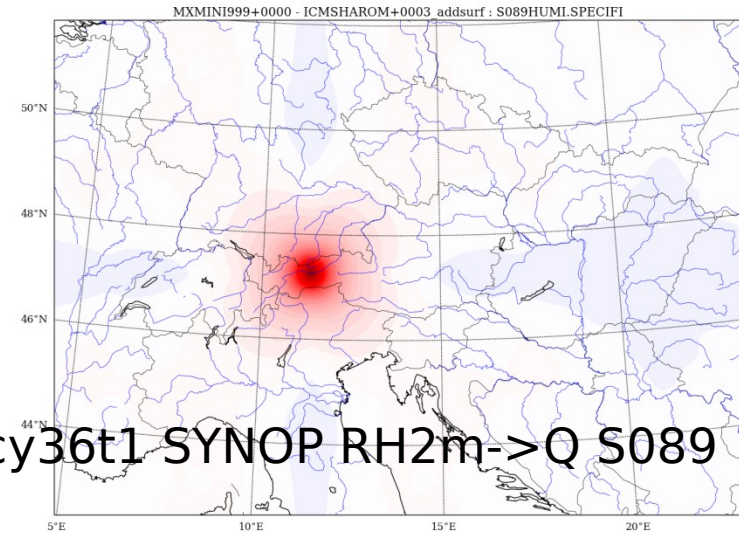


20160913 12UTC

REF_A=190/80km, LVARSIGO=F, LMESCAN=T/F, LCORRF=T
 REF_S_T2=5.0/3.0, REF_S_H2=0.3/0.2,
 RCLIMCA=0.045, RCT2SY=3.9, RCH2SY=2.5,
 ØROLIM=3800., ORODIF=1650.



3D-Var cy36t1 vs cy40t1 single obs experiments same B-Matrix 20160719 06 UTC SYNOP, AMDAR, radio sounding OK!

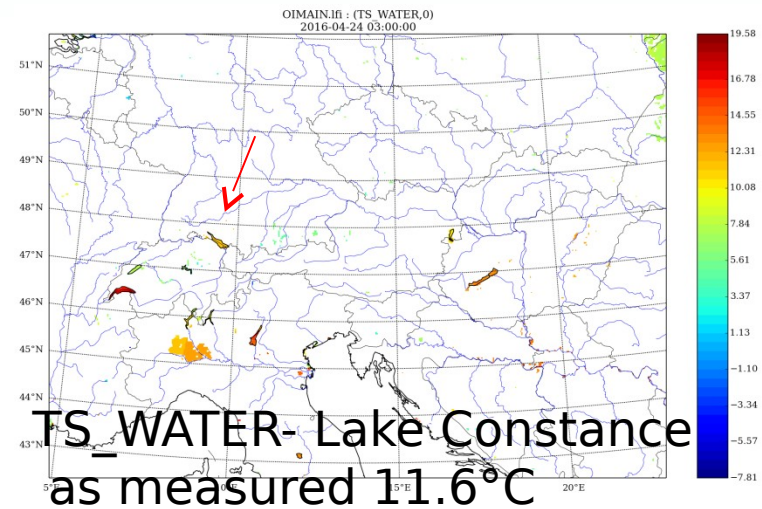
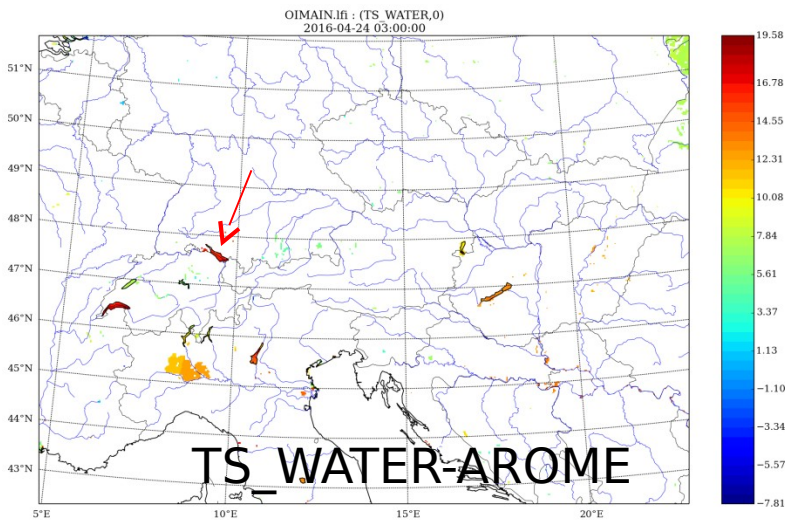
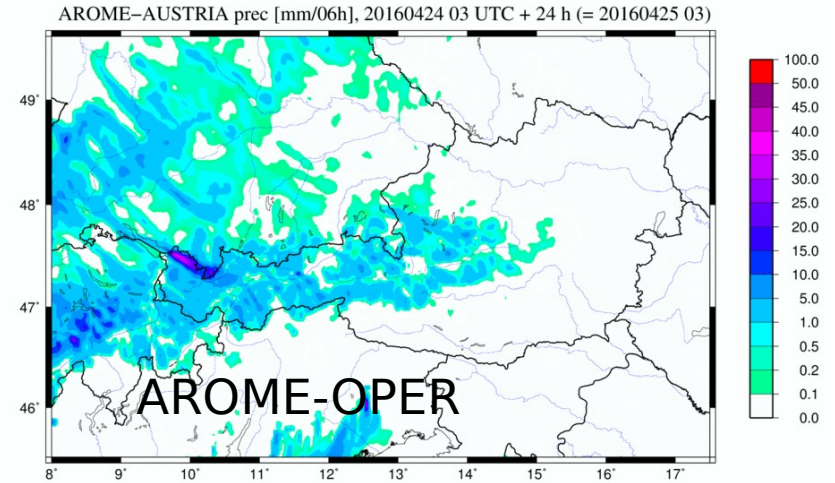


T_LAKE for Lake Constance

Regional Cooperation for
Limited Area Modeling in Central
Europe



„Lake effect“ on 25th April 2016: 06h precipitation 20160424 03 UTC+24h



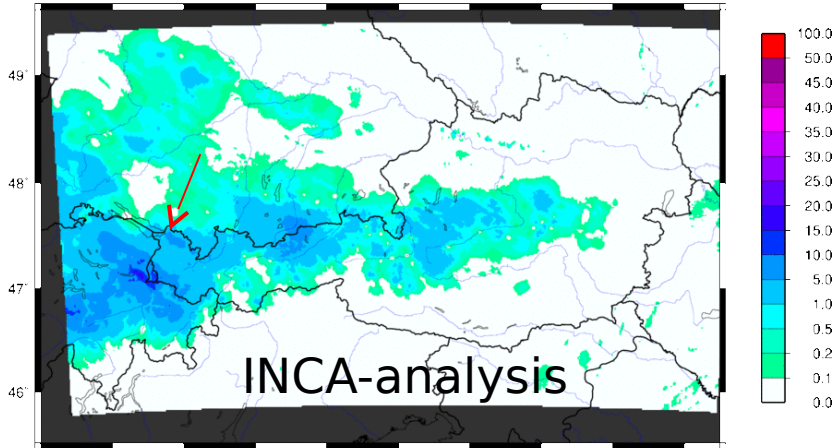
29th April 2016 30cm snow in Bregenz



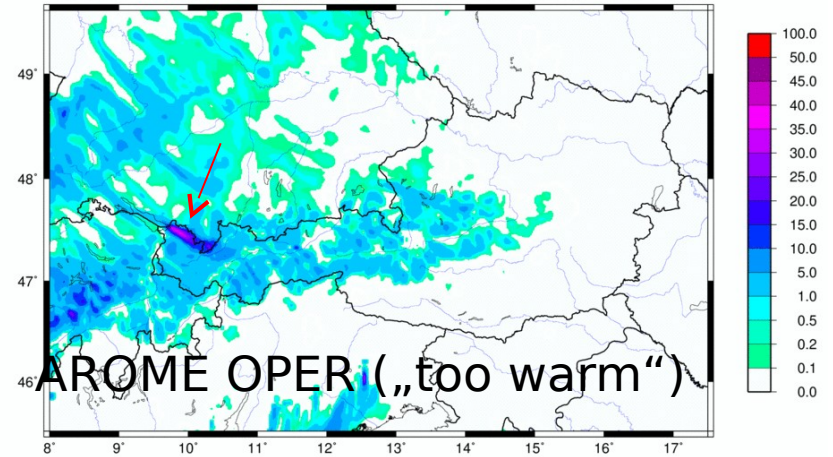
T_LAKE for Lake Constance

„Lake effect“ on 25th April 2016: 06h precipitation 20160424 03 UTC+24h

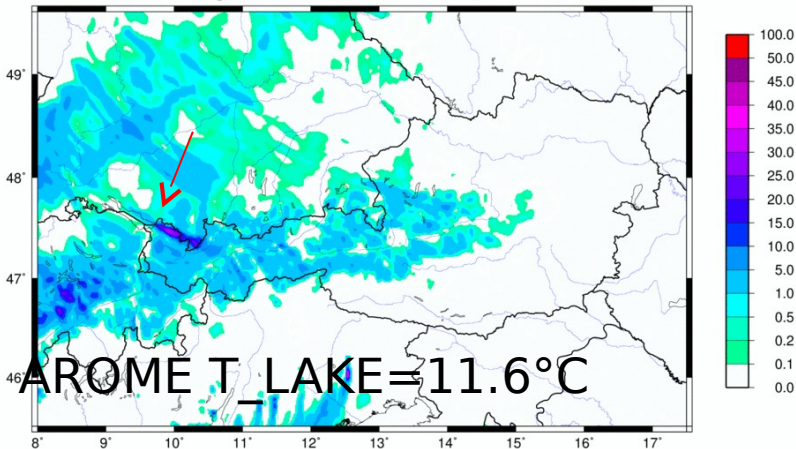
INCA Precip. Analysis [mm] 20160425 03 UTC, 06 h sum



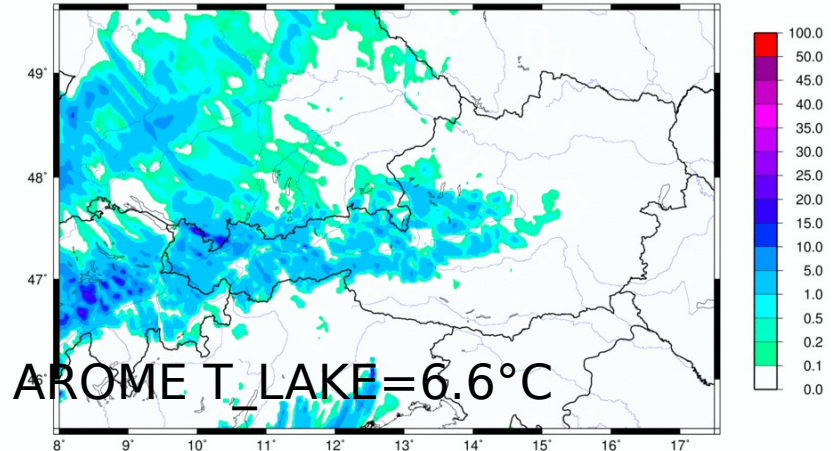
AROME-AUSTRIA prec [mm/06h], 20160424 03 UTC + 24 h (= 20160425 03)



AROME-AUSTRIA prec [mm/06h], 20160424 03 UTC + 24 h (= 20160425 03)



AROME-AUSTRIA prec [mm/06h], 20160424 03 UTC + 24 h (= 20160425 03)



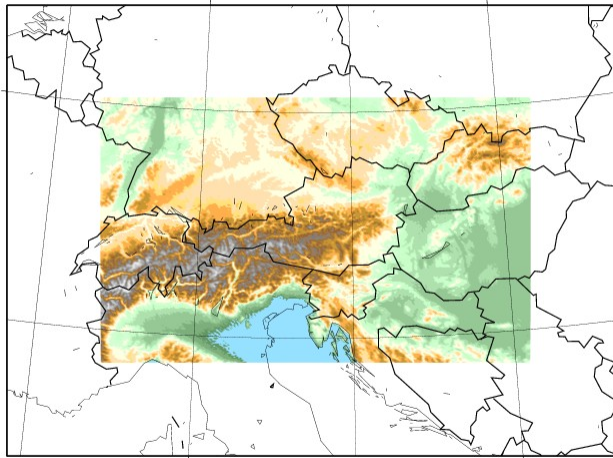
25th April 2016 30cm snow in Bregenz

AROME-Nowcasting

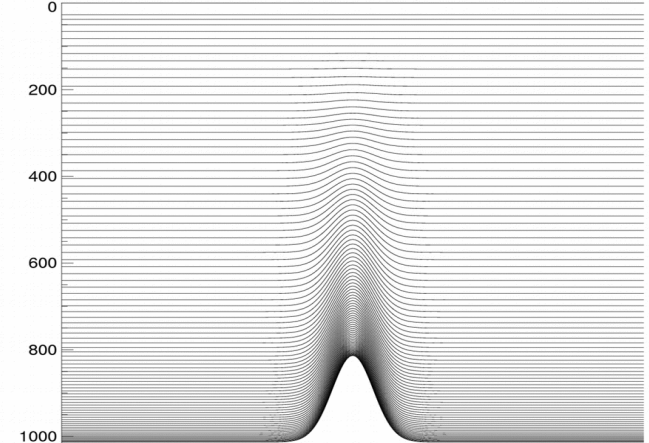
- ▶ Assimilation : 3D-Var on AROME-OPER 2.5km or smaller 1.2km domain every hour (30min cutoff time) cy40t1
- ▶ OBS like in AROME-OPER + RADAR REF/DOW+ MODE-S-Slovenia+ AMADR-humidity+ OPLACE-national+Latent heat nudging (INCA);
- ▶ B-Matrix as in AROME-OPER (2.5km) or 1.2km ; REDNMC=2.5
- ▶ Interpolation of last AROME-OPER (BC) and 1h-3D-Var analysis (IC) to smaller 2.5km domain, Soil: Interpolated last AROME 2.5km (prep offline) or ALARO 5km run (927 surf) or cycling
- ▶ Real time experiments 30th June - 15th July 2016
- ▶ Plans: Include MODE-S (KNMI), cloud masking, improvement of LHN and RADAR usage

AROME-Nowcasting

AROME-RUC Domain & Topography



AROME-AUSTRIA be(90 levels)



AROME-Nowcasting: 432x270/900x576 GP

2.5/1.2km/L90

AROME-OPER:600x432 GP 2.5km/L90

Identical centre point 13.8, 47.4

Orography: SRTM - AROME-OPER: GTOPO

Sand/clay: HSWD - AROME-OPER: fao

ECOCLIMAP: ECOCLIMAPIv2

FLAKE off, TEB on

Domain: C+I+E



ALARO-OPER001

AROME-Nowcasting 2.5km

ion for
Central
Europe



927ALA5

AROME-OPER 001

ALARO-DOMAIN

AROME-OPER-DOMAIN

Nowcasting-DOMAIN

POSTPROCESSING-DOMAIN

ADDSURF

927surf

BATOR3D | SCREEN | MINIM-BLEND | 927 | 927 | 927

OBS

PREP-OFFLINE

INIT.sfx

AROME-001

RROBS for LHN

FULLPOS

PROGRID

ADDGRIB

PGD.fa



ALARO-OPER001

AROME-Nowcasting 1.2km

ion for
Central
Europe



927ALA5

AROME-OPER 001

ALARO-DOMAIN

AROME-OPER-DOMAIN

Nowcasting-DOMAIN

POSTPROCESSING-DOMAIN

ADDSURF

927surf

927

BATOR3D

SCREEN

MINIM-BLEND

927

927

OBS

PREP-OFFLINE

AROME-001

INIT.sfx

FULLPOS

RROBS for LHN

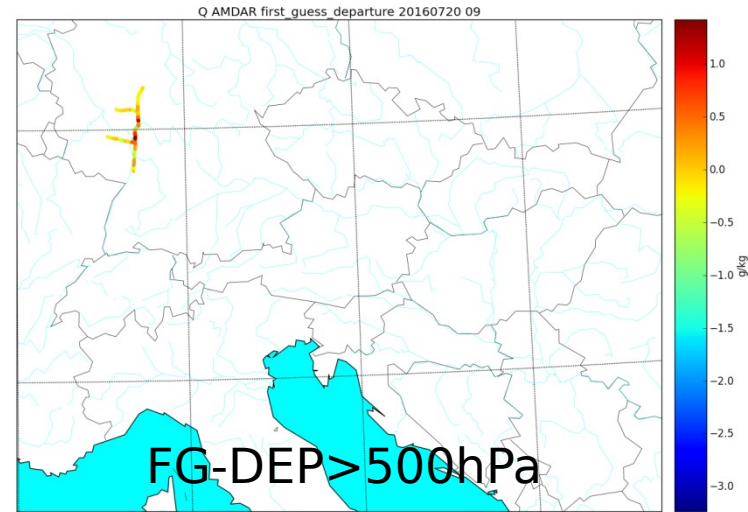
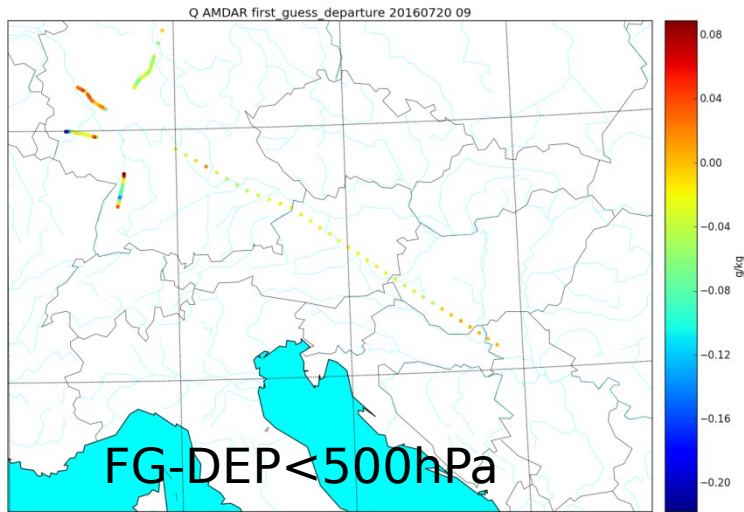
PGD.fa

PROGRID

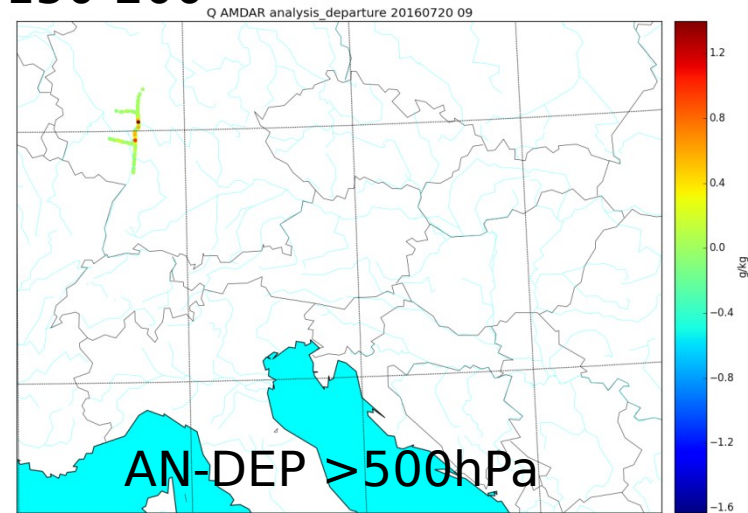
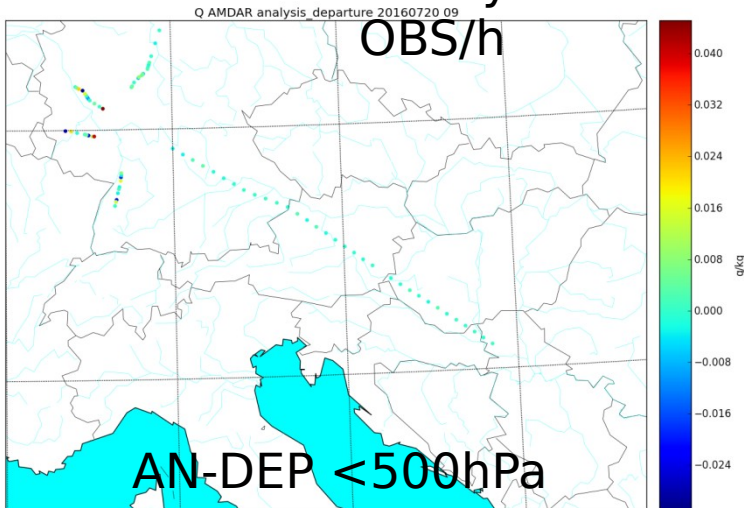
ADDGRIB



AMDAR-Q Test 20th July 2016 09 UTC



at daytime about 150-200



Plans for next year

- ▶ AROME-3D-Var->cy40t1
- ▶ Test of cloud masking in AROME
- ▶ Further optimisation of RADAR usage 3D-Var+LHN
- ▶ Validation of AROME-Nowcasting
- ▶ Include MODE-S-EHS in AROME-Nowcasting, testing Austrian MODE-S
- ▶ Further developments in DA in AROME-Nowcasting
- ▶ SURFEX-EKF experiments (soil moisture, LST, ASCAT+SENTINEL)