Regional Cooperation for
Limited Area Modeling in Central Europe

LACE
nwp central europe

Status data assimilation in Austria

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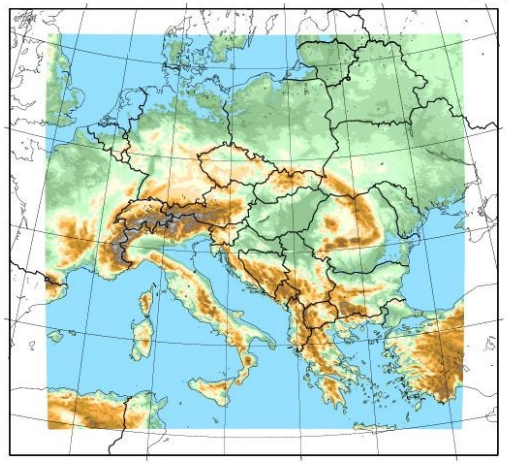
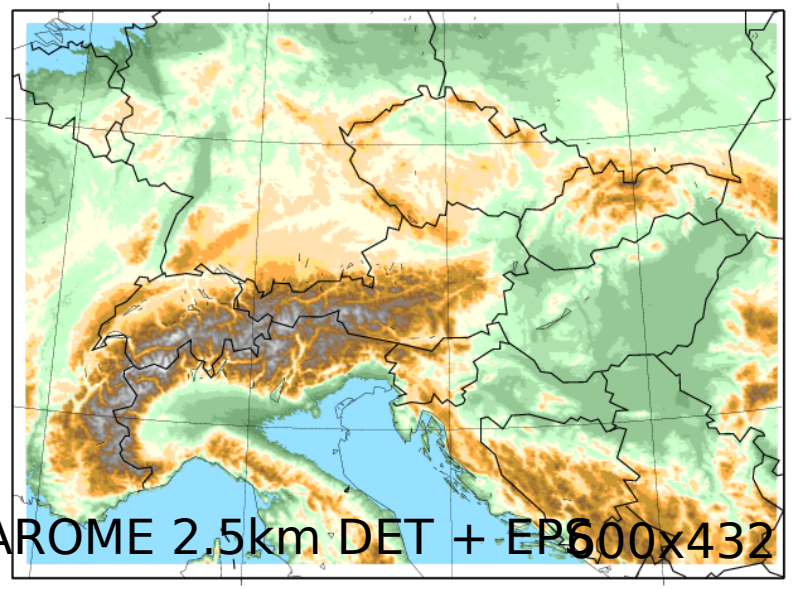
Christoph Wittmann, Stefan Schneider, Jasmin Vural

DHMZ SHMU OMSZ ZAMG ROMANIA ANM

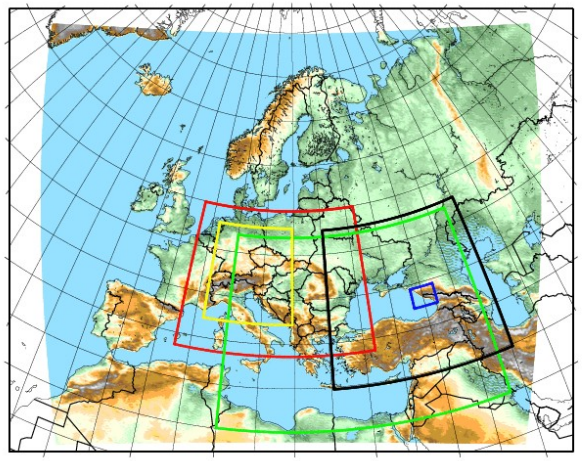
ALADIN–AUSTRIA 5km Domain & Topography

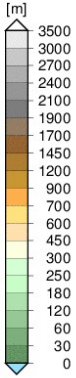


ALARO-0 4.8km 600x540

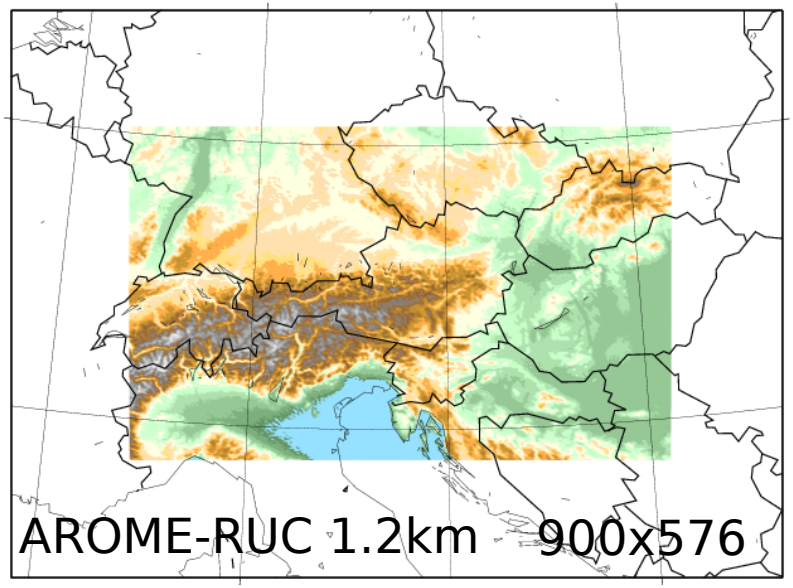


AROME 2.5km DET + EPS 600x432





LAEF10.9km 500x600



AROME-RUC 1.2km 900x576

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Operational configurations CMCs

ALARO-0 4.8km L60 cy40t1	AROME-2.5km L90 cy40t1	ALADIN-LAEF 10.9km L45/16+1 cy36t1 (LACE)	(AROME-EPS-2.5km L90/16 cy40t1)	(AROME-RUC 1.2km L90 cy40t1)
3h-IFS 4x/day +72h dt=180s	1h-IFS 8x/day +60h dt=60s	6h-IFS-EPS 2x/day +54h dt=450s	6h-IFS-EPS 2-4x/day +48h dt=60s	1h-AROME 2.5km dt=30s
dynamical downscaling	3D-VAR	Breeding-blending	3D-Var-EDA-Jk	3D-VAR +LHN+FDDA-nudging
CANARI	CANARI-OIMAIN+MESCAN inline+ SNOW exchange/ SNOWGRID+SAT	CANARI-EDA offline	CANARI-EDA	CANARI-OIMAIN/downscaling AROME (PREP offline)
DFI	-	-	-	IAU
	Static Ens-B from LAEF downscaling		Static Ens-B from LAEF downscaling	Static-Ens-B from AROME2.5km

Observations used AROME:

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-SEVIRI (Meteosat11)	WV radiances
NOAA18/19/MetOp-A,-B	AMSU-A, AMSU-B, MHS, HIRS
MetOp-A	IASI
MetOp-A	U10m, V10m ASCAT ocean winds

T_LAKE from Lake Constance from measurement interpolated inside OIMAIN

CANARI settings: 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
OROLIM=3800.,ORODIF=1650.

New super computer at ZAMG

- **HPE Apollo 8600 (=SGI ICE-XA)**
- 192 nodes with 18-core SKL 6140@2.4GHz
- 2 frontend nodes (à 2x8 processors, 64 GB R
- 96 GB RAM per node
- OmniPath enhanced hypercube network
- Lustre Filesystem with total capacity of 350TB
- PBSpro scheduling system
- The new HPE/SGI system replaced the old SGI ICE-X in December 2017.

New unified scripting system for ALARO/AROME: ksh+bash+python

Installation of Harmonie-OBS-Monitor for AROME/AROME-parallel (F. Weidle)

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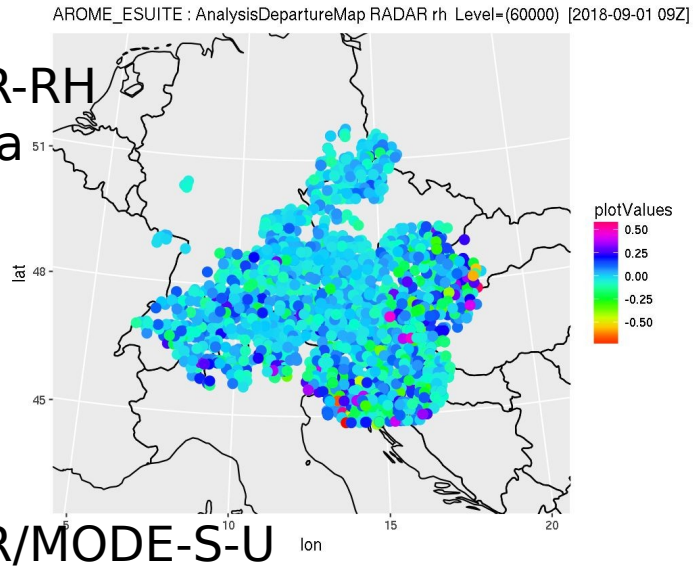
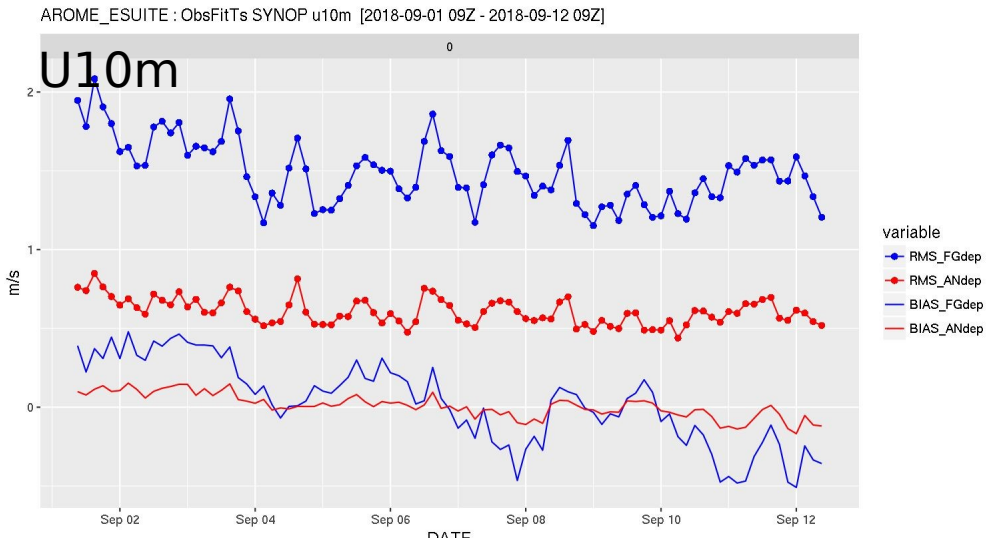
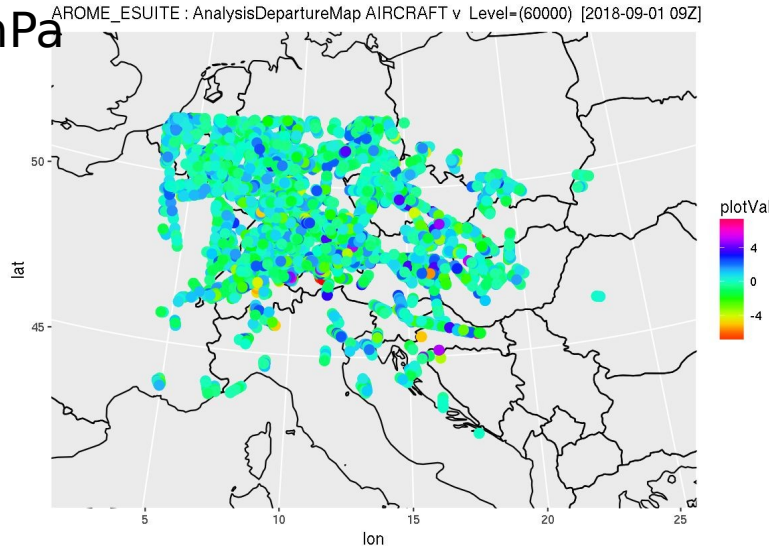
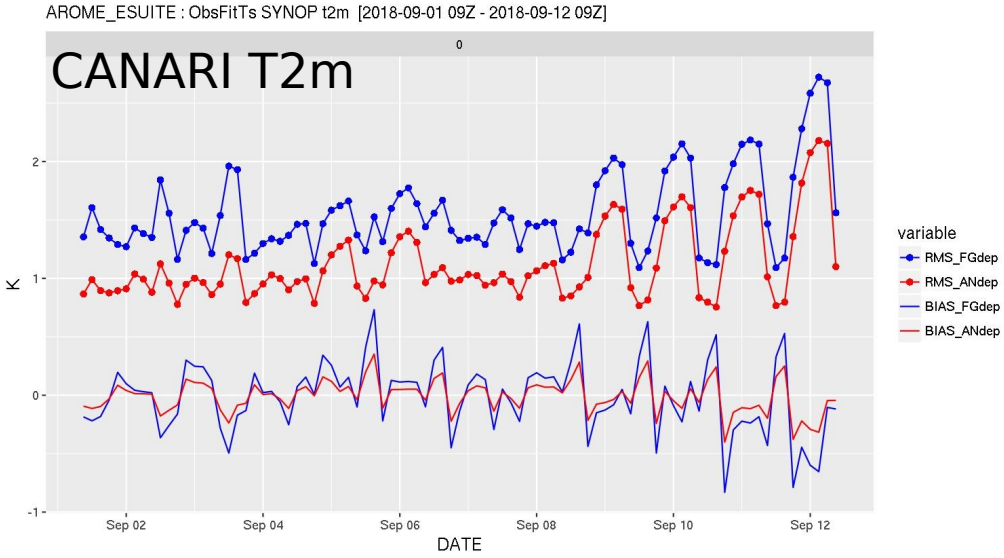
RADAR-RH 600hPa





AMDAR/MODE-S-U 600hPa

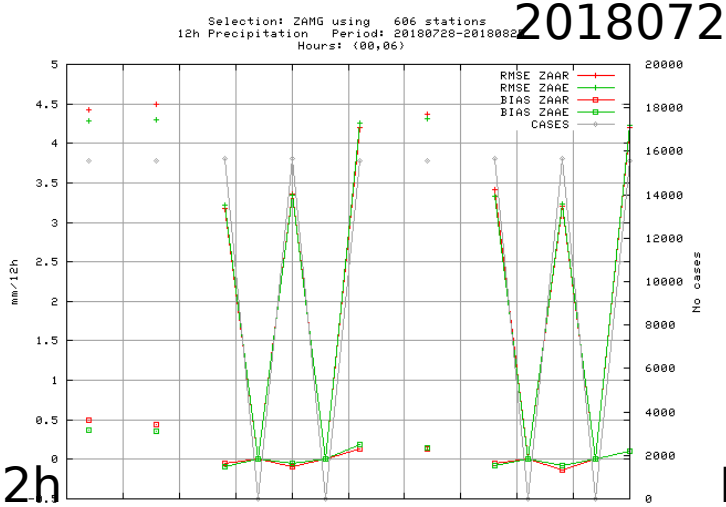




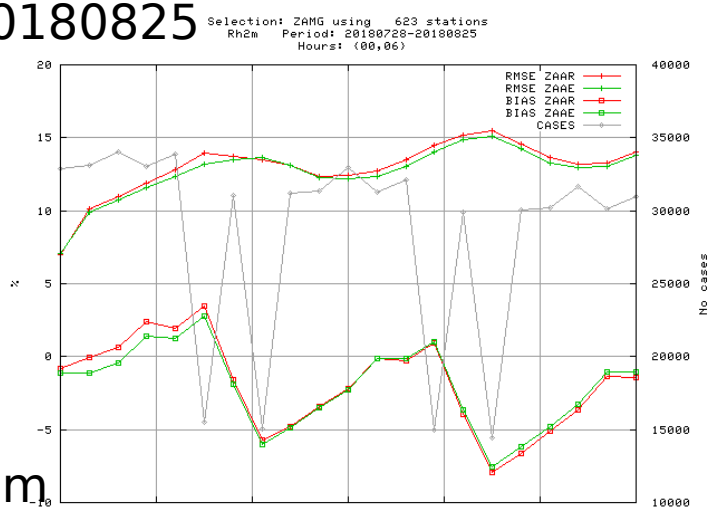
AROME-Parallel-Experiment

- Additional use of radar reflectivities from AT, Slovenia, Germany and MODE-S wind Slovenia, KNMI, national and AMDAR-Q -> now starting GNSS-ZTD

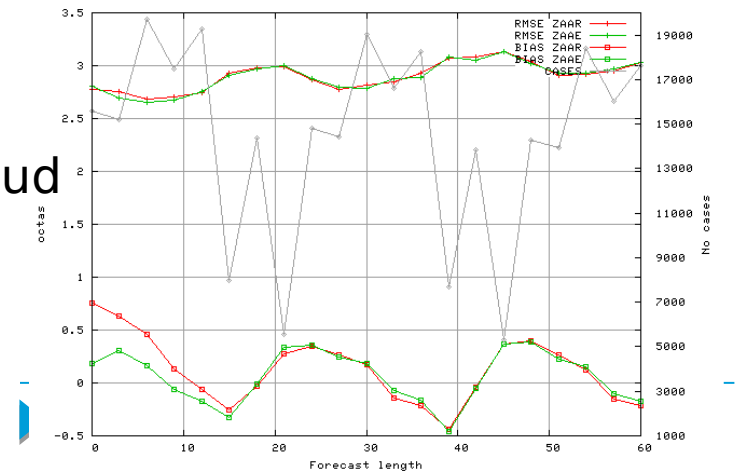
20180728-20180825



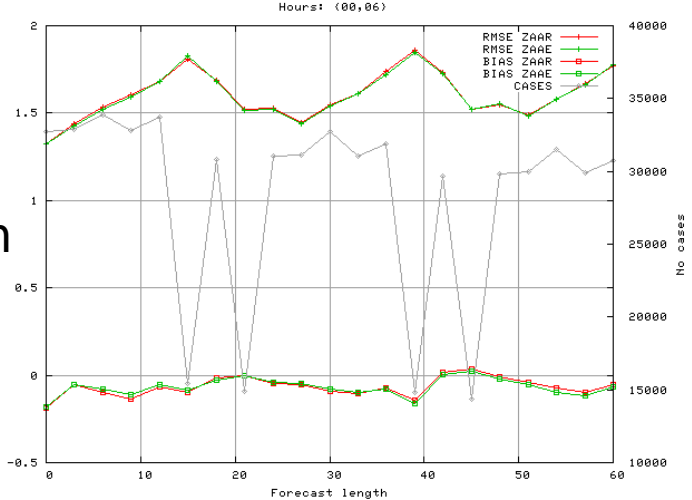
RR12h



RH2m



cloud



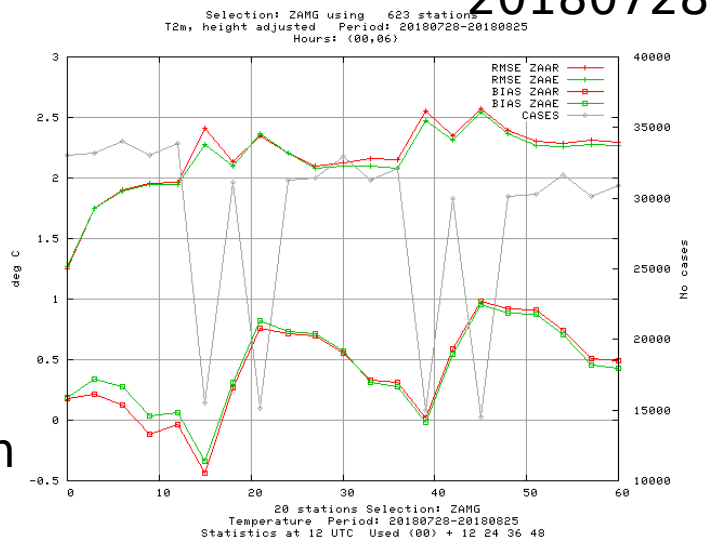
U10m

AROME-Parallel-Experiment

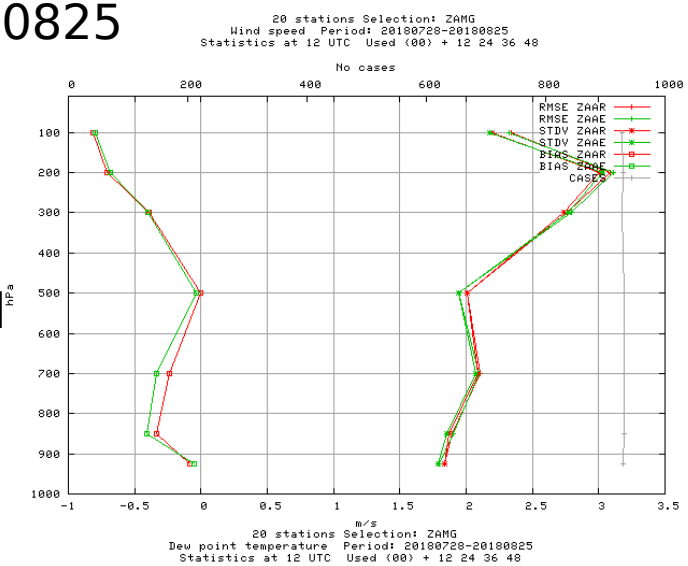
- Additional use of radar reflectivities from AT, Siovenia, Germany and MODE-S wind Slovenia, KNMI, national

20180728-20180825

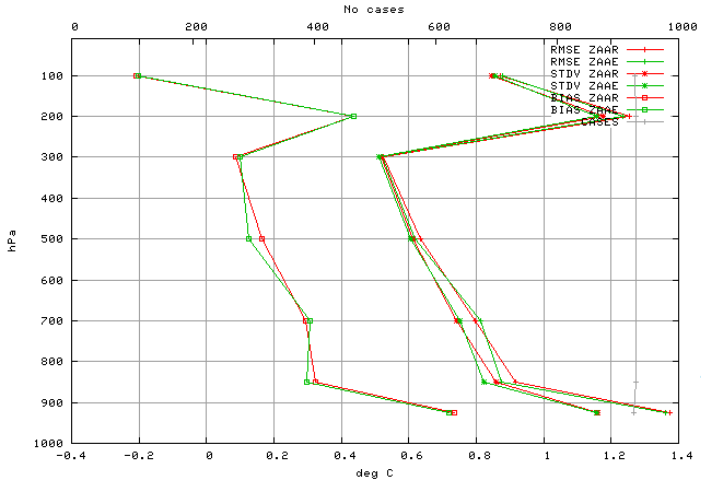
T2m



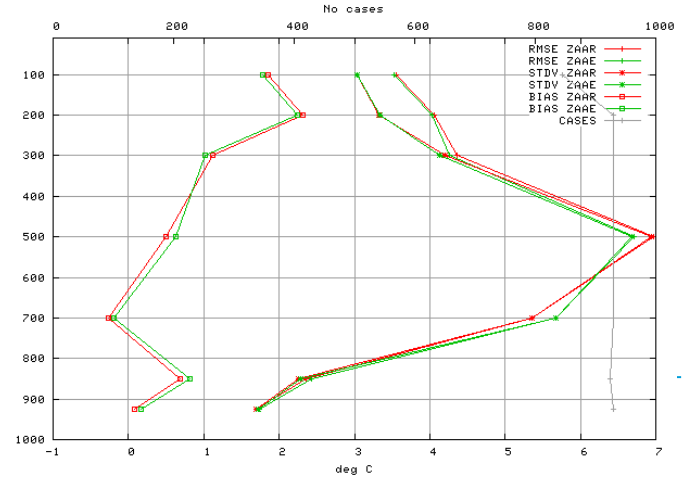
wind



T

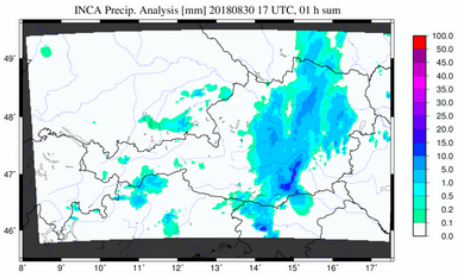


Td



AROME-Parallel-Experiment

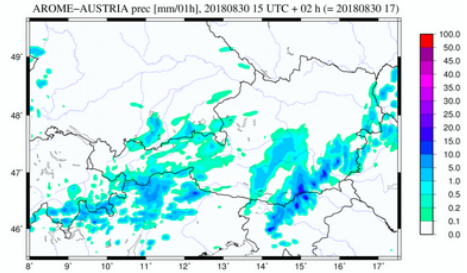
INCA

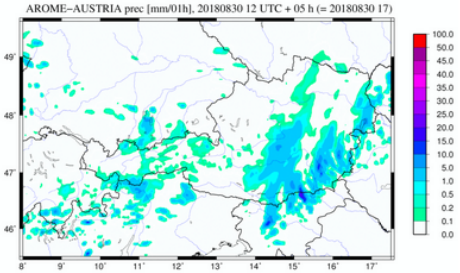


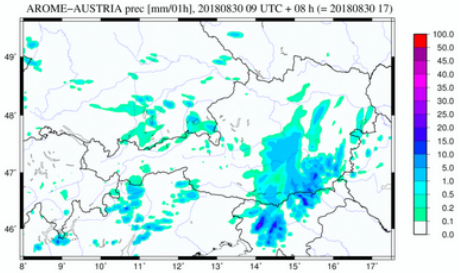
Analyse vom Thu, 30.08.2018 17:00 UTC

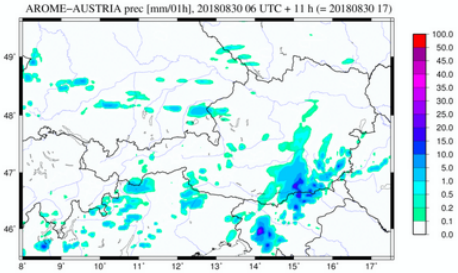
⇦ **aktuell** ⇨

OPER

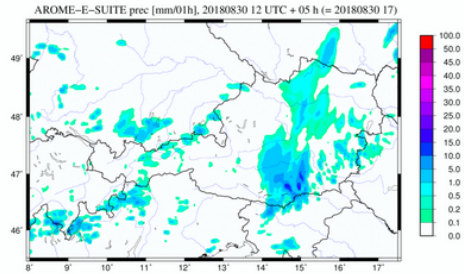


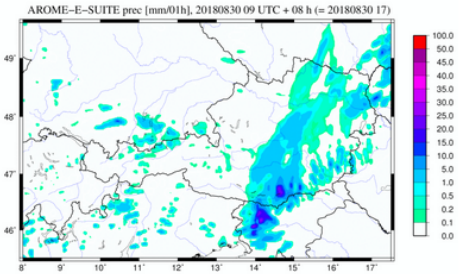


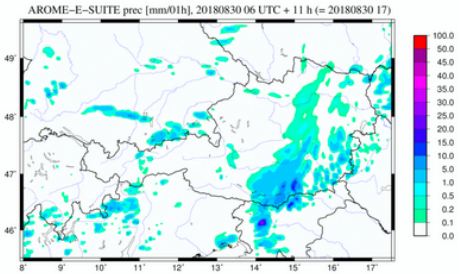


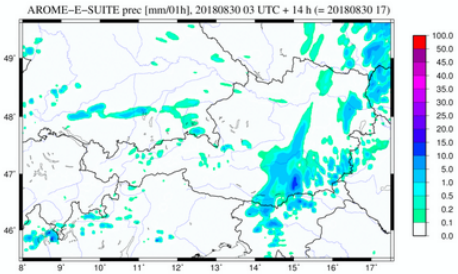


PARALLEL





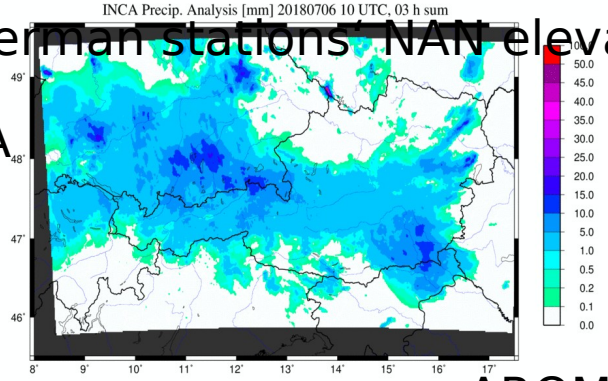




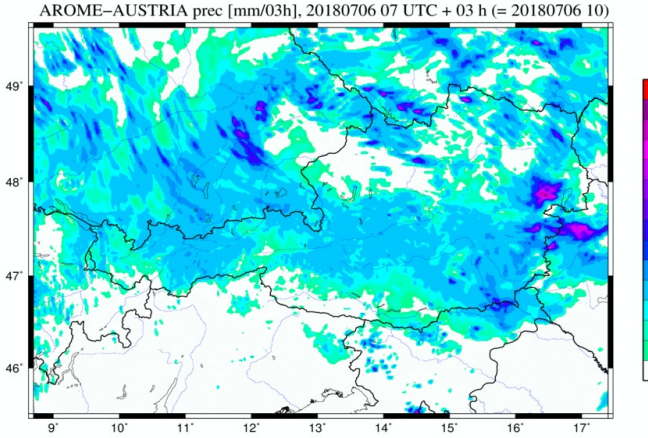
Modification of HARMONIE PREPOPERA

- Enable usage of MF-BATOR (interpolate quality index, copy attributes)
- Enable Romanian stations; add some missing station IDs
- Disable parallelisation (due to HDF5 library version)
- Take into account German stations' NAN elevations

INCA

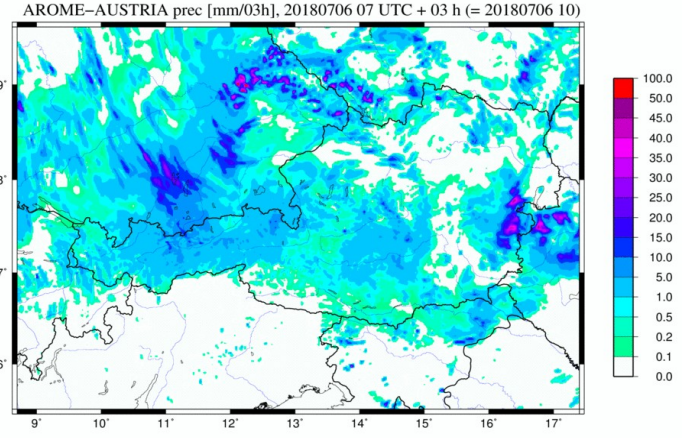


AROME-RUC-HARMONIE-BATOR modified



20180706 07UTC

AROME-RUC-MF-BATOR (cy40t1)



GNSS-activities

- gpssol for hourly 3D-Var modifications in source code
- GNSS ZTD in RUC2.5km July2016 + case studies 1.2km (master thesis university of Innsbruck)
- regular exchange established

- GNSS-RO: due to lack of observations OSSE planned
- comparison of ZTD and slant delays planned
- VARBC is not working in cy40t1 without code

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SCADA windturbine assimilation

Possible solutions:

klima+ energie fonds

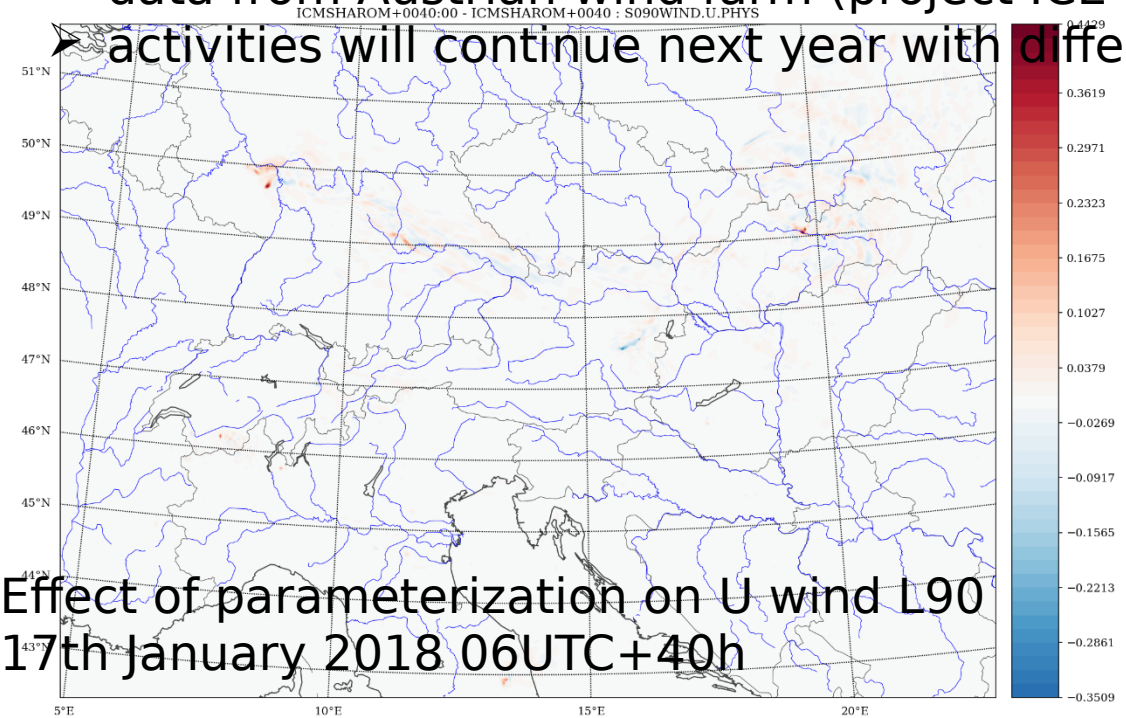
FFG Austrian Research Promotion Agency

Verbund

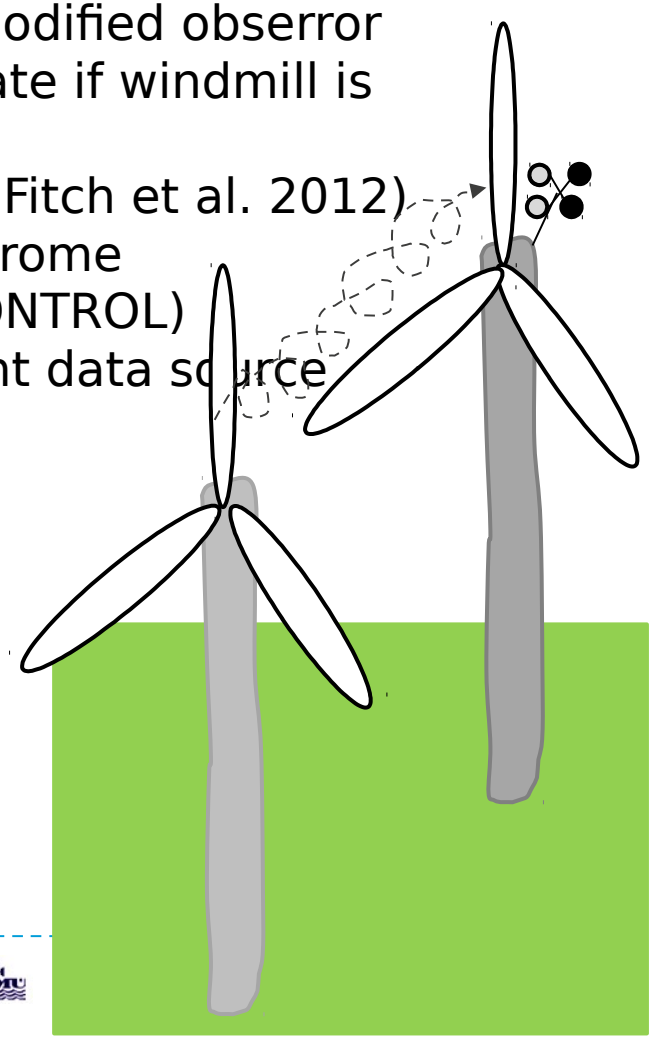
Meteotest

universität wien

- Assimilate as obstype 6 (windprofiler) with modified obserror (factor) and simple QC checks (don‘t assimilate if windmill is not running)
- Parameterisation of windfarm effect on flow (Fitch et al. 2012) new kind of turbines added called from apl_arome
- data from Austrian wind farm (project ICE-CONTROL)
- activities will continue next year with different data source

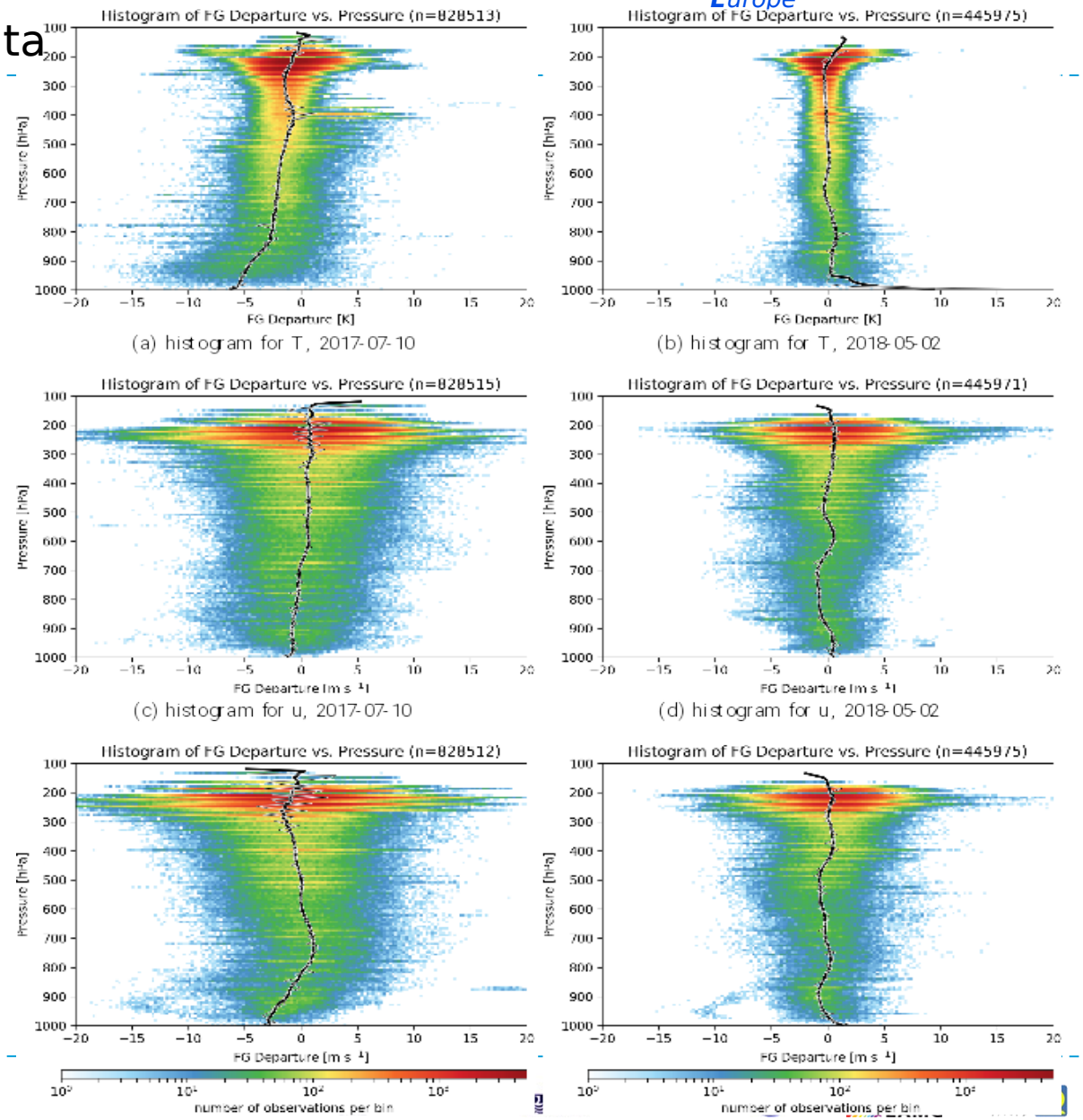


Effect of parameterization on U wind L90
17th January 2018 06UTC+40h



national MODE-S EHS data from Austrian ATC (P. Scheffknecht)

quality improved



(a) histogram for T, 2017-07-10
(b) histogram for T, 2018-05-02
(c) histogram for u, 2017-07-10
(d) histogram for u, 2018-05-02
(e) histogram for v, 2017-07-10
(f) histogram for v, 2018-05-02

austro CONTROL

FFG Austrian Research Promotion Agency

AROME-Nowcasting 1.2km