Regional Cooperation for
Limited Area Modeling in Central Europe

LACE
nwp central europe

QC analysis of "new" observations

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Motivation

- **Widen the use of existing observations**

- **Currently assimilated observations within 6h BlendVar:**
    - **SYNOP** (Ps), **TEMP** (t, q, u, v), **AMV**,
    - **AMDAR** (t, u, v), **Mode-S MRAR CZ** (t, u, v), **Mode-S EHS** from KNMI (t, u, v)
    - **SEVIRI** (channels: 2, 3)

- **Quality assesment of "new" data is ongoing**

Methodology:

- **Validation with respect to NWP model**

- **3 months period of 25 March - 25 June 2019**

Data

- **Observations** (from OPLACE, except for Czech MRAR):
    - aircraft: AMDAR, Mode-S EHS (KNMI), MRAR (ARSO) & **local Czech MRAR**
    - wind profiler
    - high-resolution AMV (HRWIND)
    - national synoptic observations

- **validation with respect to NWP data**
    - operational ALARO/CZ 2.3km forecast of various length (6-11h)
    - observations assimilated with +/-30min assimilation window
    - pragmatical decision to get **data samples every hour**
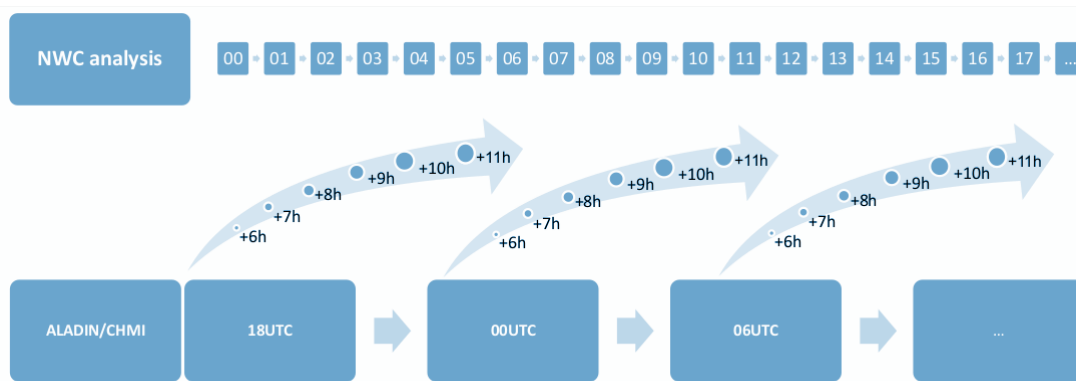

Figure 4: The scheme of the ALADIN/CHMI operational forecast used as the first guess for hourly analyses.

National synoptic observations

- **All OPLACE SYNOPs validated with respect to ALARO/CZ NWP model (OMG)**

- **3 months statistics (March-June 2019)**

- **Several problems fixed during the assessment, i.e. time stamp of AT data, SK data has a good format for distribution, fixed height of a Croation station**

- **Only stations with sufficient sample are processed (meassure at least 4 times a day)**

- **Black list approach per variable**

var	gross error	% of gross error	mean	std
temperature	15K	>1	>1.5K	>2.5K
u,v wind	15m/s	>1	>1m/s	>3m/s
geopotencial	$500m^2/s^2$	>1	>$100m^2/s^2$	>$500m^2/s^2$
relative humidity	1%	>1	>0.3%	>0.5%

Table 1: Thresholds used to generate SYNOP blacklist

National synoptic observations (2)

- **Boxplots of hourly bias per country**
  - **- G in the plot means gts data (blue box), N denotes national data (pink box)**

- **National and gts data are comparable**

- **Switzerland and Italian stations larger bias**
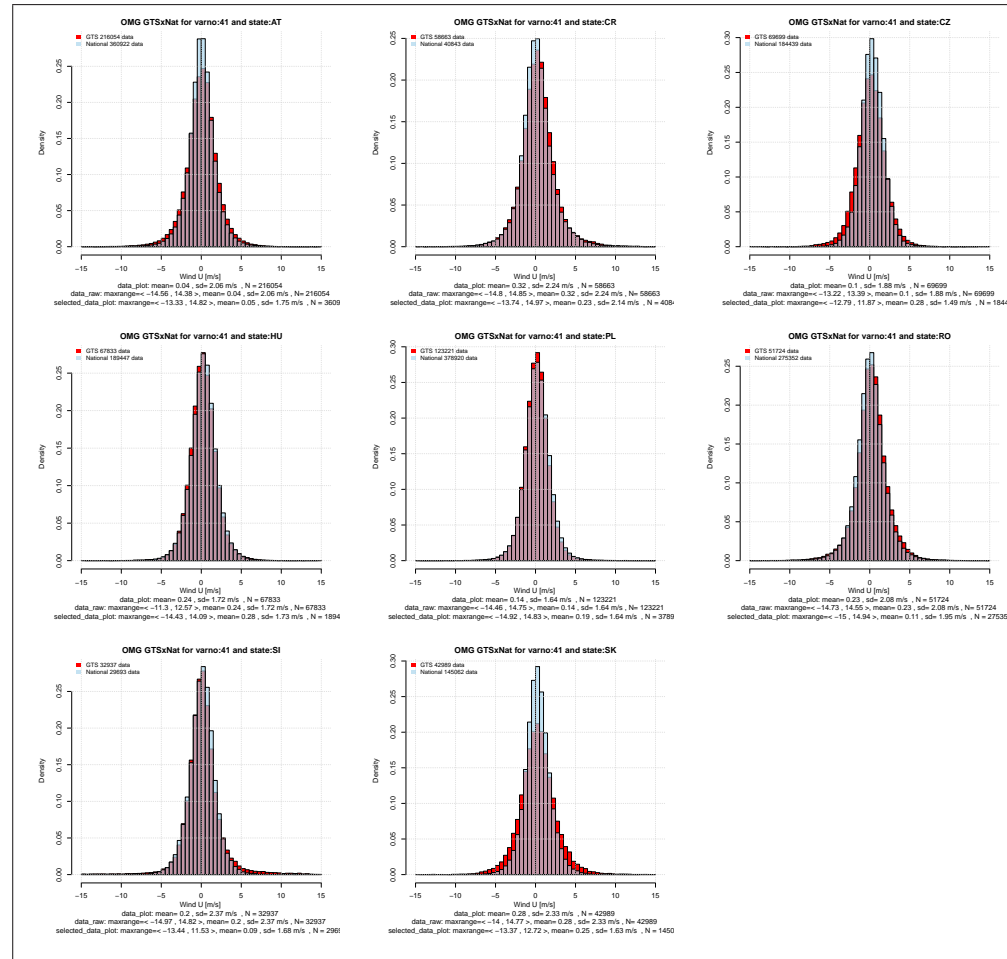

Bias OMG for varno:39
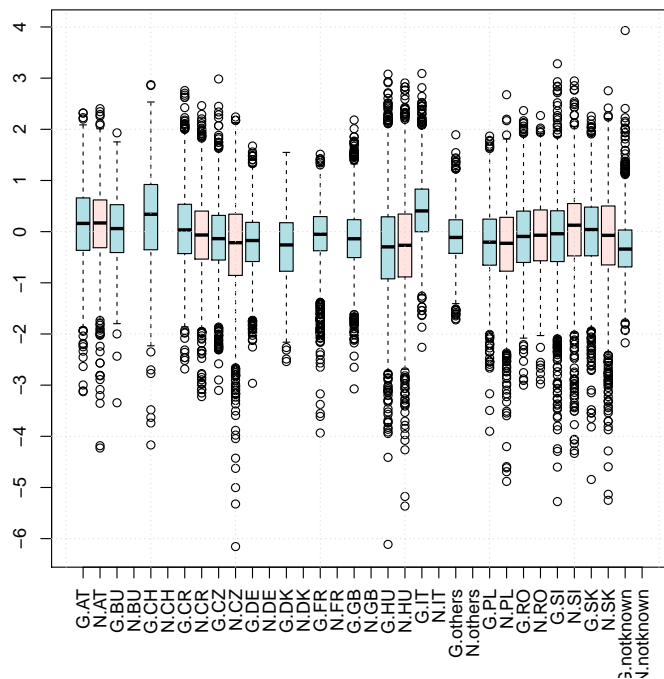
National synoptic observations (3)

- **Geopotential histograms per state**

- **Heavy tails, SK biased (might be already fixed)**

- **GTS (red) and National (tranparent blue)**
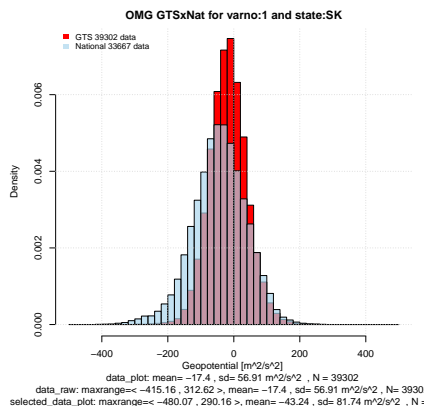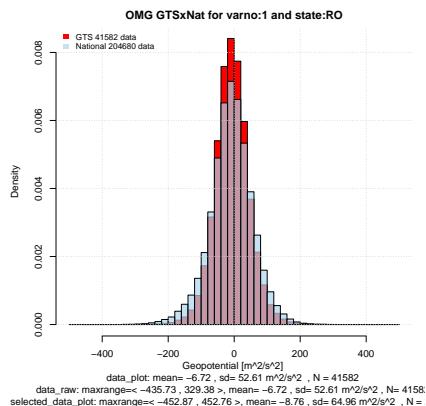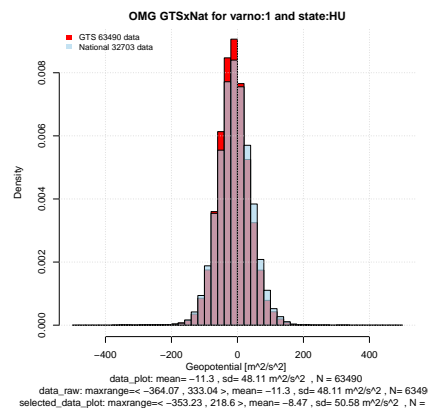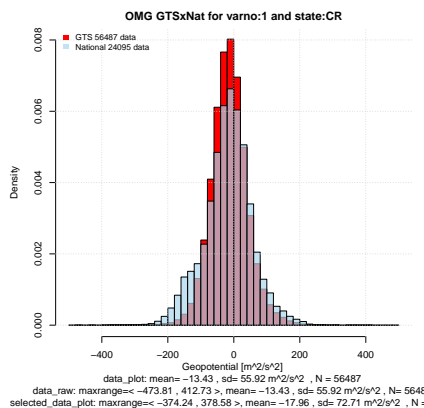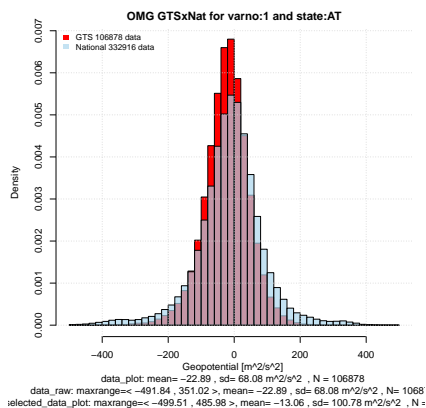
- **U wind histograms per state**

- **National data better fit with model than GTS**

- **GTS (red) and National (tran-parent blue)**
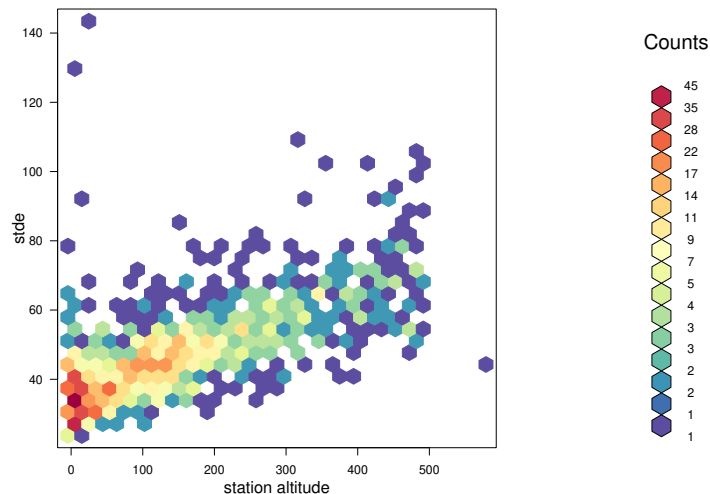
National synoptic observations (5)

- **Geopotential bias dependence on station height**

- **SK stations over 500m all rejected**
  - **- SK11936, SK11957, SK11868, SK11878, SK11910, SK11950, SK11901, 11958, 11812, 11918**
    - **- it might be already fixed**

- **AT national mslp up to 1000m, then station pressure – large stde**

- **HU, RO, SI, stations over 500m measuring pressure but not coded geopotential,Why?**
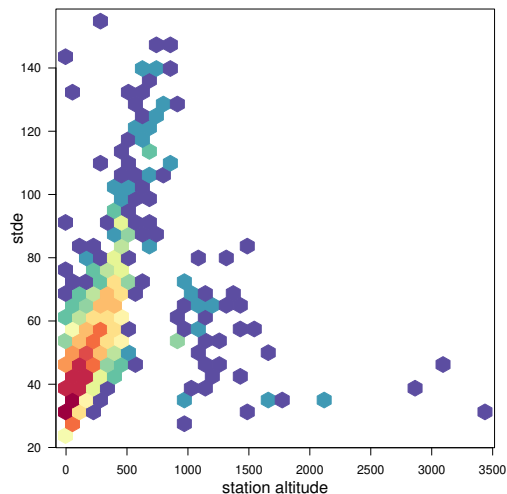
National synoptic observations (6)

- **T2m bias dependence on station height at 18, 00, 06, 12 UTC**

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National synoptic observations (7)

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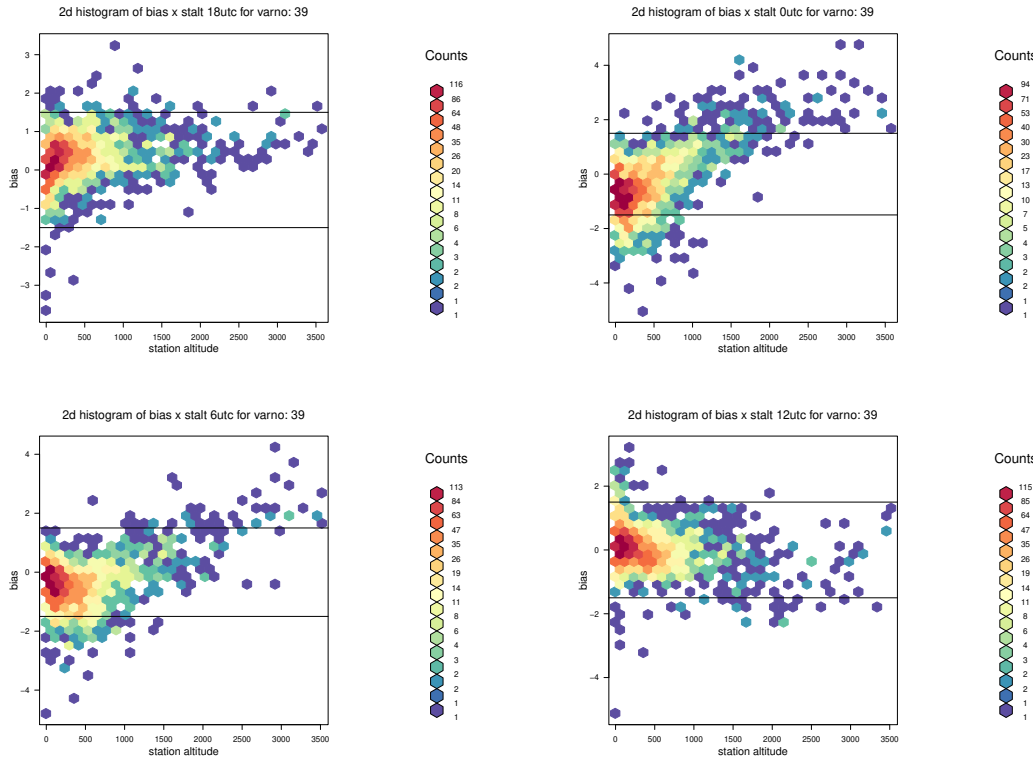
- **Stations maps**

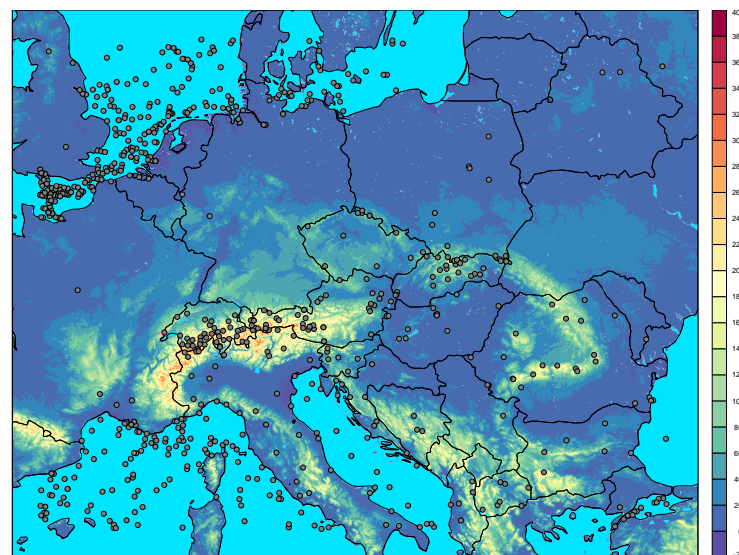### allstations

All stations
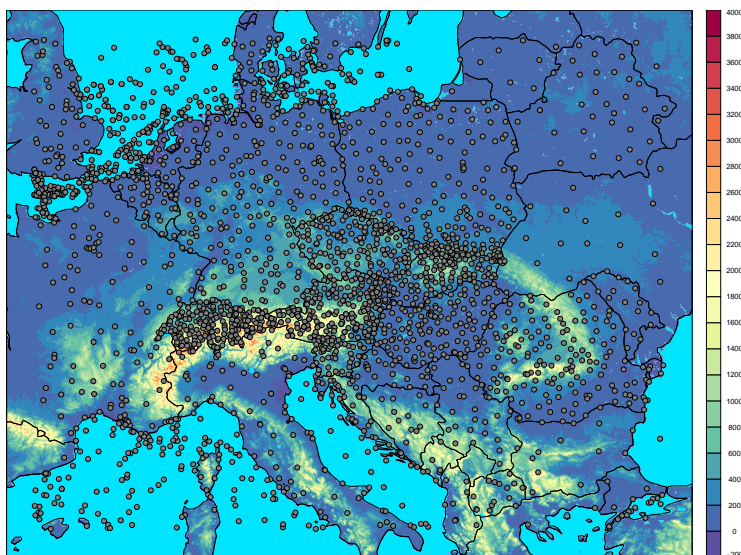
blacklisted stations (at least for one variable)

Stations with too big bias or stde for all var

National synoptic observations (8)

- **Histogram of t2m before (red) and after (tranparent blue) blacklisting**

Future Plans
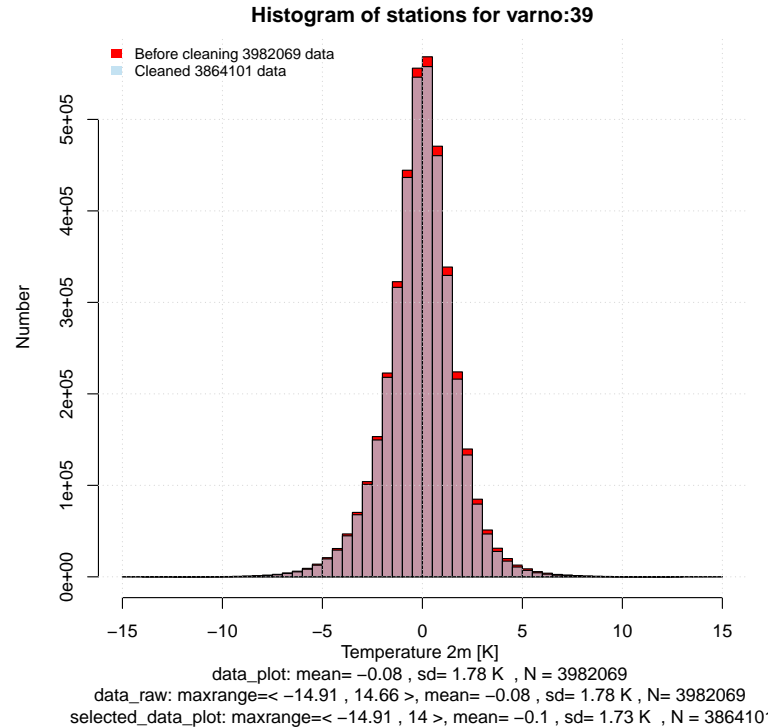
- **Increase BlendVar cycling frequency from 6h to 3h**

- **Improve representation of B matrix**

- **Extend use of existing observations:**
    - **national synoptic observations**
    - **wind observations (HRWIND, wind profilers,scatterometers)**
    - **radar data**
    - **radiances from polar satellites**

- **Investigate hourly RUP (non-cycled) NWP based nowcasting system up to +12h**

End

Thank you for your attention !

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References

Operational Setup at CHMI

- **ALARO NH-v1B cy43t2pt_op1:**

    - **domain:** $\triangle$x **2.3km, 1069x853GP**

    - **87 vertical levels, mean orography**

    - **time step 90s**

    - **3h space consistency coupling ARPEGE synchronous**

    - **forecasts up to +72/+54h at 00, 06, 12 and 18 UTC**

    - **weak IDFI of short cut-off production analysis**
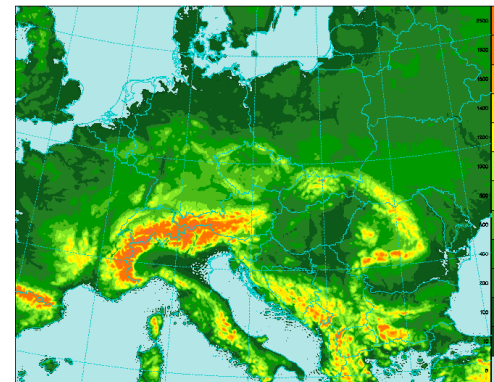
- **Upper air analysis – BlendVar scheme**

    - **BlendVar = DF Blending (filter. at trunc. E102x81) followed by 3D-Var**

    - **6h assim cycle, no IDFI in the next +6h assim guess**

    - **REDNMC=0.5, spin-up ensemble B matrix based on AEARP**

    - **$\pm$1.5h assim window, VARBC 24h cycling**

    - **Assimilated observations - SYNOP (Ps), TEMP (t, q, u, v), AMDAR (t, u, v), AMV, SEVIRI (channels: 2, 3), Mode-S MRAR CZ (t, u, v), Mode-S EHS from KNMI (t, u, v)**

    - **SIGMAO_COEF=.67, SIGMAO_COEF(AMDAR)=2.8, SIGMAO_COEF(RADIANCE)=1.15**

- **Surface analysis – OI based on SYNOP (T2m, RH2m)**

    - **SST from ARPEGE**