Regional Cooperation for
Limited Area Modeling in Central Europe

LACE
nwp central europe

Status - Slovenia 2020

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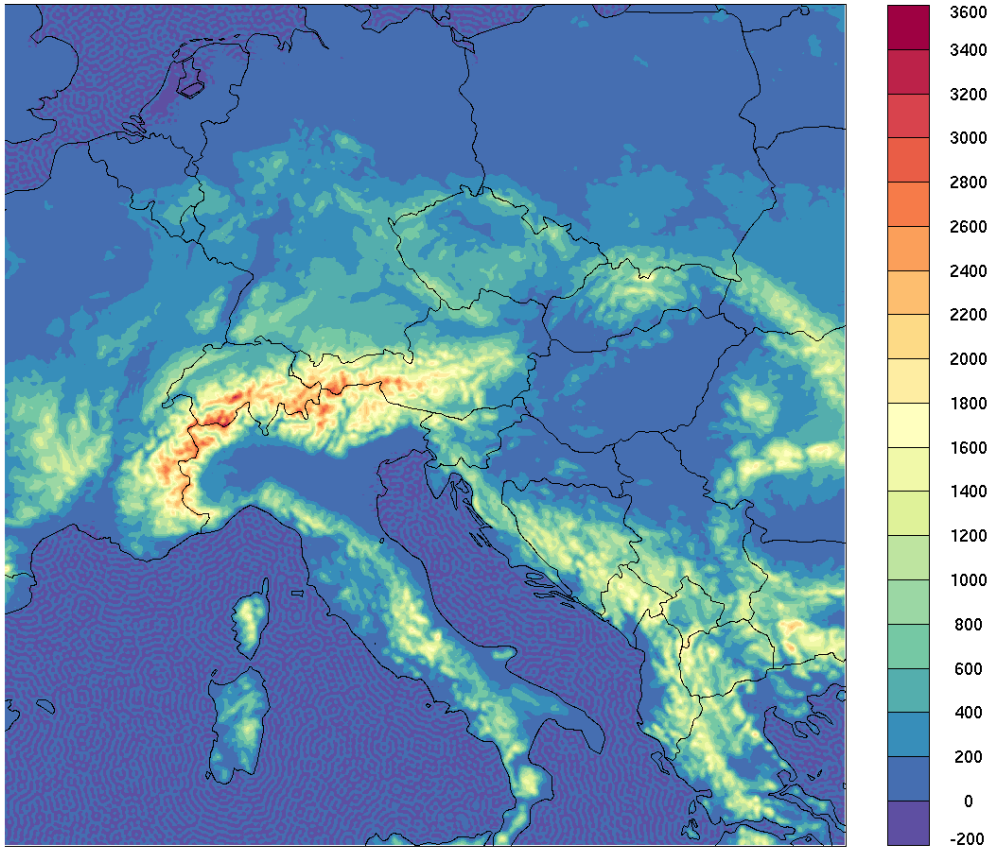
Outline

- Operational and experimental setups
- EDA experiment
- Radar assimilation: dealiasing of winds, HOOF
- Assimilation of OSCAT observations
- Validation of EMADDC Mode-S data (test stream)
- Conclusions

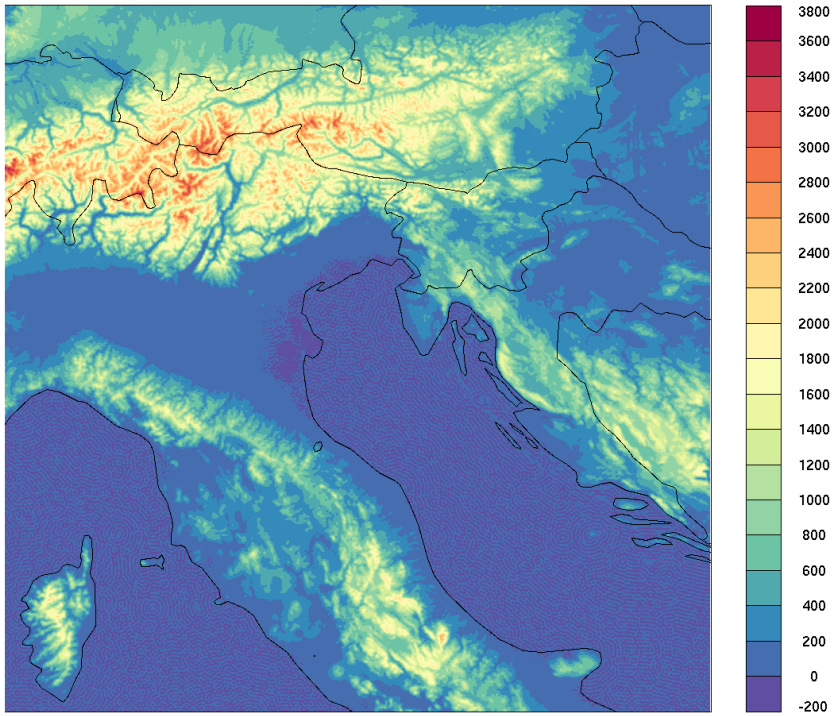
Mitarbeiter, Predstavitelj

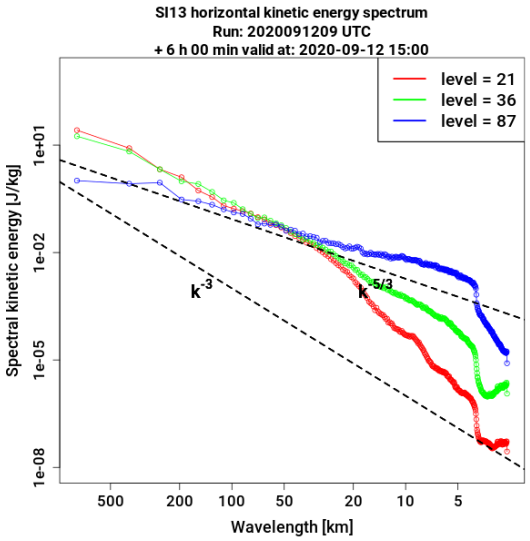
- Model: ALARO-v1B cy43t2_bf10
- 4.4 km, 87L, 432x432
- Timestep: 180 s
- Coupling: ECMWF (6h lag), 1h/3h
- Space-consistent LBC, no init.
- 72h/36h forecasts every 3h
- Upper-air DA: 3h 3D-Var, static ENS DSC B matrix
- observations: SYNOP, AMV, HR-AMV, TEMP, AMSU&MHS, SEVIRI, IASI, ASCAT, OSCAT, Mode-S MRAR SI/CZ, MUAC EHS

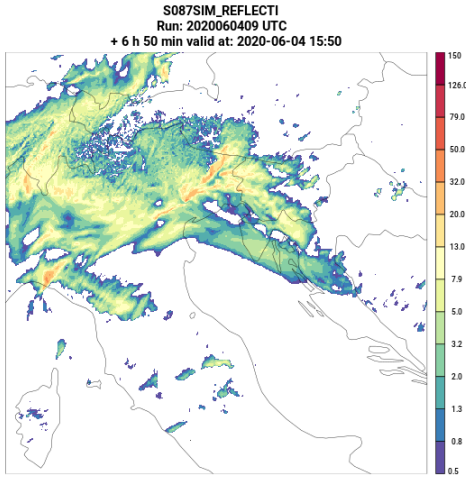


Test nowcasting setup - NWCRUC

- Centered in N Adriatic Sea.
- Model: ALARO-v1B cy43t2_bf10
- 1.3 km, 87L, 589x589
- Timestep: 60 s
- Coupling: ECMWF (lag 6h to 12h), 1h/3h
- Space-consistent LBC, no init.
- 36h forecasts every 3h (to be increased to 1h)
- Upper-air DA: 1h 3D-Var, static ENS DSC B matrix (160 cases)
- All obs in SIS4 + radar
- Runs regularly for feasibility test
- Output (in-line fullpos) every 5 min, plots available for subjective validations







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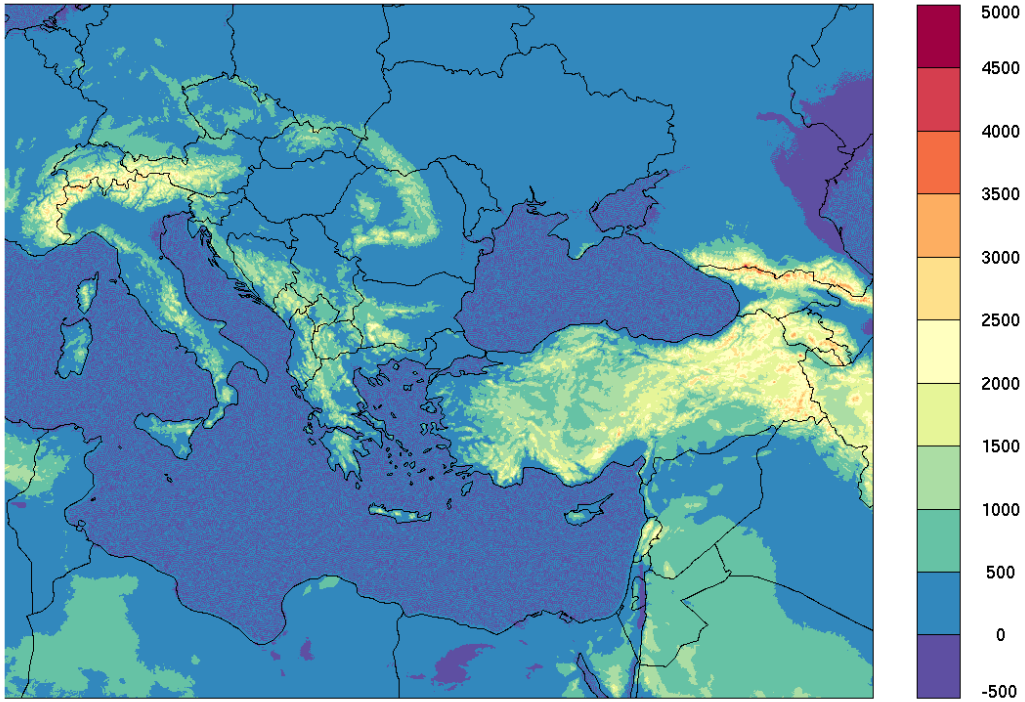
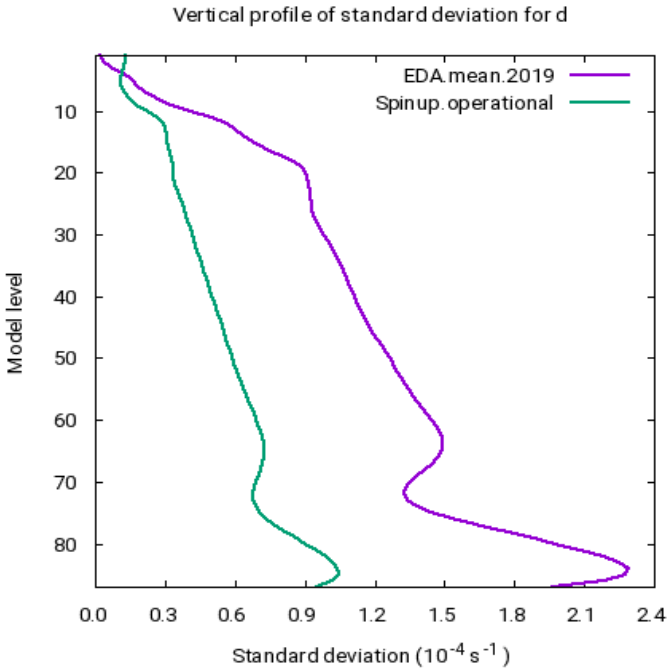
SEEMHEWS (@cca -ECMWF)

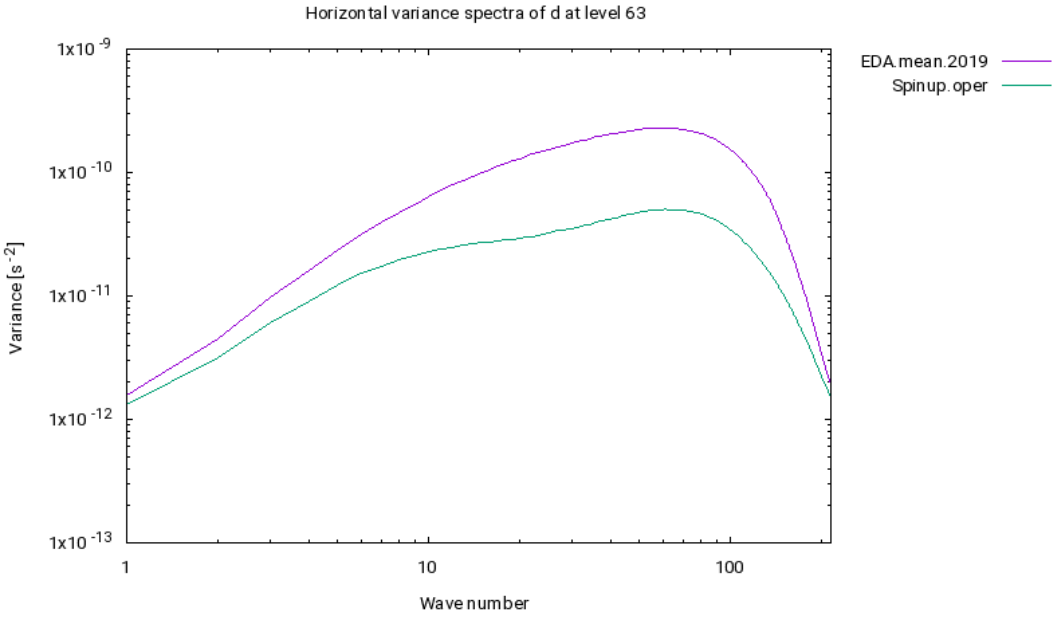
- Project financed by WMO/World Bank to increase flood awareness in SE Europe
- Model: ALARO-v1B cy43t2_bf10
- 2.5 km, 87L, 1429x1141
- Timestep: 90 s
- Coupling: ECMWF (no lag), 1h/3h
- Space-consistent LBC, no init.
- 72h forecasts once per day
- Upper-air DA: 3h 3D-Var, static ENS DSC B matrix (600 cases)
- All obs. as in operational SIS4, observations from OPLACE
- Assimilation cycle since June 2020, production runs under preparation



EDA experiment

- One month local 3h EDA in SIS4 setup and 20 members, period 20 June - 20 July 2019.
- Same (fixed) ECMWF boundary conditions.
- B-matrix diagnosed daily (over 160 cases) and additionally a mean EDA matrix from a random subsample of the period (600 cases)





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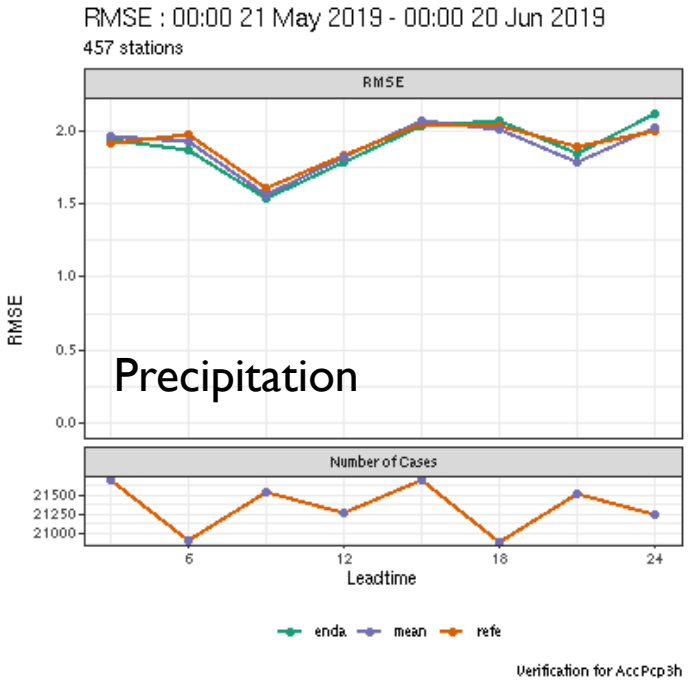
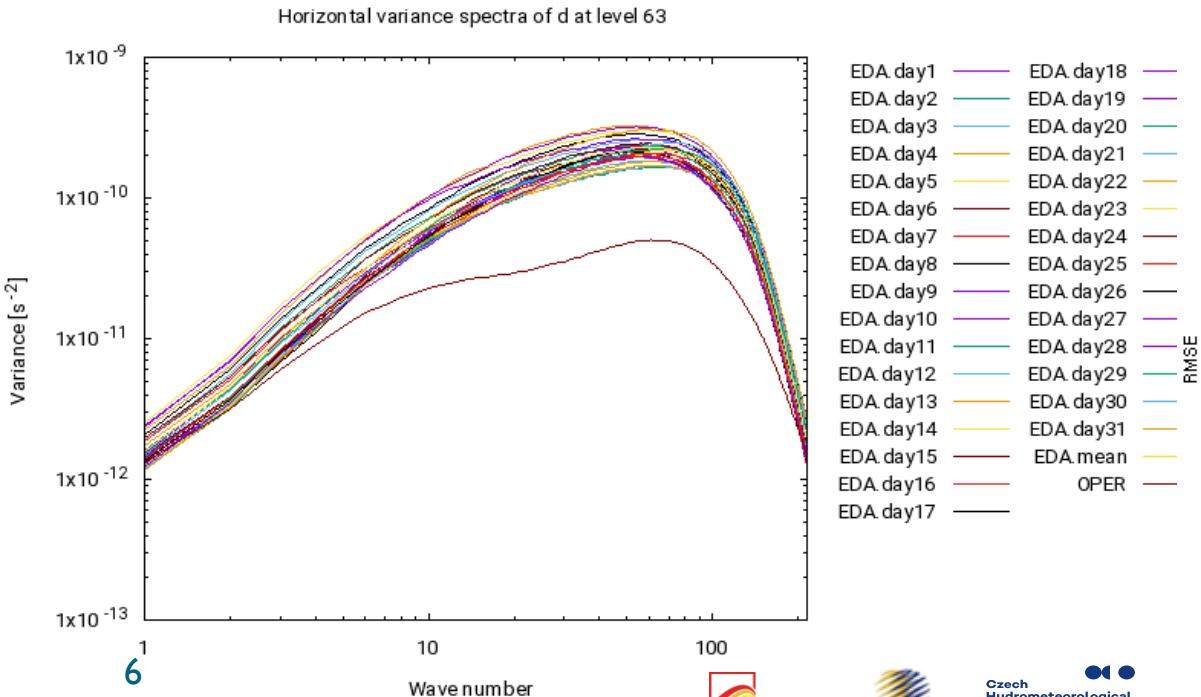
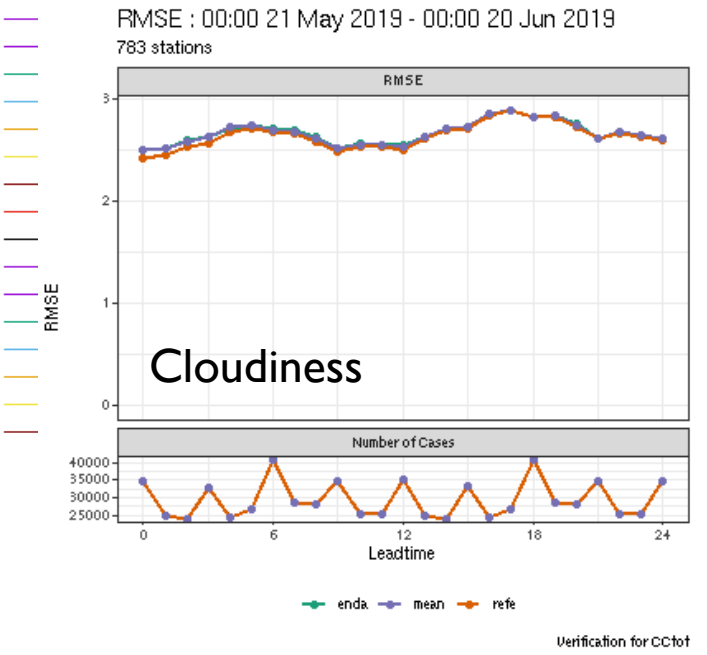
EDA evaluation

- Deterministic assimilation experiments over 1 month
  - Operational B-matrix
  - Mean EDA B-matrix
  - Daily EDA B-matrix
- Evaluation of forecast:
  - Improved bias of surface winds
  - Significant degradation of cloudiness, upper-level humidity
  - Slightly positive impact on 3h precipitation

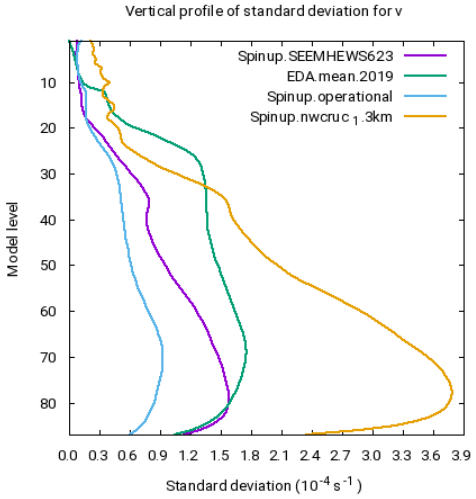




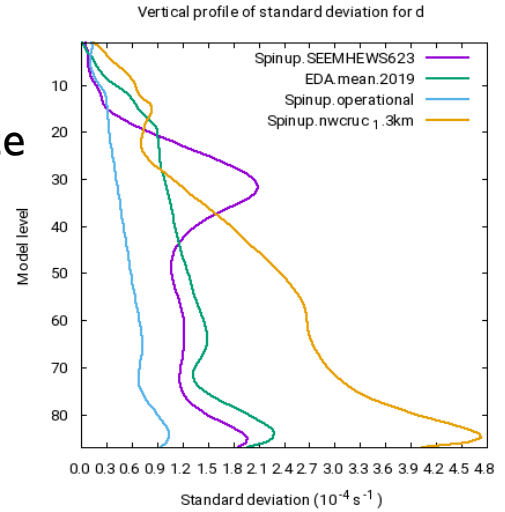


Background errors across suites

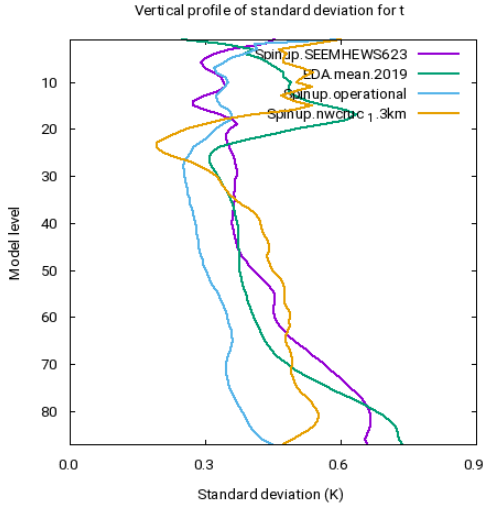
Vorticity



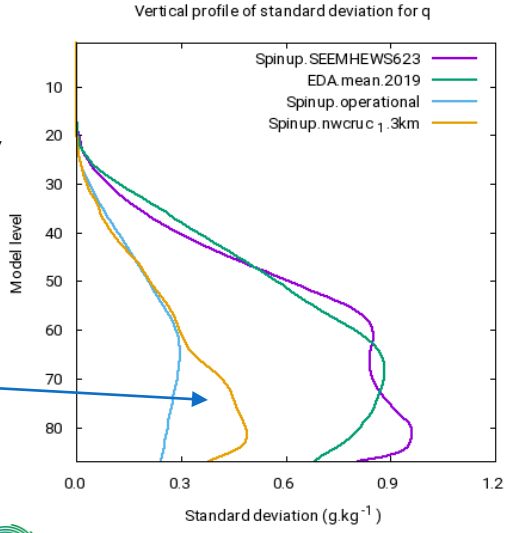
Divergence



Temperature



Humidity



Sigma B for humidity less than expected

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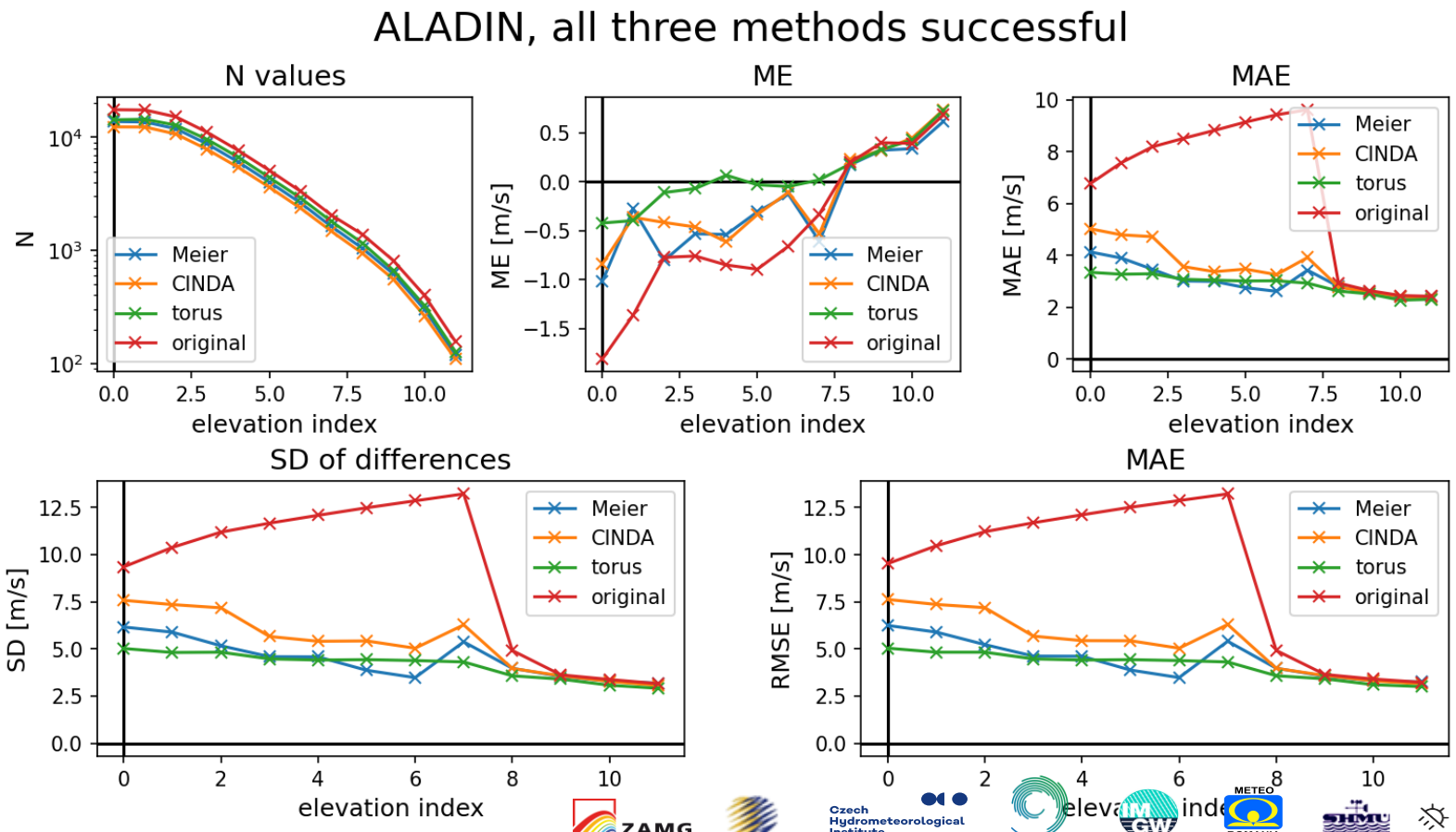
Radar dealiasing:

- Dealiasing proved partly successful (on Slovenian radars)
- 3 methods, torus mapping slightly better than others
- There are cases where methods fail: need to increase robustness



HOOF progress

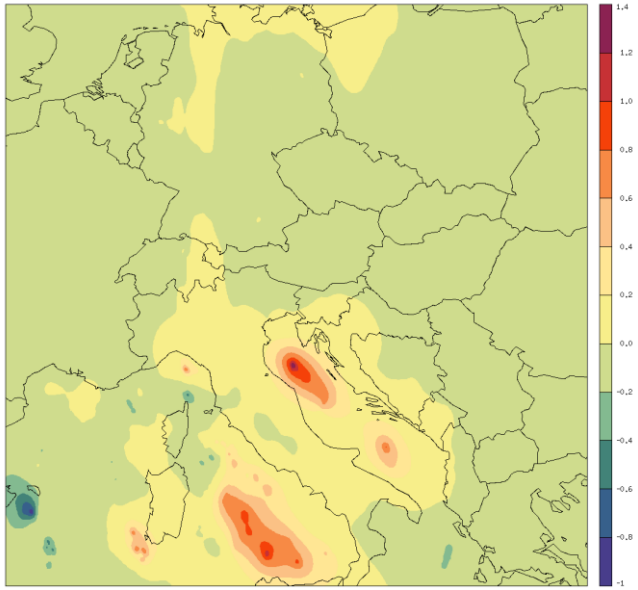
- Small adjustments (thanks for feedback!)
  - Fixed bug with wrong radar quantity names when no splitting
  - TH omitted in case of no DBZH
  - warnings in log files, suppress warning functionality
- Improved measurement splitting under consideration
- Plan: include one of the wind dealiasing methods
- Plan: include superobbing functionality (methodology to be provided by HIRLAM)

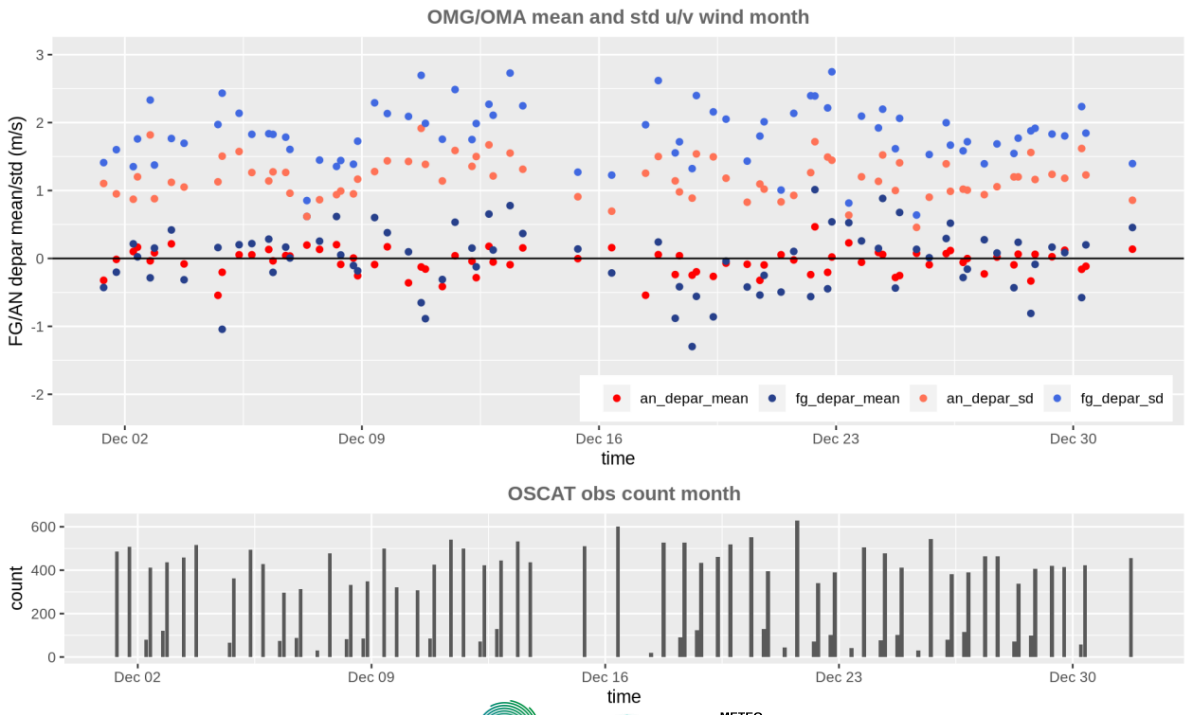
Upgrade of Slovenian GNSS-ZTD observations

- Data from GIS (geodetic institute), processed by Bernese GNSS software instead of currently used Pivot
- Coordination with E-GVAP to include Slovenian data
- Separate talk tomorrow

Assimilation of OSCAT

- OSCAT – scatterometer on ScatSat-1 (India)
- 25 km resolution
- at 9 and 21 UTC, close to Metop-B
- From OPLACE, in BUFR, treated as „kuscat“ in BATOR
- addjust param.cfg
- No code changes needed (cy43t2_bf10)





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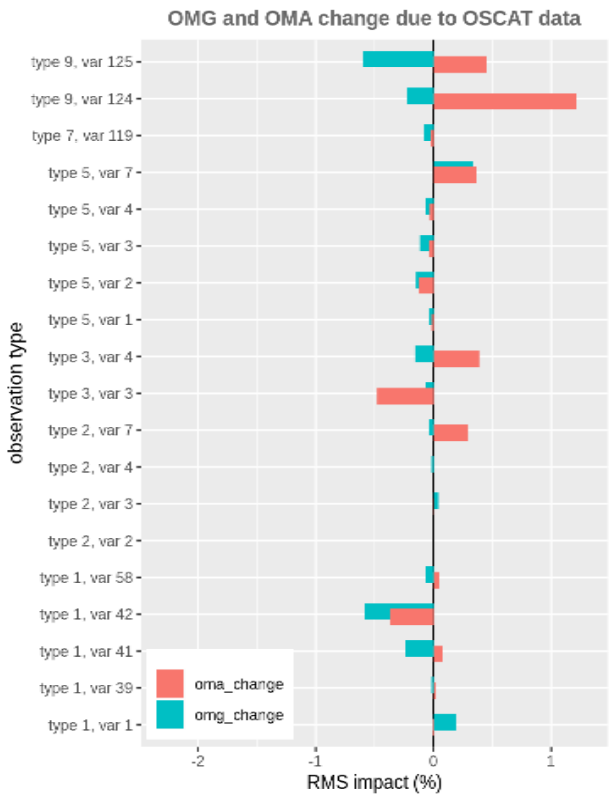
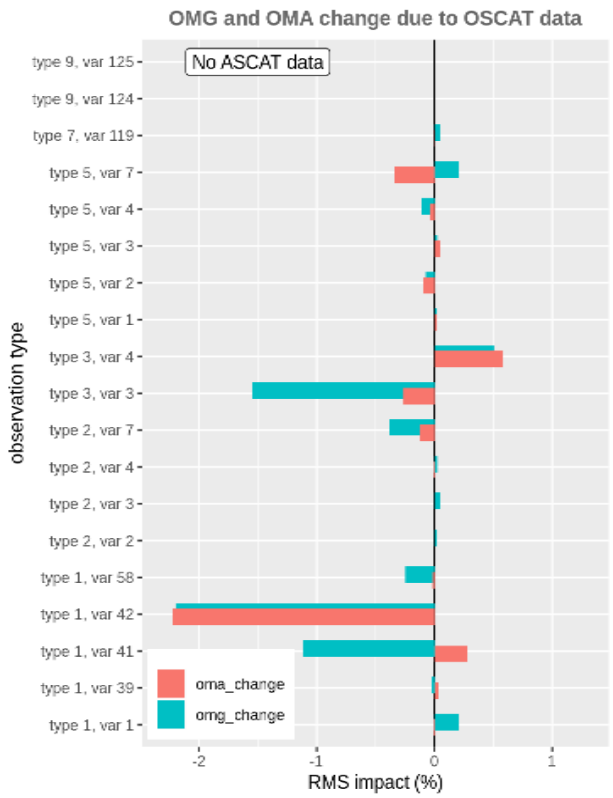
Validation of OSCAT

- Improves OMG fit to SINOP winds, especially if ASCAT not assimilated
- very small (neutral) impact on 24h forecast
  - Slight signal in Tyrrhenian Sea around Sardinia and Corsica
- Report by J. Čampa on RC LACE web

OMG and OMA change due to OSCAT



Ref with ASCAT.



Ref without ASCAT.

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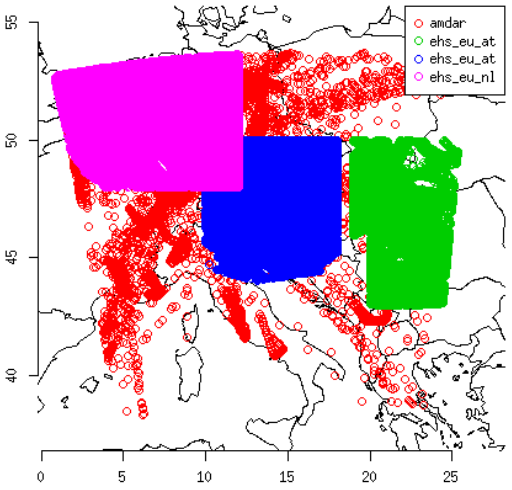
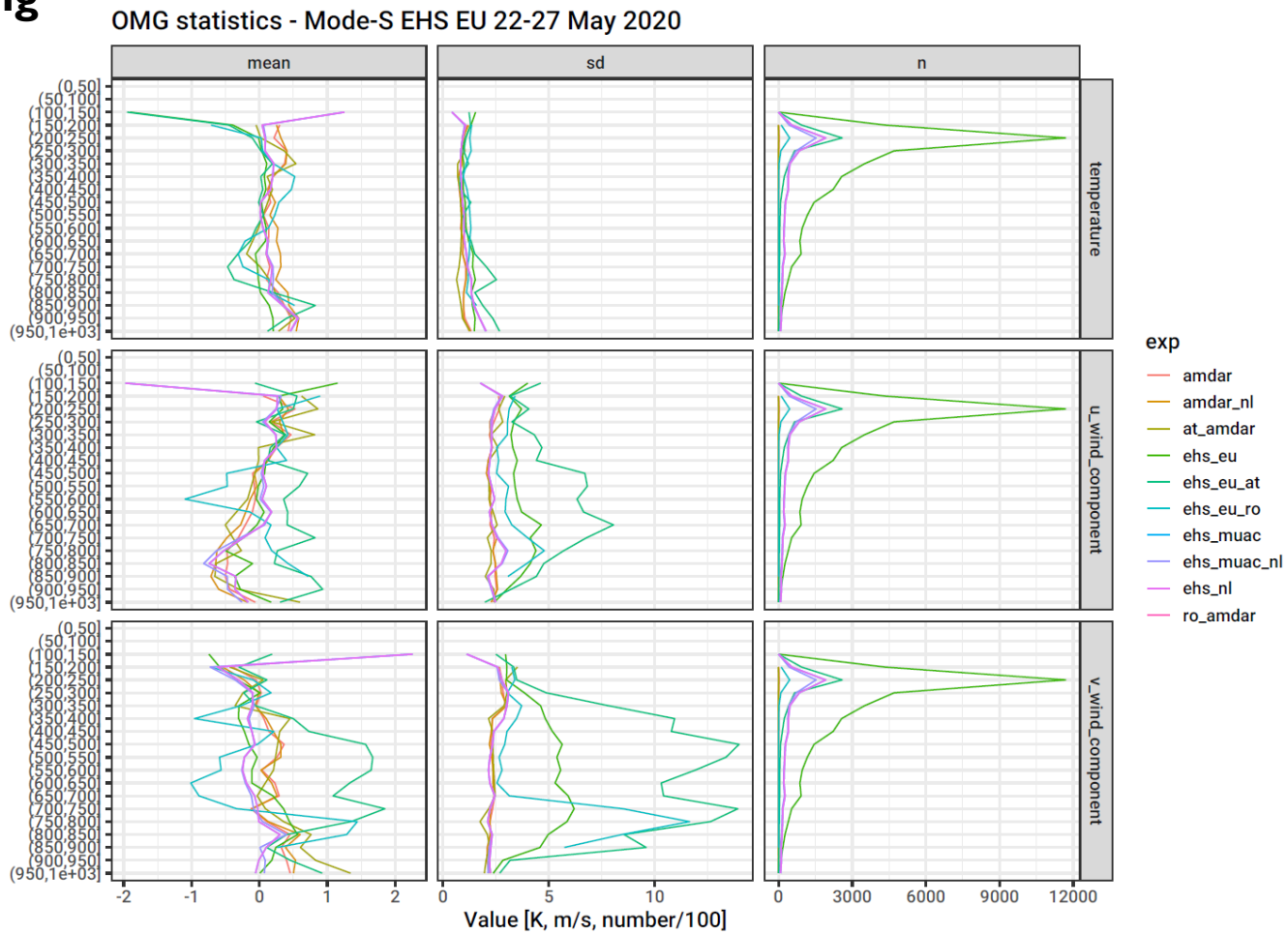
Preliminary validation of EMADDC Mode-S observations

- New EMADDC data set validated (OMG vs. operational first guess), versus MUAC EHS and AMDAR over NL, AUT, RO
- Degradation over AUT and RO for both wind components, remains after the proposed **whitelisting**





Conclusions and plan

- A nowcasting-oriented setup NWCRUC under development and needs:
  - Validation of spin up
  - Verification of forecast (so far subjective)
  - Validation of radar assimilation
- Radar DA: HOOF and radial winds
- EDA was implemented, but results so far not very convincing, tuning will be tried as the next step
- Improvements in observations expected (GNSS, Mode-S)
- SEEMHEWS project to be completed by the end of year