Regional Cooperation for
Limited Area Modeling in Central Europe

LACE
nwp central europe

Status - Slovenia 2020

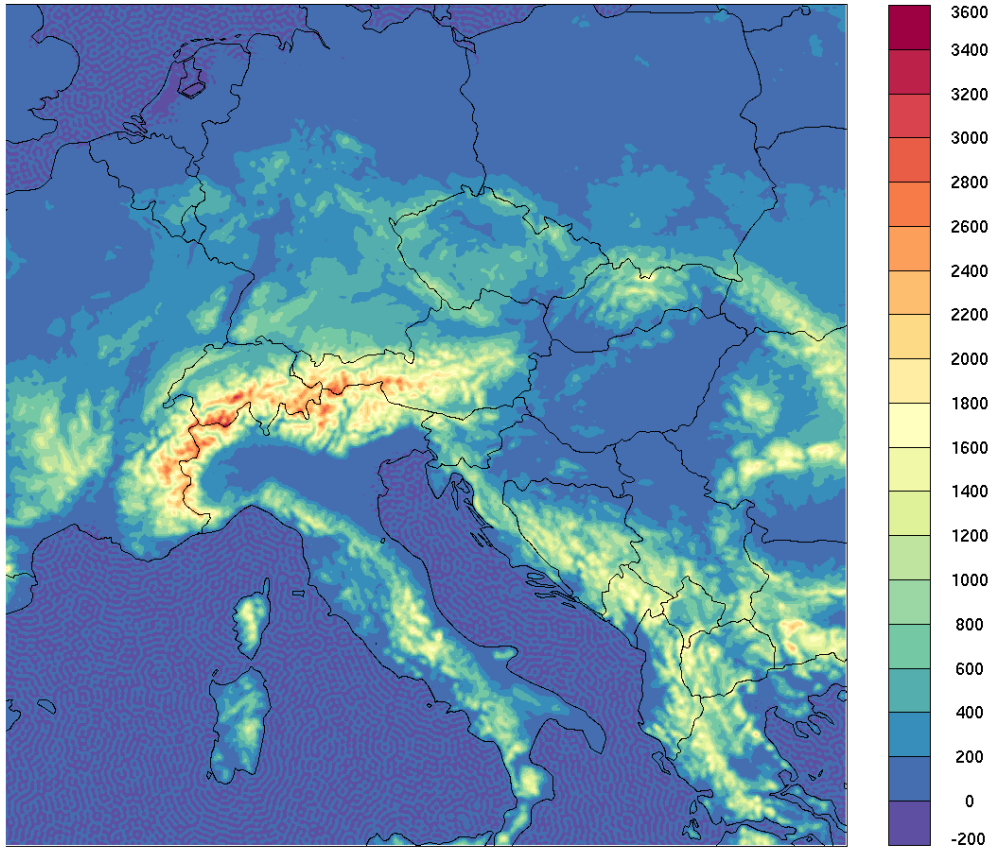
Benedikt Strajnar, Vito Švagelj, Peter Smerkol, Jana Čampa

ZAMG DHMZ Czech Hydrometeorological Institute OMSZ IMGW METEO ROMANIA SHMU ARSO METEO Slovenia

Outline

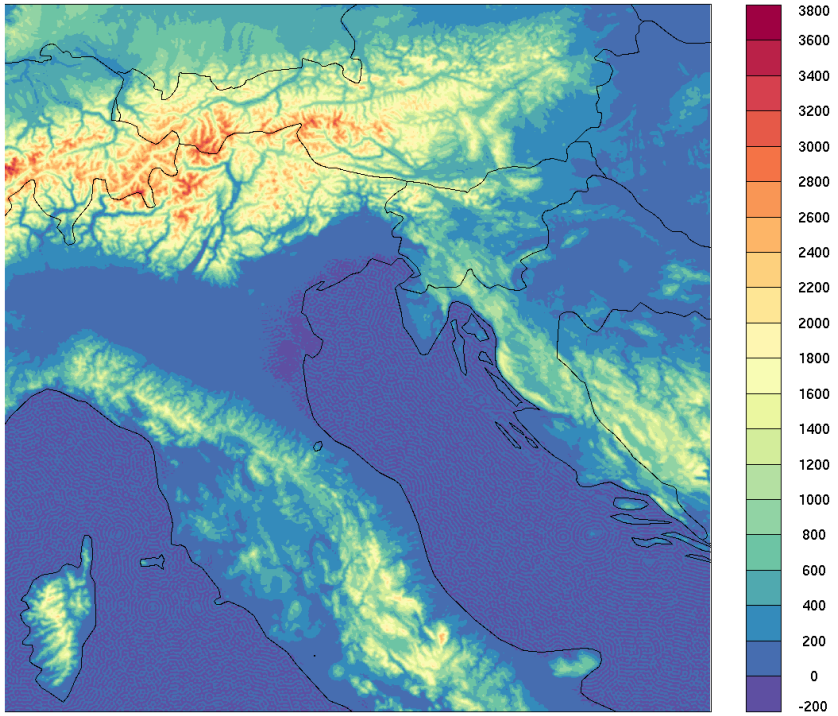
- Operational and experimental setups
- EDA experiment
- Radar assimilation: dealiasing of winds, HOOF
- Assimilation of OSCAT observations
- Validation of EMADDC Mode-S data (test stream)
- Conclusions

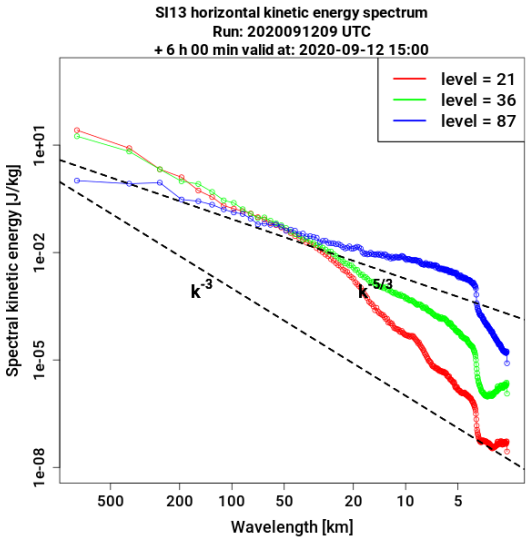
- Model: ALARO-v1B cy43t2_bf10
- 4.4 km, 87L, 432x432
- Timestep: 180 s
- Coupling: ECMWF (6h lag), 1h/3h
- Space-consistent LBC, no init.
- 72h/36h forecasts every 3h
- Upper-air DA: 3h 3D-Var, static ENS DSC B matrix
- observations: SYNOP, AMV, HR-AMV, TEMP, AMSU&MHS, SEVIRI, IASI, ASCAT, OSCAT, Mode-S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

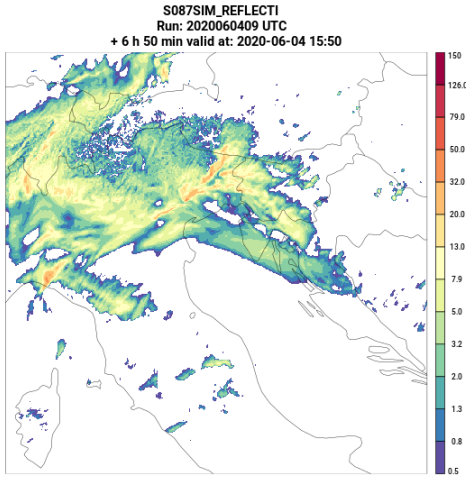


Test nowcasting setup - NWCRUC

- 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



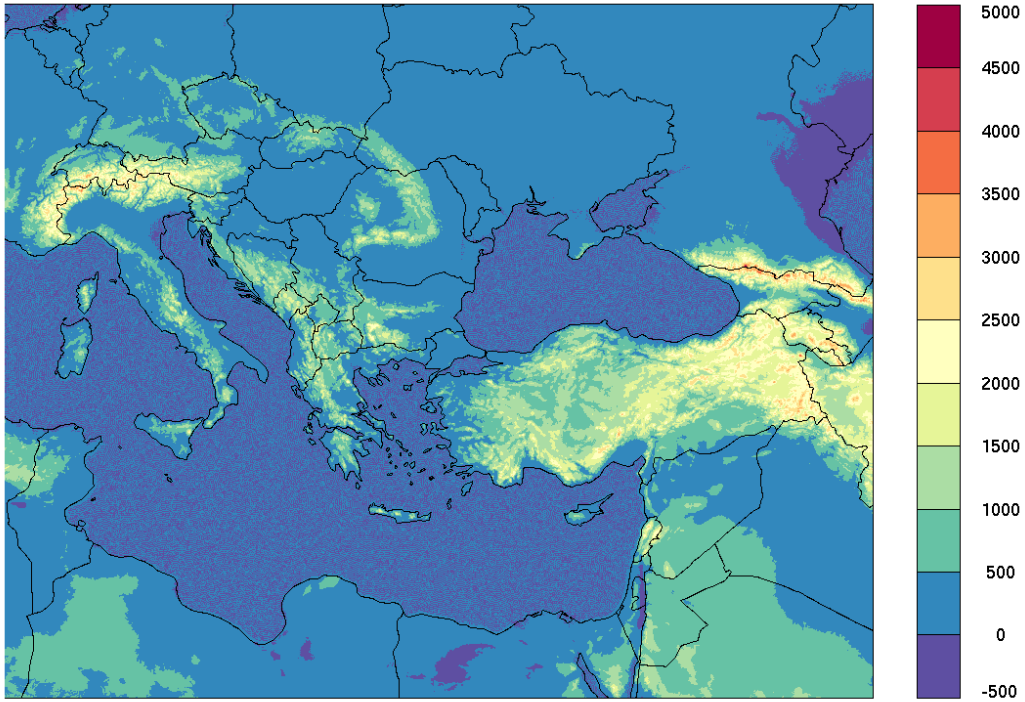




ZAMG DHMZ Czech Hydrometeorological Institute OMSZ ROMANIA SHMU ARSO METEO Slovenia

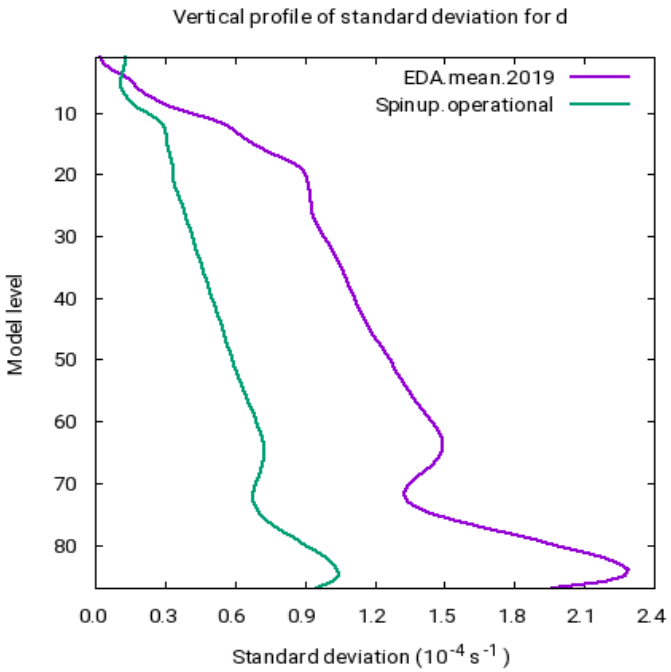
SEEMHEWS (@cca -ECMWF)

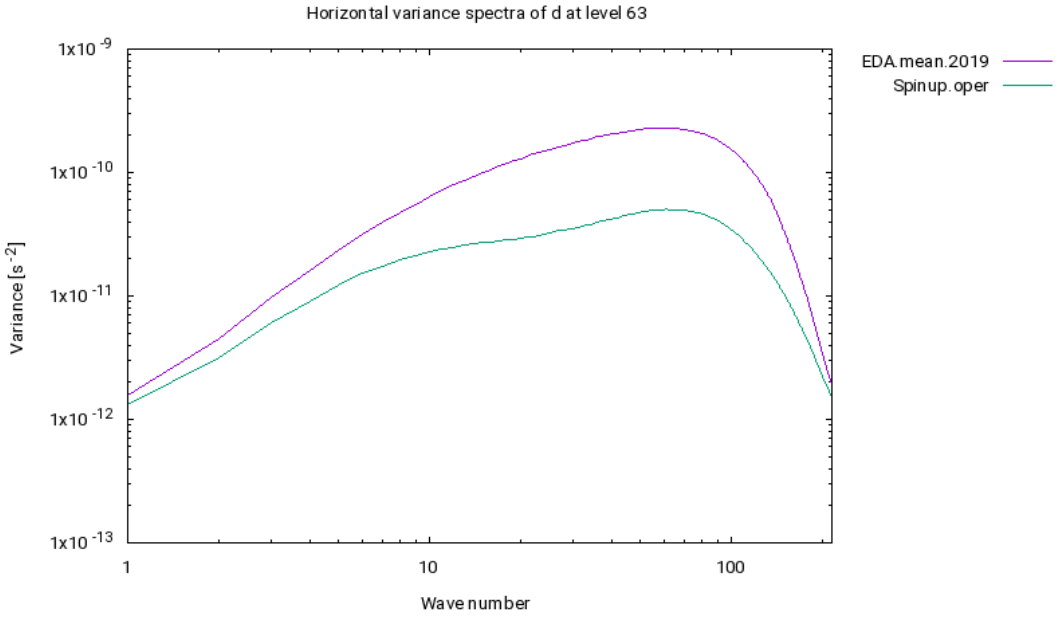
- Project financed by WMO/World Bank to increase flood awareness in SE Europe
- Model: ALARO-v1B cy43t2_bf10
- 2.5 km, 87L, 1429x1141
- Timestep: 90 s
- Coupling: ECMWF (no lag), 1h/3h
- Space-consistent LBC, no init.
- 72h forecasts once per day
- Upper-air DA: 3h 3D-Var, static ENS DSC B matrix (600 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)

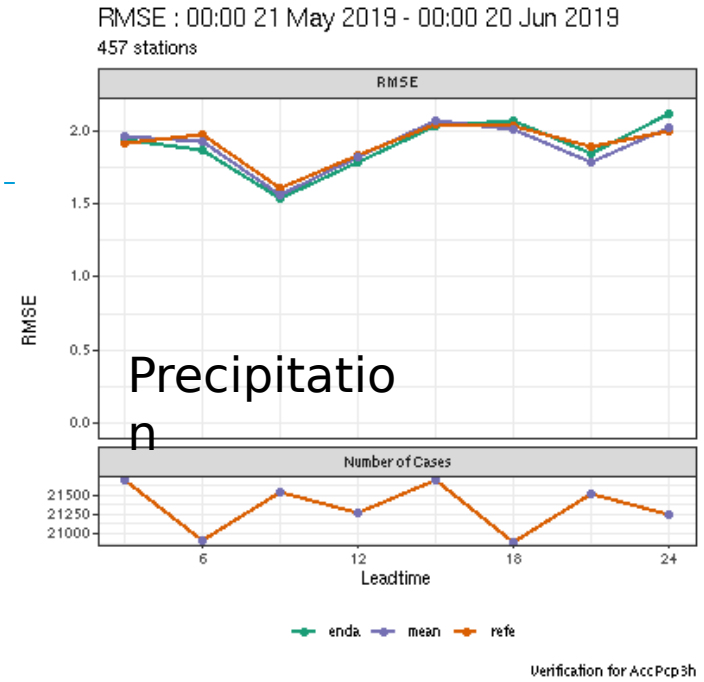


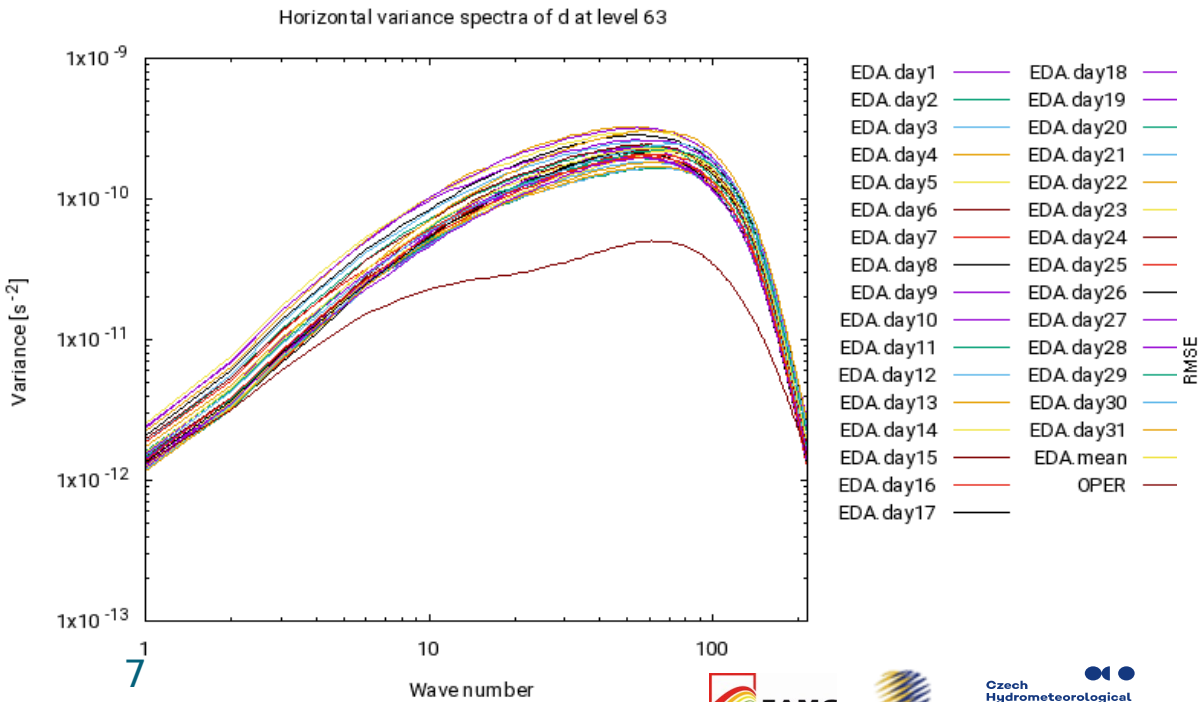


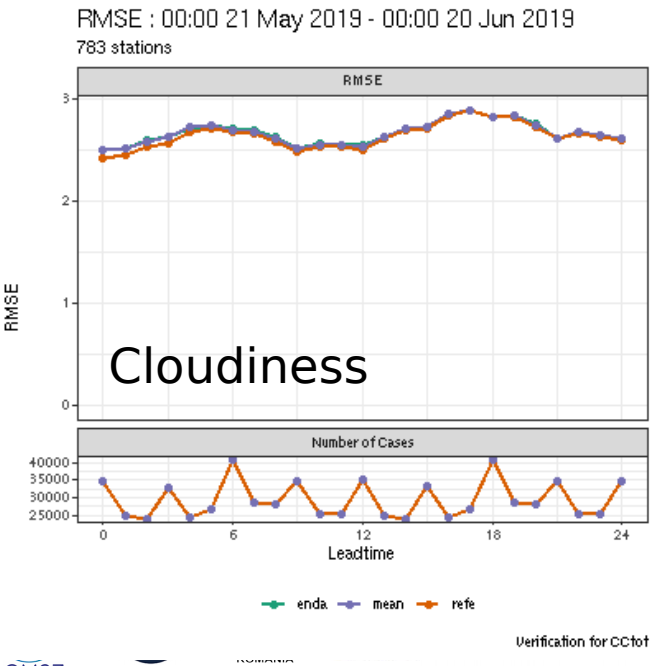
ZAMG DHMZ Czech Hydrometeorological Institute OMSZ IMGW METEO ROMANIA SHMU ARSO METEO Slovenia

EDA evaluation

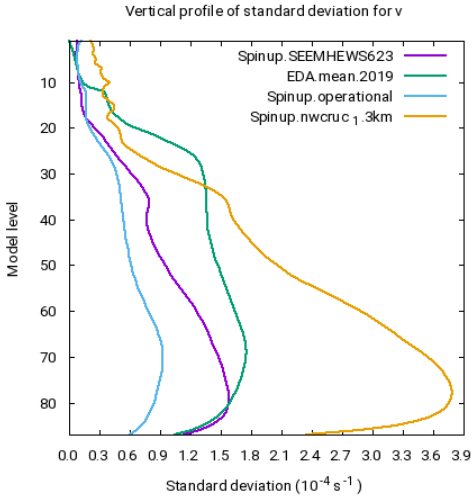
- Deterministic assimilation experiments over 1 month
  - Operational B-matrix
  - Mean EDA B-matrix
  - Daily EDA B-matrix
- Evaluation of forecast:
  - Improved bias of surface winds
  - Significant degradation of cloudiness, upper-level humidity
  - Slightly positive impact on 3h precipitation





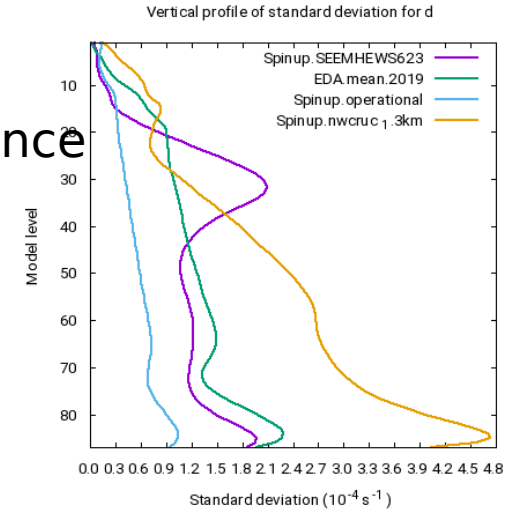


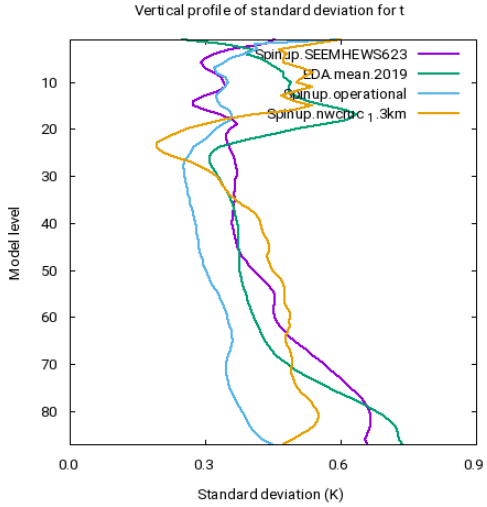
Background errors across suites



Vorticity

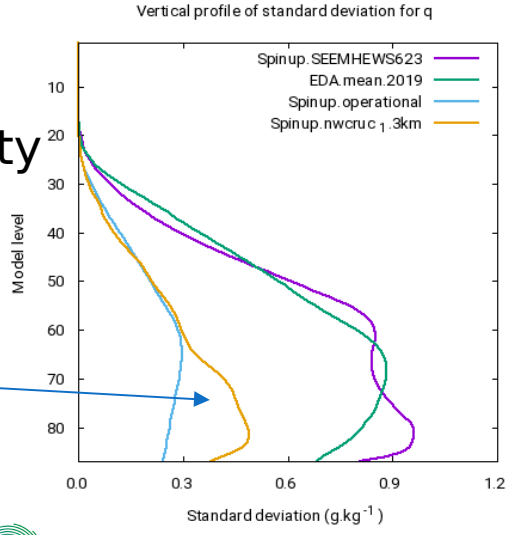
Divergence





Temperatur e

Humidity

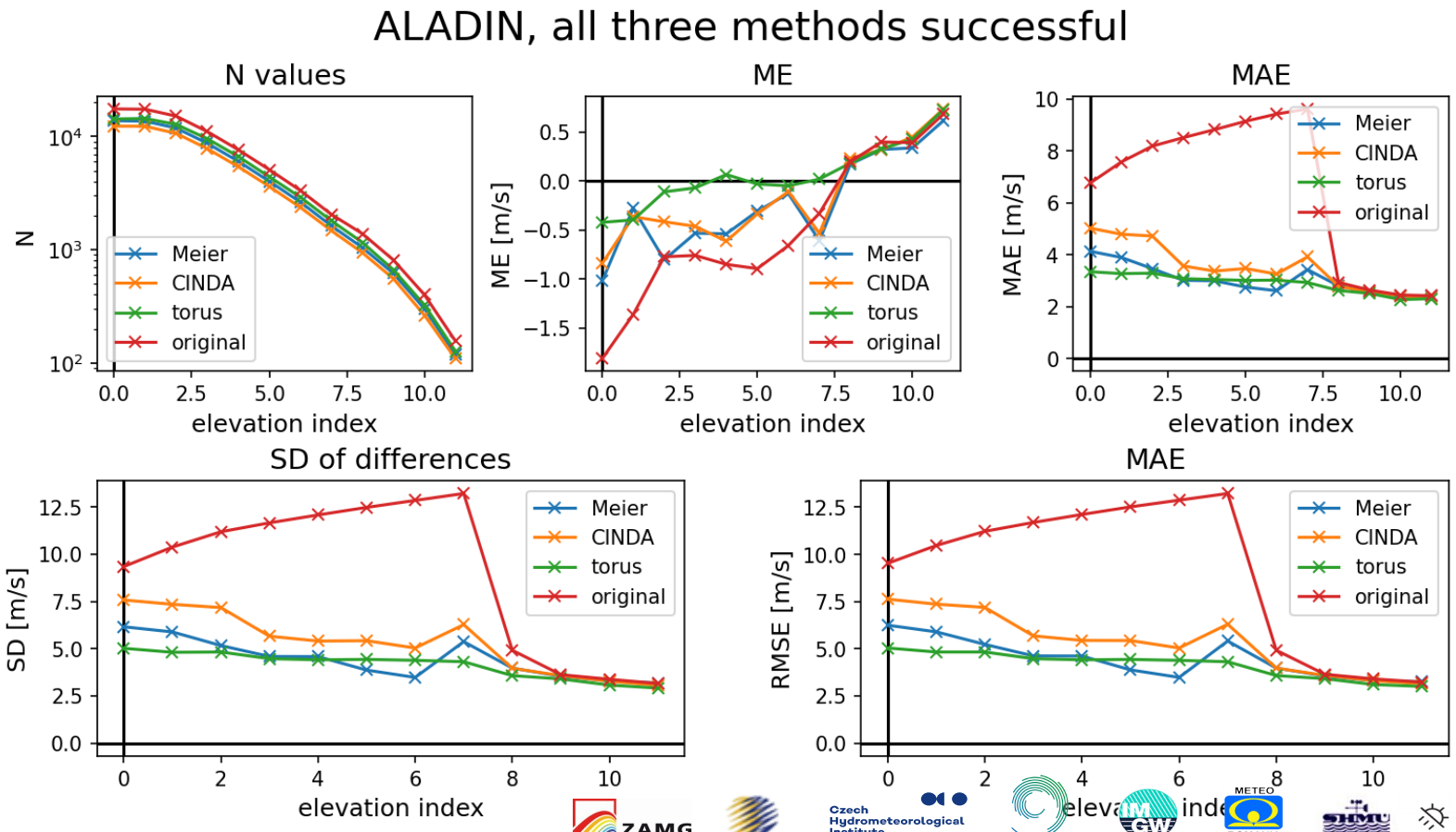


Sigma B for humidity less than expected

ZAMG DHMZ Czech Hydrometeorological Institute OMSZ METEO ROMANIA SHMU ARSO METEO Slovenia

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

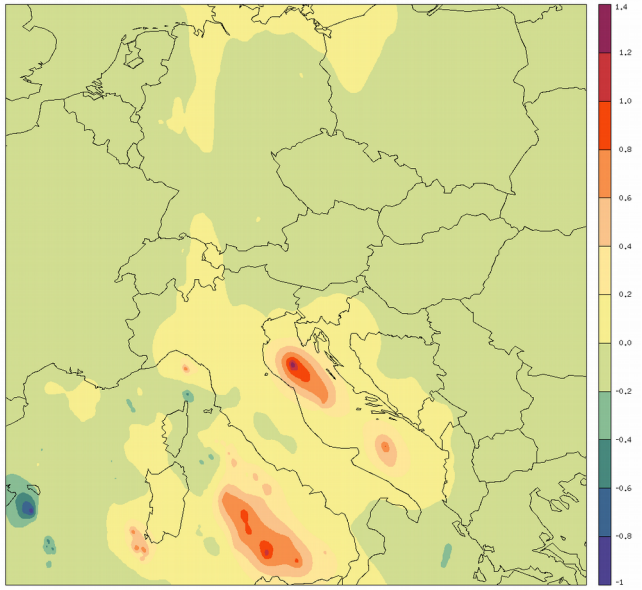
- Small adjustments (thanks for feedback!)
  - Fixed bug with wrong radar quantity names when no splitting
  - TH omitted in case of no DBZH
  - warnings in log files, suppress warning functionality
- Improved measurement splitting under consideration
- Plan: include one of the wind dealiasing methods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

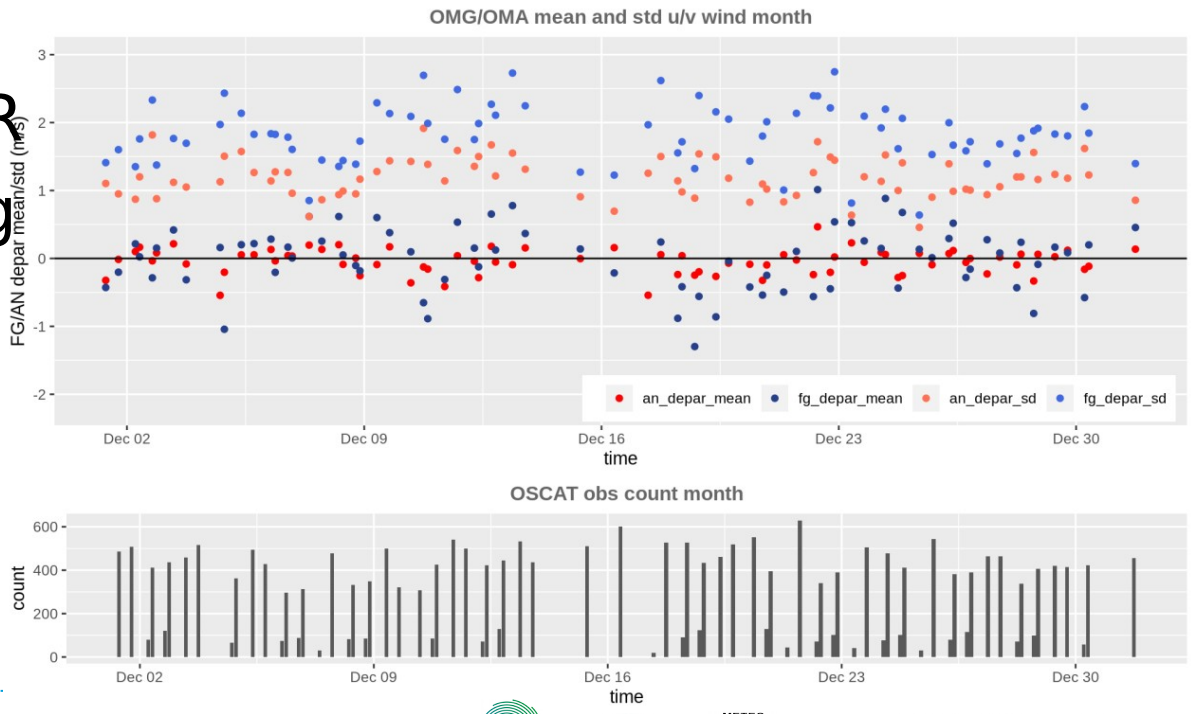
Upgrade of Slovenian GNSS-ZTD observations

- 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)

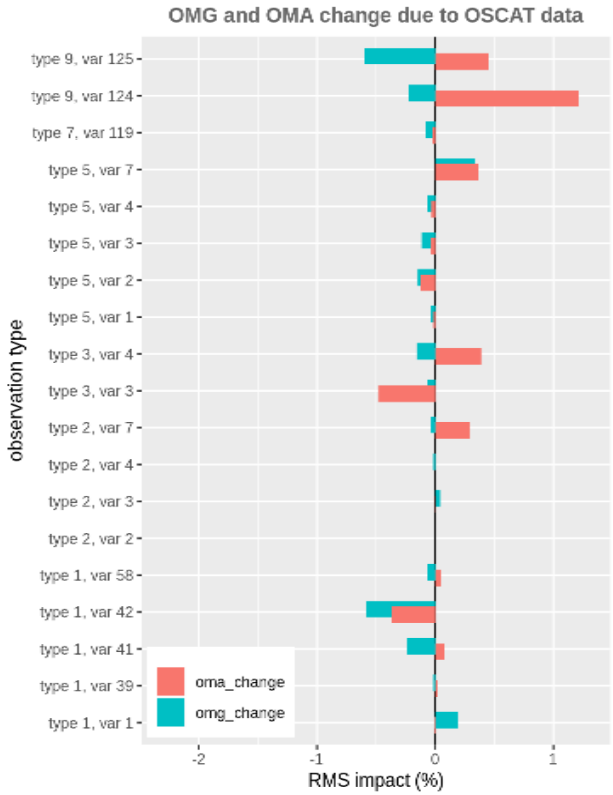




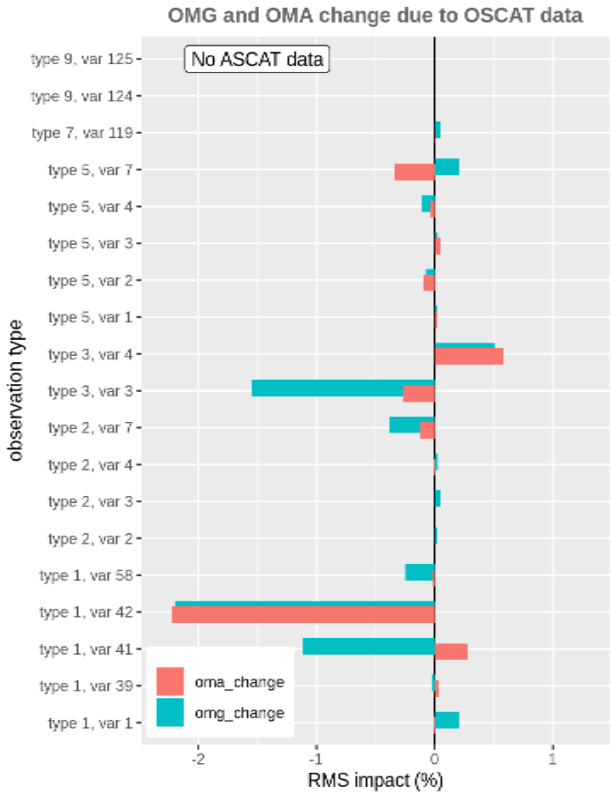
Validation of OSCAT

- 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.

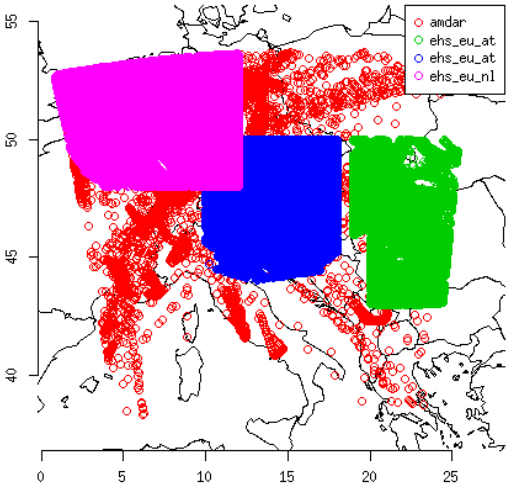


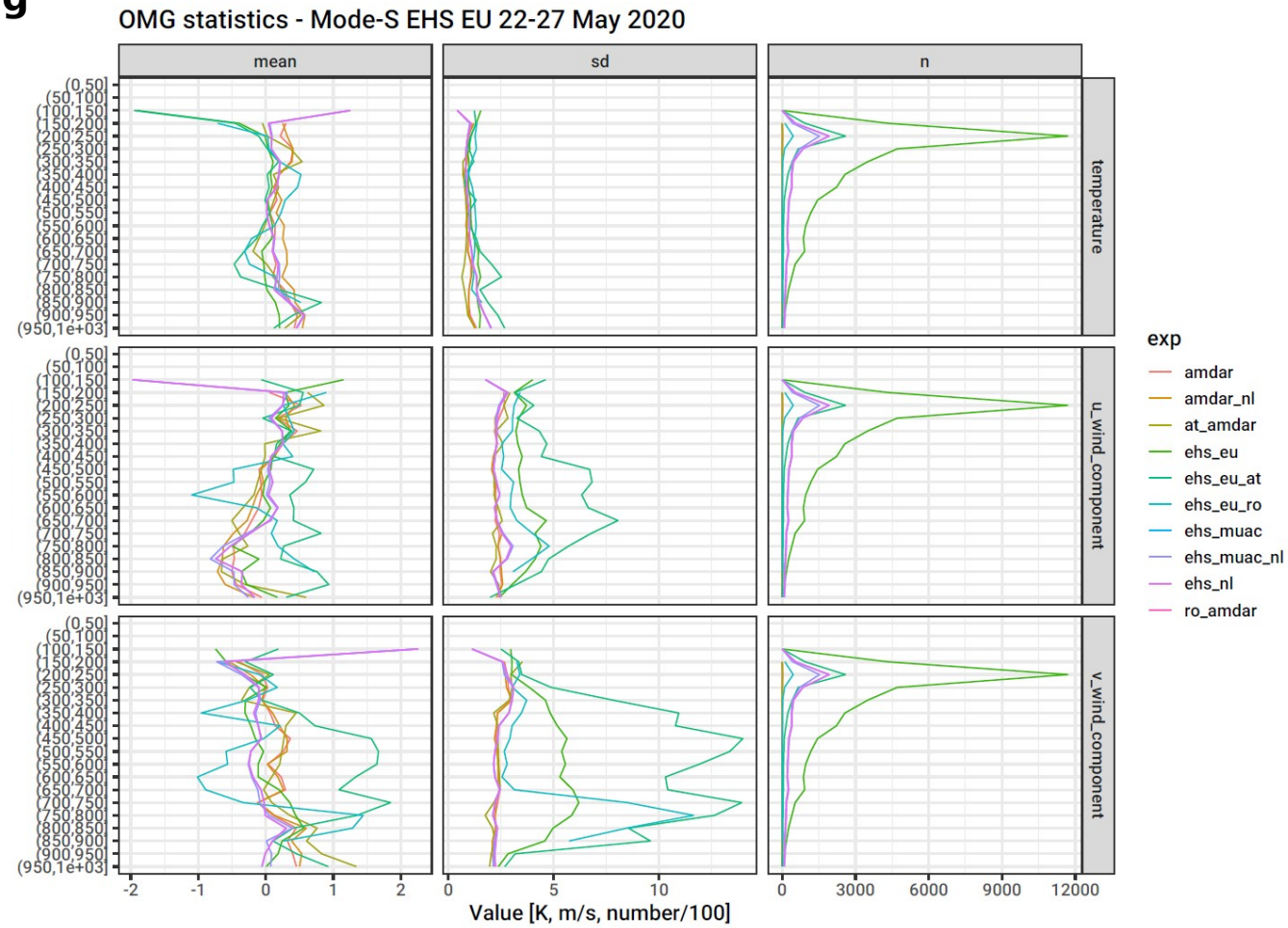
Ref without ASCAT.

ZAMG DHMZ Czech Hydrometeorological Institute OMSZ METEO ROMANIA SHMU ARSO METEO Slovenia

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