NWP activities in Romania

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ACC☰RD — A Consortium for COnvection-scale modelling Research and Development
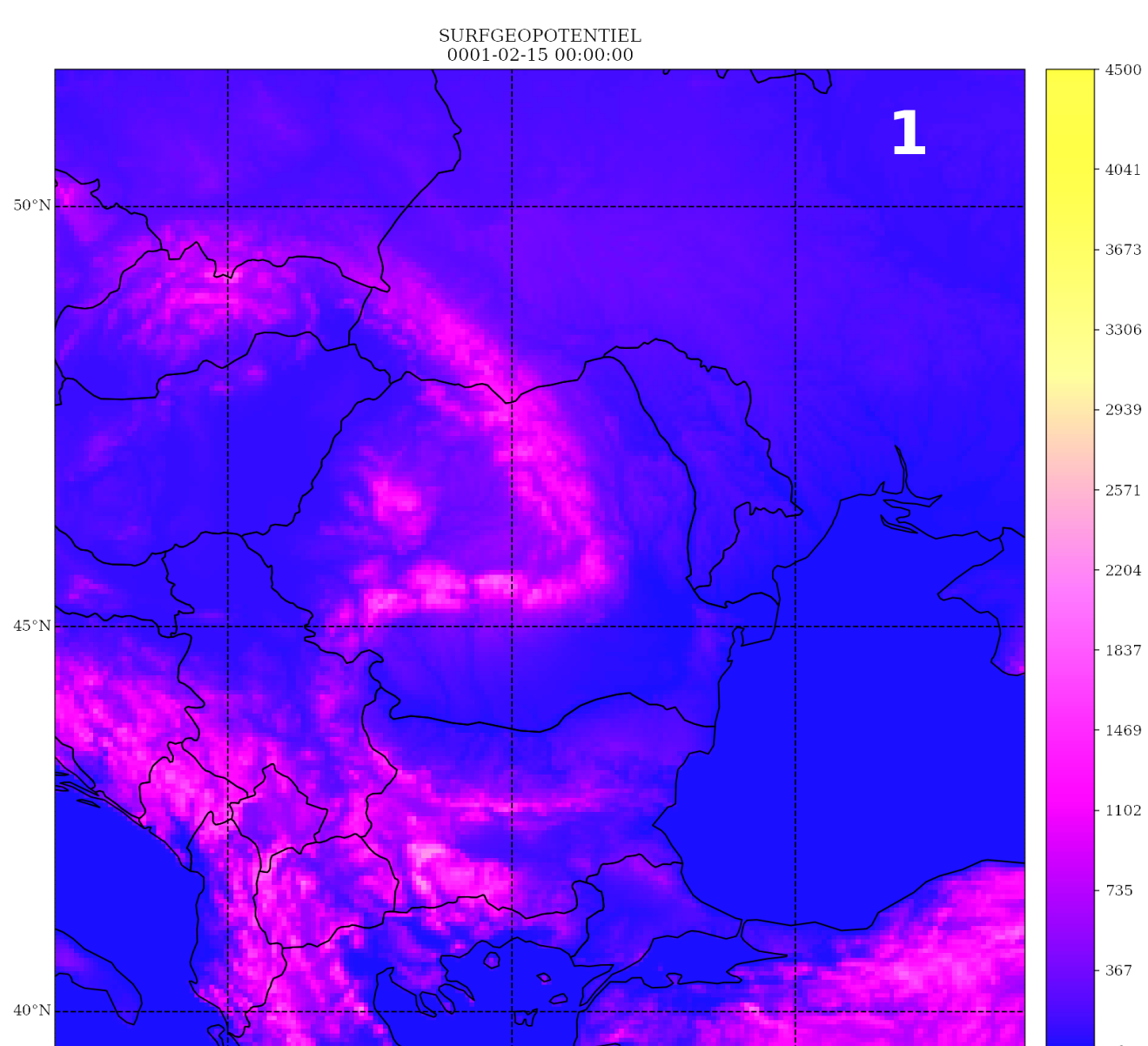
LACE nwp central europe

METEO ROMÂNIA

Operational configurations

- **cy43t2**
- semi-implicit semi-Lagrangian 2TL
- 60 vertical levels, linear grid
- Lambert projection
- LBC from ARPEGE (3h frequency)
- DFI Initialization
- 4 runs/day 00, 06, 12, 18 UTC; no DA
- forecast range: 78/54/78/54 hours

➢ **2 parallel configurations**
1) ALARO-0 baseline, Δx=6.5 km, **L60**, 240 x 240 points, Δt=240 s

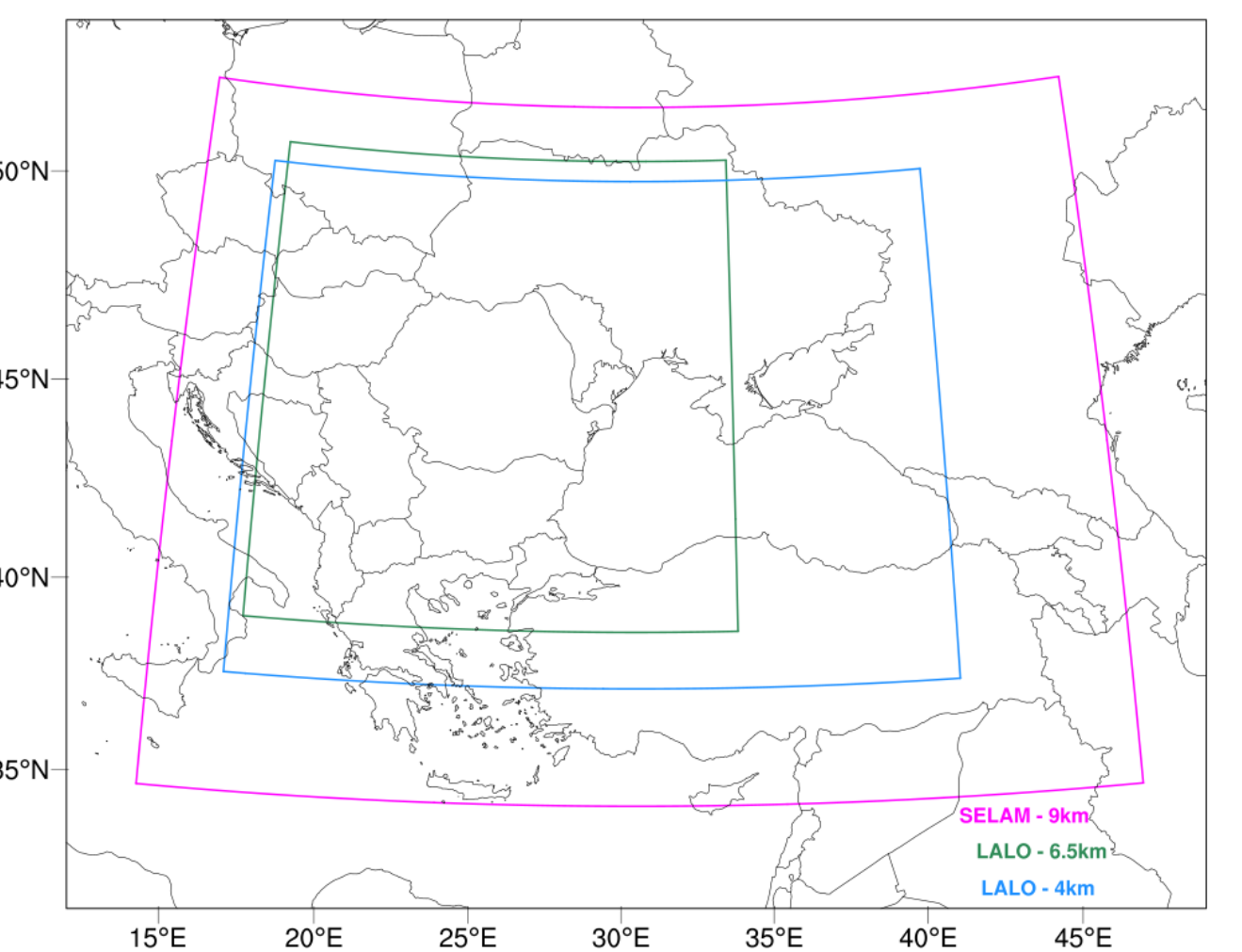2) ALARO1 vB, **Δx=4 km, L60**, 600 x 432 points, Δt=180 s
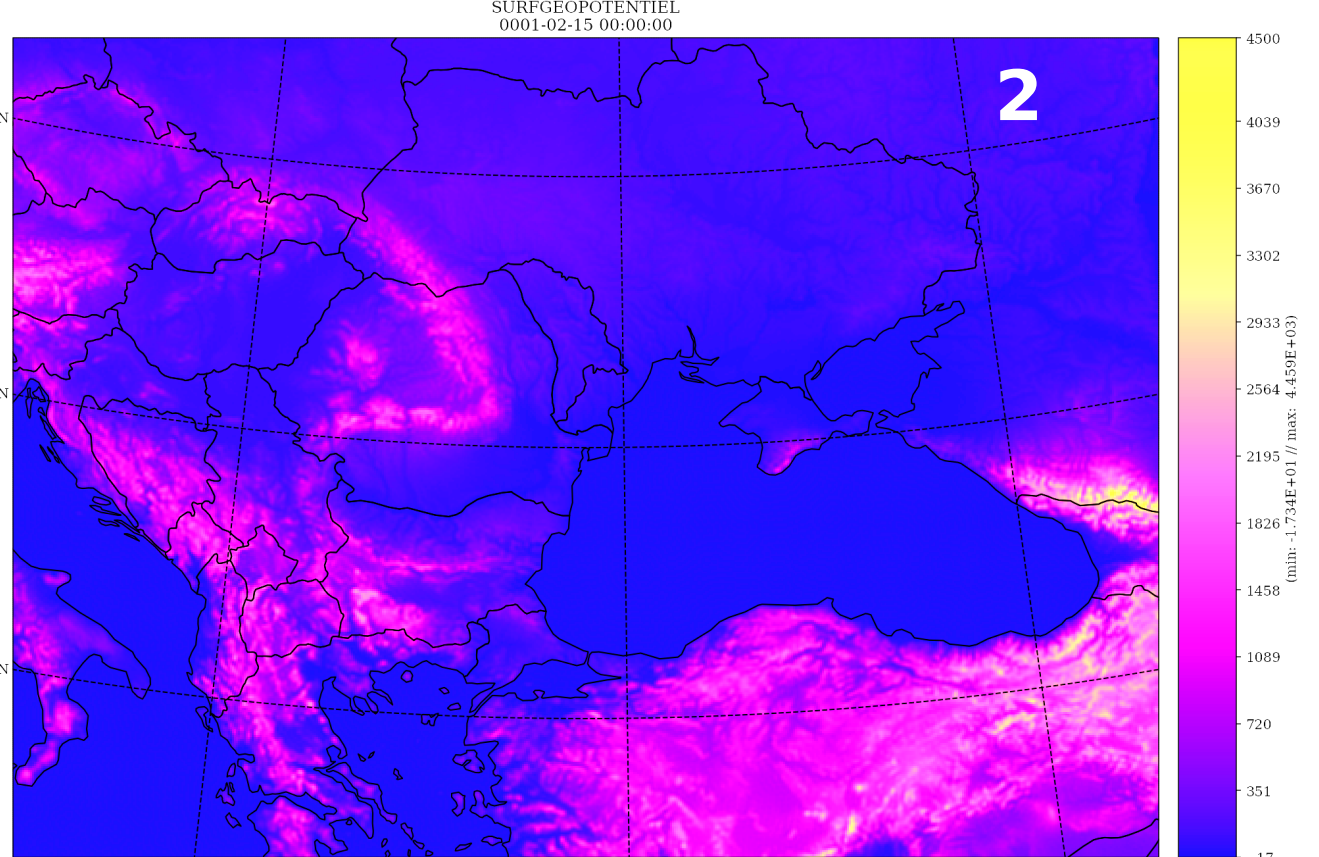
Downstream applications
Atmospheric input from ALARO for hydrological model

Post-processing
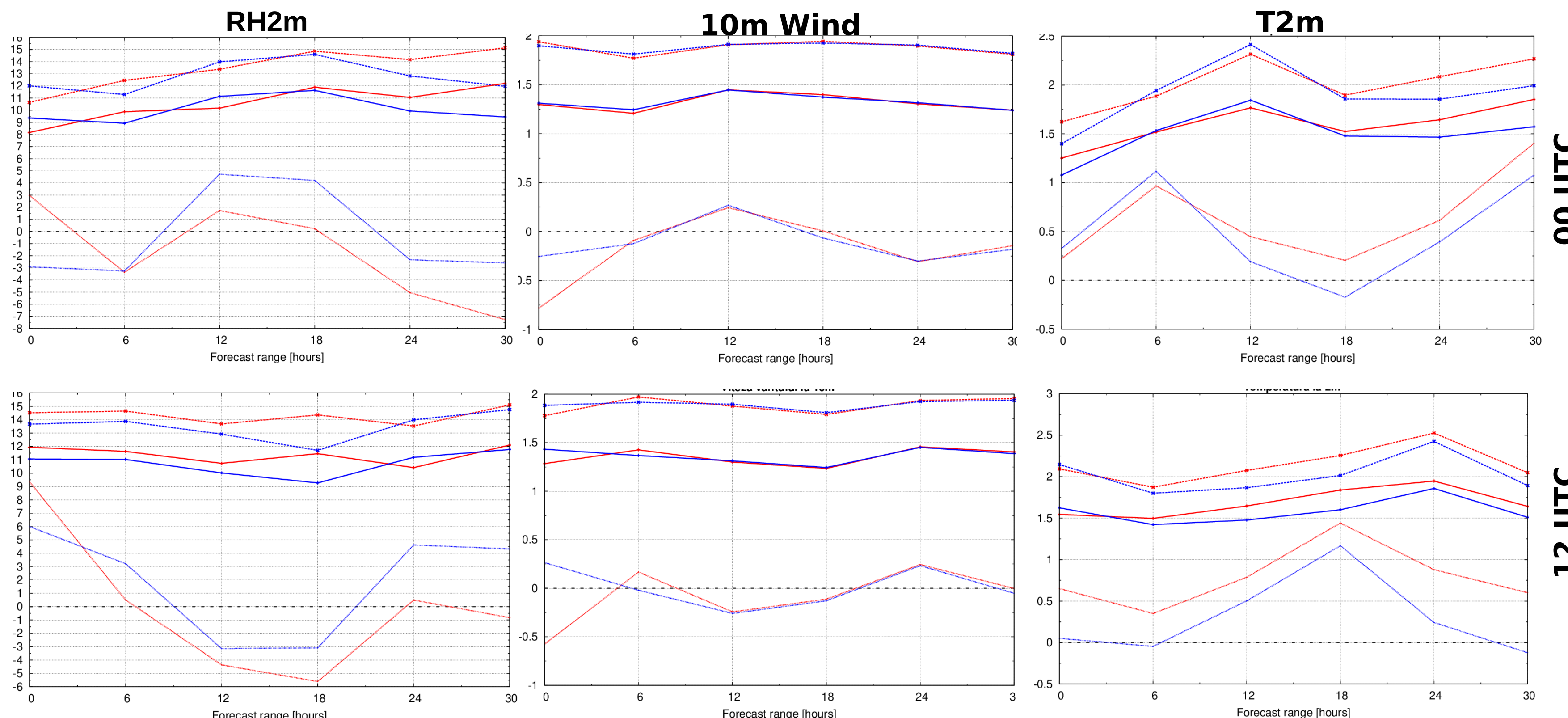FULLPOS in line – geographical grid (0.06° x 0.085°)

Visualization
Graphics based on package developed within NMA and RC-LACE, based on grib_api, perl and NCL-NCAR

Statistical Adaptation Verification

Preliminary results of surface data assimilation using CANARI (ALARO 4km, L60)

The work on the implementation of a data assimilation system was continued. Several steps ahead were completed related to the integration of the CANARI configuration in the ALARO 4 km setup. Some examples of the scores (BIAS, RMSE and MAE) obtained for one-month period of data from May 2023 are presented.

RH2m — 10m Wind — T2m — 00 UTC — 12 UTC

Legend: BIAS - ALARO-4; BIAS - ALARO-4-DA; RMSE - ALARO-4; RMSE - ALARO-4-DA; MAE - ALARO-4; MAE - ALARO-4-DA

- **OPLACE Synop** observations: U10m, V10m, RH2m, T2m
- slight negative impact of assimilation on RH2m in the 00 UTC run for daytime, not present in the 12 UTC run
- mostly neutral impact of 10m wind assimilation
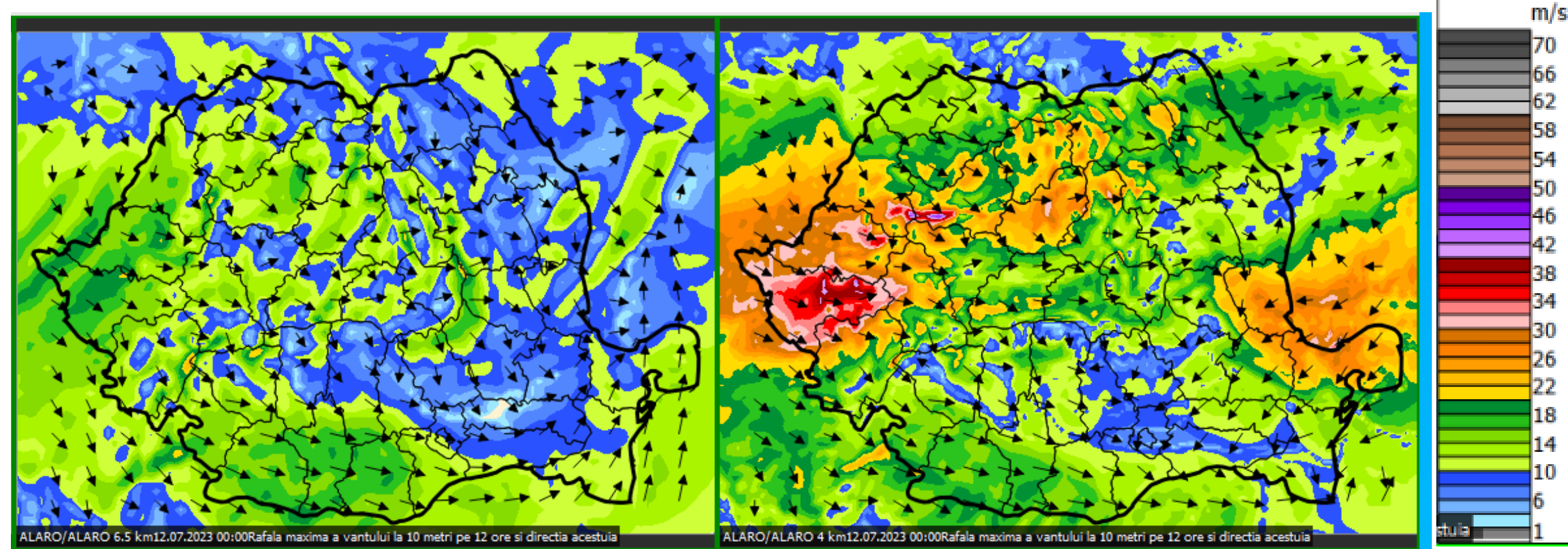- small improvements in T2m, especially in the 12 UTC run

Testing new climate files for ALARO 4km

Recently, we have been working on the preparation of the climate files for the 4 km version of ALARO taking into consideration the e923 update procedure with tools for improving physiography. This was done with the help of the CHMI team. The reason for doing this study was motivated by our forecasters reporting unrealistic values of wind gusts for the 4 km operational version. An example of such behaviour is shown for the case of 12th July 2023.*

*https://www.rclace.eu/media/files/ALARO/alaro1_wd22/presentation_masek_tools.pdf

- The new climate files were used for experiments with several cases where ALARO 4 km presented significant overestimation of the wind gusts values and large differences between the 2 model operational configurations.

- The results showed small improvements in wind speed forecasts for some meteorological stations, while for others there is no significant change.

- Further analysis for longer period should be done.

Maximum wind gust over 12 hours (06 – 18 UTC): ALARO 6.5 km (left) and ALARO 4 km (right)

Wind rose diagram for 48 hours for station **Bistrita**, 12th July 2023; OBS (red) and forecast (blue); left – ALARO TEST; right – ALARO OPER
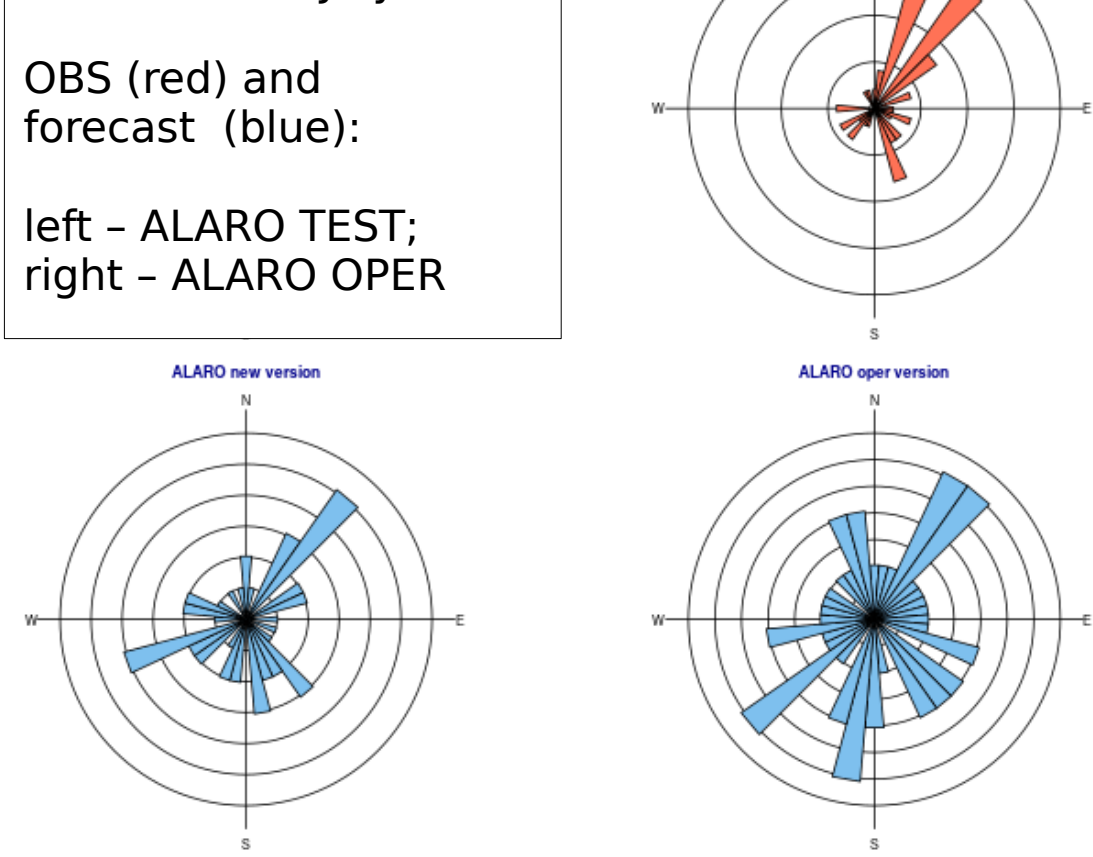
Wind rose diagram for 48 hours for station **Oradea**, 12th July 2023; OBS (red) and forecast (blue); left – ALARO TEST; right – ALARO OPER
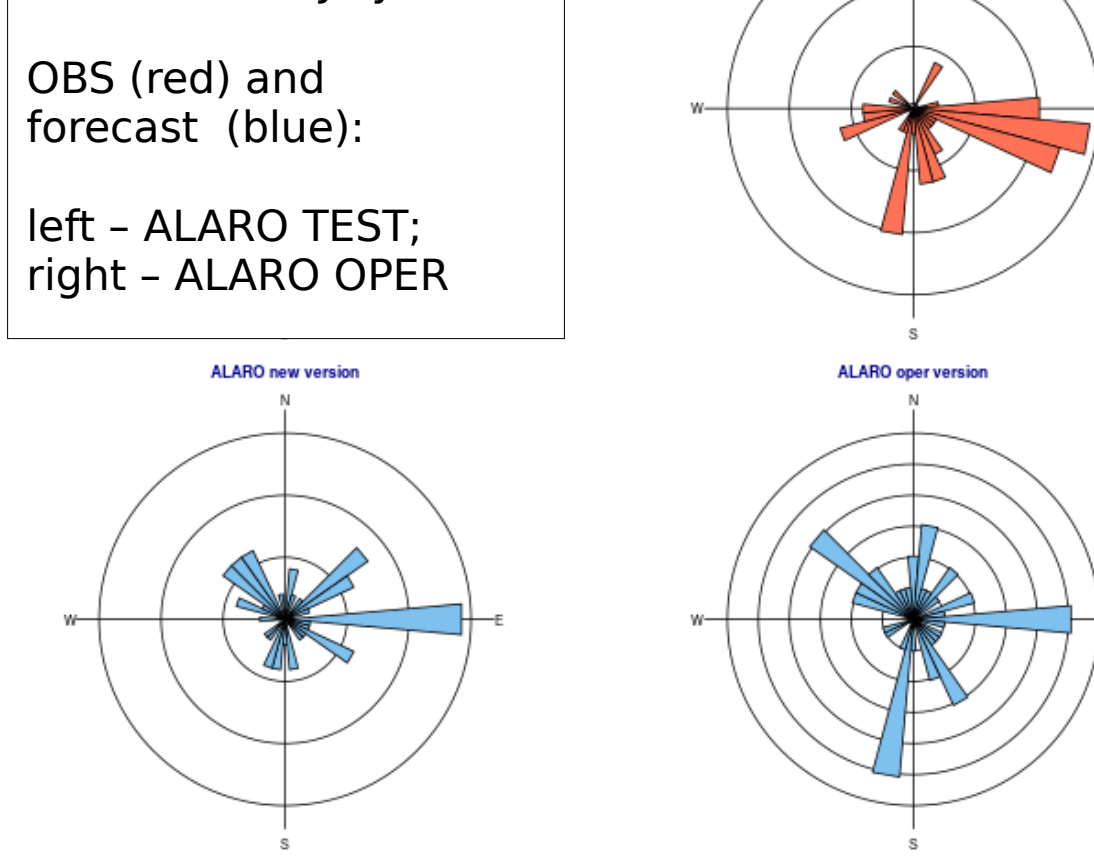
Wind rose diagram for 48 hours for station **Stei**, 12th July 2023; OBS (red) and forecast (blue); left – ALARO TEST; right – ALARO OPER
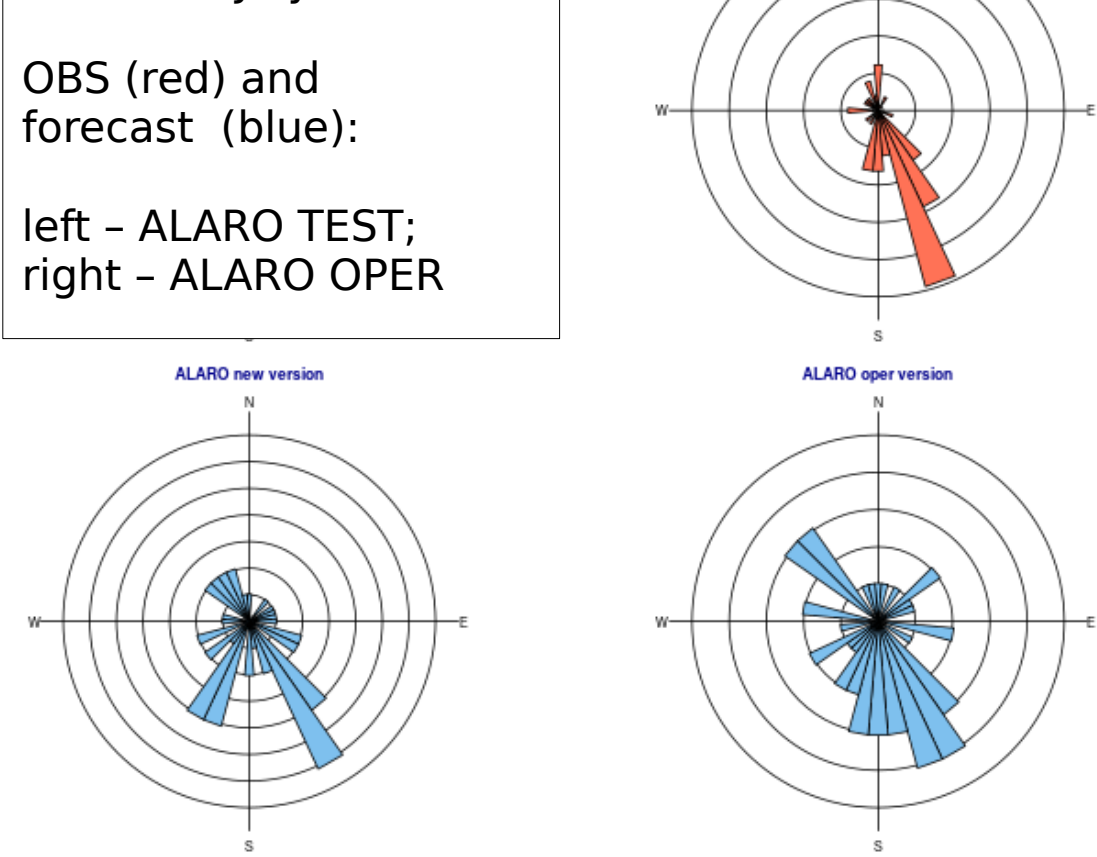
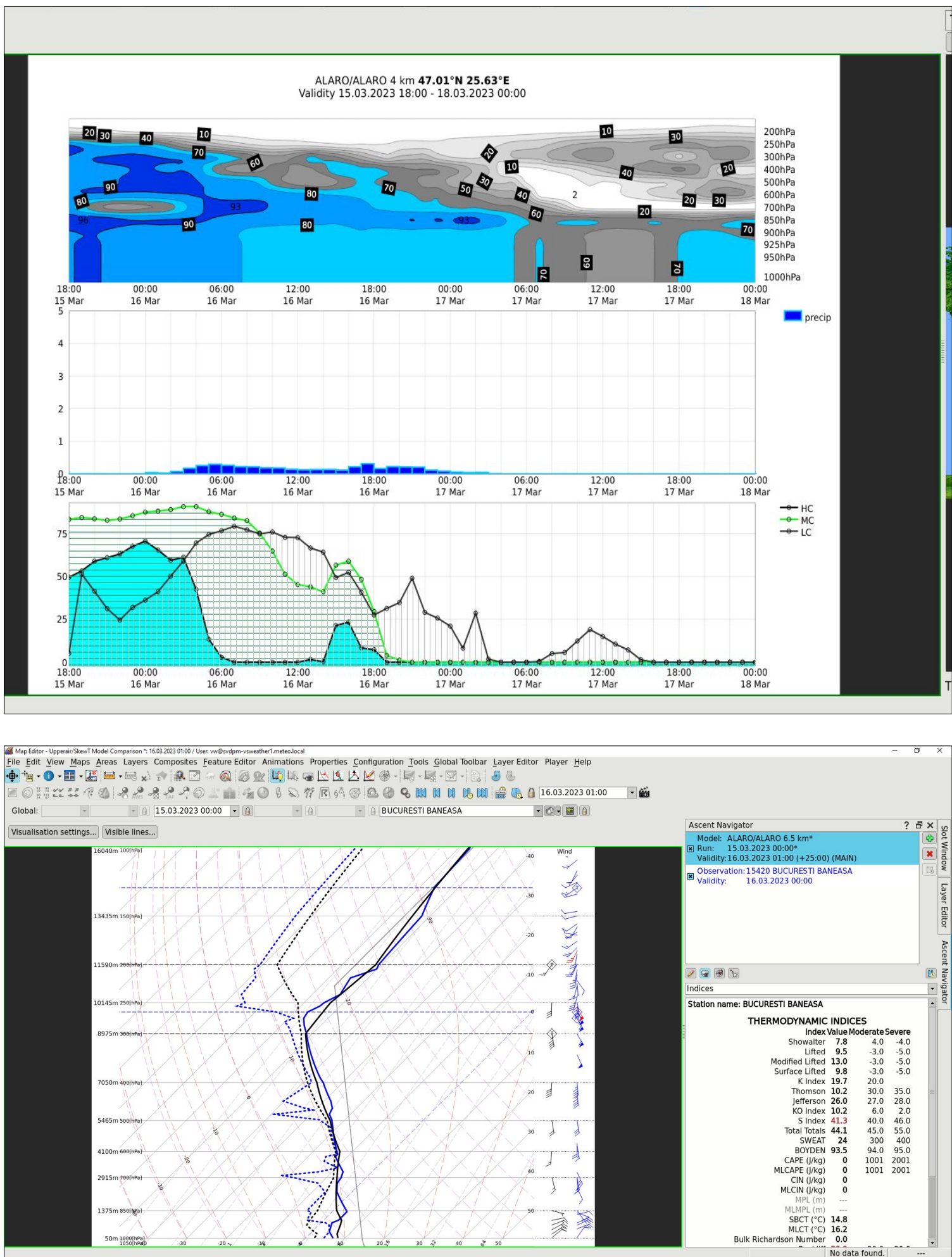Diagrams for stations Gorgova (left), Holod (center) and Sarmasu (right), 12th July 2023, ALARO TEST (upper panels) and ALARO OPER (bottom panels)
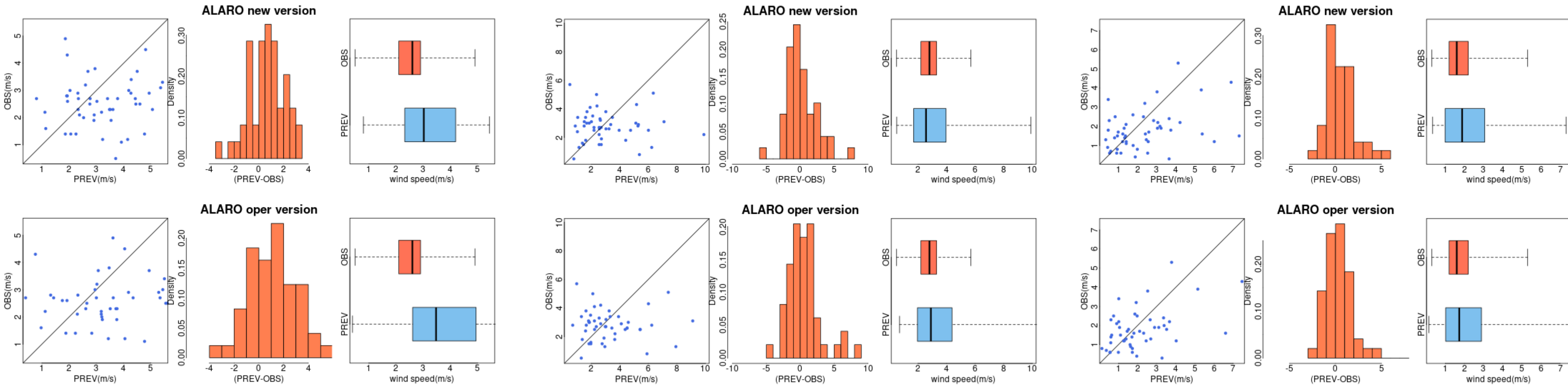
## The visualisation system Visual Weather

- *The visualisation system was aquired recently in our institute, providing new tools and products designed for the visual dissemination of available data, including the ALARO forecast.*

- *Some examples of graphical products are presented:*

Meteogram for chosen location.

Comparison of radiosonde data between ALARO and observations.

MOS for ALARO 4 km

T2m — Cloudiness/Precipitation — 10m wind

Probability of precipitation
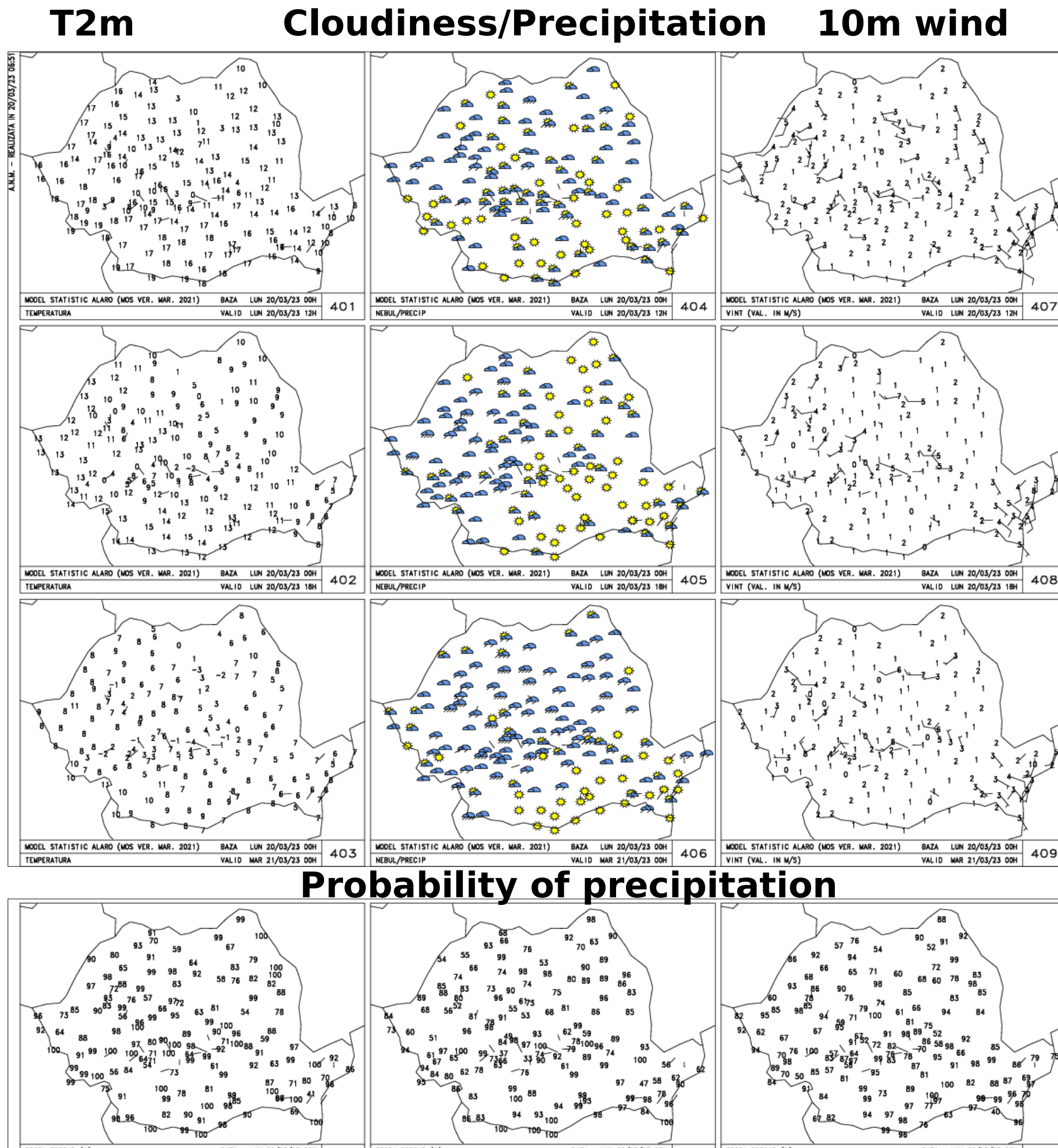
Statistical adaptation using Model Output Statistics (MOS) method was prepared and implemented operationally for the new configuration ALARO 4 km.

- the method is applied for 166 meteorological stations in Romania, the training period is 2018 – 2021; the forecast is obtained for the following meteorological parameters: 2 m temperature, 10 m wind speed and direction, cloudiness, 6h cumulated precipitation
- applied daily for 00 and 12 UTC runs, disseminated on the *intranet* webpage
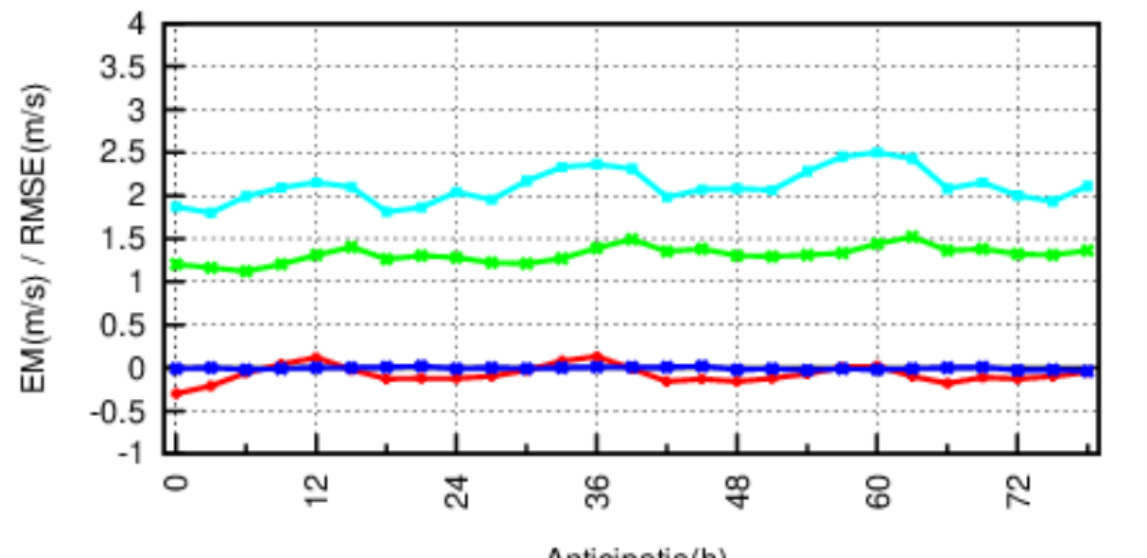
Mean error and RMSE for 10 m wind speed for July 2023; AS – MOS output and PE (persistence method)