3rd ACCORD ASW, 27-31 March 2023, Tallinn (hybrid)

NWP activities in Romania

Alina Dumitru, Simona Tașcu, Alexandra Crăciun, Mirela Pietriși, Mihaela Neacșu, Meda Andrei

National Meteorological Administration of Romania

http://www.meteoromania.ro

aladin@meteoromania.ro

ACCORD — A Consortium for COnvection-scale modelling Research and Development

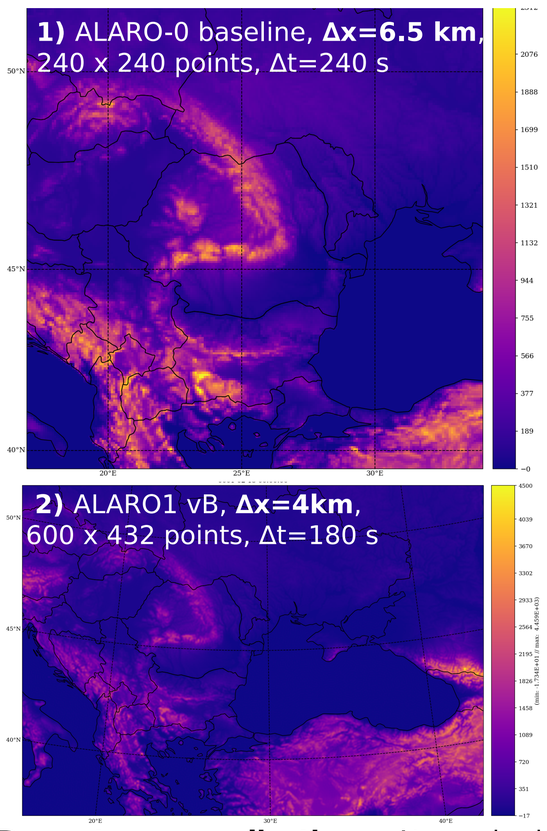
LACE — nwp central europe

METEO ROMÂNIA

Operational configurations

- **Cy43t2,** Lambert projection
- semi-implicit semi-Lagrangian 2TL
- 60 vertical levels, linear grid
- LBC from ARPEGE (3h frequency)
- DFI Initialization, 4 runs/day, no DA
- forecast range: 78/54/78/54 hours

➢ **2 parallel configurations**



Downstream applications: Atmospheric input from ALARO for hydrological models

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 eccodes, perl and NCL-NCAR, Visual Weather.

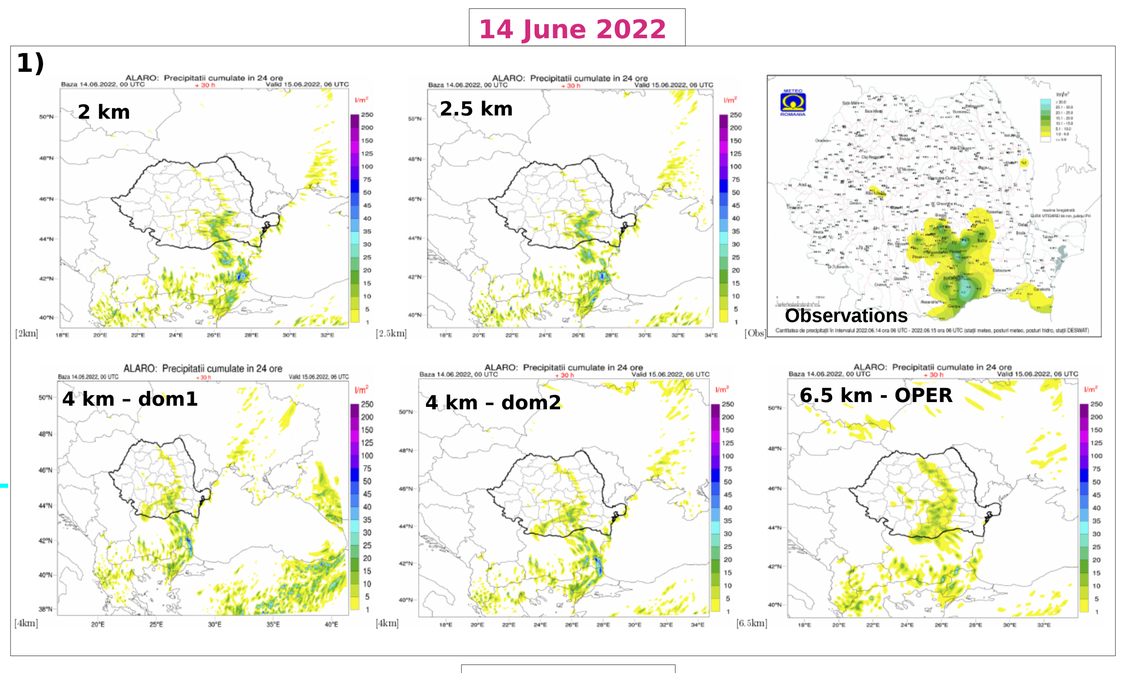
Sensitivity tests for ALARO with different resolutions

Longer period runs were performed for several ALARO configurations, at 6.5 (operational), 4 (2 versions which differ in the size of the integration domain), 2.5 and 2 km.

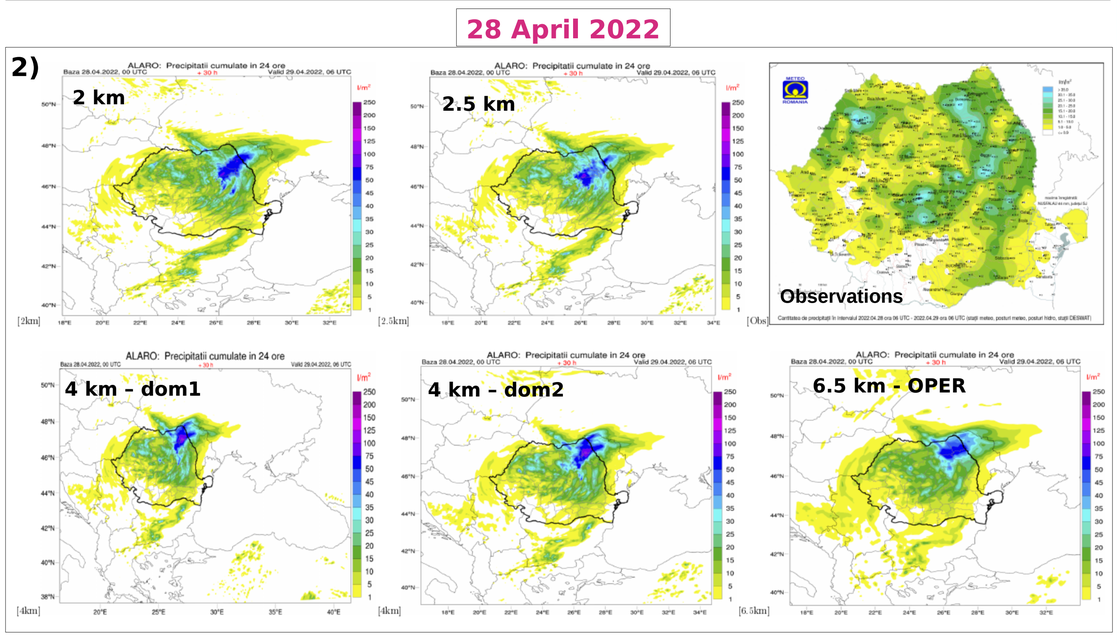
- Subjective evaluation for precipitation forecast was done. Two cases were selected to show the impact of the change in resolution for this parameter.
- For case 1), highest resolution experiments (2 and 2.5 km) reduced the amounts in the north-eastern and west-southern parts of the country, leading to more realistic precipitation representation; for the same regions 4 km forecasts are slightly better than the 6.5 km one.
- For case 2), all led to quite large overestimation of amounts, most visible in 4 km runs.

24 hours cumulated precipitation

14 June 2022



28 April 2022



Feedback on ALARO performance

Forecasters reported several features that they encountered related to their experience with the ALARO at 6.5 km forecast:

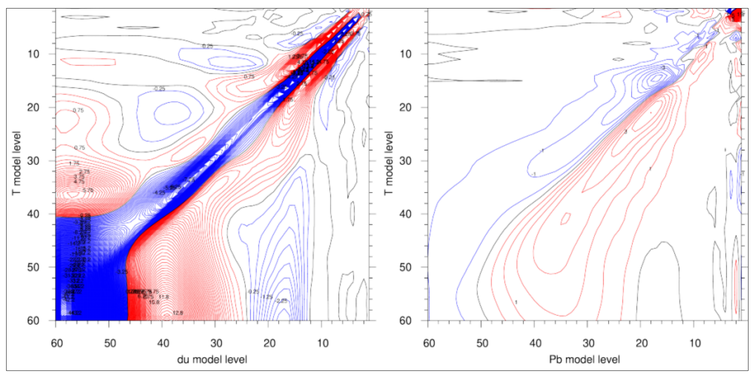
- in general, the amount of precipitation and size of target areas are overestimated, both in the cold season when stratiform precipitation prevail and in the warm season when convective precipitation occur;
- it was observed that in the cold season, for cases characterized by atmospheric stability, humidity was overestimated which led to the prediction of an overextension of the area of weak precipitation in the form of drizzle and snow flurries;
- in most cases, 2 m temperature is overestimated in the southern and eastern parts of the country, while in the inter-Carpathian areas it is usually underestimated;
- similar pattern was observed for 10 m wind speed; biases in the southern and eastern parts are usually larger than those in the inter-Carpathian regions;
- mean sea level pressure is generally underestimated.

B matrix computation*

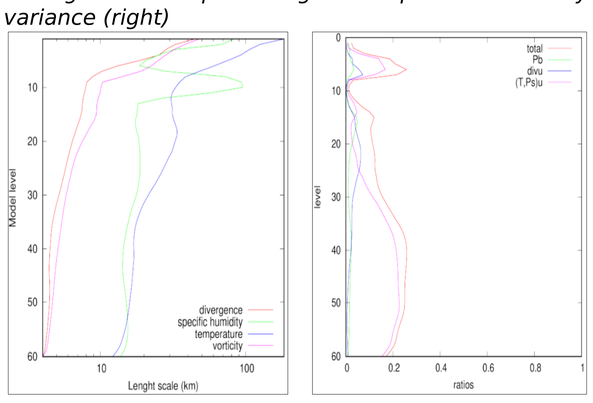
B matrix for 4 km ALARO was computed during a research stay at CHMI. The method chosen for this purpose was the spin-up ensemble method.

- A period of 30 days in two different seasons: summer (20210611 - 20210625) and winter (20220108 - 20220122) was selected. The first 6 members of AEARP for creation of the LBC from global assimilation ensemble were used. The LAM operational configurations of *ee927*, DFI Initialisation and *e001* was used for the creation of 6 hours forecast of each member of AEARP and based on this results, the differences between members were computed for all days of selected period valid at 00, 06, 12 and 18 UTC. A total of 360 differences were computed and the outputs, stored in grib files, were used for computation of B matrix.

Mean vertical cross-variance between temperature and unbalanced divergence (left) and vorticity – balanced (right)



Length scale profile of divergence, vorticity, temperature and specific humidity (left) and spectral averages of the percentage of explained humidity variance (right)



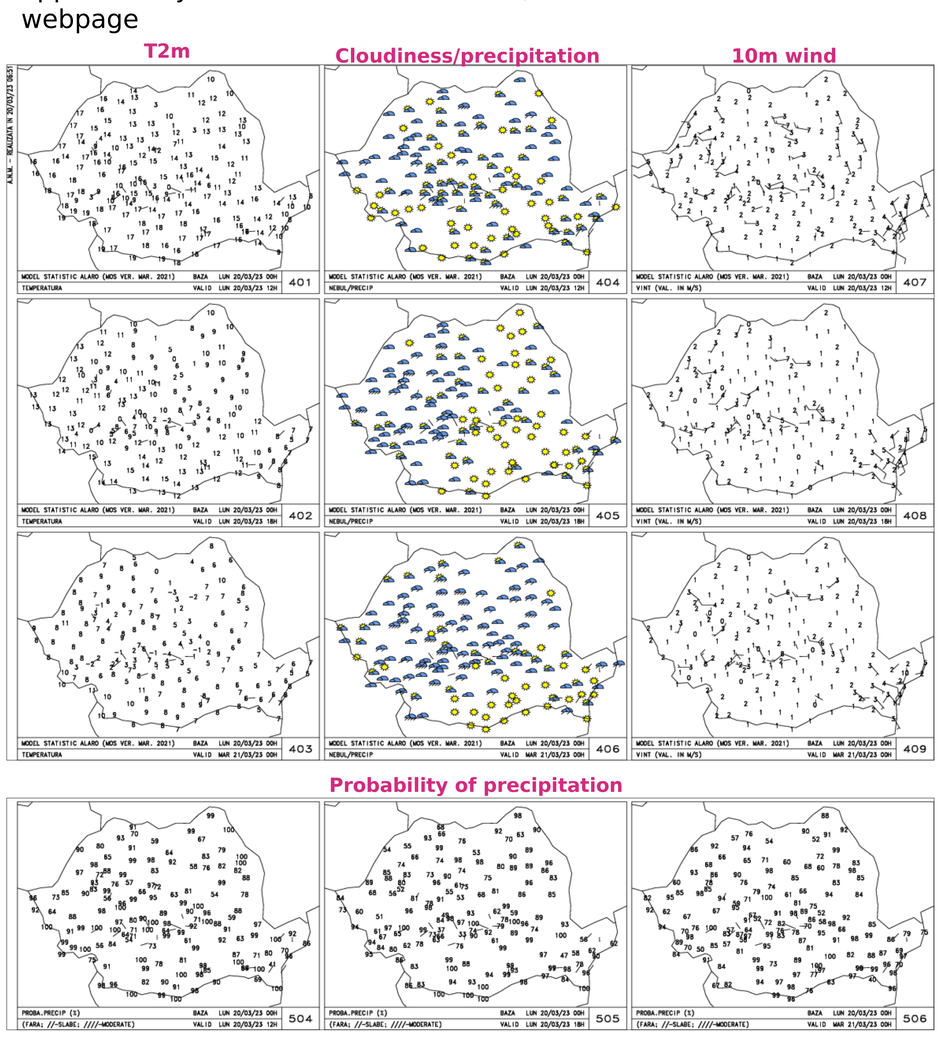
- The SYNOP, TEMP and AMDAR observations and default values for REDNMC (0.7) and SIGMAO_COEF (0.9) were used. Experiments which contain only CANARI or CANARI and 3DVAR (gradually introducing each type of observation) were performed and analyzed based on *a posteriori* diagnostics available on RC-LACE forum.

*https://www.rclace.eu/media/files/Data_Assimilation/2022/repStay_ADumitru_Bmatrix_Prague_2022.pdf

MOS for ALARO 4 km

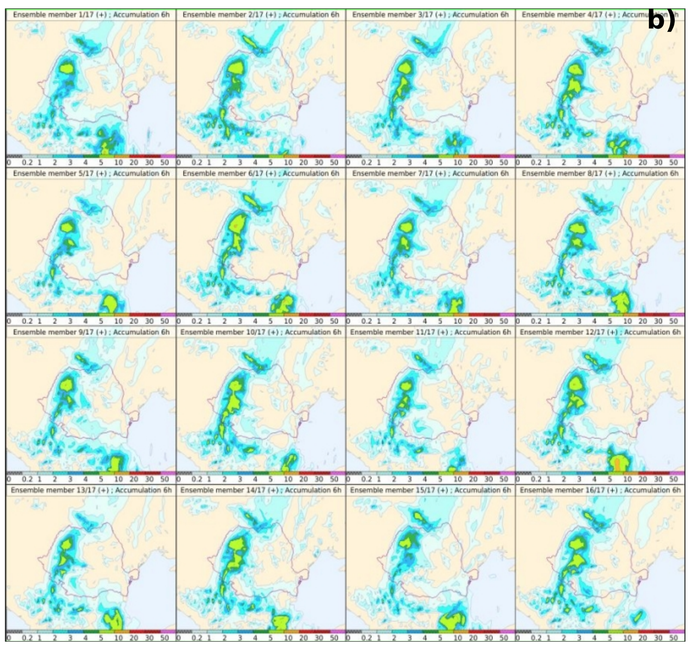
Statistical adaptation using Model Output Statistics (MOS) method was prepared and implemented operationally for the new configuration ALARO 4 km.

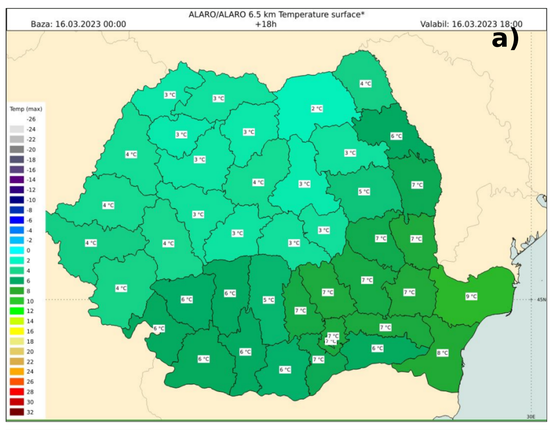
- 166 meteorological stations; the training period is 2018 – 2021
- the forecast is obtained for: 2 m/maximum/minimum temperature, 10 m wind speed and direction, cloudiness, 6h cumulated precipitation
- applied daily for 00 and 12 UTC runs, disseminated on the *intranet* webpage



New visualisation system Visual Weather

A new visualisation system was acquired recently in our institute, providing new tools and products designed for the visual dissemination of available data, including the ALARO forecast. Some examples are presented:





a) Mean surface temperature computed for each county.
b) A-LAEF 6h cumulated precipitation.
c) Meteogram for chosen location.
d) Geopotential height at 500 hPa from ALARO overlapped over satellite image over Romania.
e) Geopotential height at 500 hPa from ALARO overlapped over satellite image over Europe.
f) Comparison of radiosonde data between ALARO and observations.