2nd ACCORD ASW , 4-8 April 2022, Ljubljana (hybrid)

NWP activities in Romania

Alina Dumitru, Simona Taşcu, Mirela Pietrișı, Alexandra Crãciun

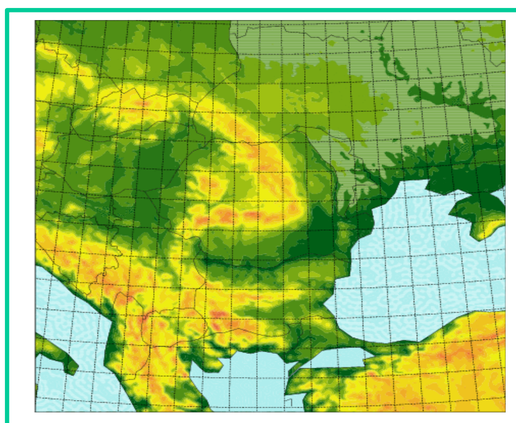
National Meteorological Administration of Romania: http://www.meteoromania.ro

aladin@meteoromania.ro

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

LACE nwp central europe

METEO ROMÂNIA



➢ Operational configuration

- **cy43t2 – ALARO-0 baseline**
- semi-implicit semi-Lagrangian 2TL, Δt=240 s
- Δx=6.5 km, 240 x 240 points, 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

Downstream applications
Atmospheric input from ALARO for hydrological model

Post-processing
FULLPOS in line – geograph ical 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

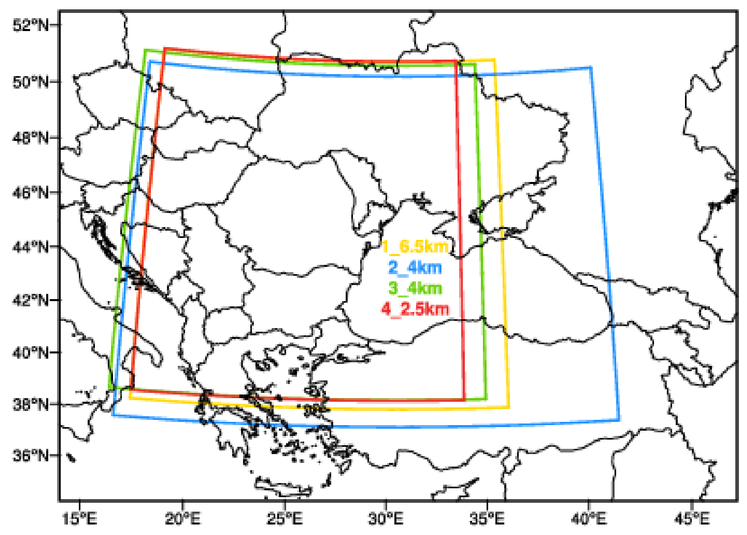
Statistical Adaptation Verification

➢ Preparation for the future operational configuration

In order to prepare the setup for an upgrade of the current operational version, the performance of the ALARO model was evaluated for experiments at higher horizontal resolution and different integration domains →

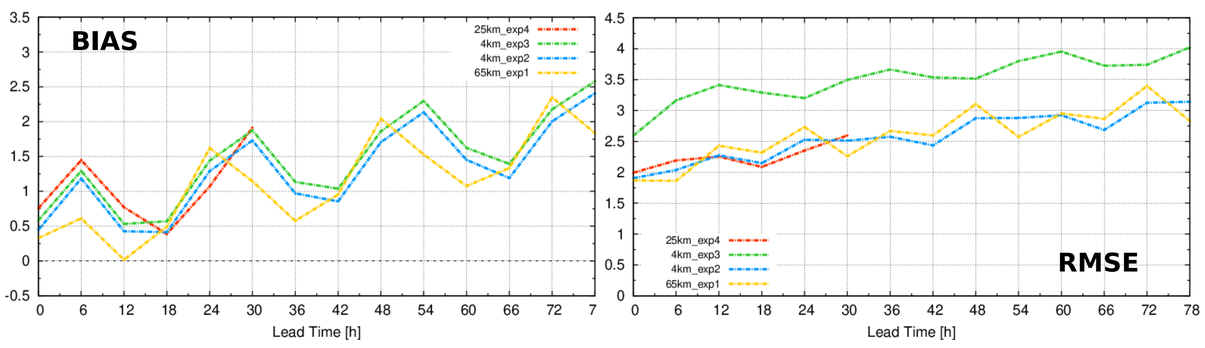
- **Period**: summer season of 2021 (June – August), 00 UTC runs
- **Observation data**: 157 Synop meteorological data
- **Parameters**: 2 m temperature, 10 m wind speed, mean sea level pressure, 2 m relative humidity and 6-hour accumulated precipitation

Experiment	exp 1	exp 2	exp 3	exp 4
Horizontal resolution	6.5 km	4 km	4 km	2.5 km
Vertical resolution	60	60	60	60
Number of points on OX	240	600	450	640
Number of points on OY	240	432	400	640
Physical package	ALARO-0	ALARO-1vb	ALARO-1vb	ALARO-1vb
Forecast range	78 h	78 h	78 h	30 h

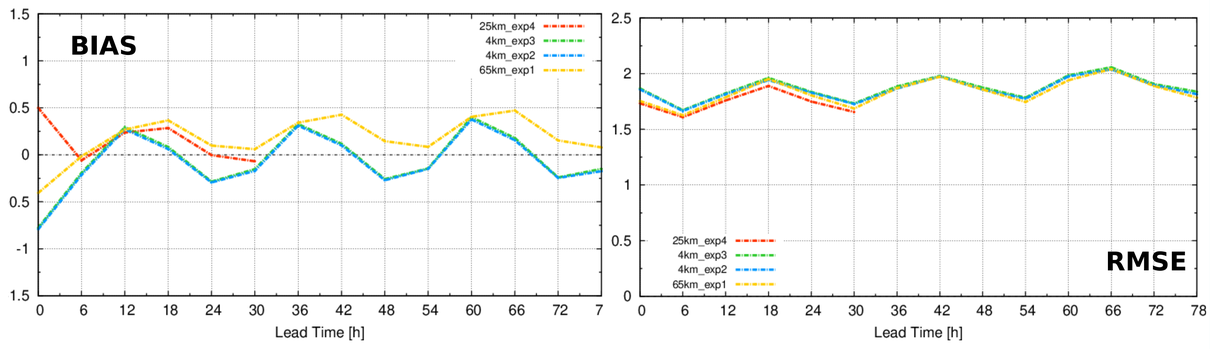


➢ Statistical validation

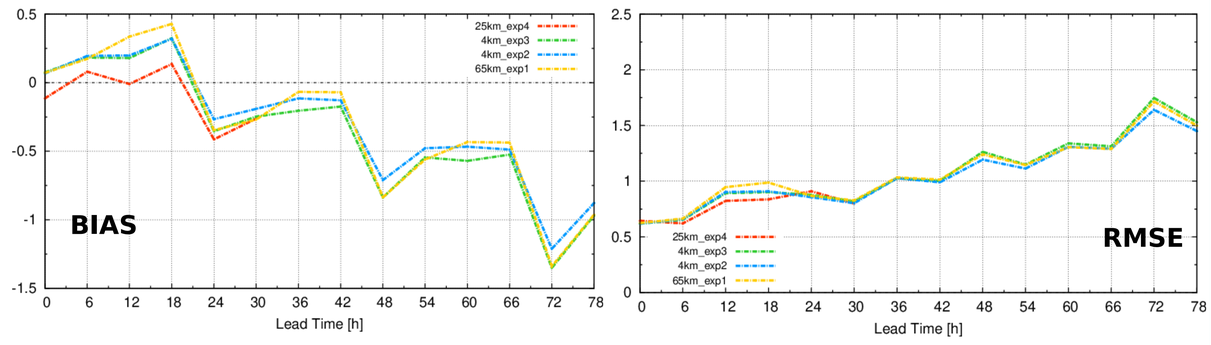
✔2 m Temperature



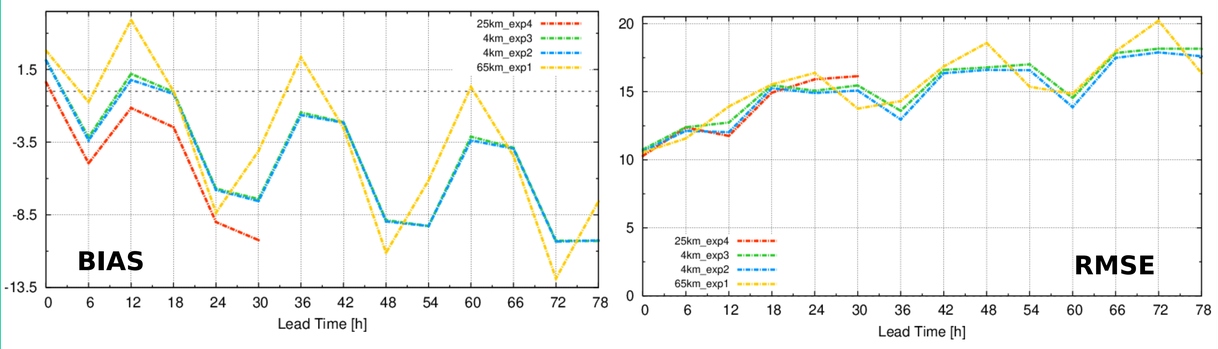
✔10 m Wind Speed



✔Mean Sea Level Pressure



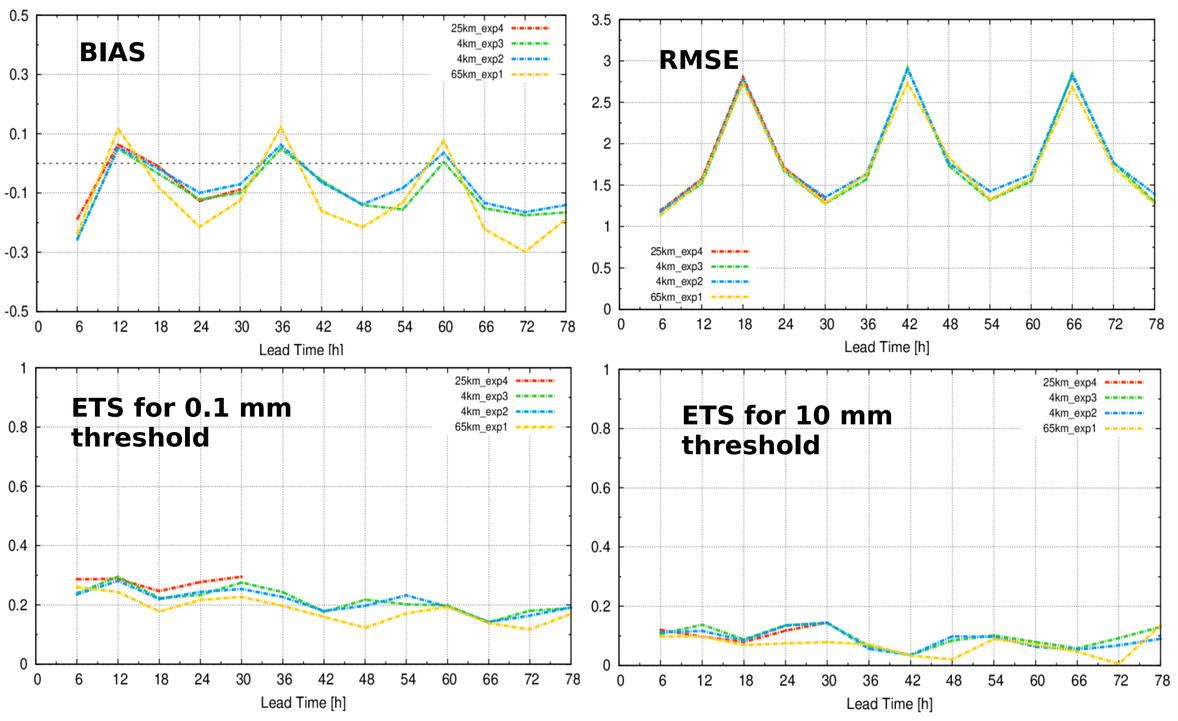
✔2 m Relative Humidity



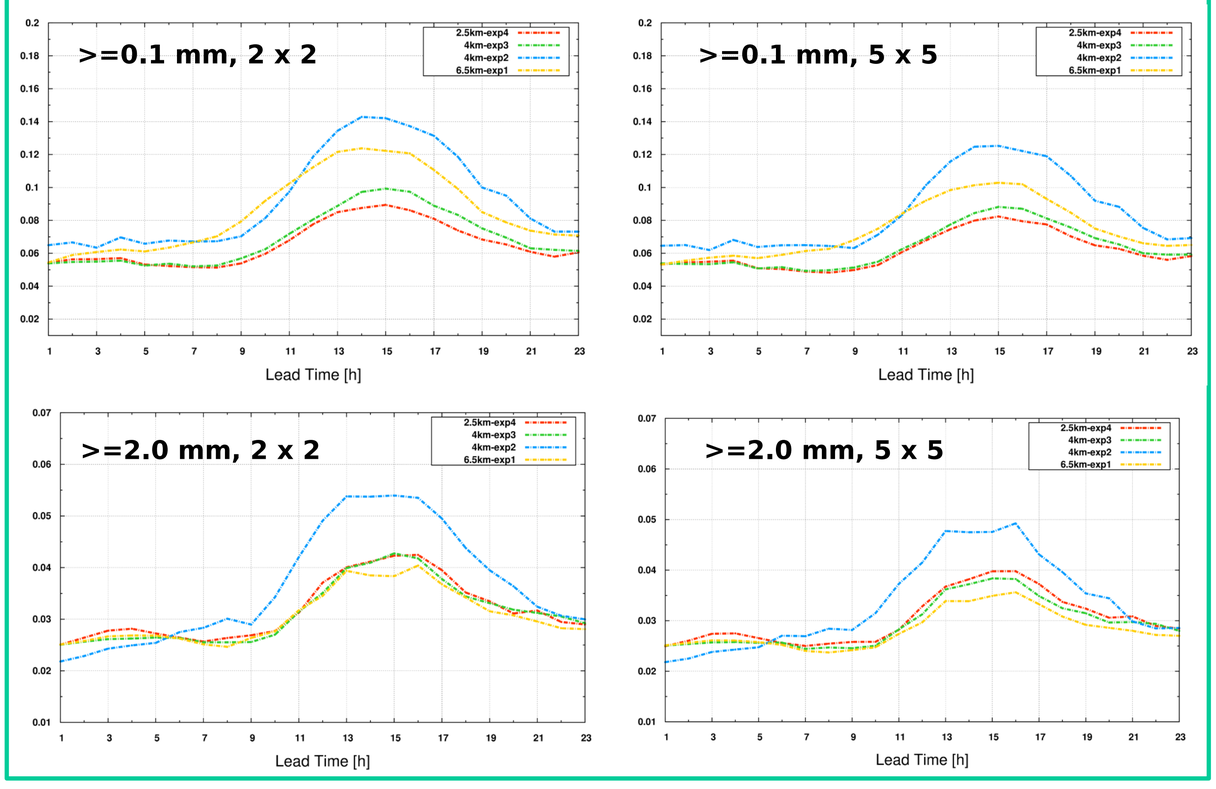
- the model forecast performance presents different tendency, depending on each parameter
- for wind speed, the overall pattern of exp 1 (operational) to overestimate in the second part of the day is replaced in the 4 km experiments (exp 2 and 3) with more visible variations between daytime and nighttime patterns of the BIAS score
- for MSLP, we can see most improvement in the 2.5 km resolution experiment (exp 4)
- for 2 m relative humidity, higher resolution results smooth the minimum and maximum values of the BIAS
- in general, few differences between the experiments can be observed in the RMSE values; exp 3 introduces a bigger variance of the 2 m temperatures forecast errors

Acknowledgments:
"Model Evaluation Tools (MET) was developed at the National Center for Atmospheric Research (NCAR) through grants from the National Science Foundation (NSF), the National Oceanic and Atmospheric Administration (NOAA), the United States Air Force (USAF), and the United States Department of Energy (DOE). NCAR is sponsored by the United States National Science Foundation."

➢ Precipitation forecast verification



- overall reduction of BIAS in higher resolution experiments (exp 2, 3, 4) can be observed when compared to the operational version (exp 1)
- the maximum values of the BIAS score are smoothed in higher resolution forecasts; the slight increase of the errors in the operational version after longer integration is not present in higher resolution experiments; very similar errors can be seen in the RMSE values
- in the ETS score, we can observe some indication of a slight improvement of the score (a perfect value being 1) in higher resolutions, especially for exp 4 (2.5 km) computed for the 0.1 mm threshold of precipitation

BRIER score

- the BRIER score was applied to neighborhoods of forecast grid points evaluated using the HIRA (High Resolution Assessment) framework, included in the MET (Model Evaluation Tools) packages
- four neighborhood sizes (2 x 2 , 3 x 3, 4 x 4 and 5 x 5) and different hourly precipitation thresholds (>=0.1, >=0.5, >=1.0, >=2.0, >=4.0, >=8.0 mm/h) were used
- for lower precipitation threshold, it seems that lower values of the score are obtained for exp 3 and exp 4, with a more visible difference increasing during daytime and a peak around 15 UTC
- for higher hourly precipitation threshold (>=2.0 mm), the increase in resolution does not determine significant changes