ALARO 0 experience in Romania

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ALARO-0

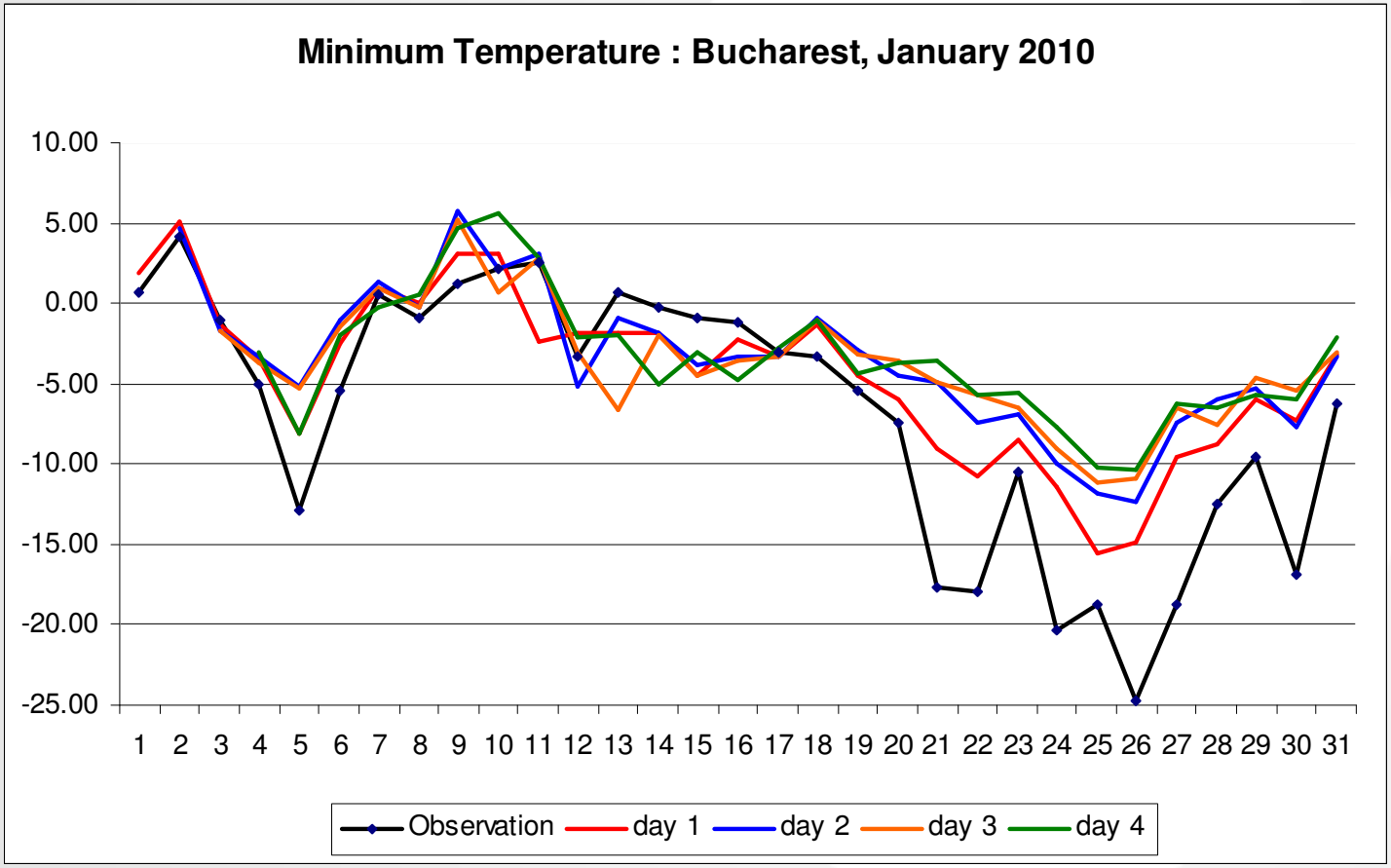
Configuration setup

- ALARO-Romania: L49, 240x240 grid points (Δx=6.5 km), Lambert projection
- Model version: Cy35T1; later cy36t1
- Dynamical adaptation mode, DFI initialisation
- 2TL Semi-lagrangian scheme; Δt=240s, Vertical finite differenced
- Arpege LBC; 3 hours coupling frequency forecast range

Operational suite: since 10th of Frebuary 2010

ALARO-0 – verification

Extreme temperatures forecast



minimum temperature:

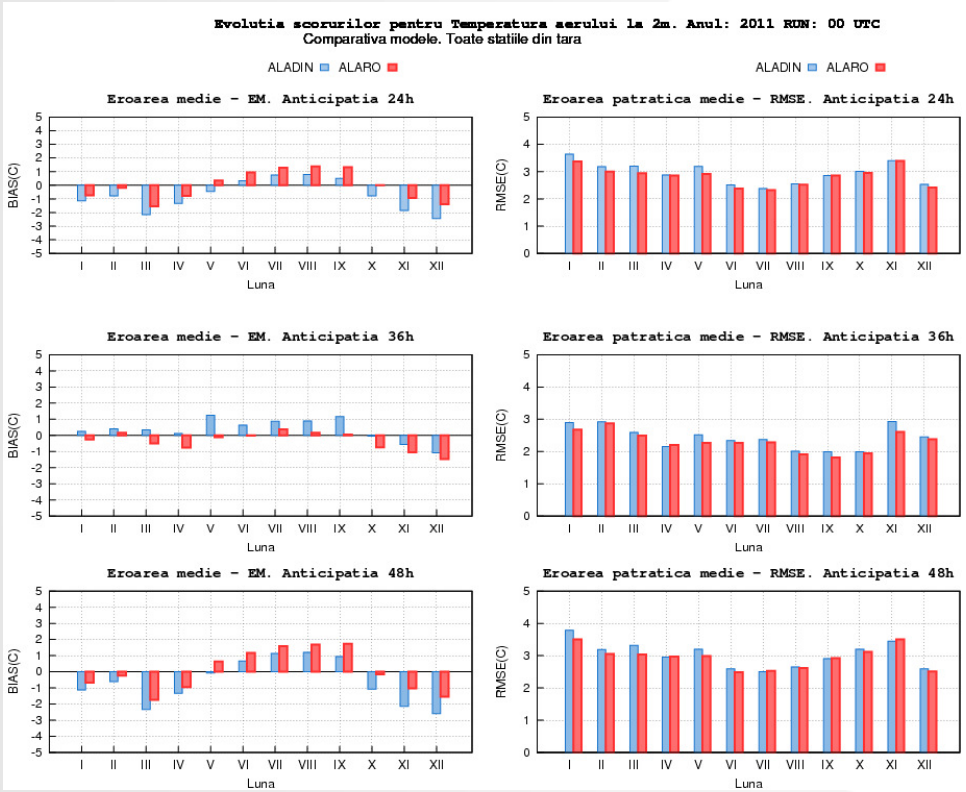
- negative bias especially during cold season
- January 2010: several strong blizzard events

Day1: mean error = 2.46˚C, max. error=9.88 ˚C, 26 January, 2010

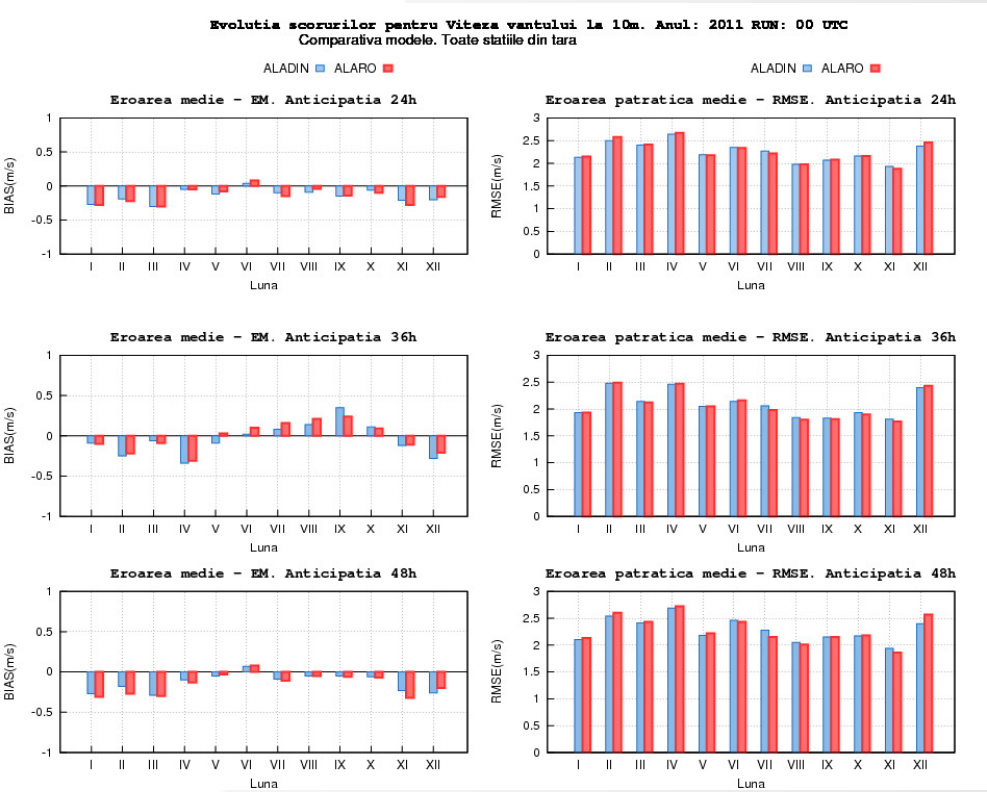
ALARO-0 – verification

2011

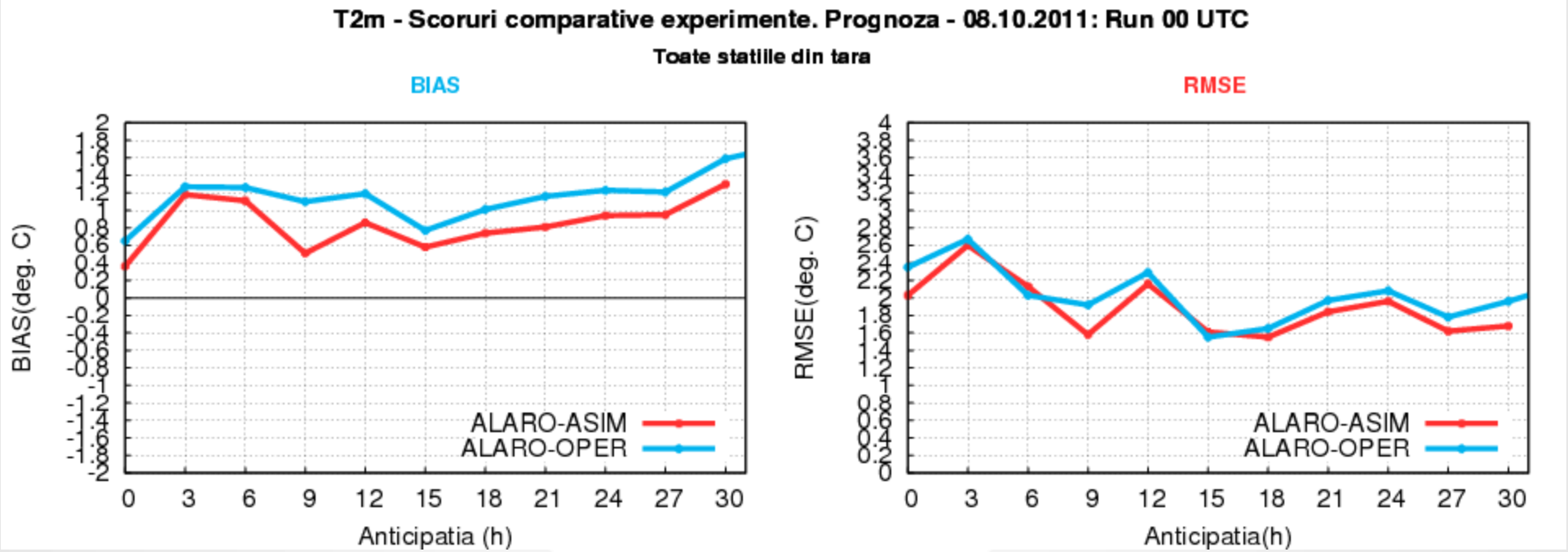
2mTemperature



10m Wind speed



ALARO-0


T2m - Scoruri comparative experimente. Prognoza - 08.10.2011: Run 00 UTC
Toate statiile din tara
BIAS
RMSE
BIAS(deg. C)
RMSE(deg. C)
ALARO-ASIM
ALARO-OPER
0 3 6 9 12 15 18 21 24 27 30
Anticipatia (h)
Anticipatia(h)

ALARO-0 - verification

Precipitation forecast ALARO versus ALADIN

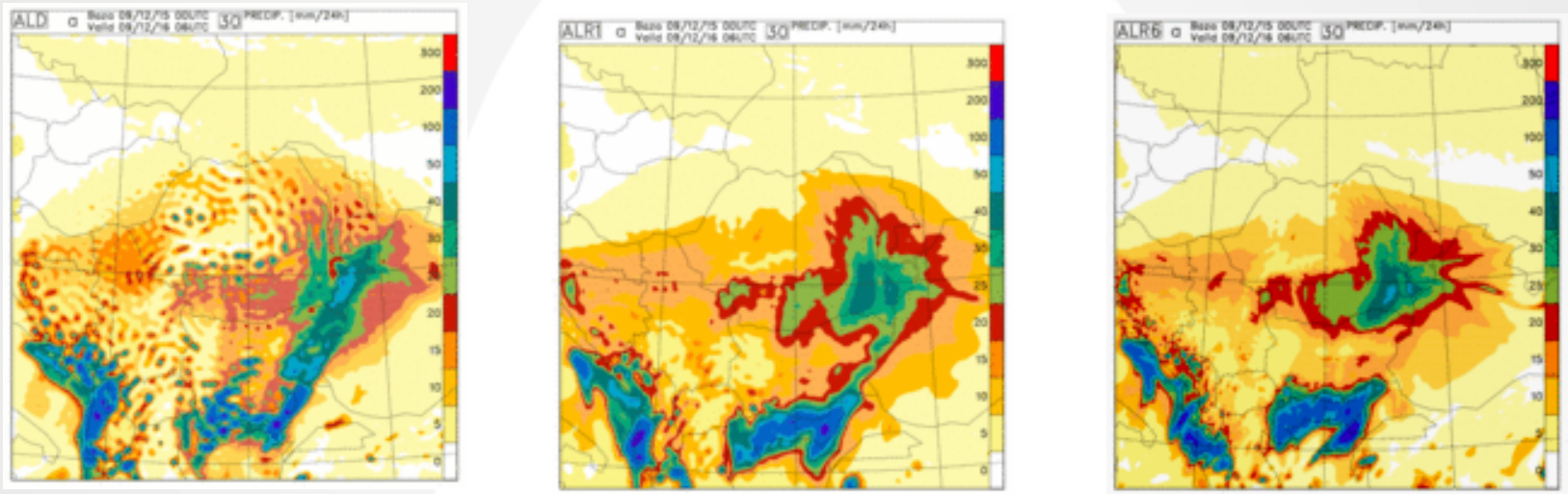
- No major differences in the precipitation pattern
  differences : development of a perturbation in the western basin of the Black Sea
- Both models has the tendency to overestimate the precipitation

ALARO

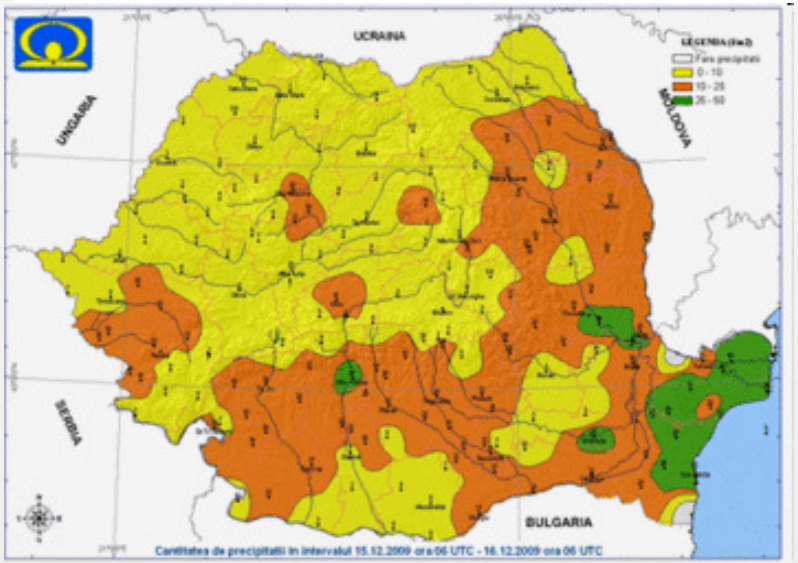
- better precipitation structure
- better position and evolution of the precipitation bands
- generally better precipitation amount

ALARO-0 - verification

Precipitation forecast



24 h cumulated precipitation: 15.12.2009, 00+06 → 00+30 UTC



ALARO-0 baseline

Configuration setup

- ALARO-Romania: **L60**, 240x240 grid points (Δx=6.5 km), Lambert projection
- Model version: **Cy36T1 + modifications for ALARO-0 baseline**
- Dynamical adaptation mode, DFI initialisation
- 2TL Semi-lagrangian scheme; Δt=240s, Vertical finite element
- Arpege LBC; 3 hours coupling frequency forecast range

Test period July – September 2013

Operational suite: since 1st of January 2014

ALARO -0 baseline - Verification

Precipitation verification

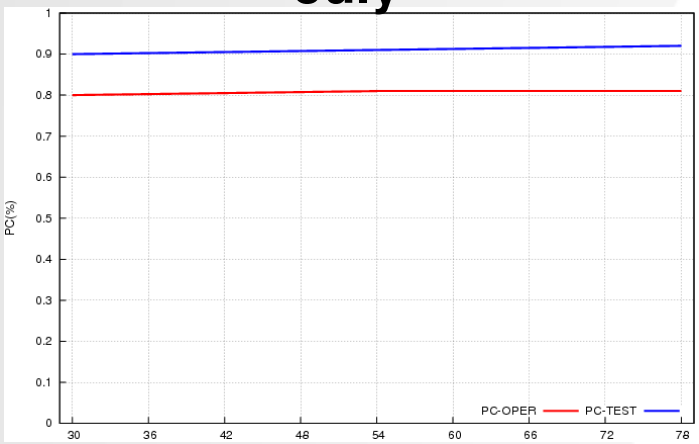
Globally better forecast:

- the fraction of correct forecasted events is higher for all precipitation classes
- the very light [0.1 – 2 mm/12/24h] unrealistic precipitation is reduced
- the more intense precipitation [10.1 – 200 mm/12h] scores are better for the first day
- subjective evaluation of the forecasters: ALARO provides the best precipitatation forecast, especially for warning situations

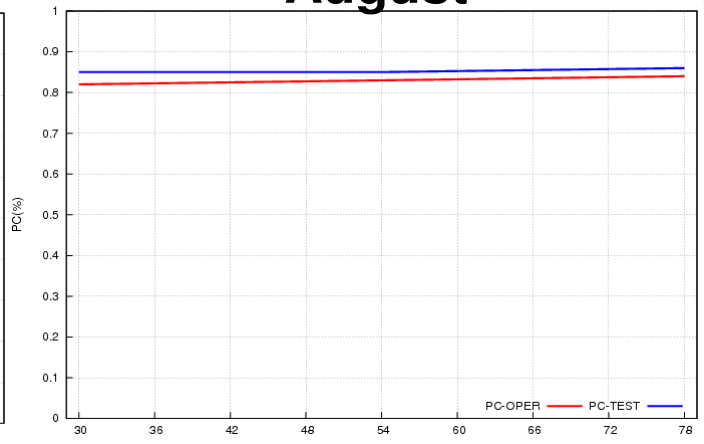
ALARO-0 baseline
Test Period: July-September 2013

24h cumulated precipitation verification
Fraction correct: RR24 : 2.1-10.0 mm

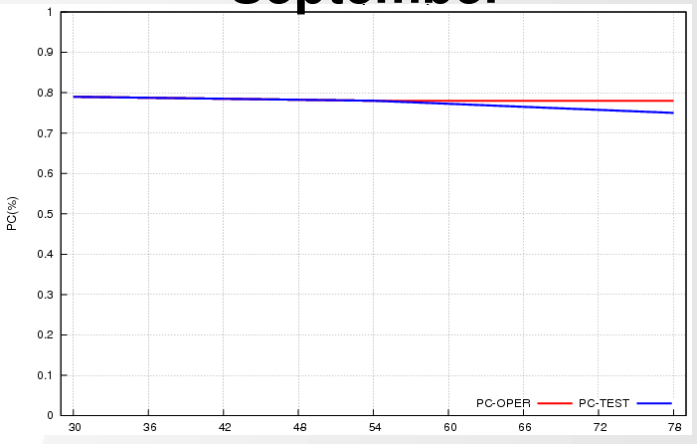
July



August



September



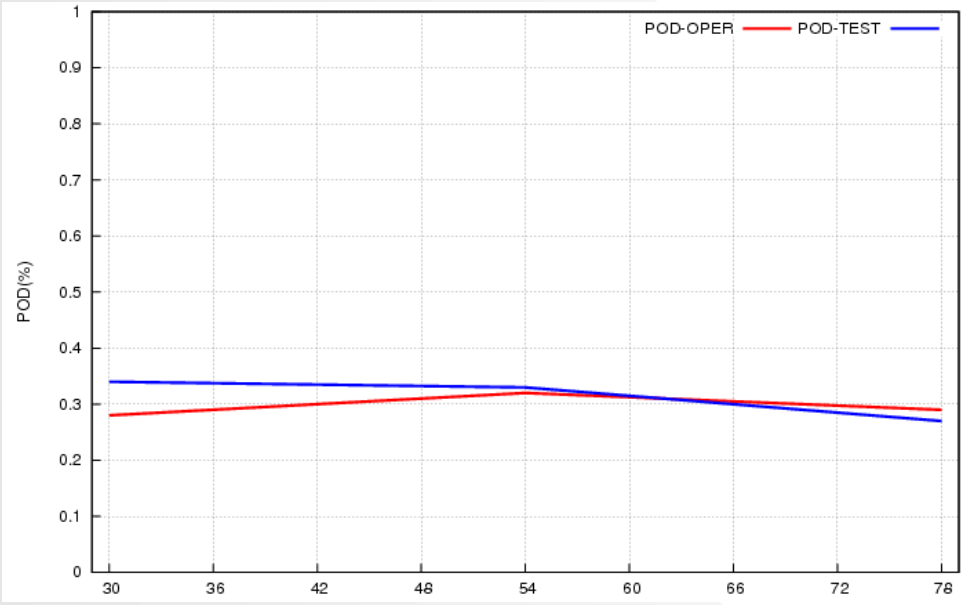
PC (perfect score = 1) ,
red line – ALARO-OPER, blue line – ALARO-TEST

- the fraction of correct forecasted events is higher for all precipitation classes (except for September)

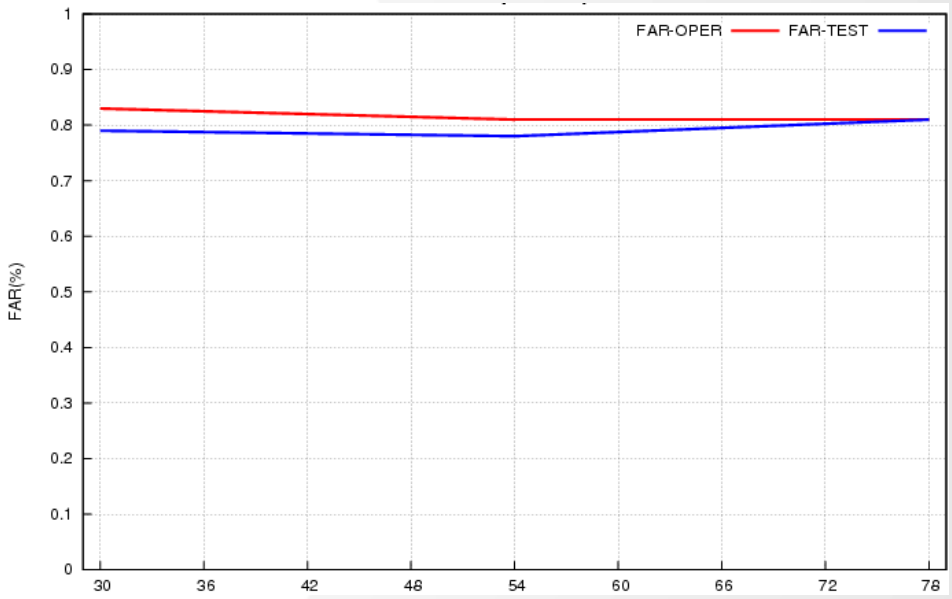
Test period: August 2013

24h cumulated precipitation verification
RR24: 0.11-2.00 mm

POD-Probability of detection (Perfect score = 1)



FAR-False alarm ratio (Perfect score = 0)

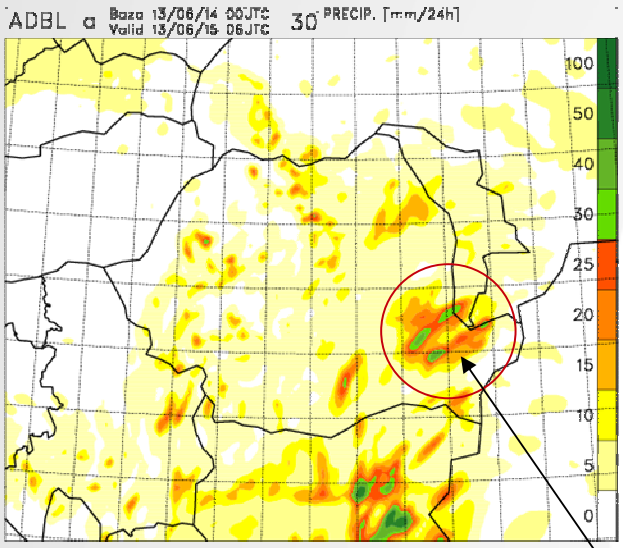


red line – ALARO-OPER, blue line – ALARO-TEST

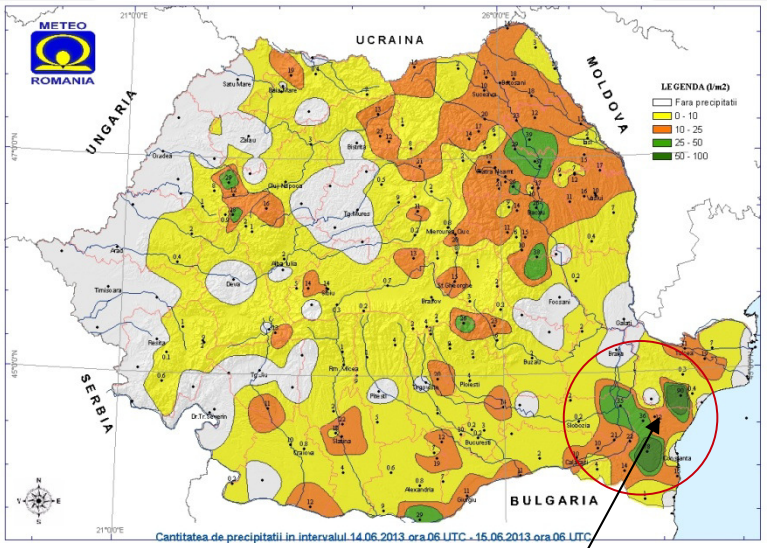
- the very light [0.1 – 2 mm/12/24h] unrealistic precipitation is reduced

Case of 14th June 2013

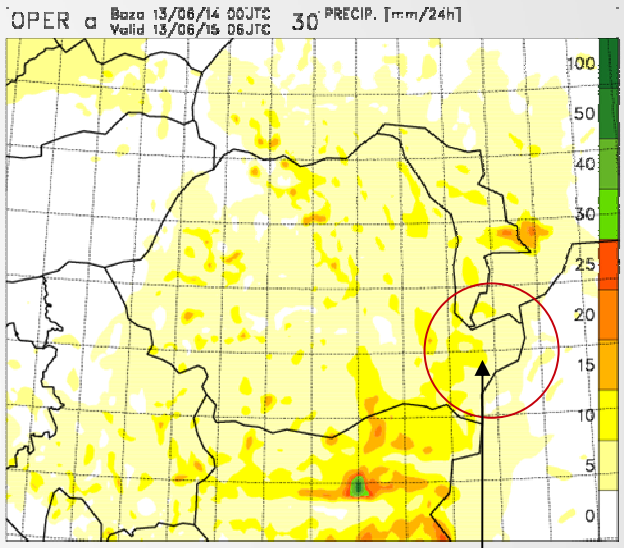
24h cumulated precipitation



ALARO-0 baseline



Observation



ALARO-OPER

max 50l/mp

- simulated the precipitation over the south-eastern part of Romania
- not sufficient accurate position of precipitation nuclei

max 90l/mp

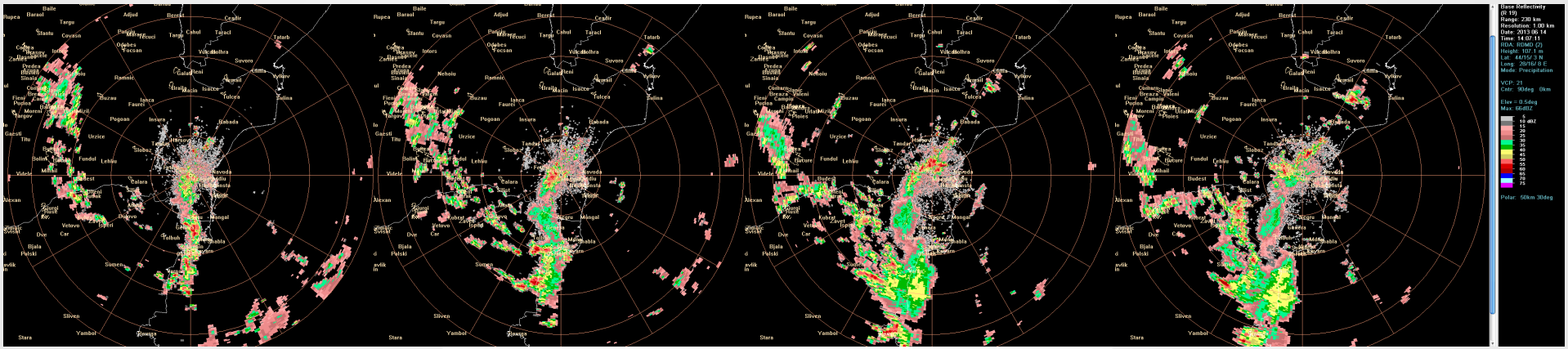
max 15l/mp

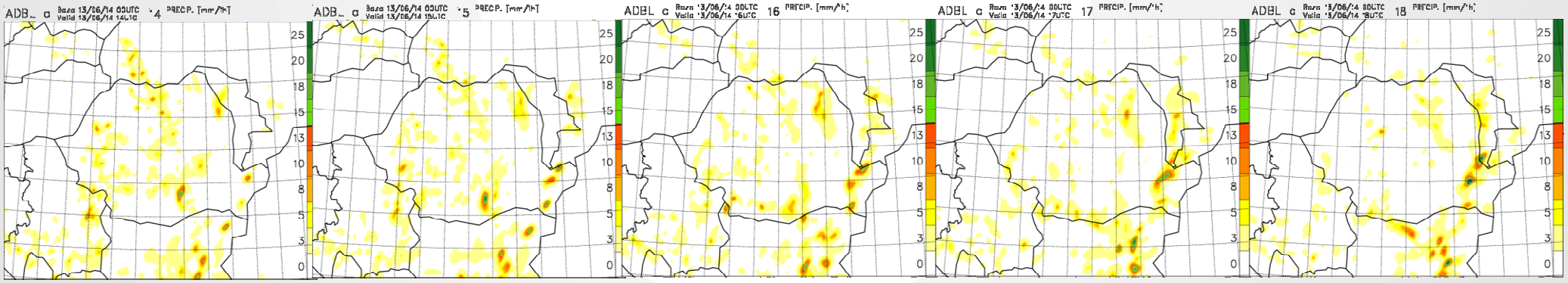
- failed in forecasting this meso-scale convective system

Case of 14th June 2013

Reflectivity at the lowest elevation (0,5º) - Medgidia radar

11:30 UTC **12:30 UTC** **13:37 UTC** **14:07 UTC**

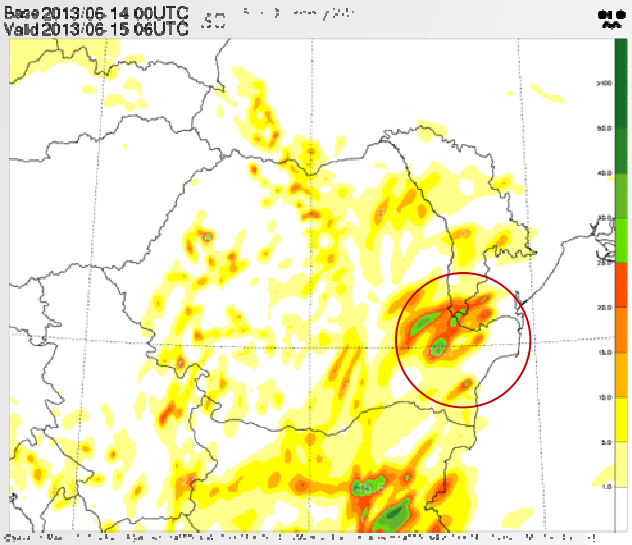




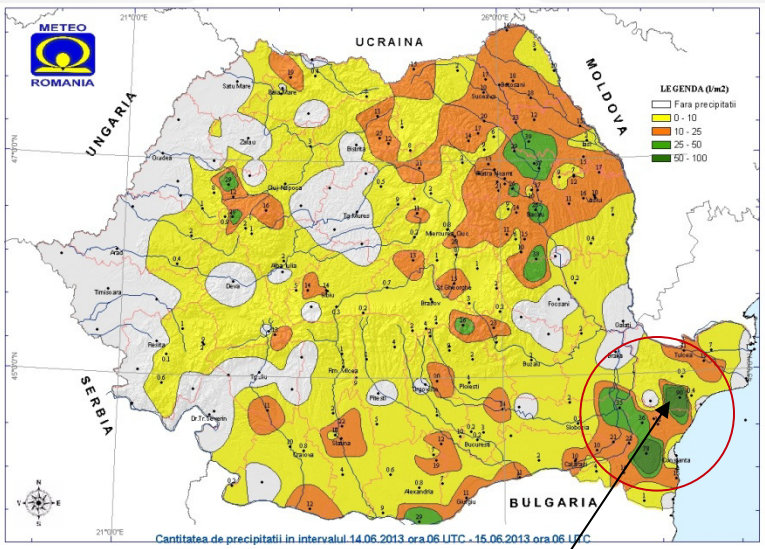
14 UTC **15 UTC** **16 UTC** **17 UTC** **18 UTC**

Last hour cumulated precipitation simulated with Alaro-0 baseline

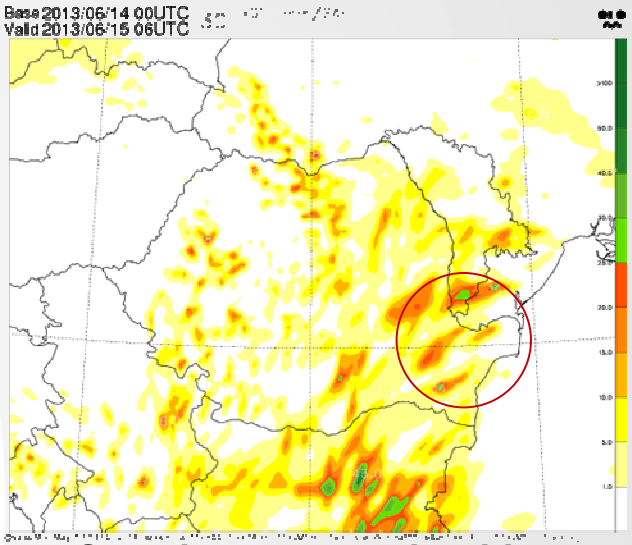
Case of 14th June 2013



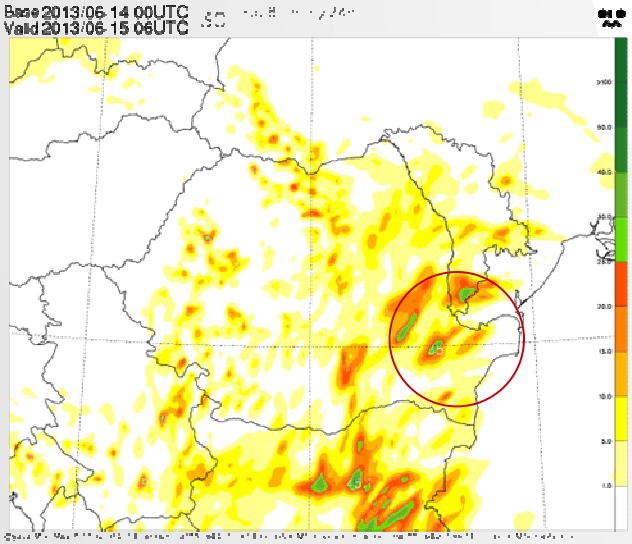
ALARO-0 baseline cy36t1 NMA



Observation



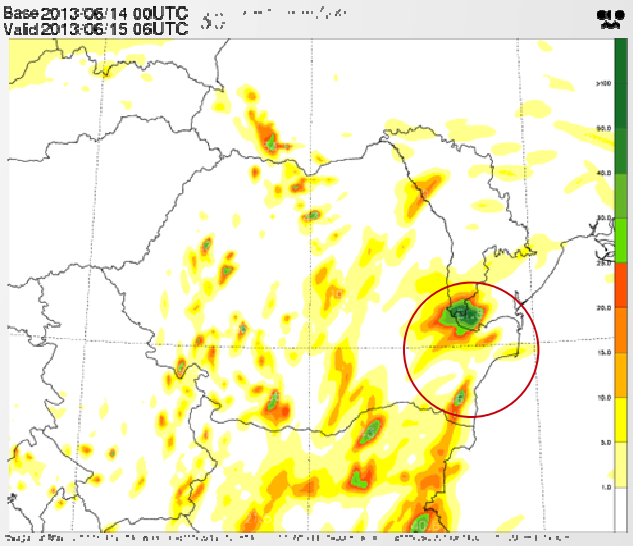
Complementary sub grid non saturated downdraft



ALARO-0 baseline cy36t1 op8 CHMI

max 90l/mp

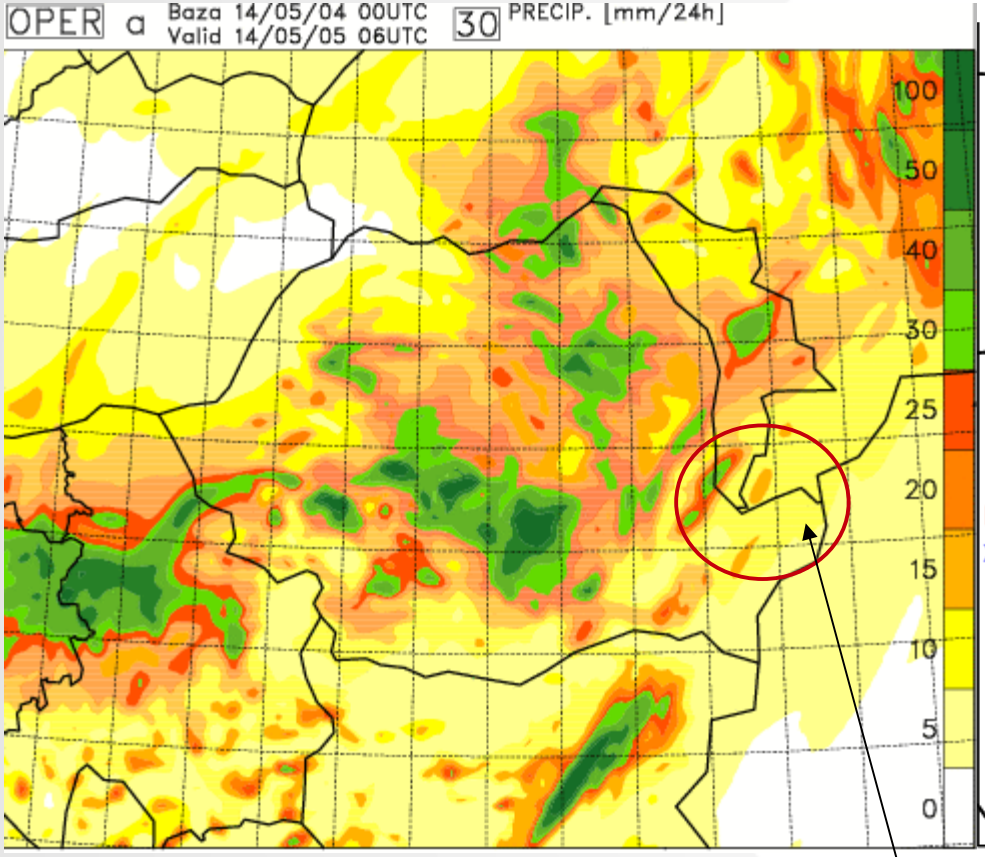
24h cumulated precipitation

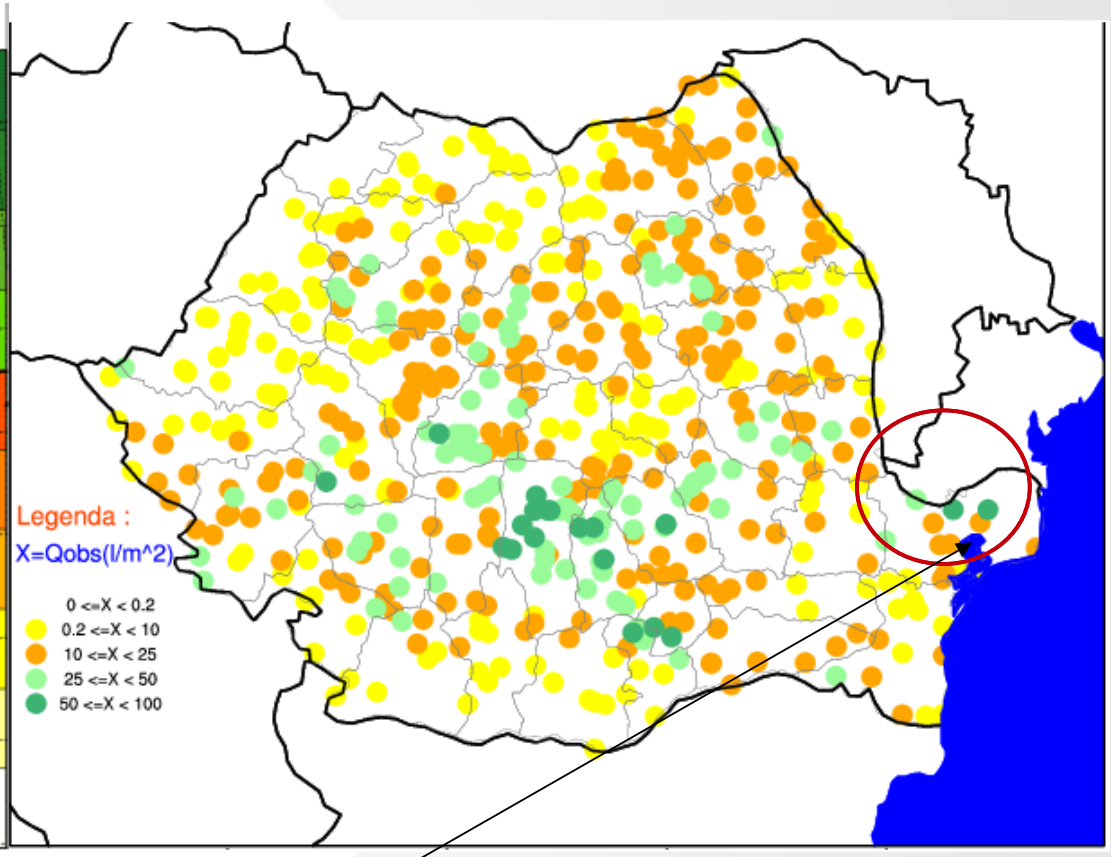


Complementary sub grid updraft & non saturated downdraft

Case of 4th May 2014

24 h cumulated precipitation





ALARO-OPER

SYNOP+PLUVIO+HYDRO Observation

Generally a good forecast !

For Bucharest:

Observed 57l/mp

Forecasted – over 50l/mp

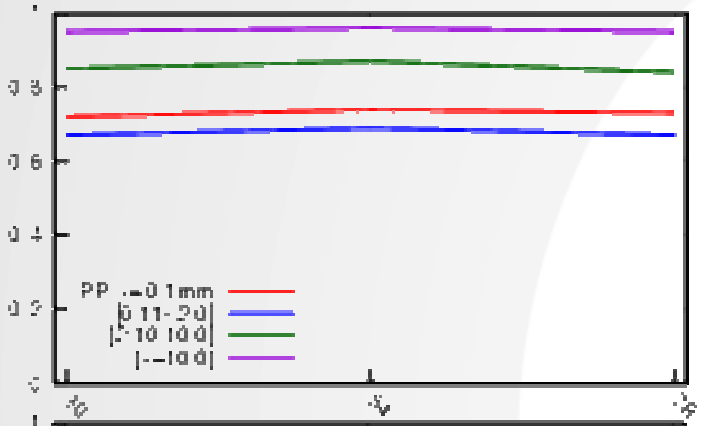
Areas of underestimated precipitation

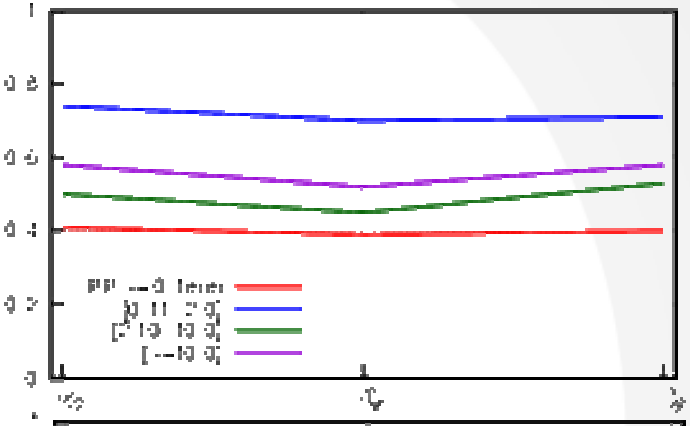
ALARO-0 baseline
Precipitation Verification scores

Fraction correct
Perfect score = 1

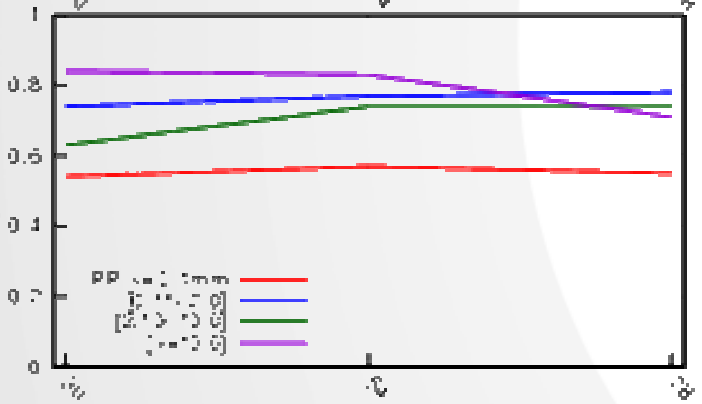
False alarm rate
Perfect score = 0

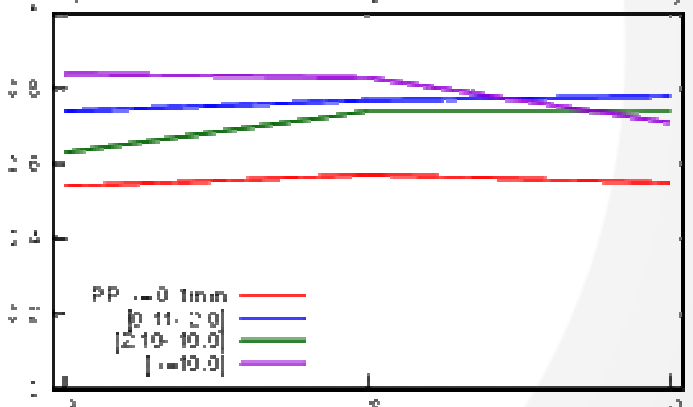
Jan



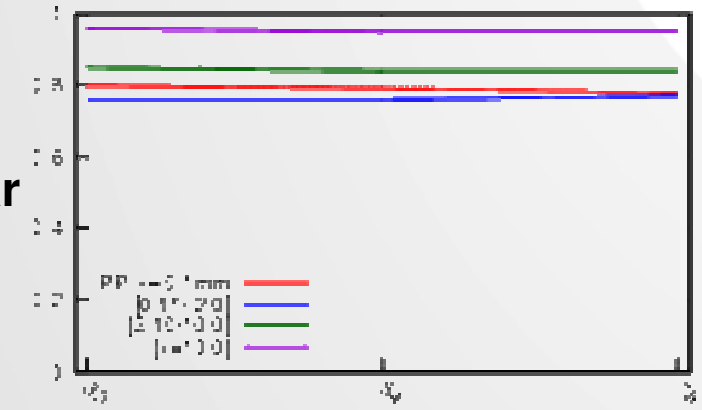


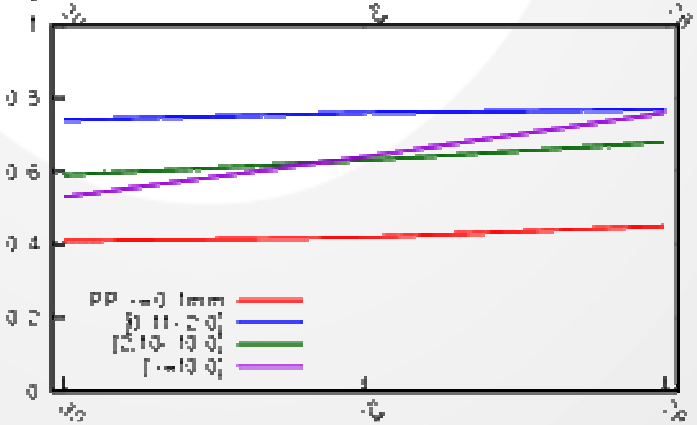
Feb





Mar





- the scores are computed against the data registered to the surface observation stations (~160)
- not enough precipitation events
- the more intense precipitation (>10l/mp) scores are better for the first day
- the very light unrealistic precipitation is reduced

ALARO-0 baseline

Future plans:

- Cy38t1
  already implemented
  to be validated

- Slight increase of the ALARO-Romania domain size and resolution
  Δx=5km
  number of the vertical levels to be established during the tests
- Data assimilation