

Alaro experiences in Croatia

Dunja Drvar and Martina Tudor

Short history

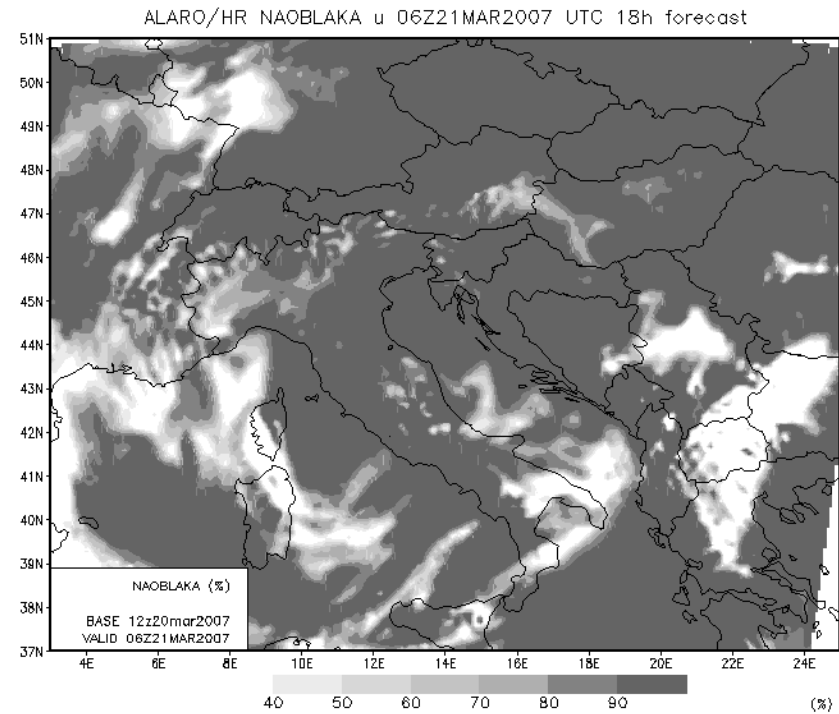
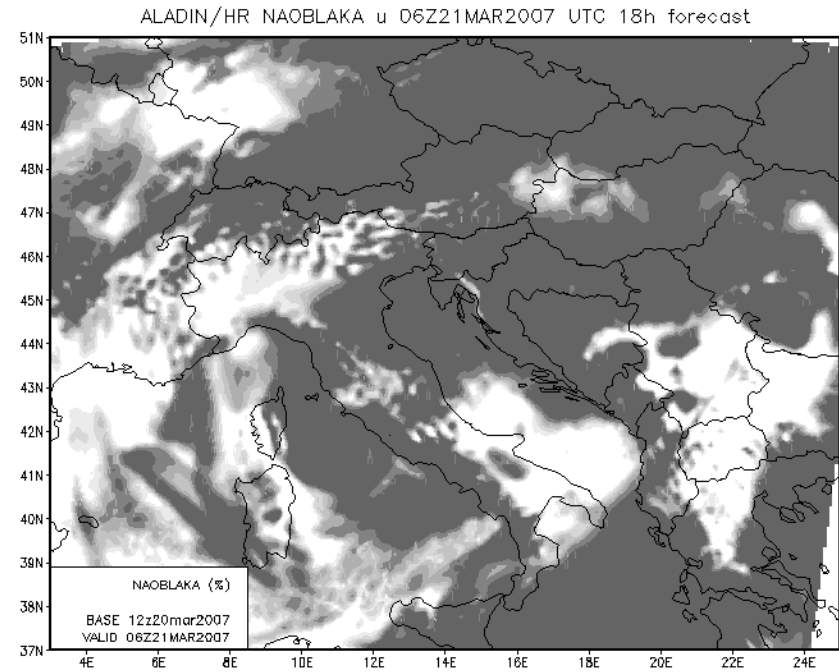
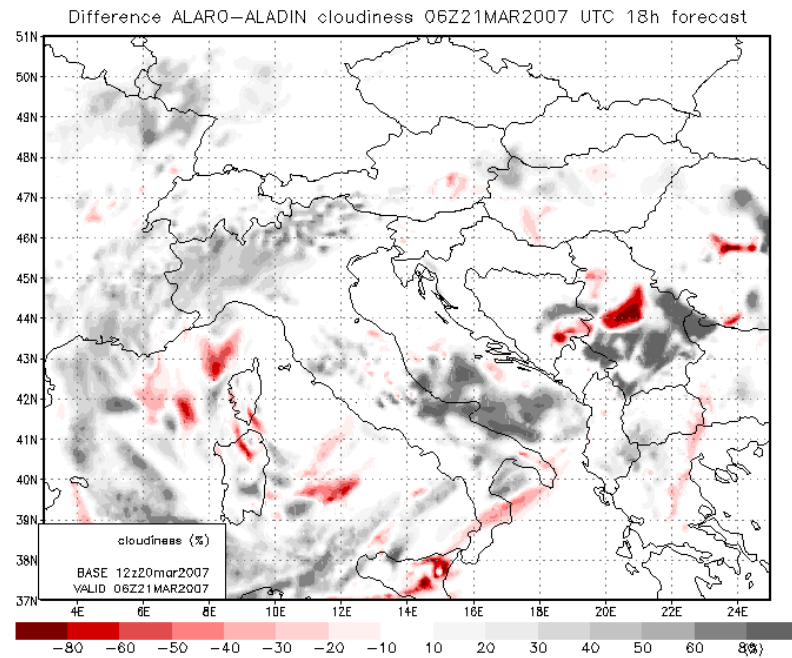
- 1st branch ported in September
- 2nd branch ported 2nd December
- Run twice a day, 00 and 12 UTC runs, 72 hour forecast, since 7th December 2006.
- “official” common version ported 2nd February 2007, used as an operational executable since 6th February

Operational Alaro outputs

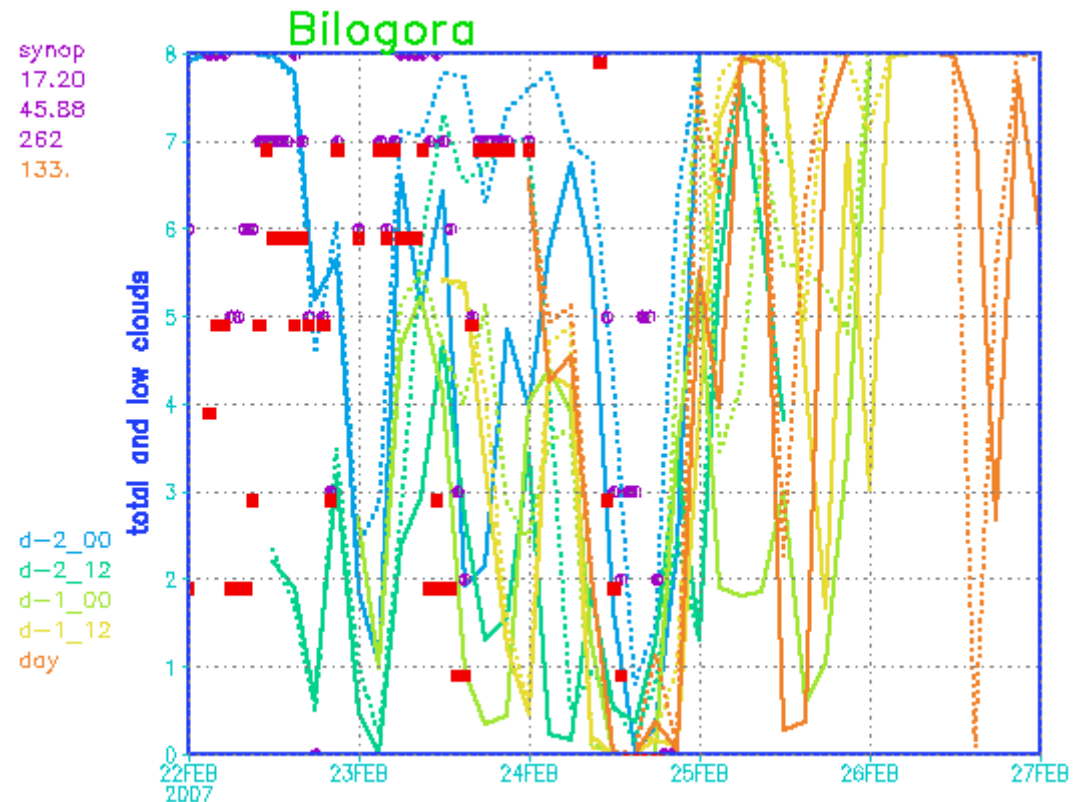
- The same output as from Aladin operational run, figures, tables and meteograms
- Differences between Alaro and Aladin forecasts are plotted for precipitation, cloudiness, 2m temperature and humidity, 10m wind, mean sea level pressure and other prognostic variables.

Cloudiness

- Differences between Alaro and Aladin forecasts are plotted



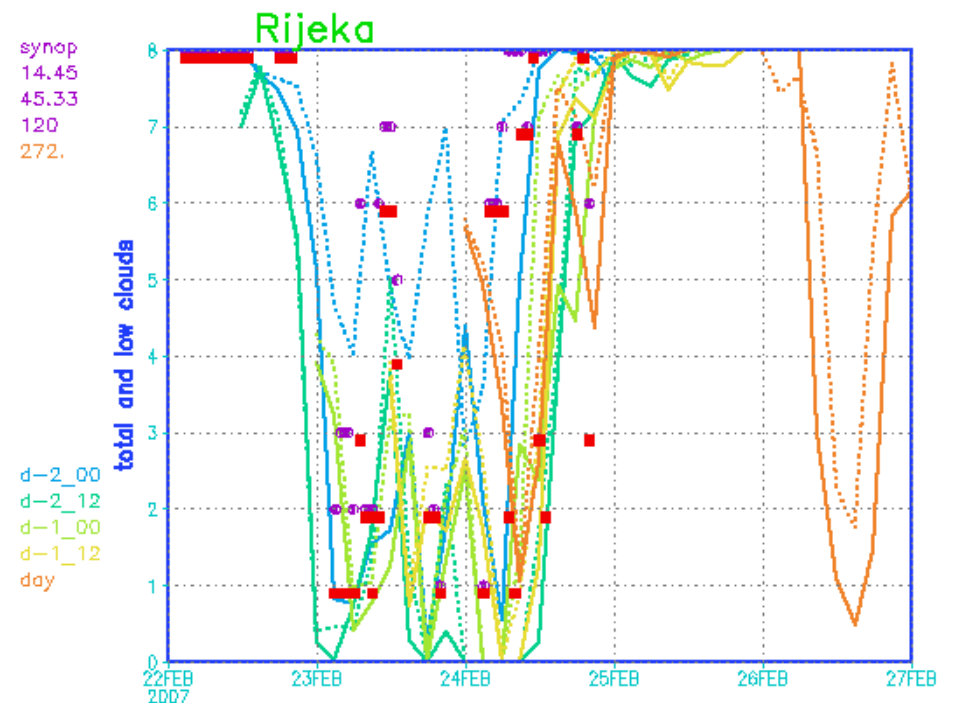
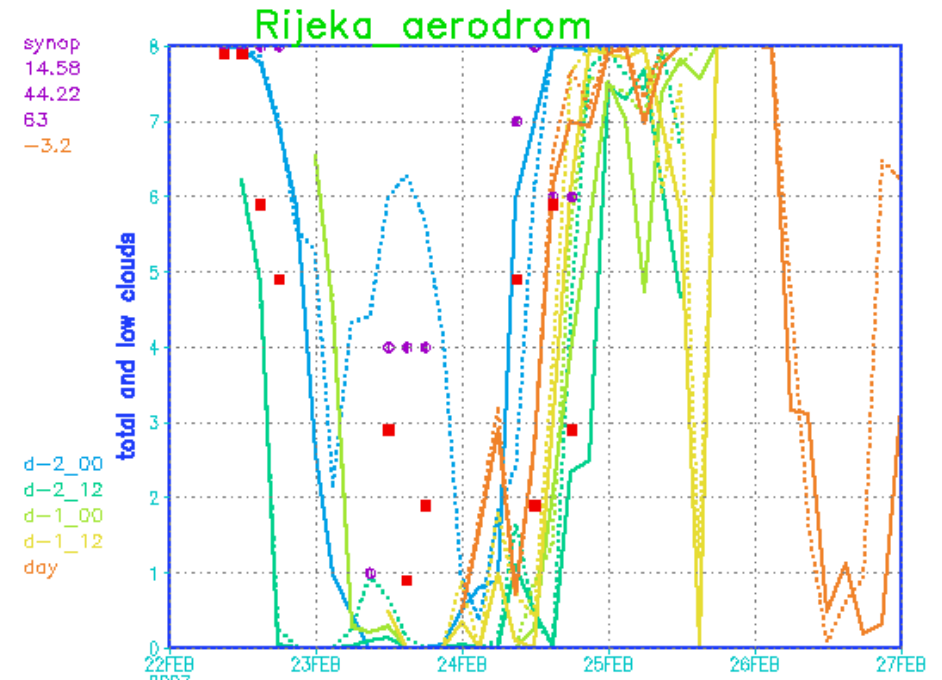
Cloudiness



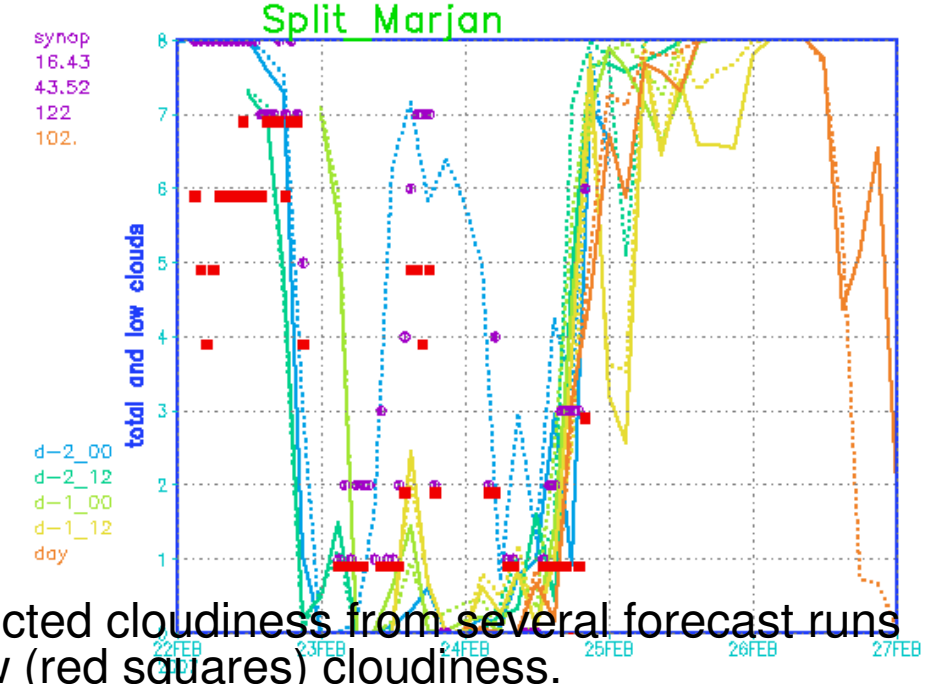
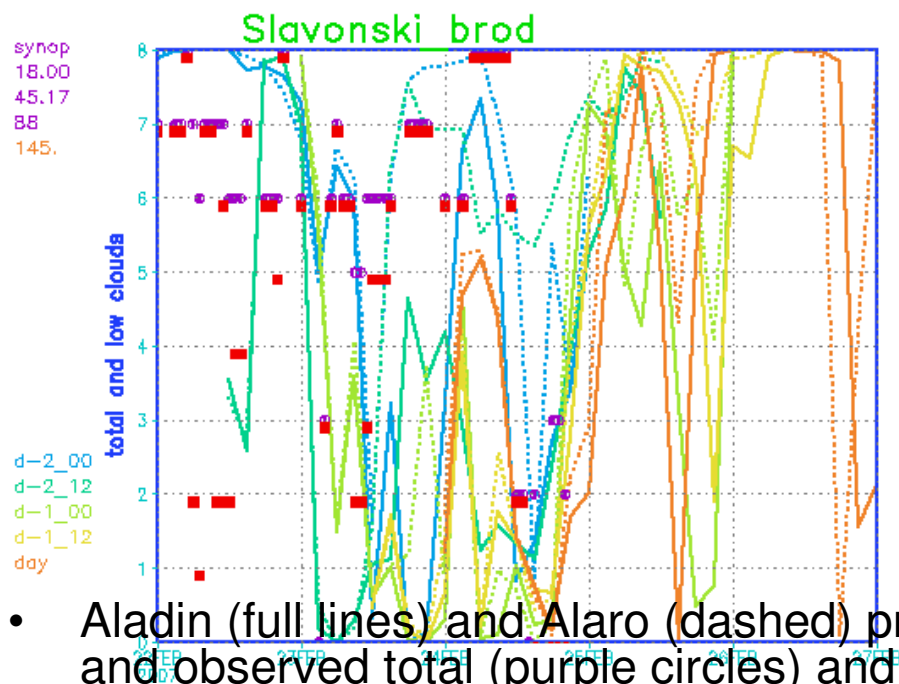
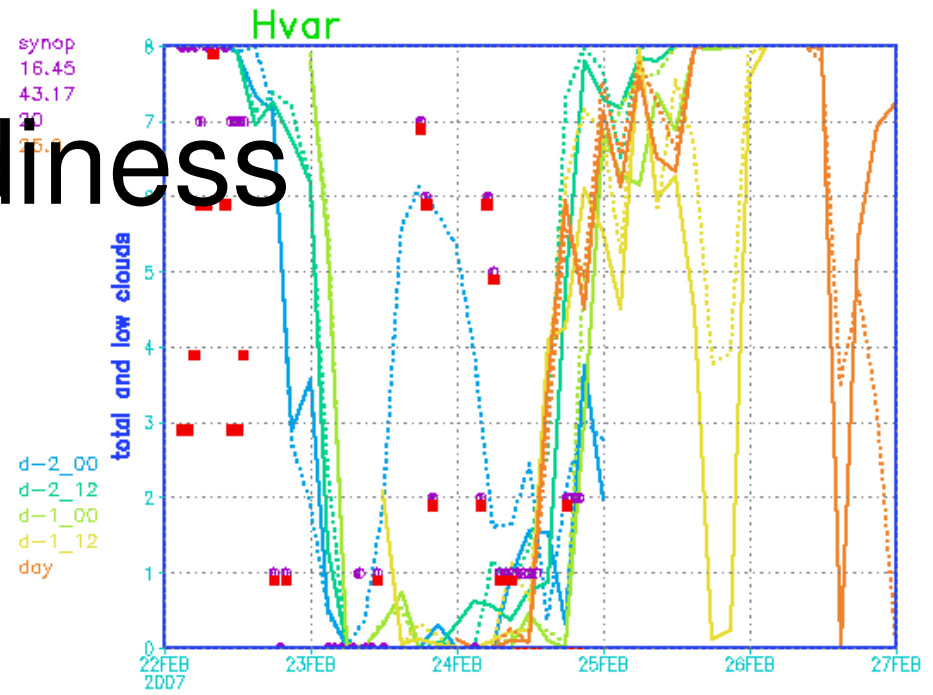
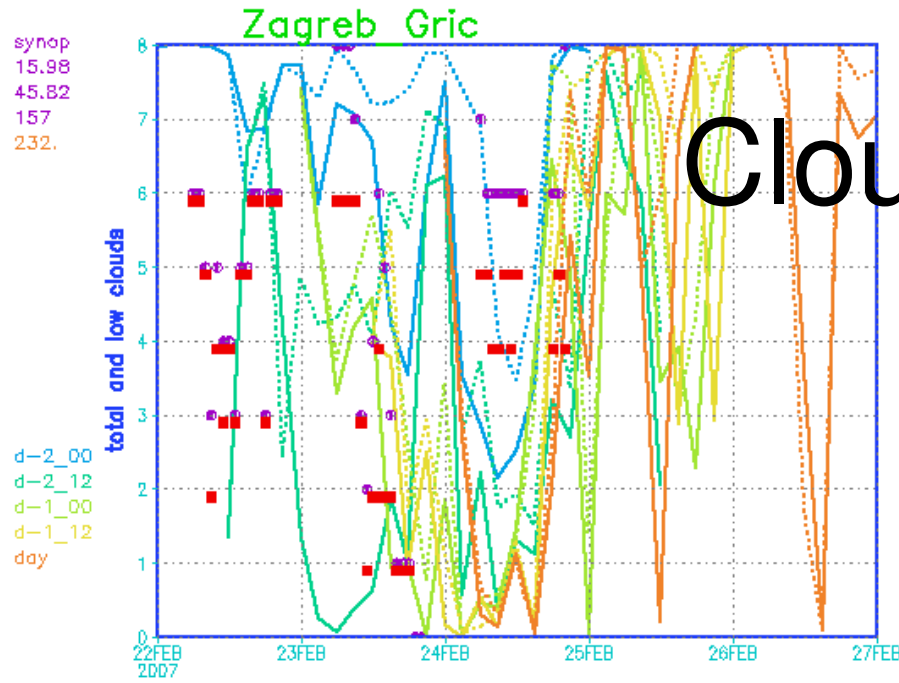
- Aladin (full lines) and Alaro (dashed) predicted cloudiness from several forecast runs and observed total (purple circles) and low (red squares) cloudiness.

Cloudiness

- Aladin (full lines) and Alaro (dashed) predicted cloudiness from several forecast runs and observed total (purple circles) and low (red squares) cloudiness.



Cloudiness



- Aladin (full lines) and Alaro (dashed) predicted cloudiness from several forecast runs and observed total (purple circles) and low (red squares) cloudiness.

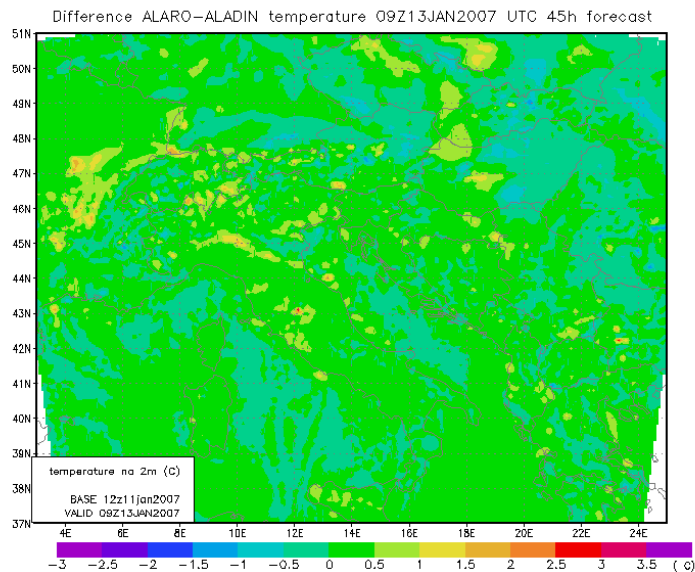
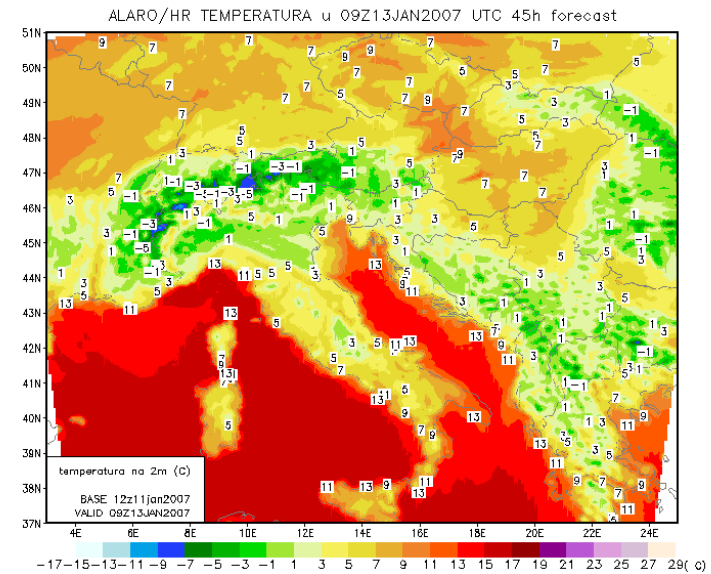
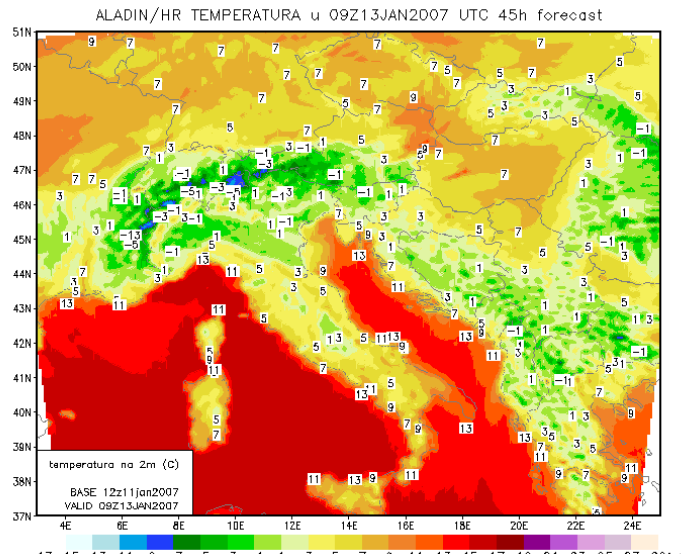
Cloudiness summary

- Usually, Alaro gives more clouds than Aladin, especially later in the forecast run
- Aladin loses much moisture from the atmosphere that is kept in Alaro with moist prognostic variables

Temperature

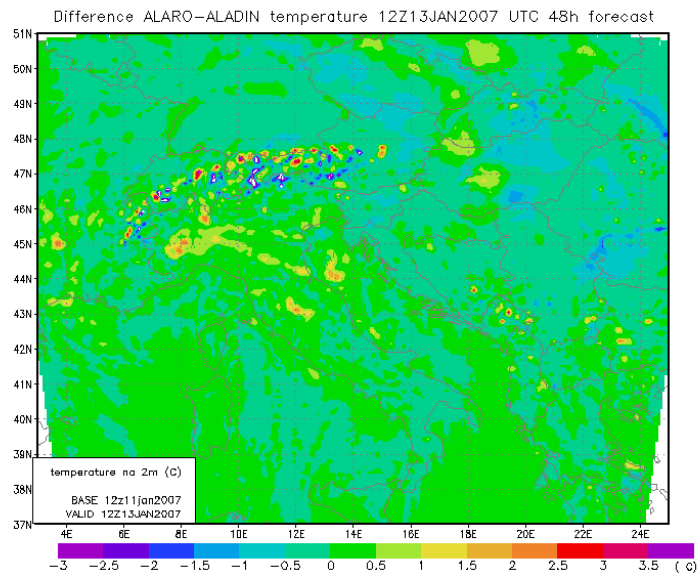
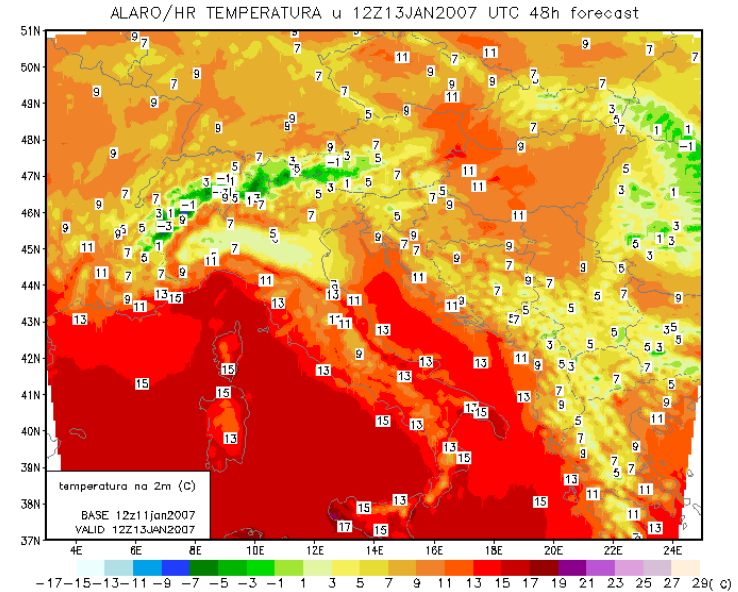
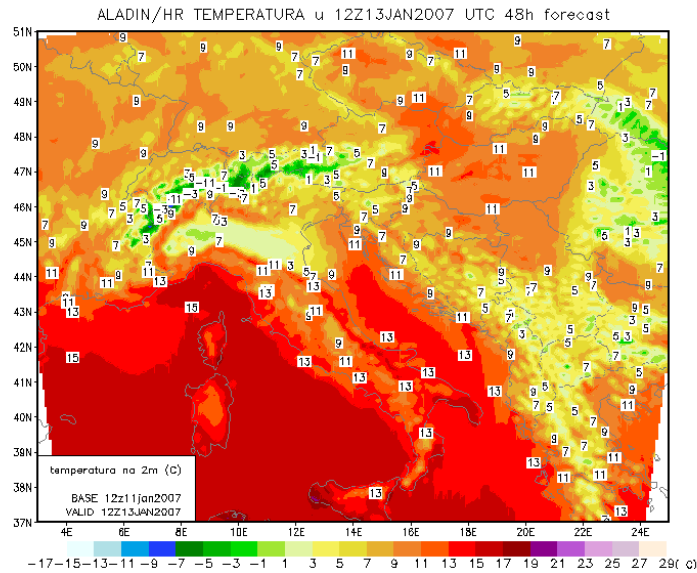
- 2m temperature forecasts are plotted as well as their difference
- Both are also compared to measurements
- Examples of a cold front, precipitation and some other phenomena will be shown.

Temperature



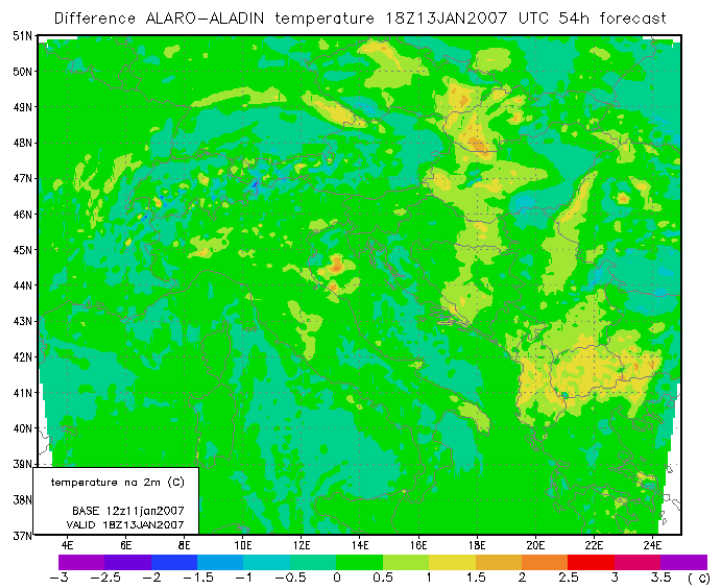
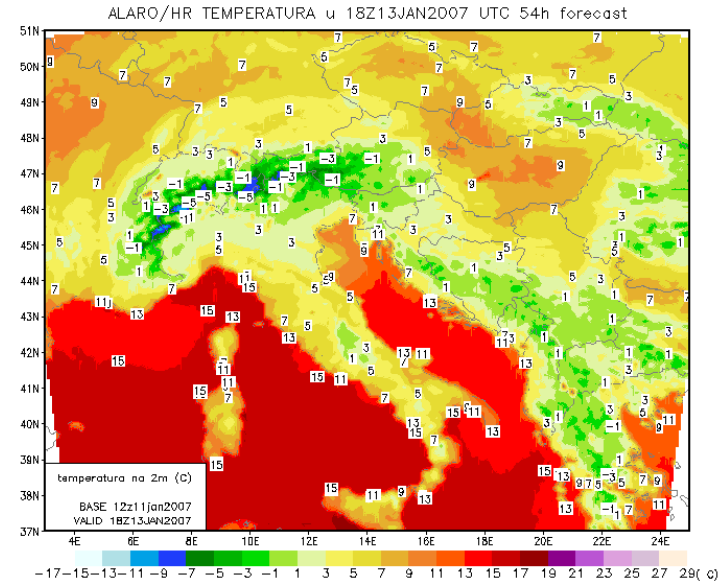
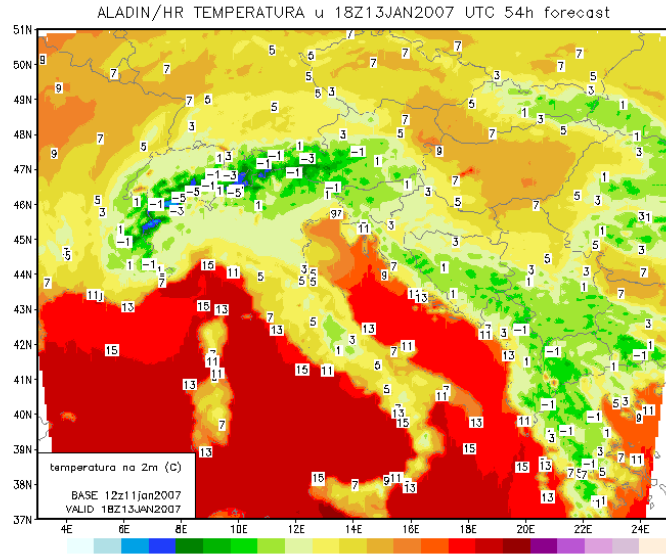
- 2m temperature forecasts from both models and their differences are plotted

Temperature



- Plotted difference in 2m temperatures shows some spotty behaviour over Alps

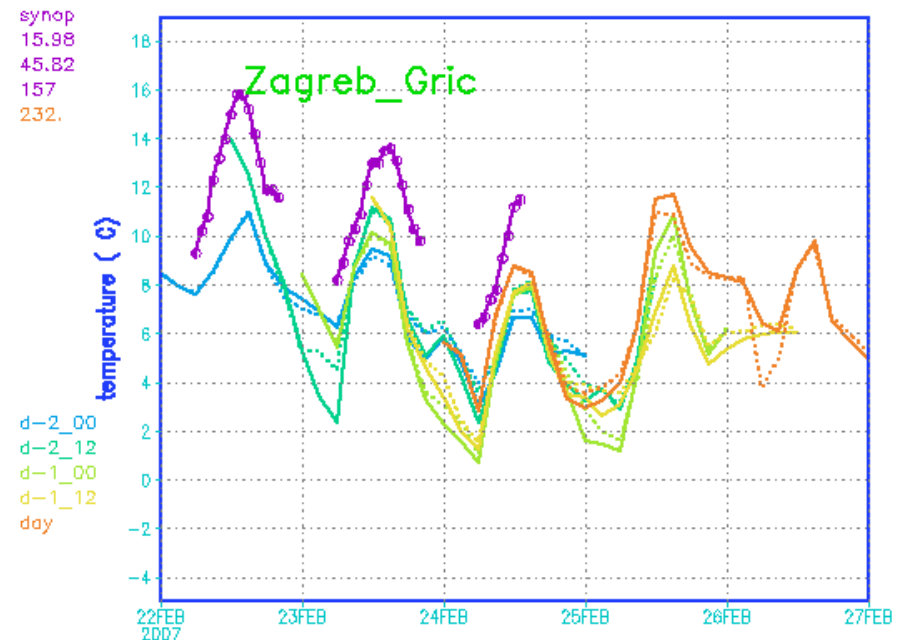
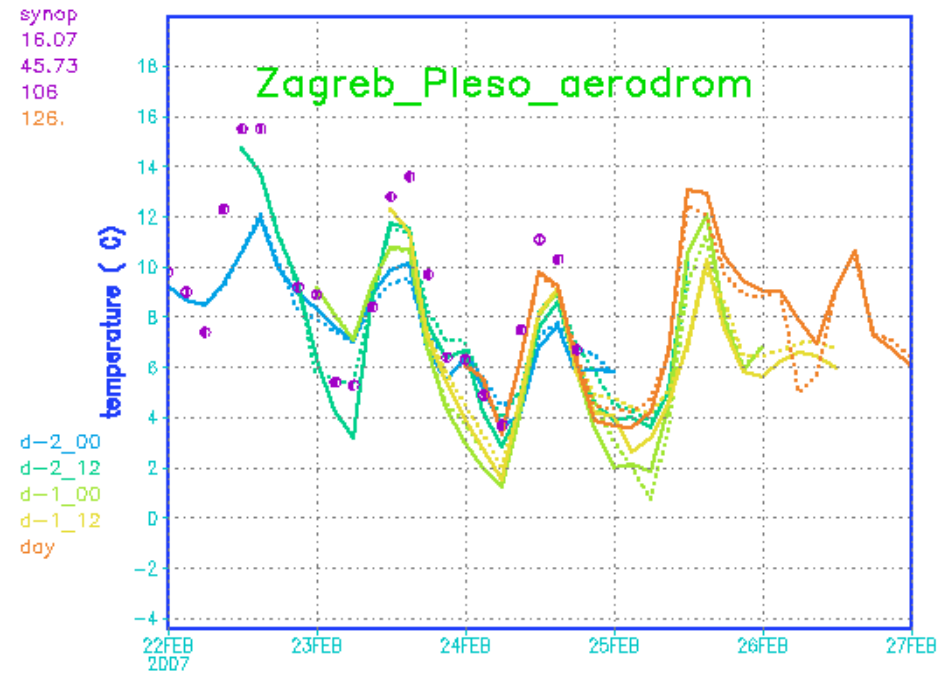
Temperature



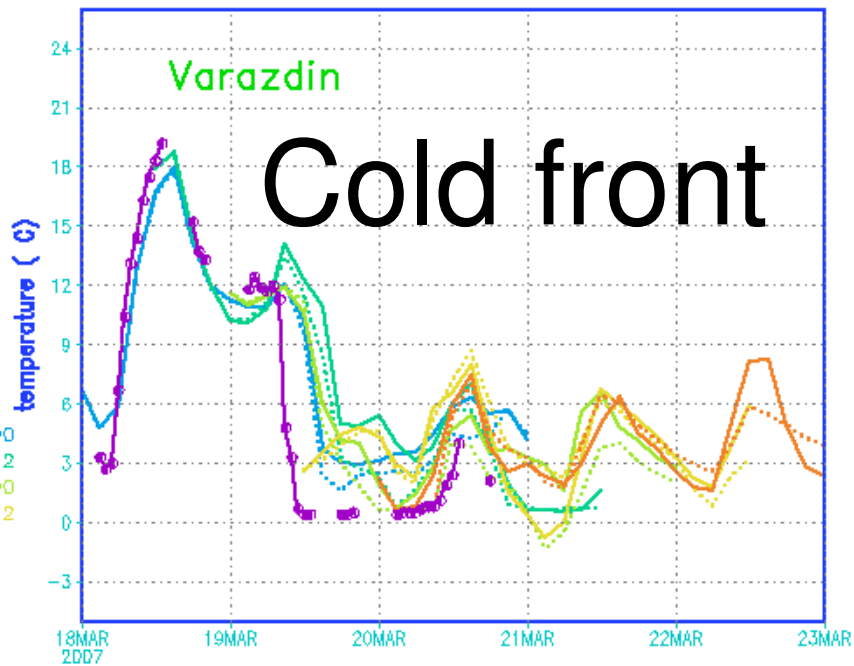
- That dissapears again after a few hours

Temperature

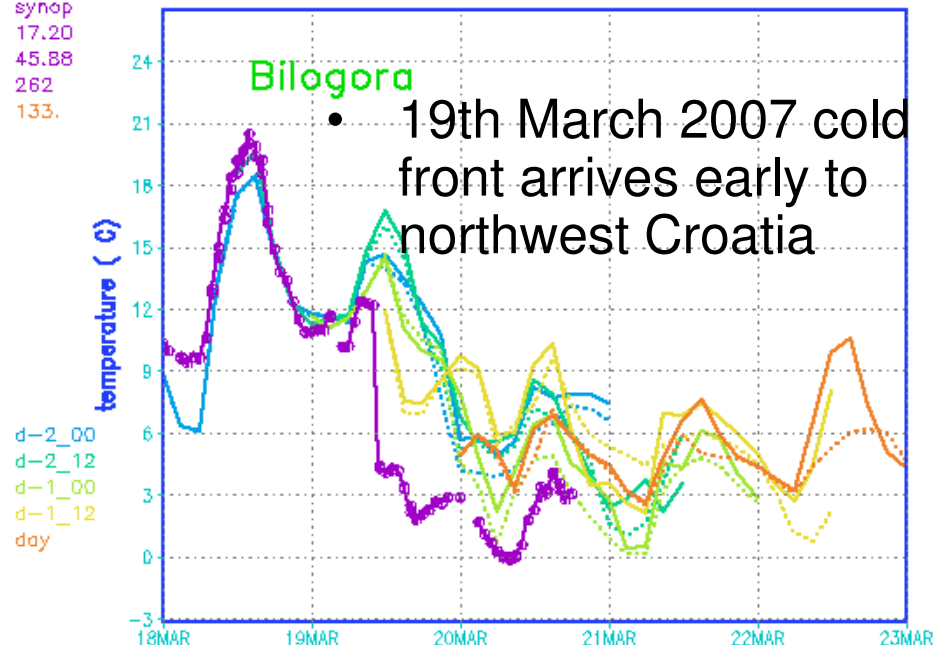
- Aladin (full lines) and Alaro (dashed) predicted 2m temperature from several forecast runs and measured 2m temperature (dark purple).



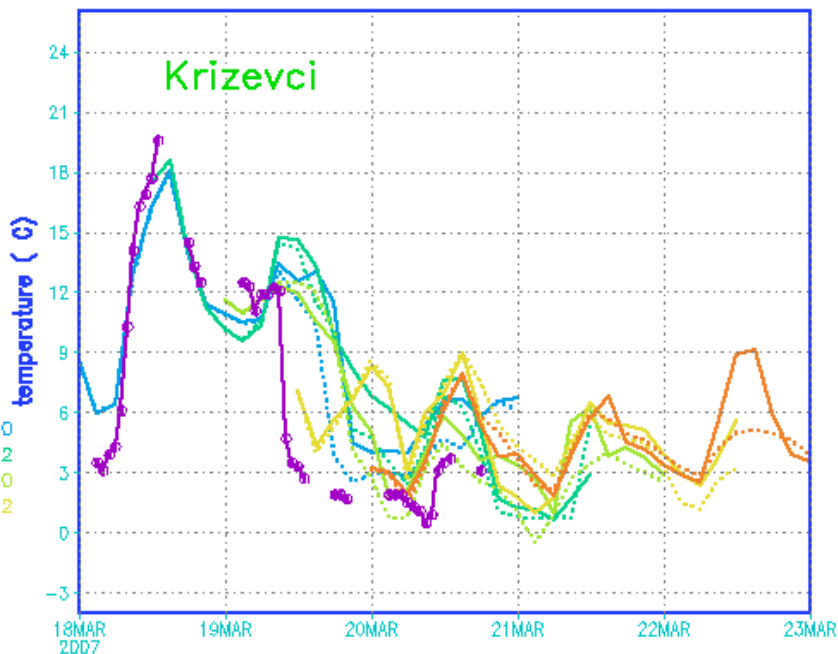
synop
16.38
46.30
167
148.



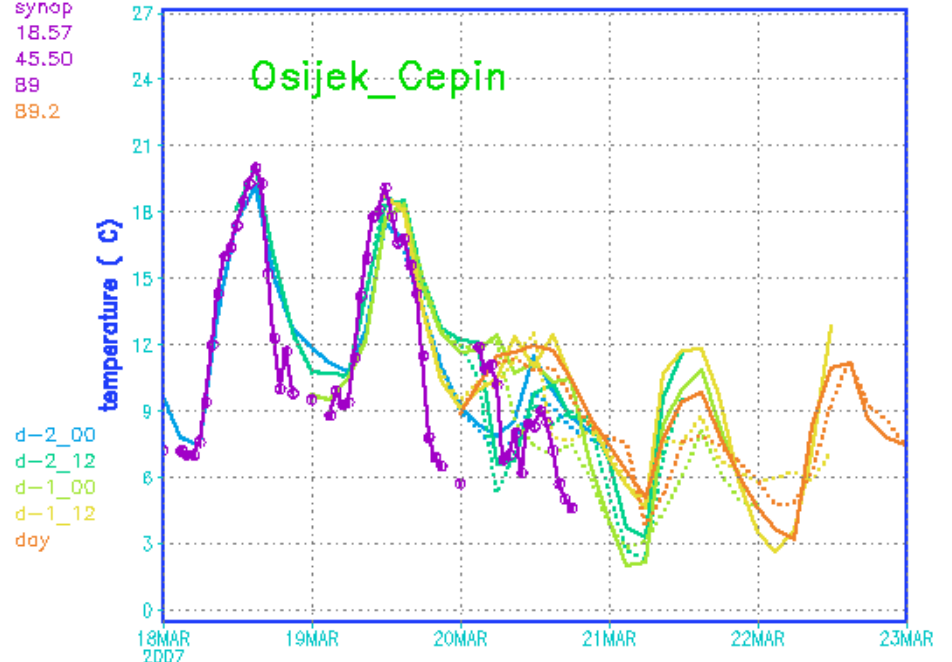
synop
17.20
45.88
262
133.



synop
16.55
46.03
155
132.

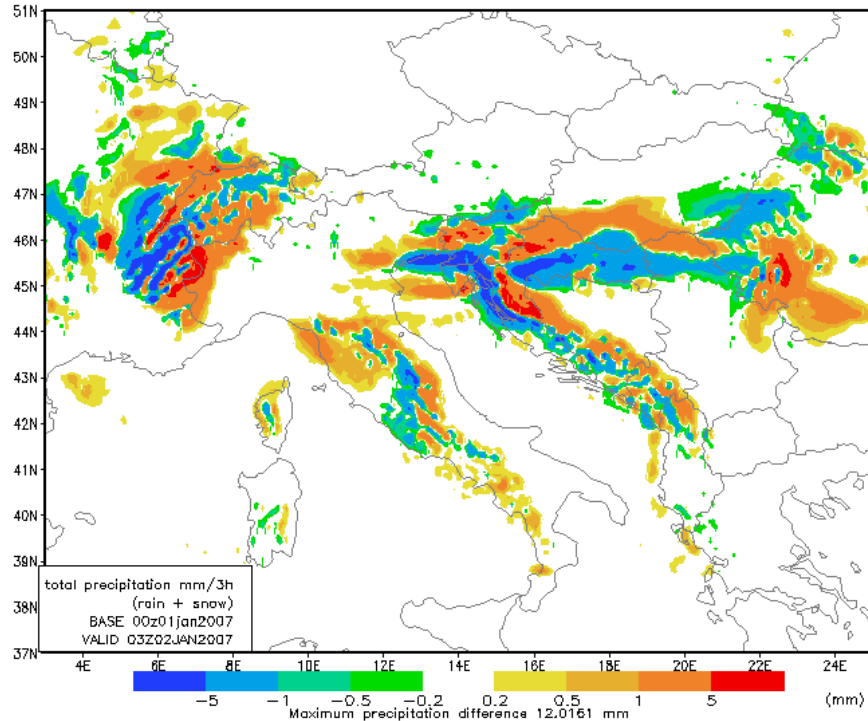


synop
18.57
45.50
89
89.2

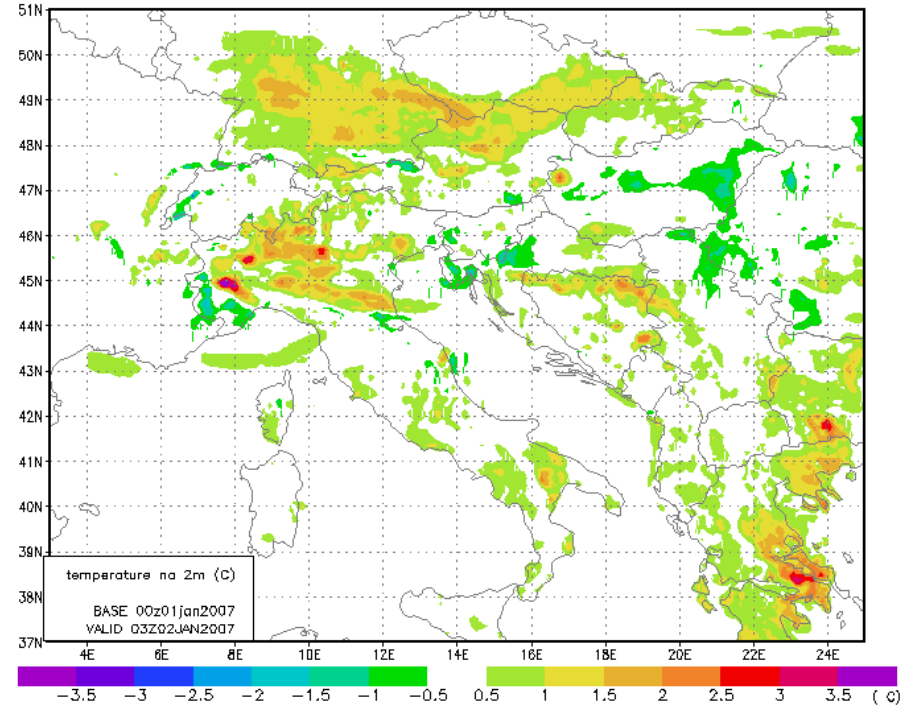


Precipitation and temperature

Difference ALARO-ALADIN total precipitation 03Z02JAN2007 UTC 27h forecast



Difference ALARO-ALADIN temperature 03Z02JAN2007 UTC 27h forecast

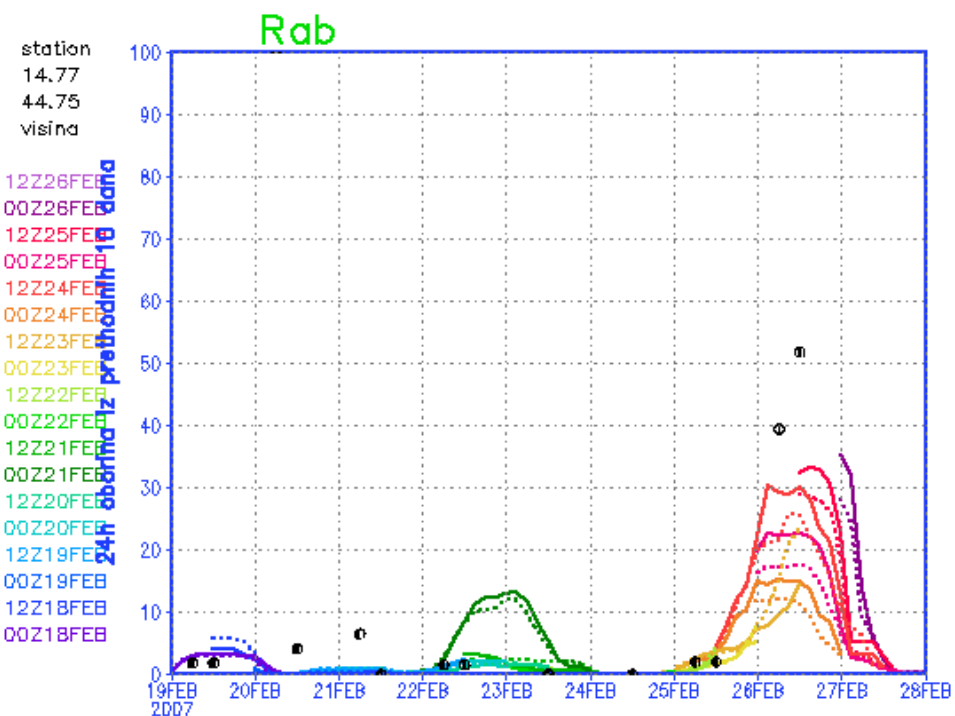
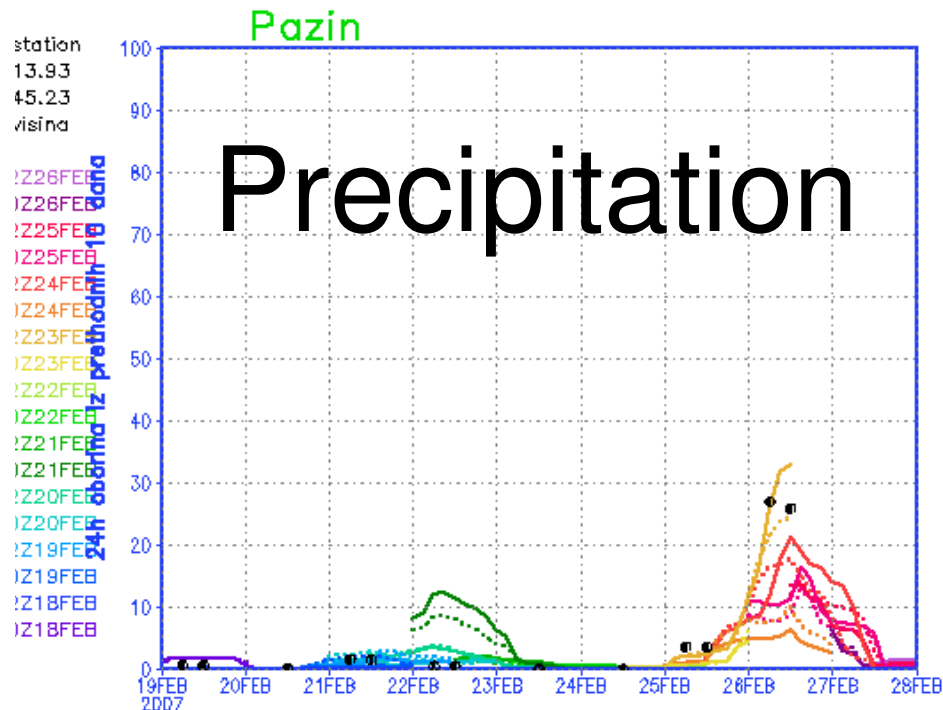
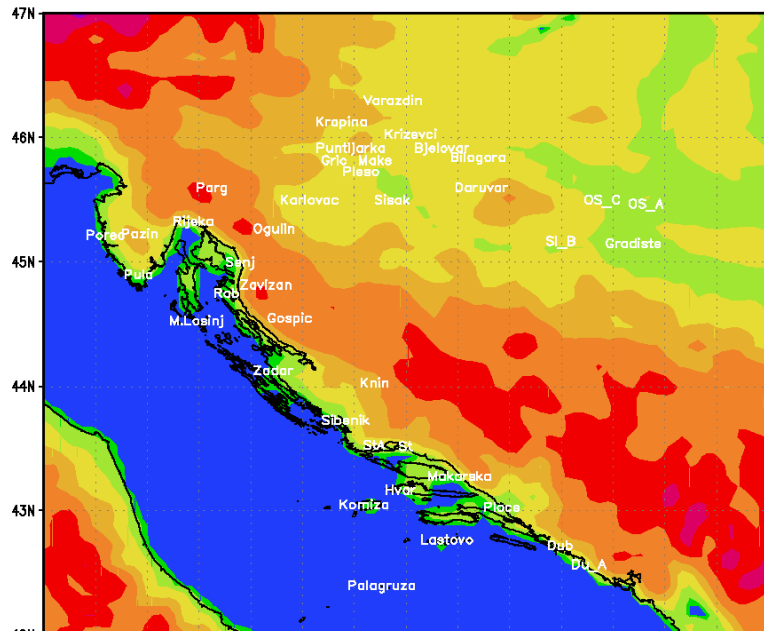


- Precipitation differences and temperature differences.

Temperature summary

- Cold fronts move faster in Alaro than in Aladin
- Temperature differences due to evaporation of precipitation
- Temperature differences due to cloudiness
- And some of the differences are not yet explained 😊

Hrvatske SYNOP stanice



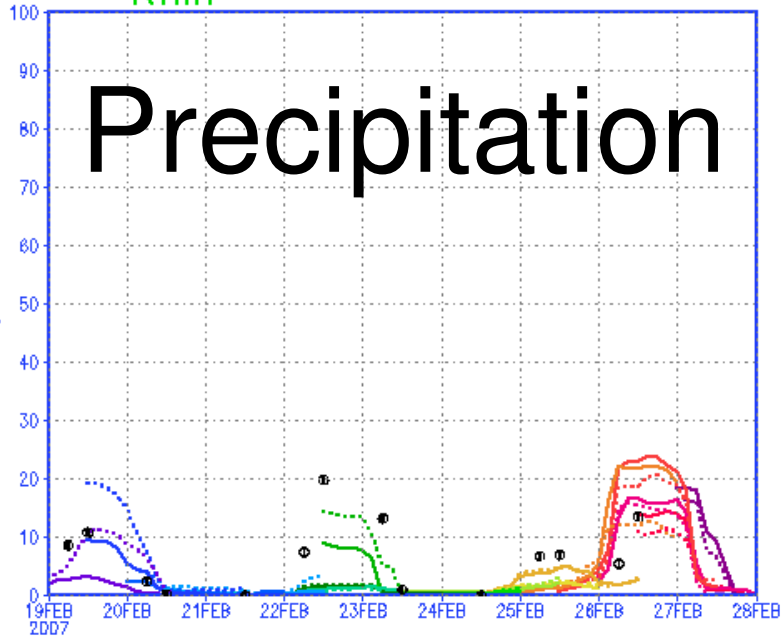
- Accumulated precipitation during previous 24 hours from Aladin (full lines) and Alaro (dashed) and measured (dots).

Knin

station
16.20
44.03
visina

Precipitation

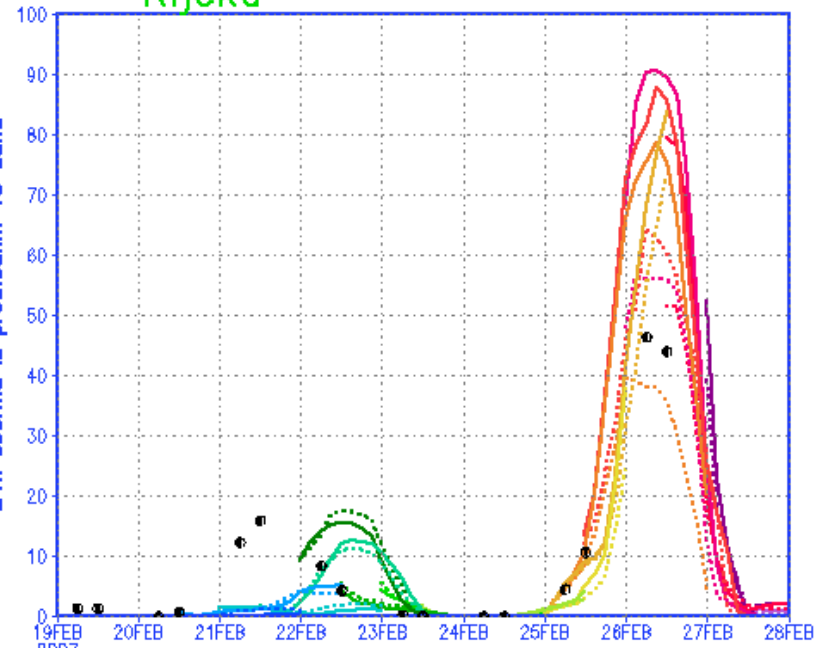
12Z26FEB
00Z26FEB
12Z25FEB
00Z25FEB
12Z24FEB
00Z24FEB
12Z23FEB
00Z23FEB
12Z22FEB
00Z22FEB
12Z21FEB
00Z21FEB
12Z20FEB
00Z20FEB
12Z19FEB
00Z19FEB
12Z18FEB
00Z18FEB



Rijeka

station
14.45
45.33
visina

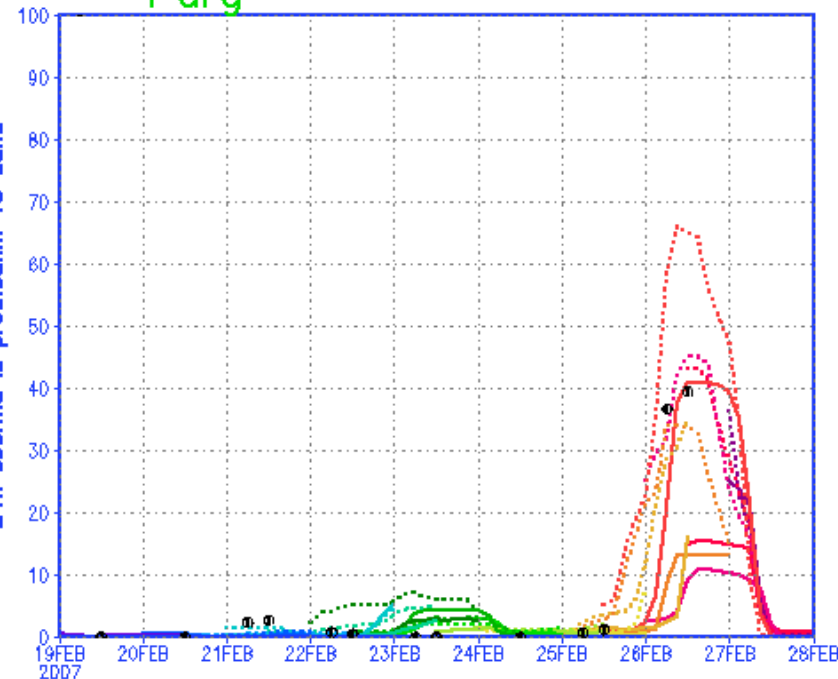
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00Z26FEB
12Z25FEB
00Z25FEB
12Z24FEB
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12Z23FEB
00Z23FEB
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00Z22FEB
12Z21FEB
00Z21FEB
12Z20FEB
00Z20FEB
12Z19FEB
00Z19FEB
12Z18FEB
00Z18FEB



Parg

station
14.63
45.60
visina

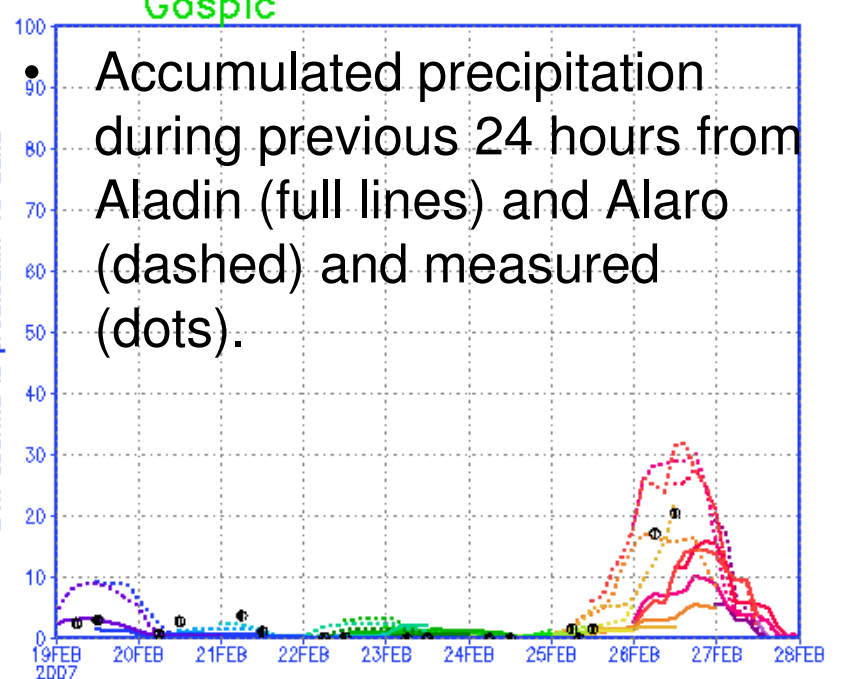
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00Z22FEB
12Z21FEB
00Z21FEB
12Z20FEB
00Z20FEB
12Z19FEB
00Z19FEB
12Z18FEB
00Z18FEB



Gospic

station
15.38
44.55
visina

12Z26FEB
00Z26FEB
12Z25FEB
00Z25FEB
12Z24FEB
00Z24FEB
12Z23FEB
00Z23FEB
12Z22FEB
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00Z19FEB
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00Z18FEB



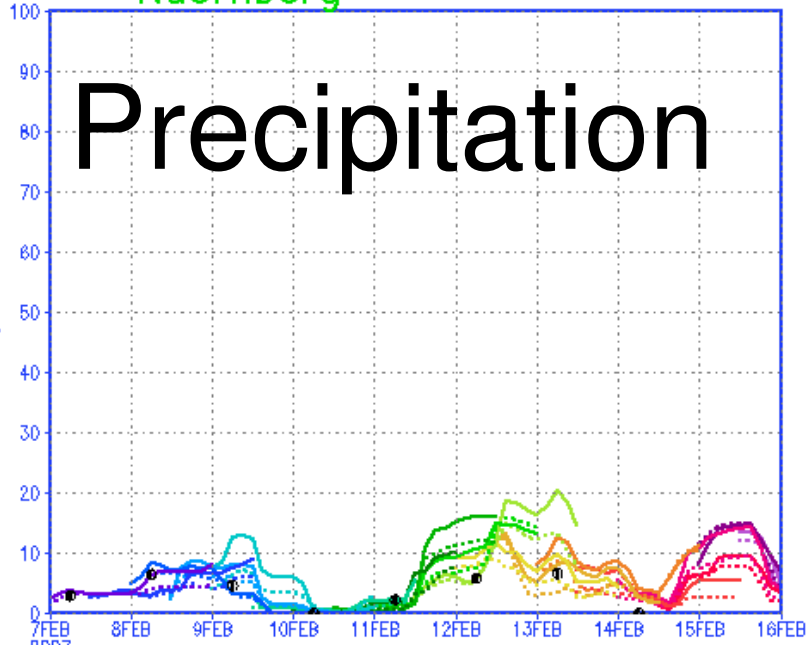
● Accumulated precipitation during previous 24 hours from Aladin (full lines) and Alaro (dashed) and measured (dots).

Nuernberg

station
11.05
49.50
visina

Precipitation

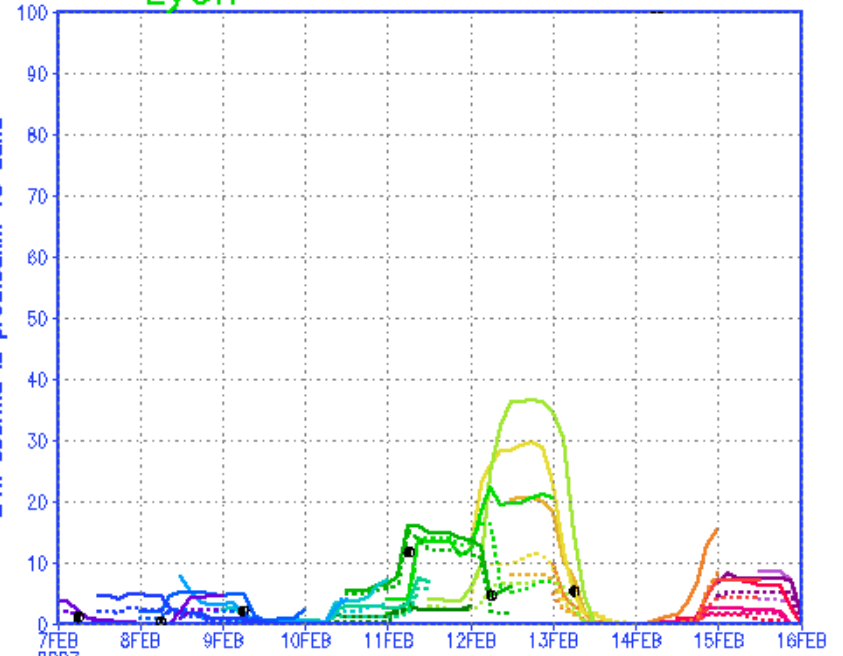
12Z14FEB
00Z14FEB
12Z13FEB
00Z13FEB
12Z12FEB
00Z12FEB
12Z11FEB
00Z11FEB
12Z10FEB
00Z10FEB
12Z09FEB
00Z09FEB
12Z08FEB
00Z08FEB
12Z07FEB
00Z07FEB
12Z06FEB
00Z06FEB



Lyon

station
04.93
45.72
visina

12Z14FEB
00Z14FEB
12Z13FEB
00Z13FEB
12Z12FEB
00Z12FEB
12Z11FEB
00Z11FEB
12Z10FEB
00Z10FEB
12Z09FEB
00Z09FEB
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00Z08FEB
12Z07FEB
00Z07FEB
12Z06FEB
00Z06FEB

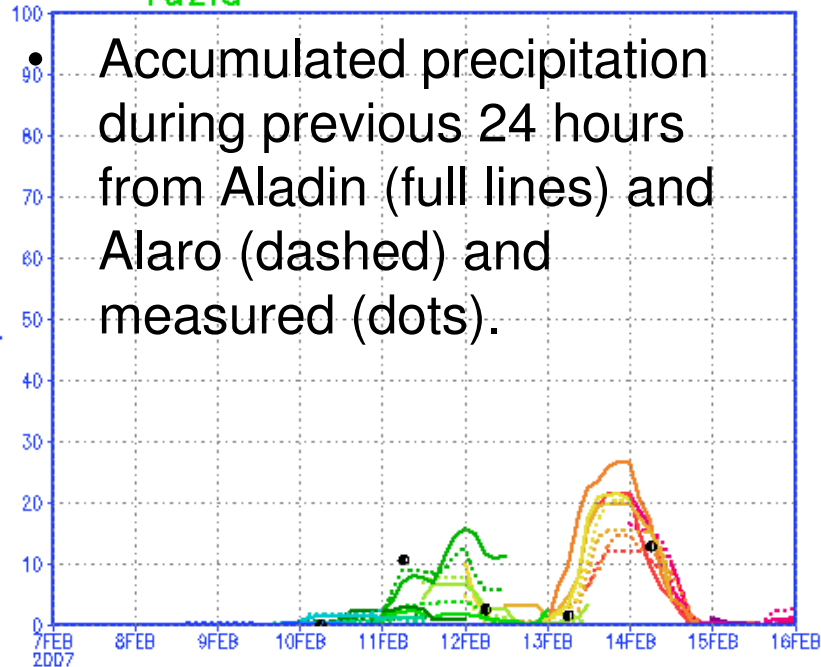


Tuzla

station
18.70
44.55
visina

● Accumulated precipitation during previous 24 hours from Aladin (full lines) and Alaro (dashed) and measured (dots).

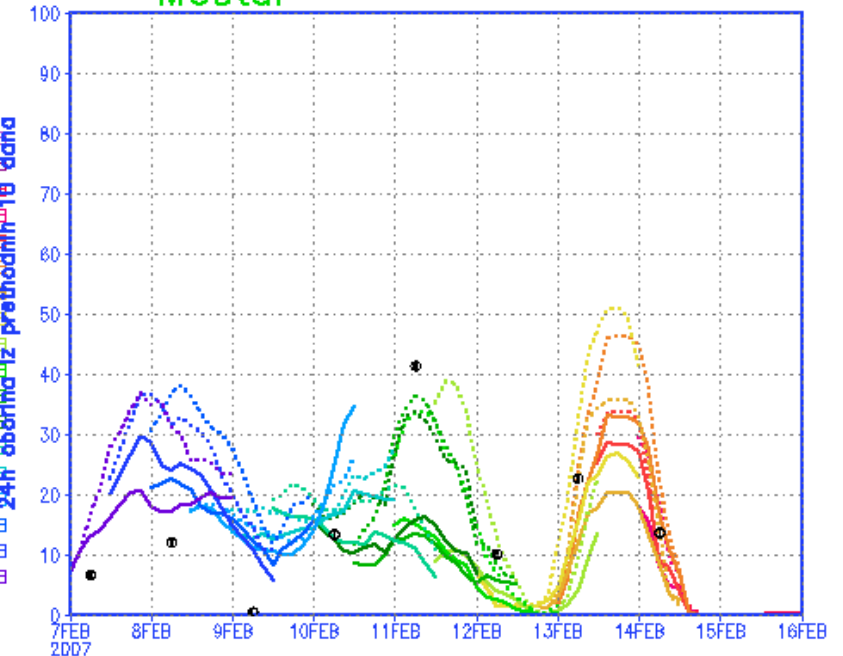
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00Z14FEB
12Z13FEB
00Z13FEB
12Z12FEB
00Z12FEB
12Z11FEB
00Z11FEB
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00Z10FEB
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00Z08FEB
12Z07FEB
00Z07FEB
12Z06FEB
00Z06FEB

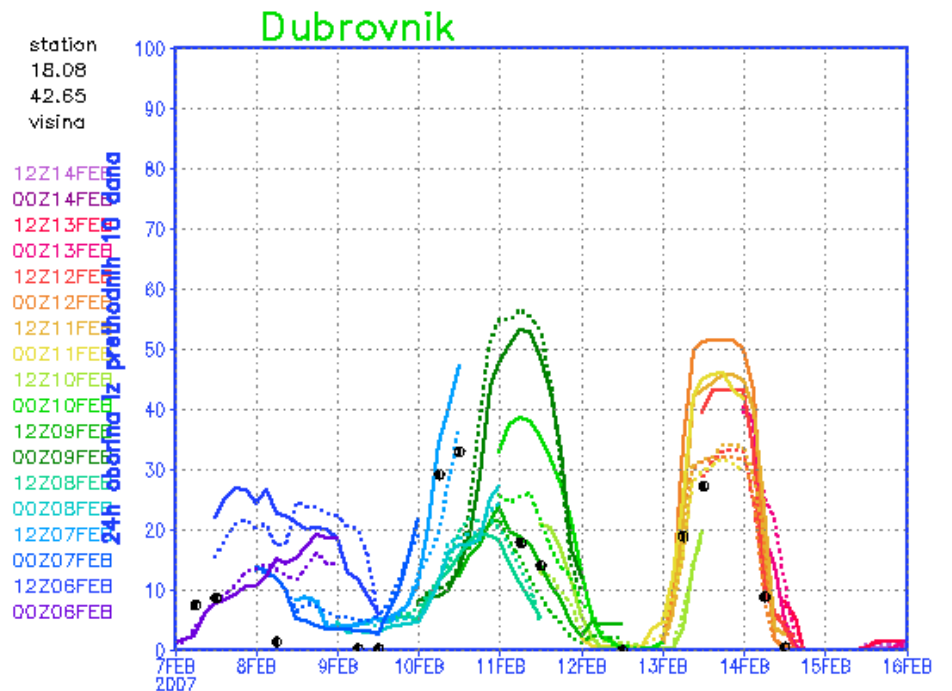
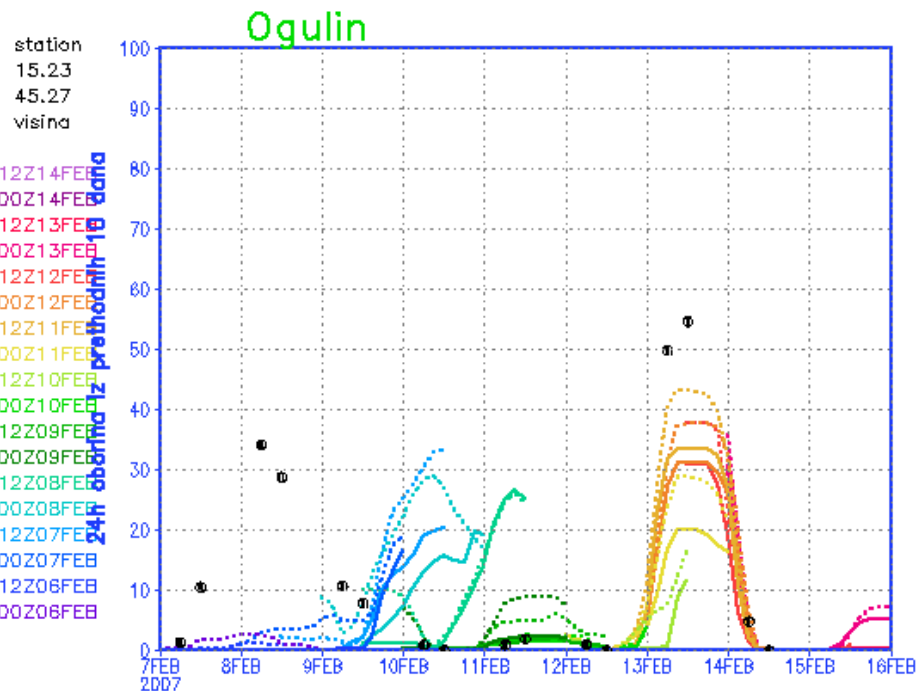
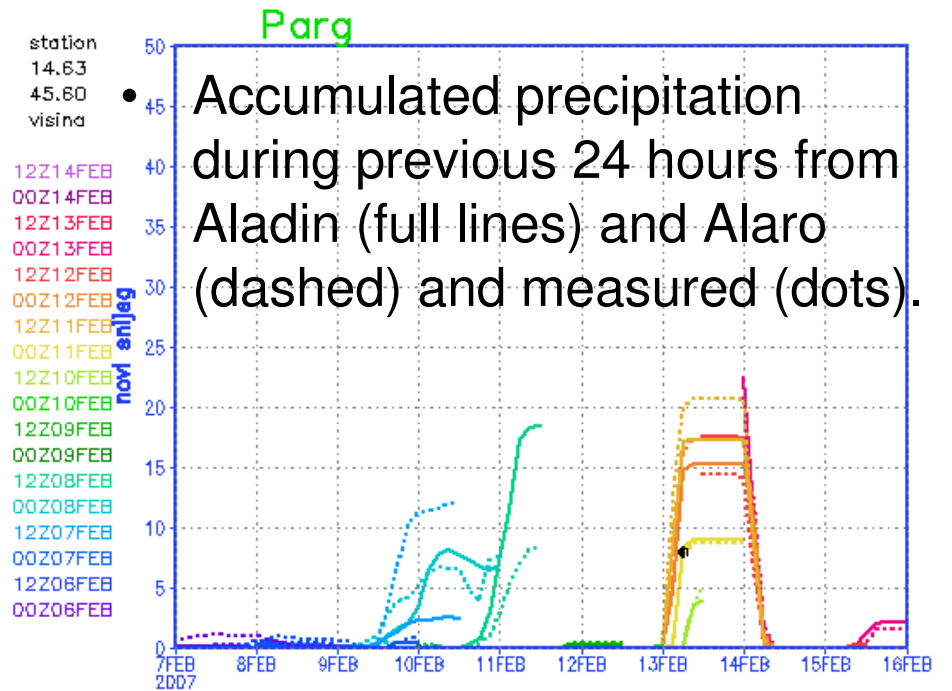
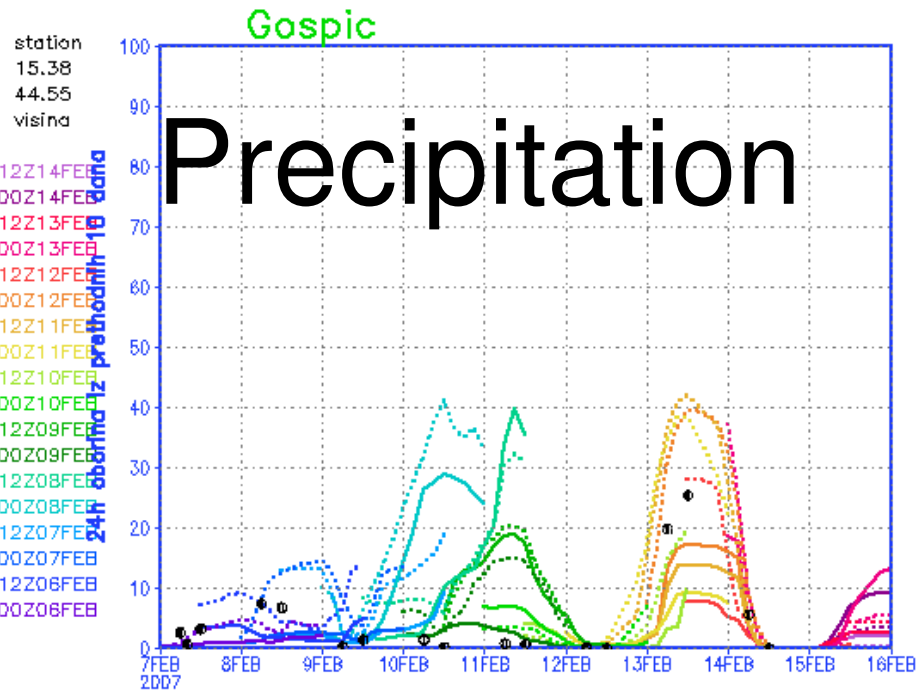


Mostar

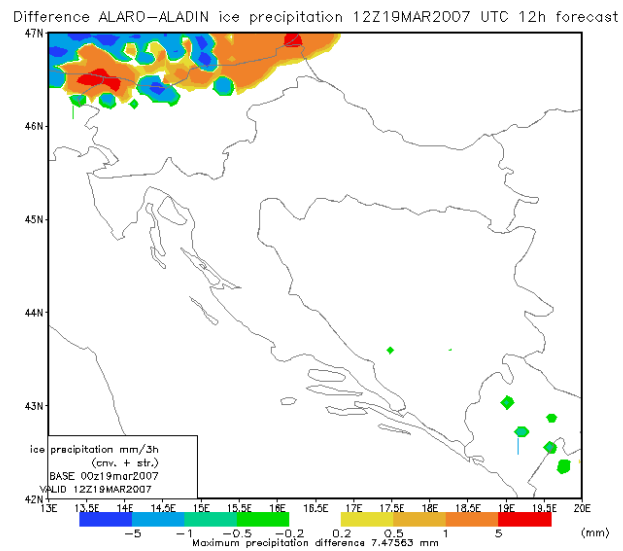
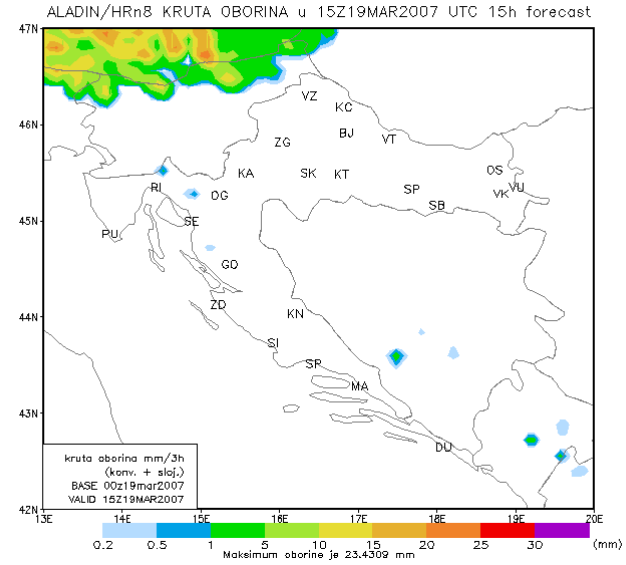
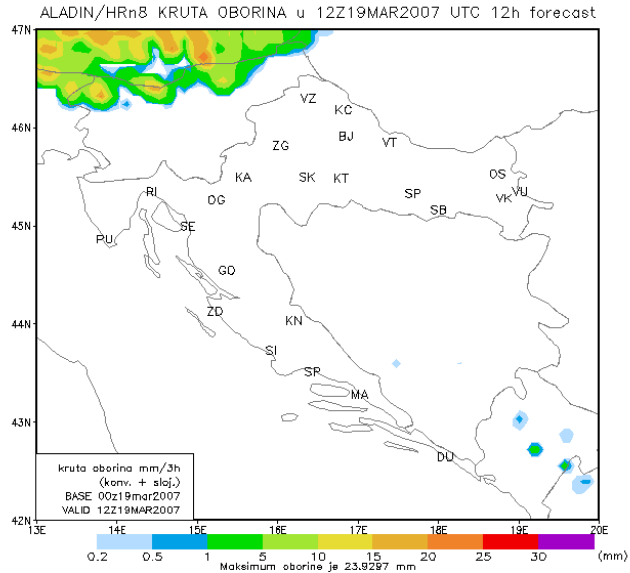
station
17.80
43.35
visina

12Z14FEB
00Z14FEB
12Z13FEB
00Z13FEB
12Z12FEB
00Z12FEB
12Z11FEB
00Z11FEB
12Z10FEB
00Z10FEB
12Z09FEB
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12Z07FEB
00Z07FEB
12Z06FEB
00Z06FEB





Snow

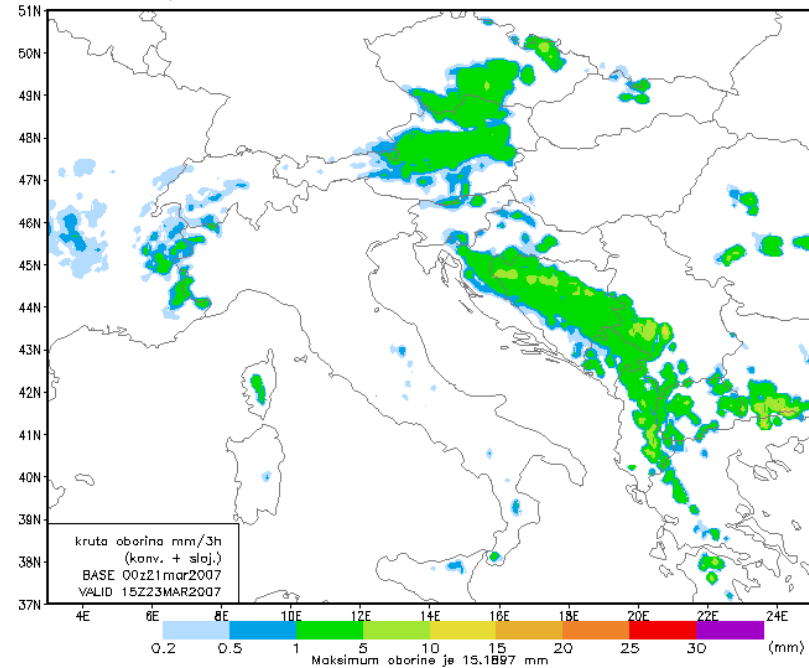


- Precipitation forecasts from Aladin and Alaro are plotted as well as their difference

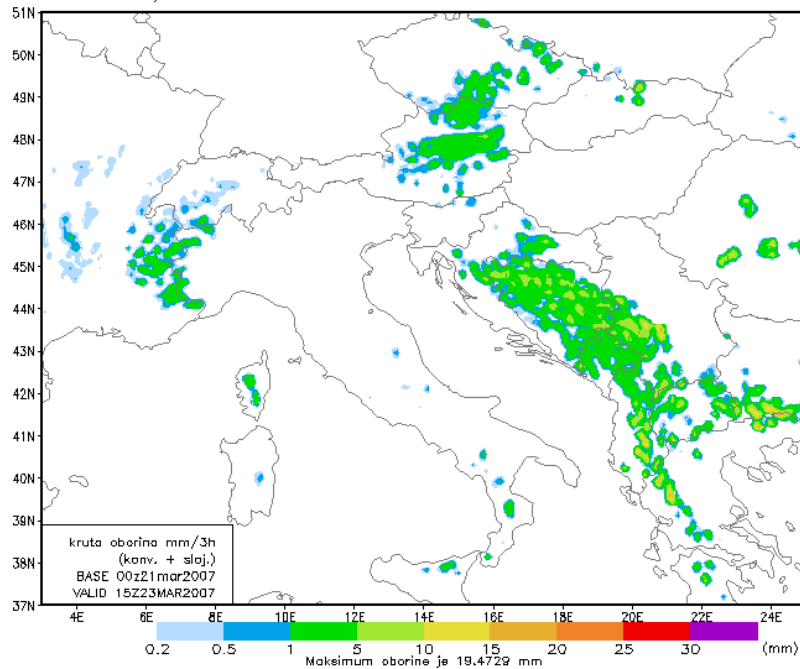
Snow

- Predicted snow from Aladin and Alaro and the difference is plotted

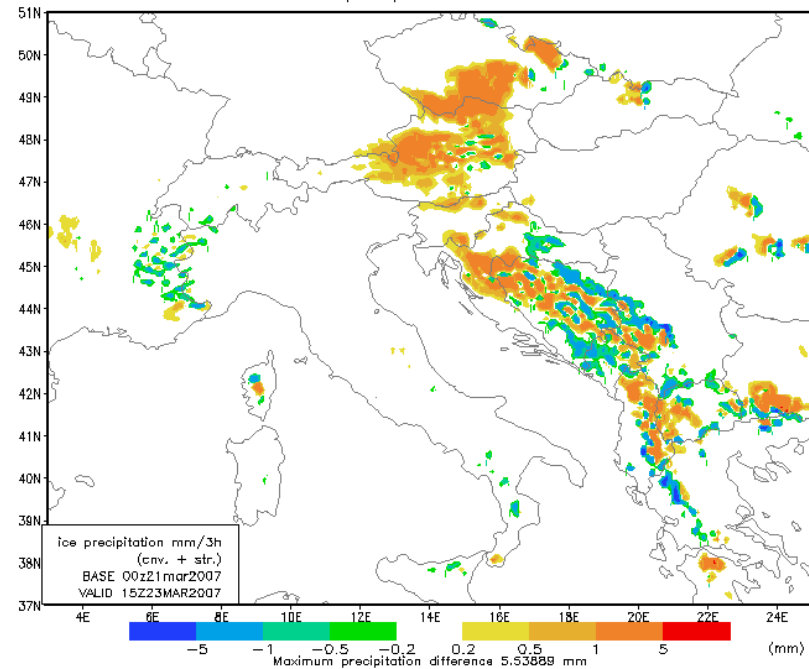
ALARO/HR KRUTA OBORINA u 15Z23MAR2007 UTC 63h forecast



ALADIN/HRn8 KRUTA OBORINA u 15Z23MAR2007 UTC 63h forecast



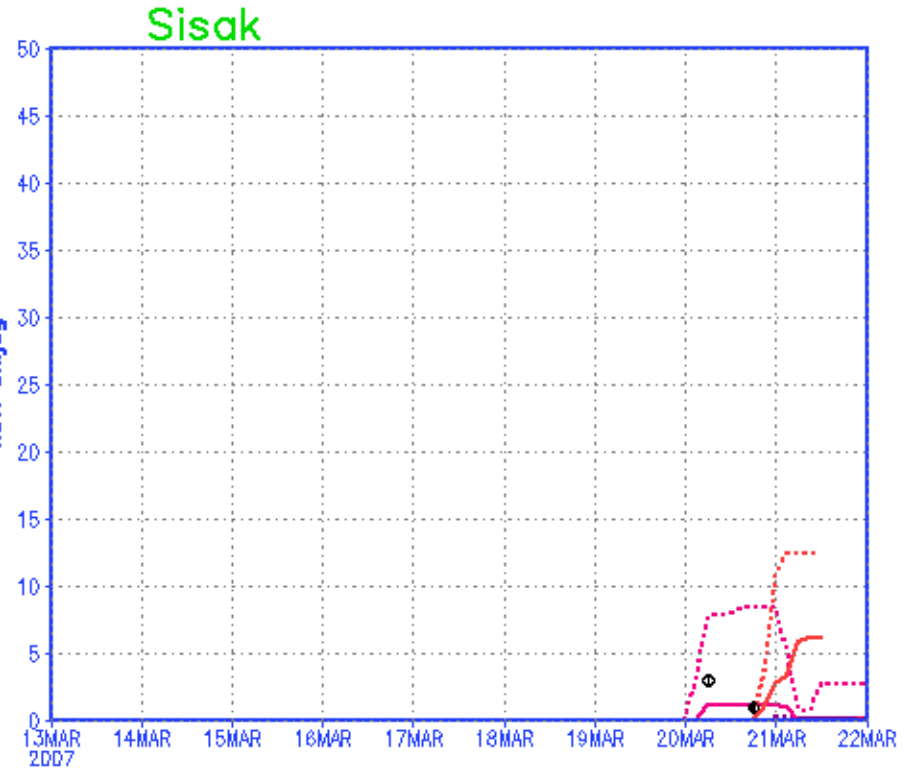
Difference ALARO-ALADIN ice precipitation 15Z23MAR2007 UTC 63h forecast



Snow

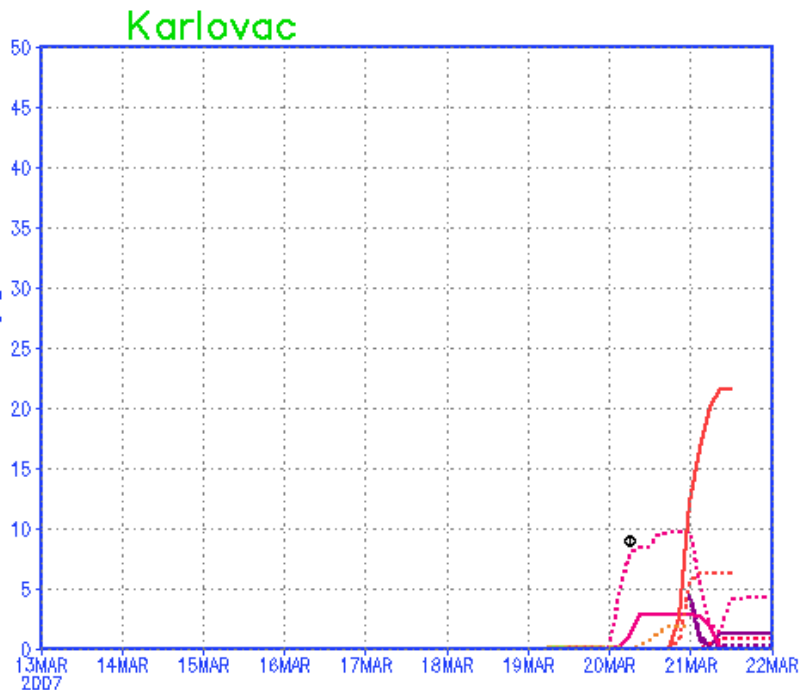
station
16.37
45.50
visina

12Z20MAR
00Z20MAR
12Z19MAR
00Z19MAR
12Z18MAR
00Z18MAR
12Z17MAR
00Z17MAR
12Z16MAR
00Z16MAR
12Z15MAR
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12Z14MAR
00Z14MAR
12Z13MAR
00Z13MAR
12Z12MAR
00Z12MAR

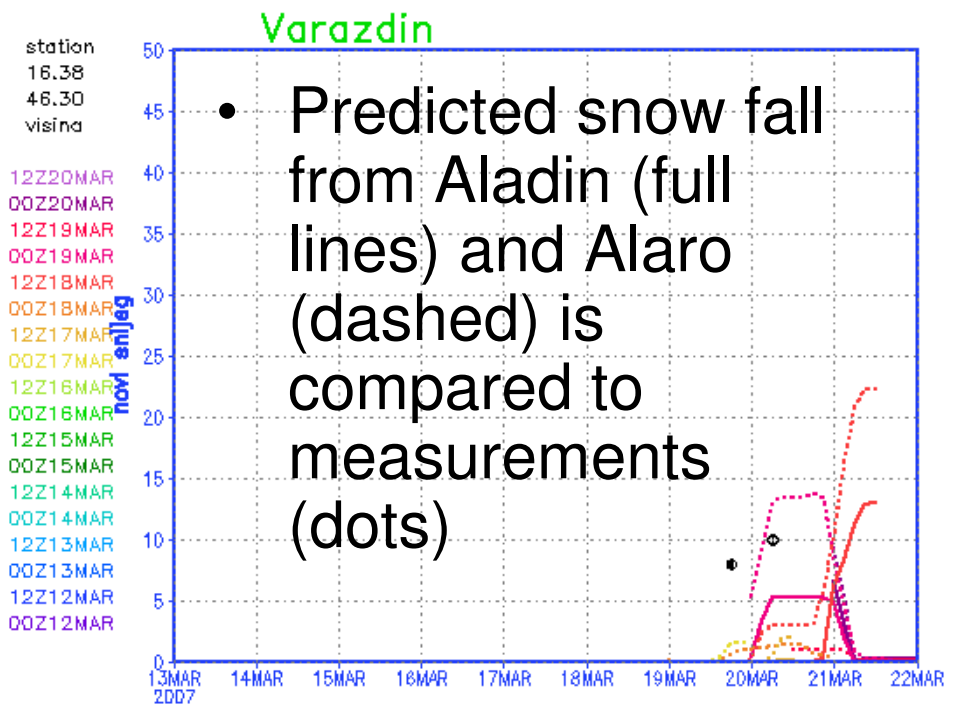
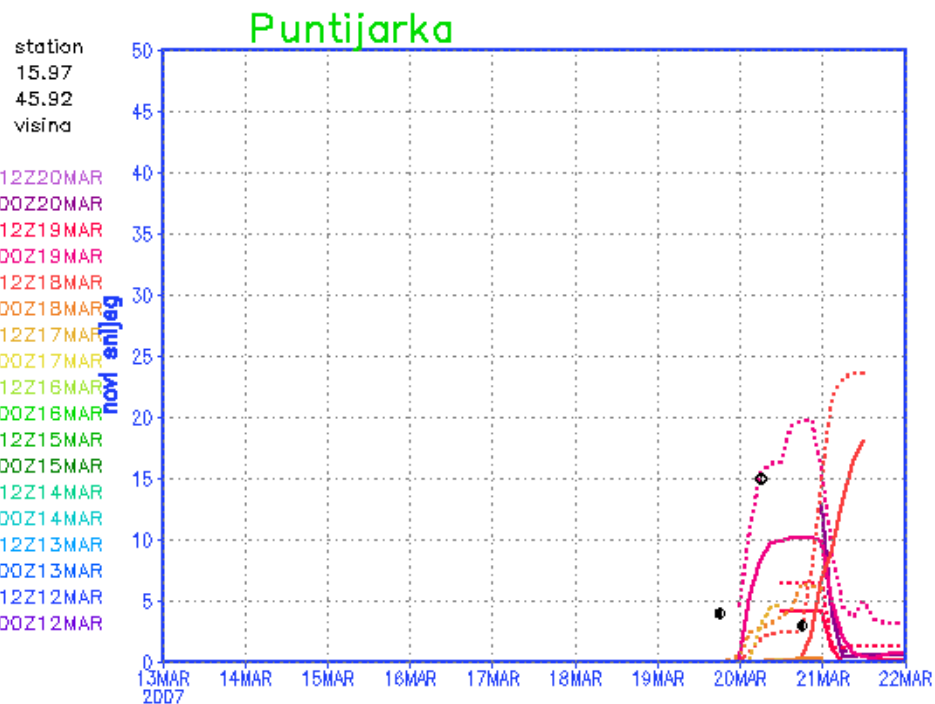
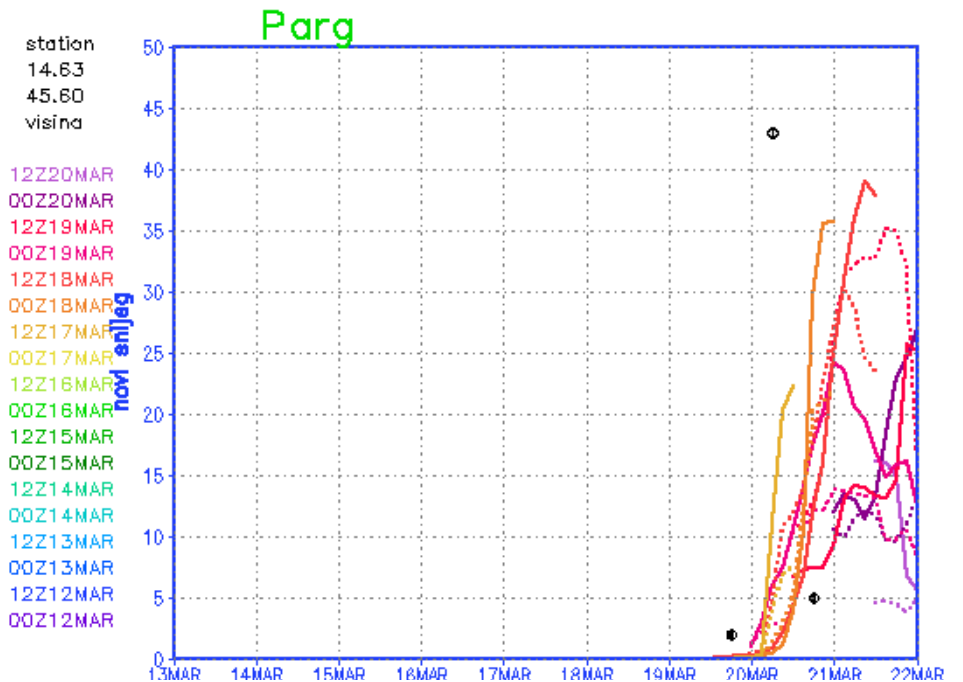
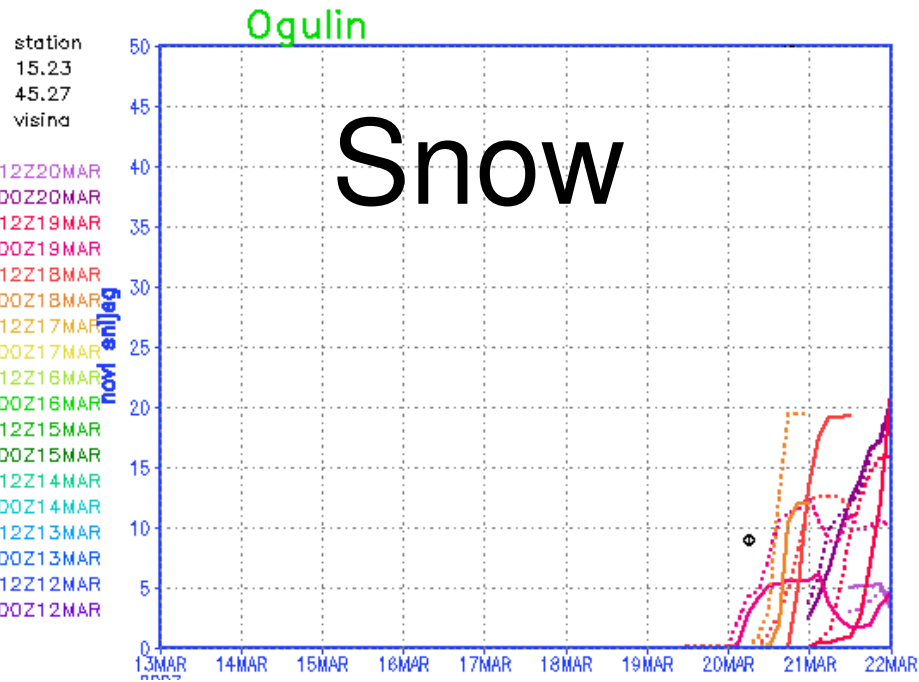


station
15.57
45.50
visina

12Z20MAR
00Z20MAR
12Z19MAR
00Z19MAR
12Z18MAR
00Z18MAR
12Z17MAR
00Z17MAR
12Z16MAR
00Z16MAR
12Z15MAR
00Z15MAR
12Z14MAR
00Z14MAR
12Z13MAR
00Z13MAR
12Z12MAR
00Z12MAR



- Predicted snow fall from Aladin (full lines) and Alaro (dashed) is compared to measurements (dots)



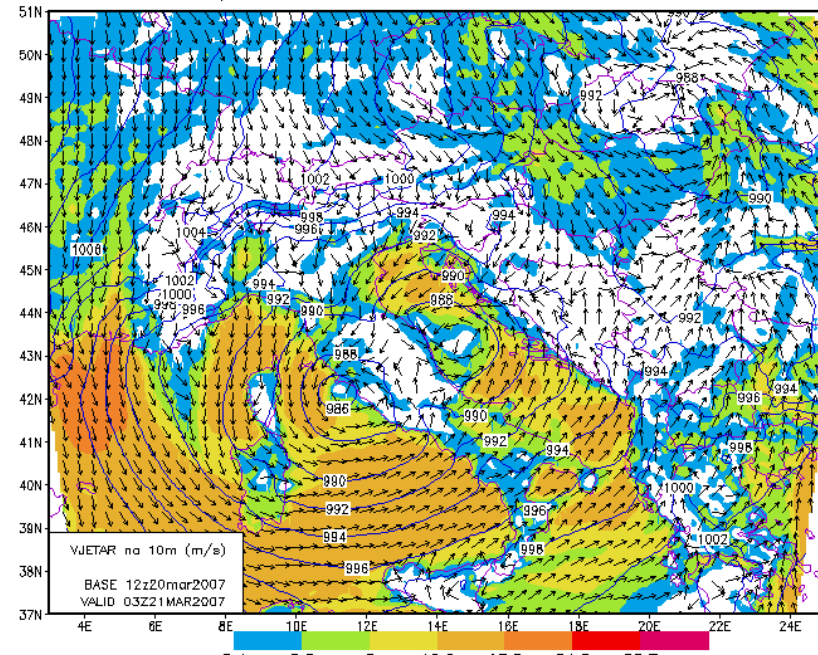
Precipitation summary

- Generally, less precipitation in Alaro
- Alaro gives more precipitation on the lee side
- Alaro produces more snow

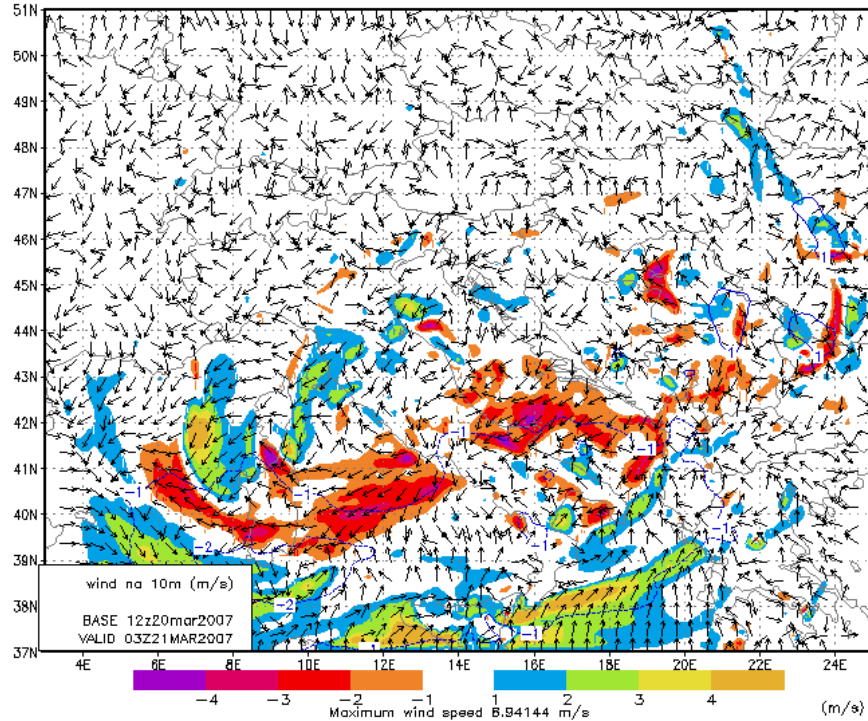
Wind

- Differences between Alaro and Aladin forecasts

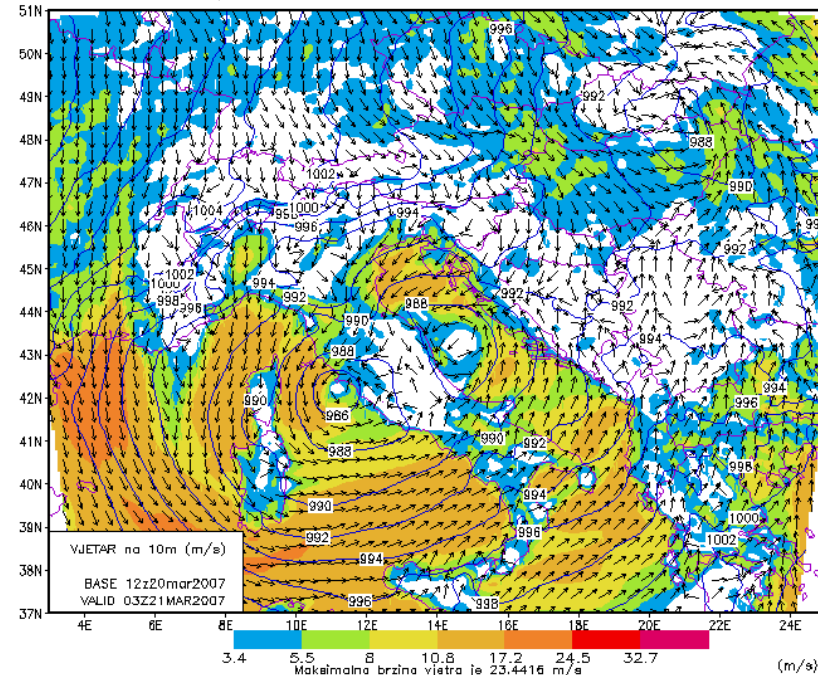
ALADIN/HR VJETAR u 03Z21MAR2007 UTC 15h forecast



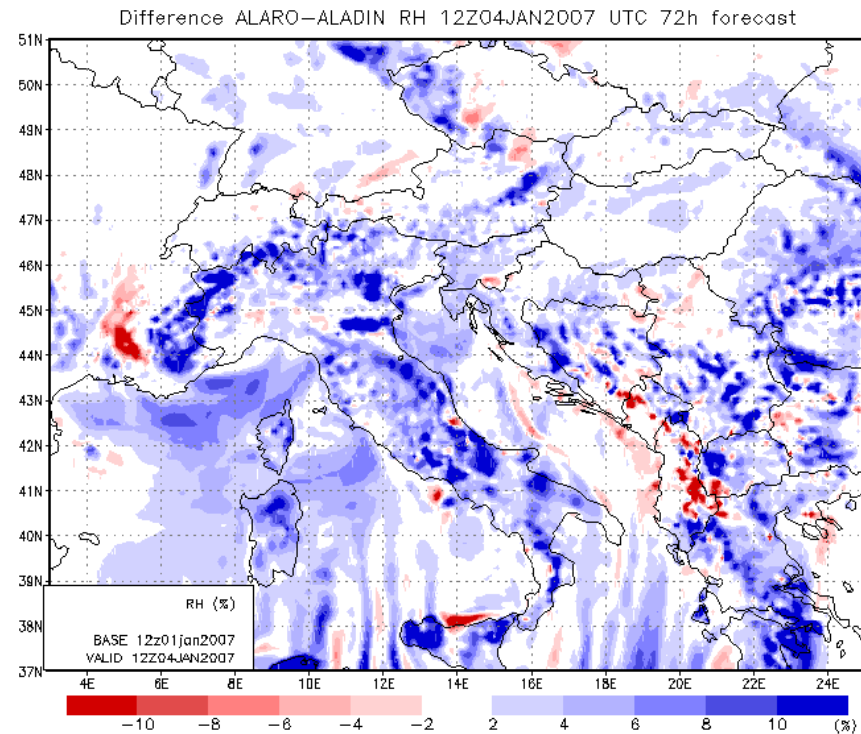
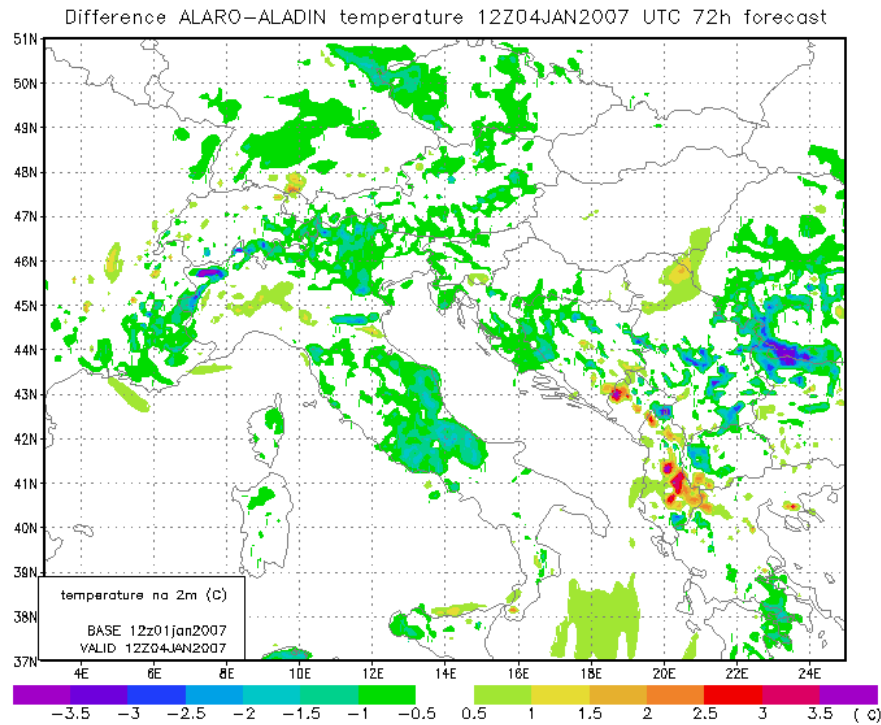
Difference ALARO-ALADIN wind 03Z21MAR2007 UTC 15h forecast



ALARO/HR VJETAR u 03Z21MAR2007 UTC 15h forecast



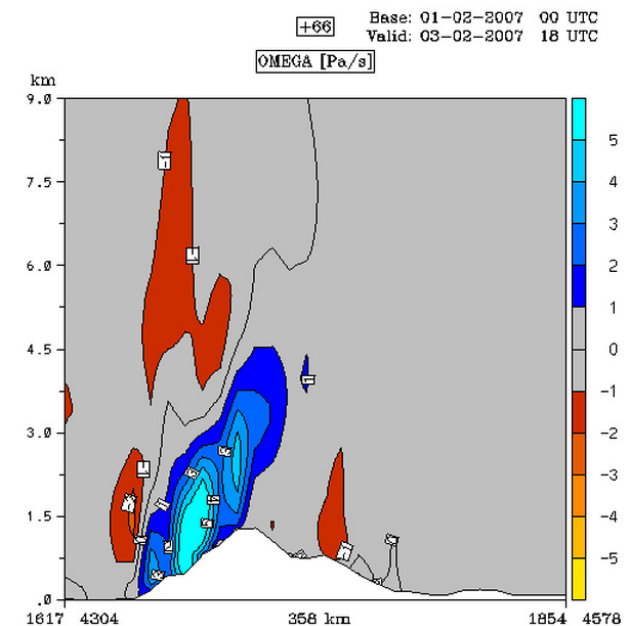
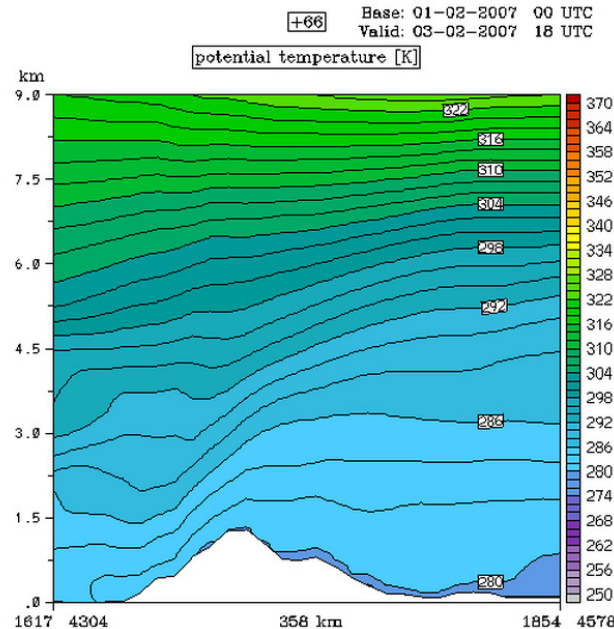
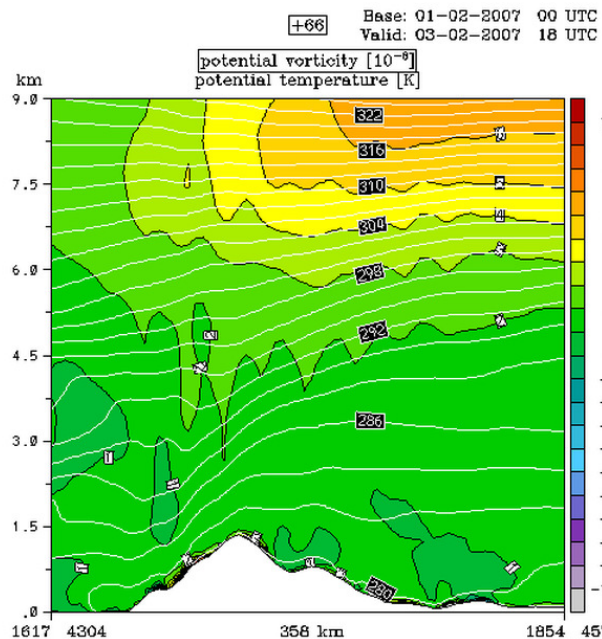
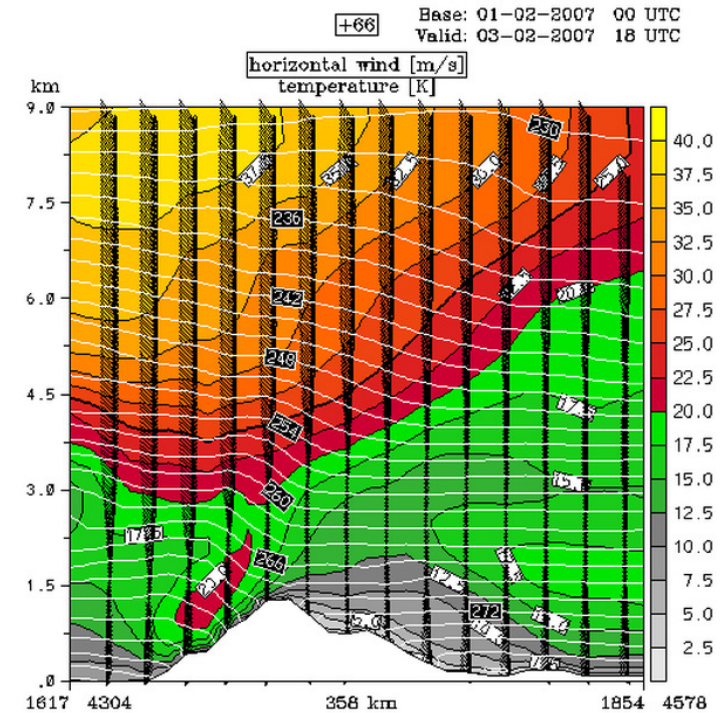
Relative humidity



- Usually different due to differences in the temperature field

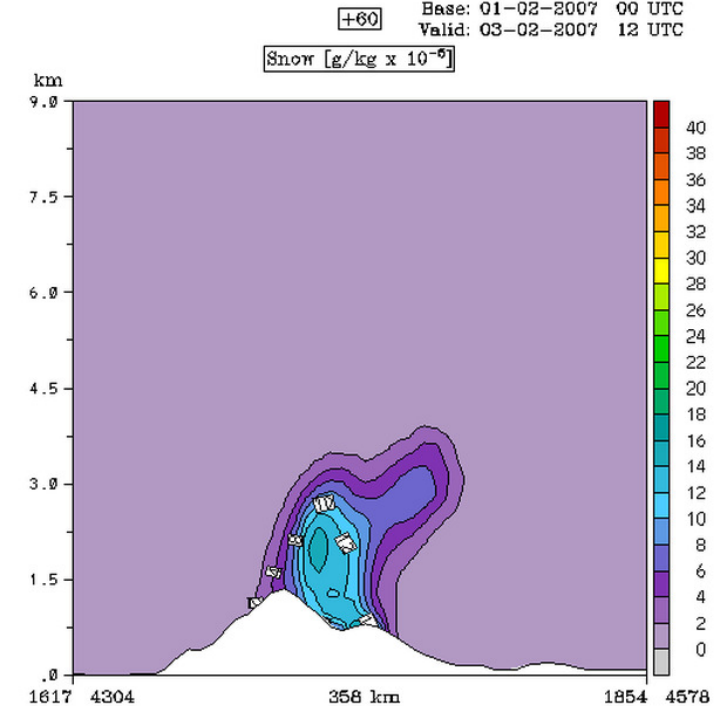
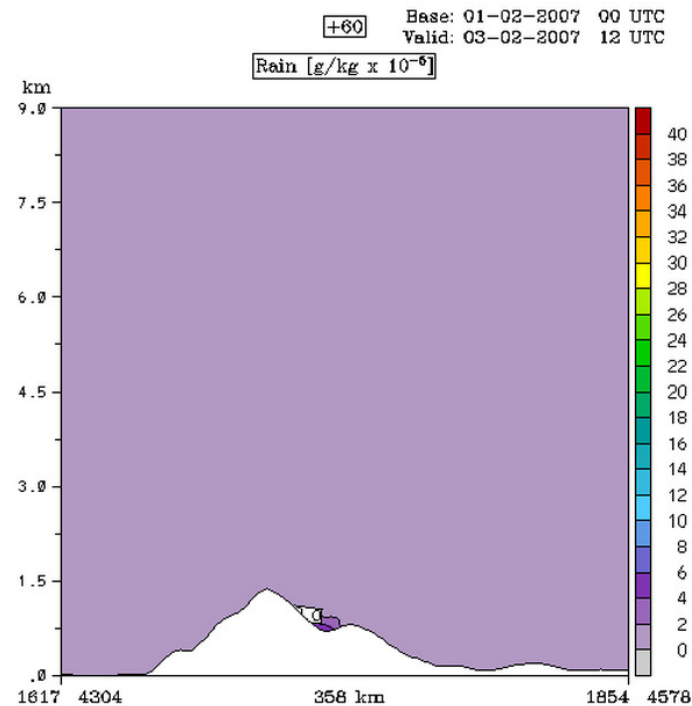
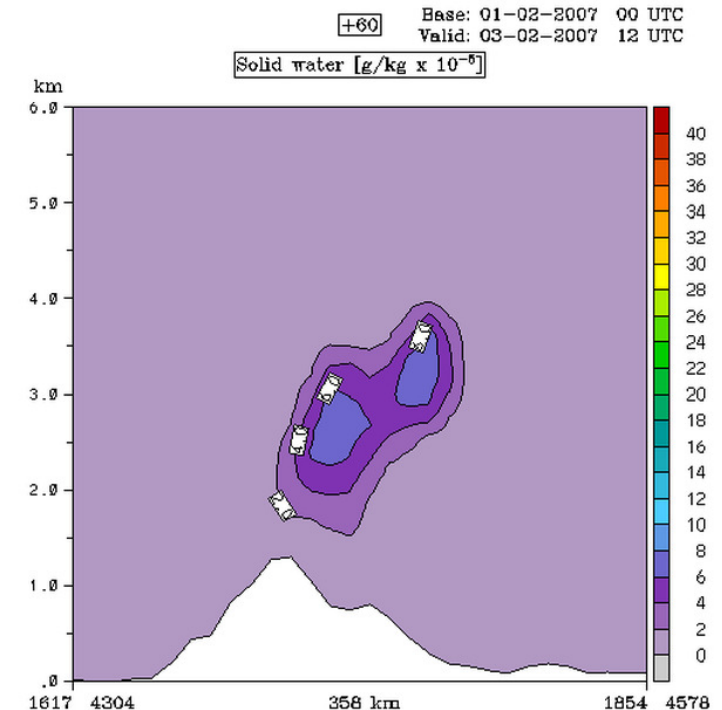
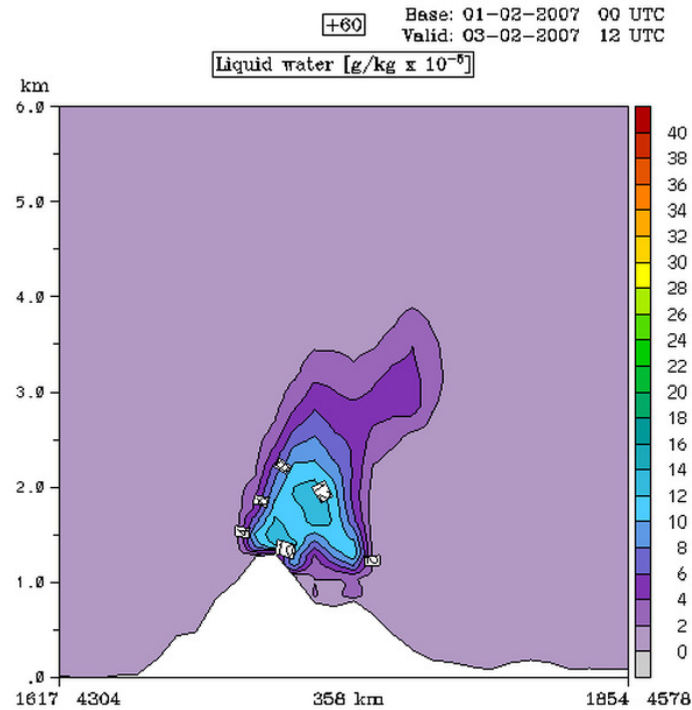
Vertical cross-sections

- Split-Osijek for wind (right), PV (low left), potential temperature (below center) and vertical velocity (below right).



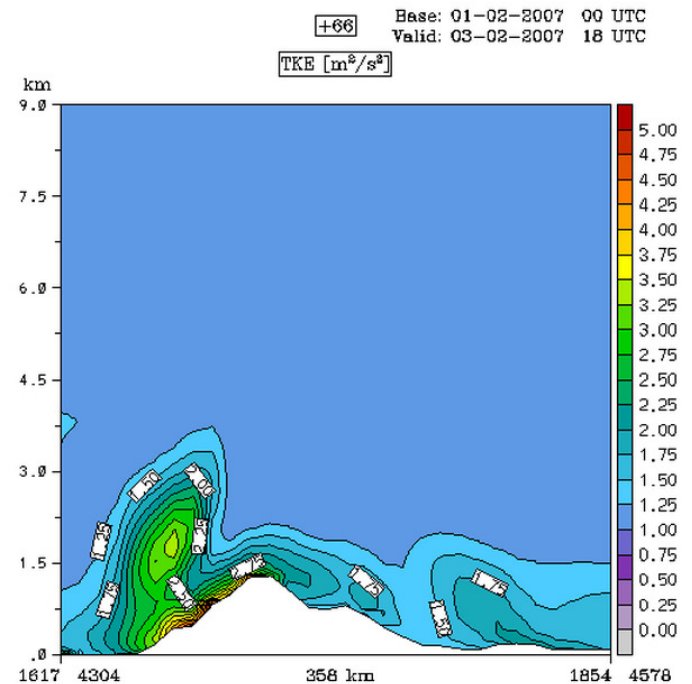
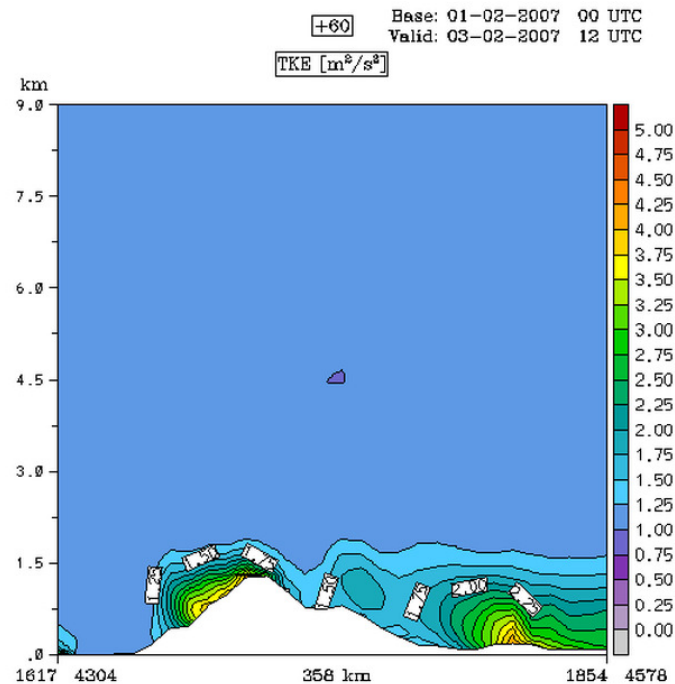
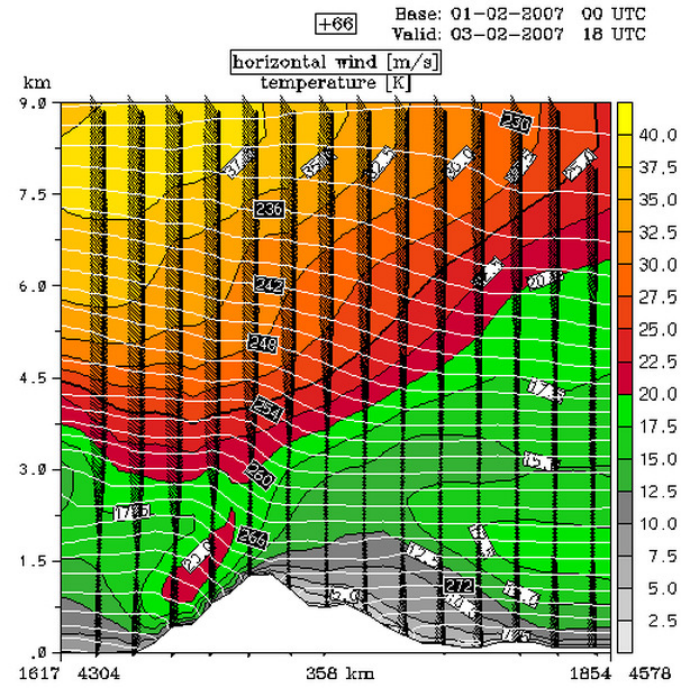
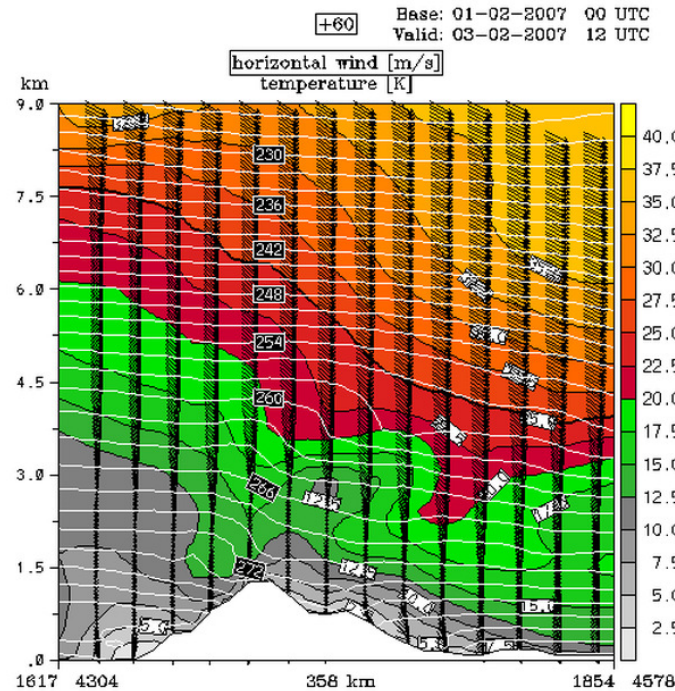
Vertical cross sections

- Moist variables:
(top left) cloud water
(top right) cloud ice
(bottom left) rain
(bottom right) snow



Vertical cross sections

Wind (top row) and TKE (bottom row) for a case of severe bura



Final remarks

- Not enough time/bench experience for a meaningful validation
- Model insight necessary (to try) to understand the behaviour of Alaro
- Surely valuable (at least) as a new ensemble member