ALARO experiences@SHMU

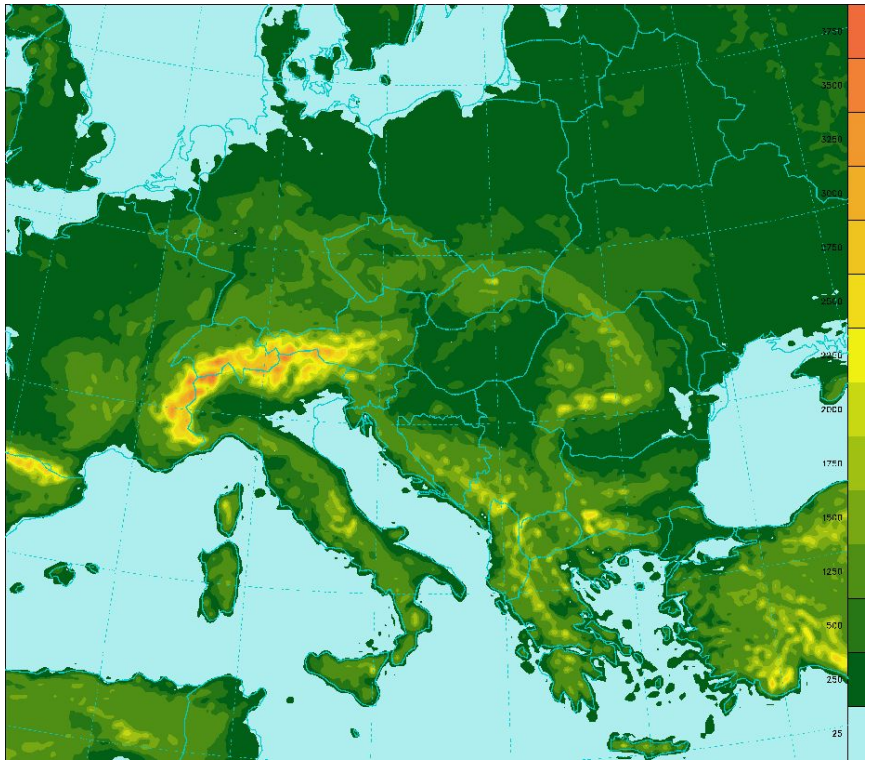
Maria Derkova

with contributions from
O. Spaniel, M. Bellus, M. Dian, M. Nestiak, V. Tarjani, R. Habrovsky

ALARO-1 working days, Brussels, 12-14/09/2016

Outline

- Operational setup and milestones
- Validation and verification
- Case studies
- Other R&D tasks
- Conclusions and plans



Operational setup

	operational	(mirror) e-suite	quasi-operational
HPC	old HPC	new HPC	
model	CY36T1_bf10	CY38T1bf03_export	CY40T1_bf05_export (+locally installed future bf06)
horizontal resolution	9km	4.5km	4.5km (exactly)
number of grid points	320 x 288	625 x 576	
spectral resolution	106 x 95 (quadratic)	312x287 (linear)	
orography	envelope orography	mean orography (old Z0)	
number of levels	37	63	
time-step	400s	180s	
coupling model	ARPEGE (long- & short cut off), 3h		
assimilation initialization	Upper air spectral blending with CANARI surface assimilation no initialization		
forecast ranges	72/72/72/60 (a' 1h)	**78**/72/72/60 (a' 1h)	
physics	ALARO 3MT, SLHD	ALARO-0 baseline	**ALARO-1**

Operational milestones

03/04/2012	current operational setup	CY36T1 CANARI + DFI blending
01/06/2014	e-suite	CY38T1bf03 ALARO-0 baseline (HR: 4.5km, 63levs)
2015	e-suite upgrade	to 4runs/day, subsequent applications linked (input4nowcasting, airport and nuclear power station apps)
29/04/2016	e-suite mirror	on new HPC
28/07/2016	upgrade quasi-oper	CY40T1bf05_export (+future bf06) with ALARO-1
30/06/2015	*LACE telecom LBC upgrade (8km, 105levs)*	

Validation & verification (1)

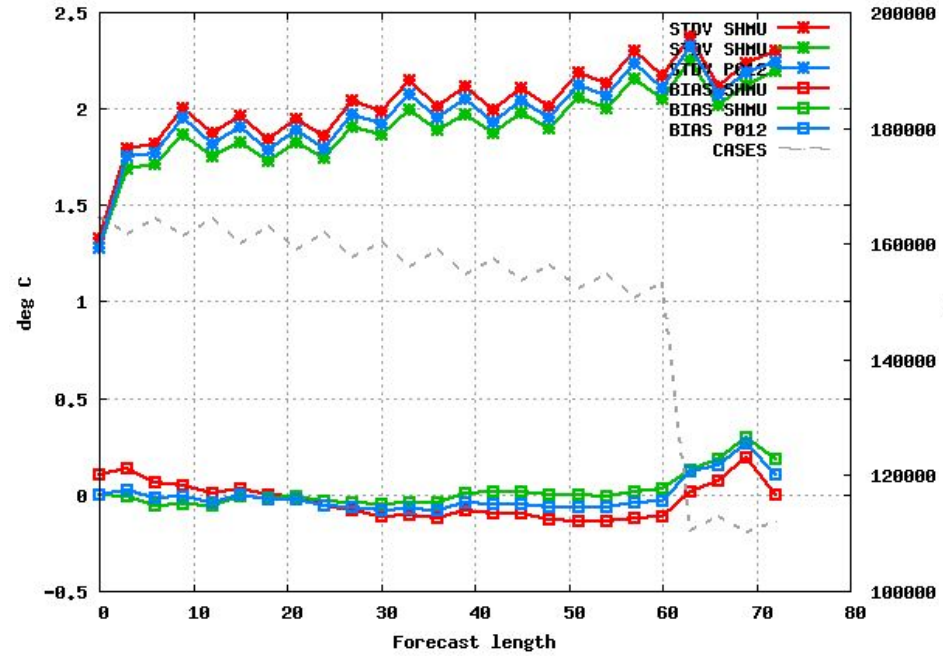
ALARO-1 scores with respect to **OPER** and **ALARO-0**

HARMONIE verification tool: 1 month of August 2016, whole SHMU domain

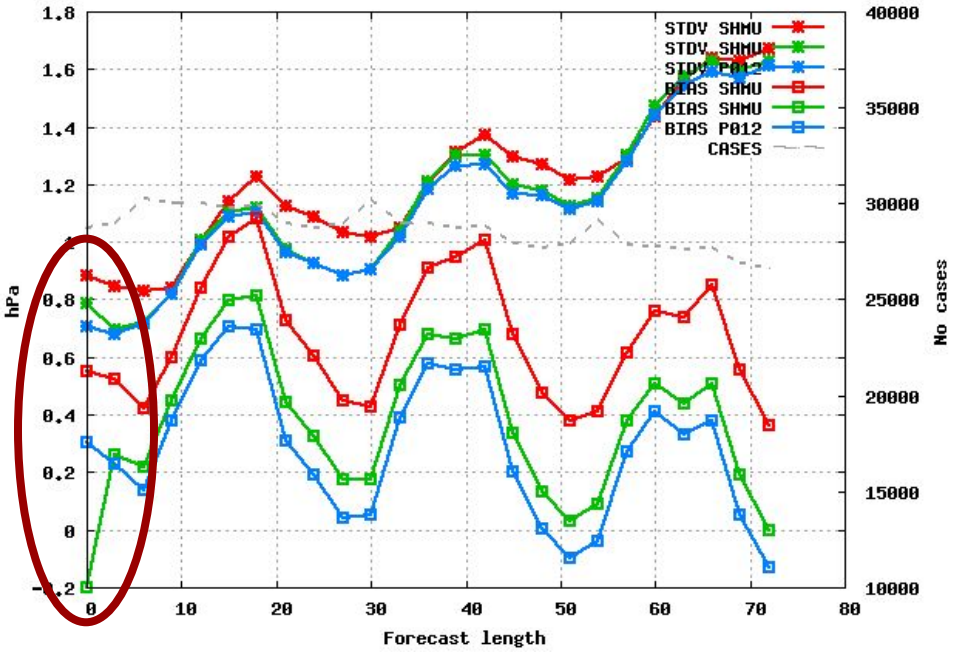
ALARO-1 generally better for all parameters (illustrated by T2m)

ALARO-1 MSLP scores: possible problem with initialization?

T2m



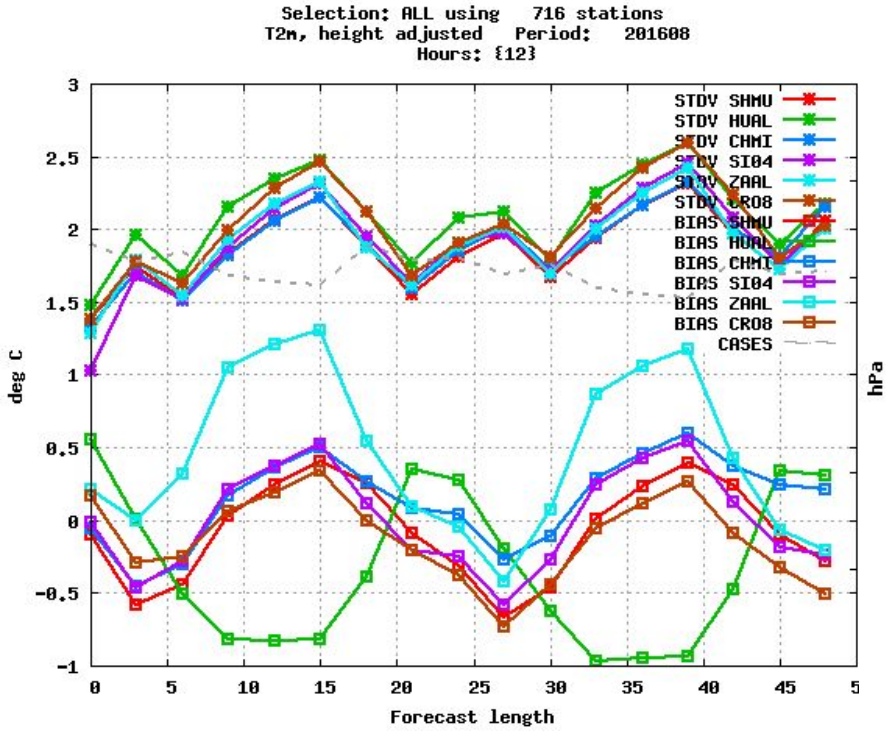
MSLP



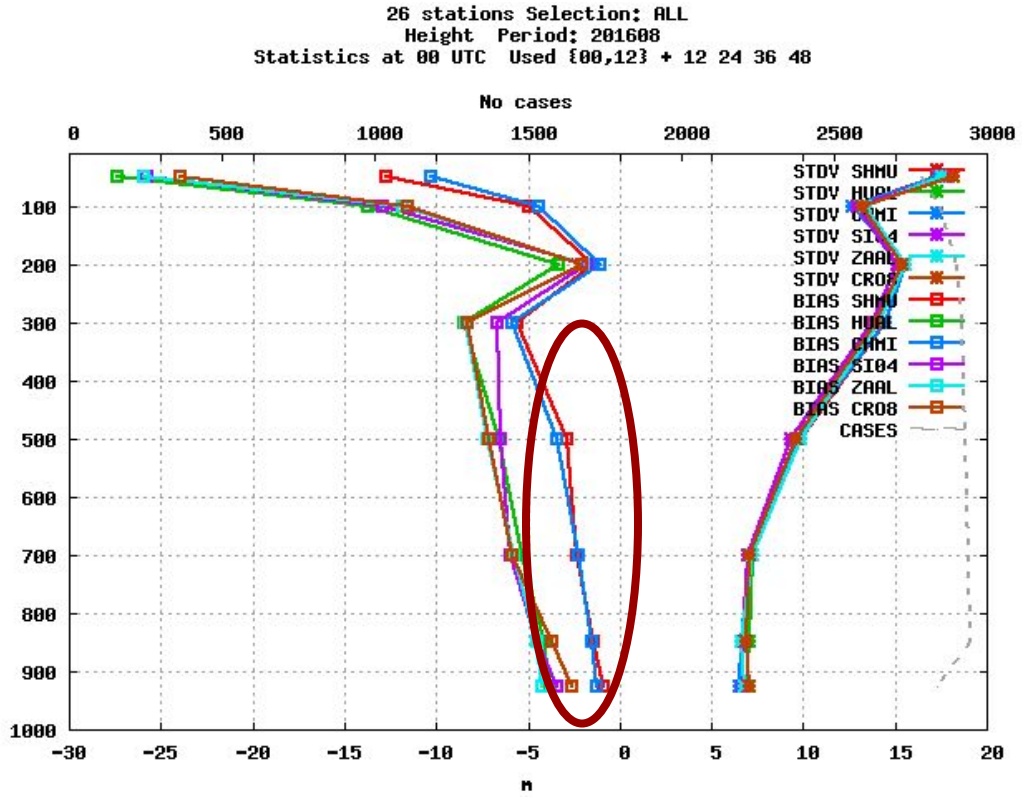
Validation & verification (2)

SHMU ALARO-1: comparison with LACE models, 1 month of August 2016

SHMU fitting, unexplained **ZAMG** and **OMSZ**…, similar to **CHMI** in G :)



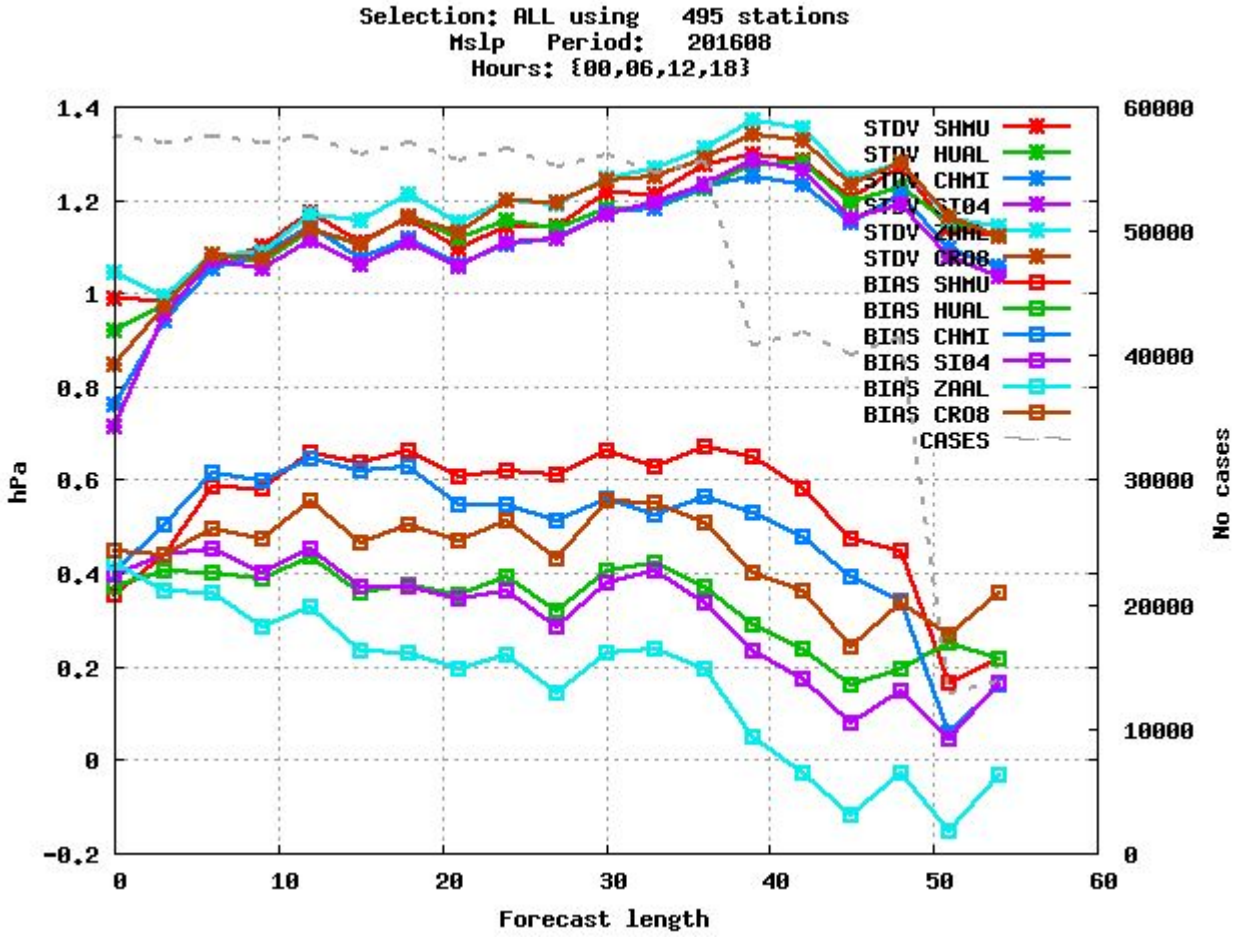
T2m height adjusted



GEOP

Validation & verification (3)

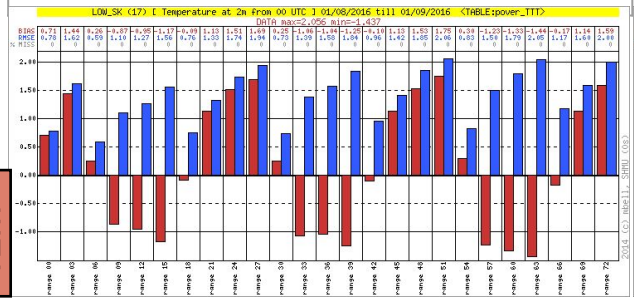
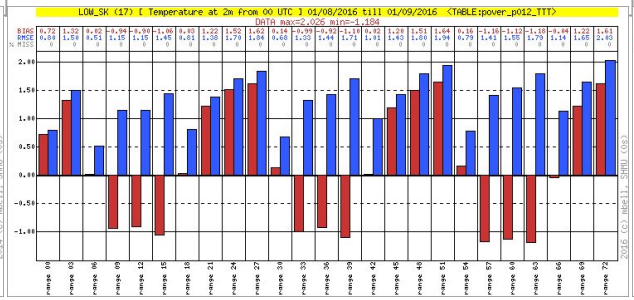
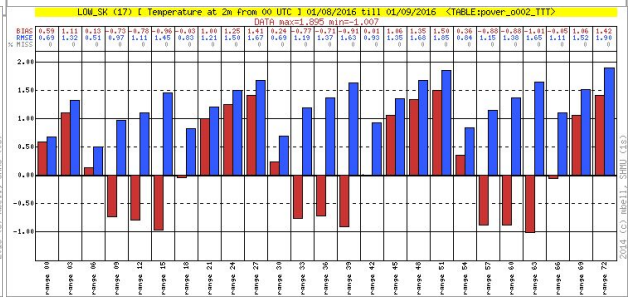
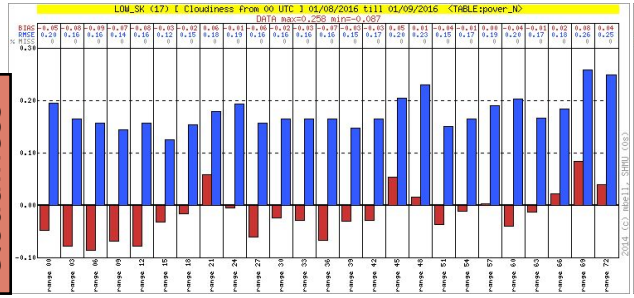
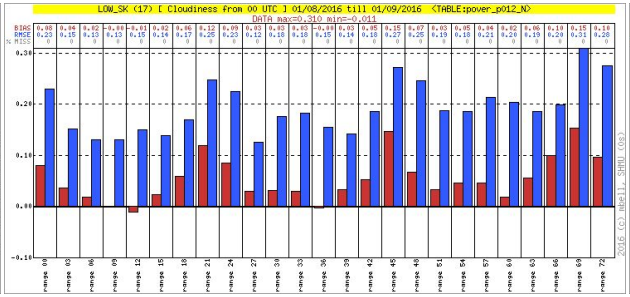
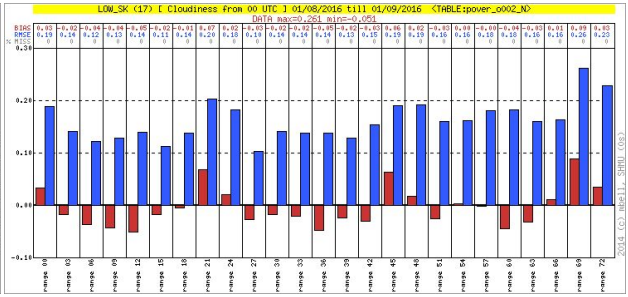
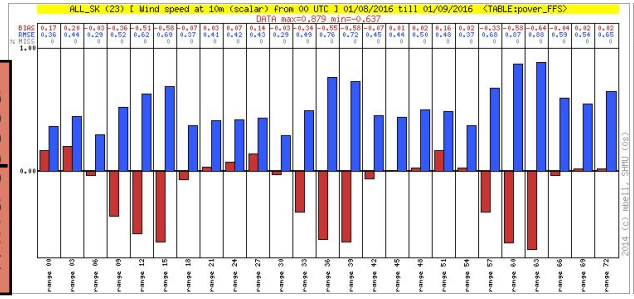
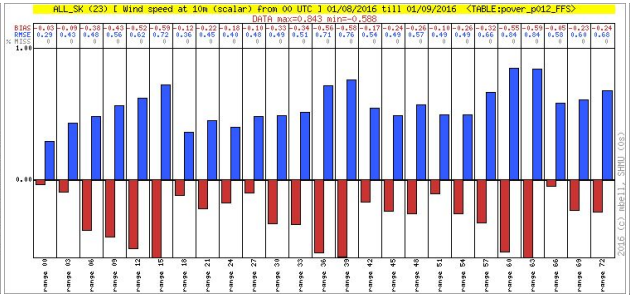
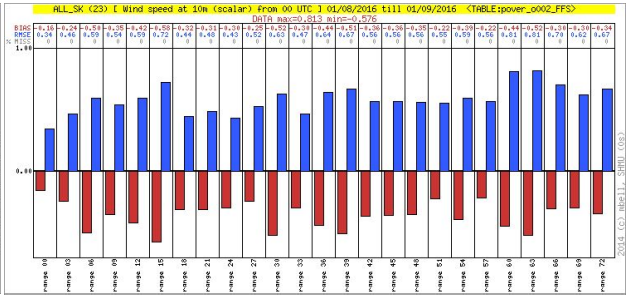
SHMU MSLP BIAS: an advertisement for 3DVAR?



Validation & verification (4)

1 month of August 2016, local verification against SYNOP stations

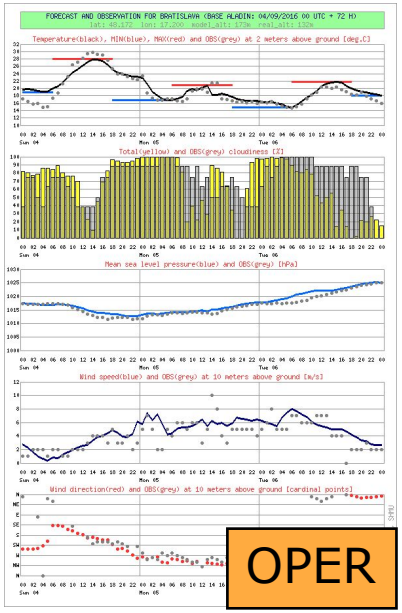
Generally better. PB with wind speed if mountain stations are included.

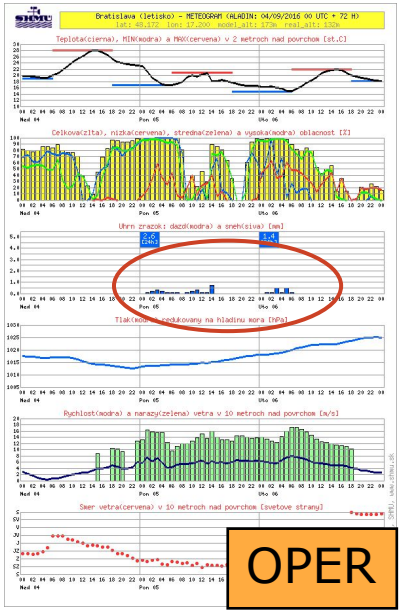
	CY36T1 OPER	CY38T1 ALARO-0	CY40T1 ALARO-1
T2m			
cloudiness			
wind speed			

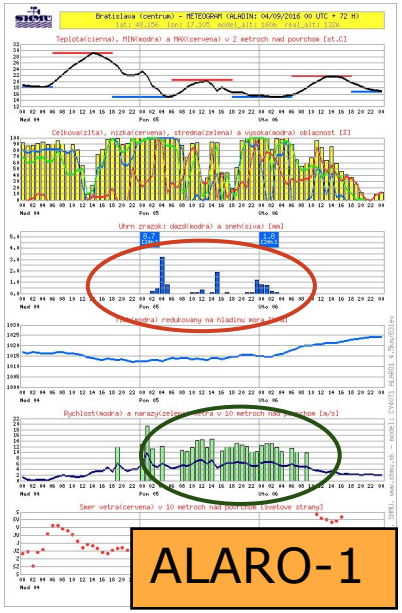
Validation & verification (5)

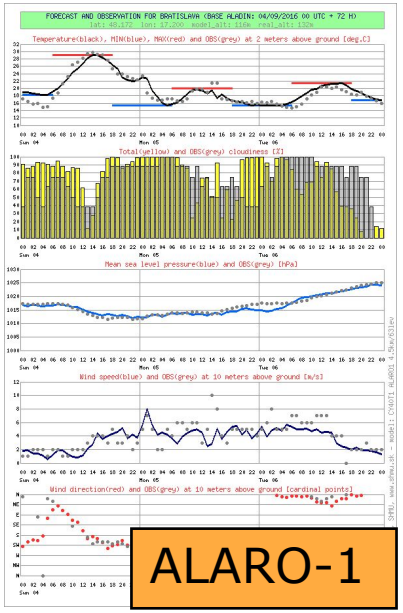
Cold front passing on the 1st day of school 05/09/2016, ~10°C cooling

Rather good forecast, ALARO-1 decreased wind (FACRAF), slightly better precip





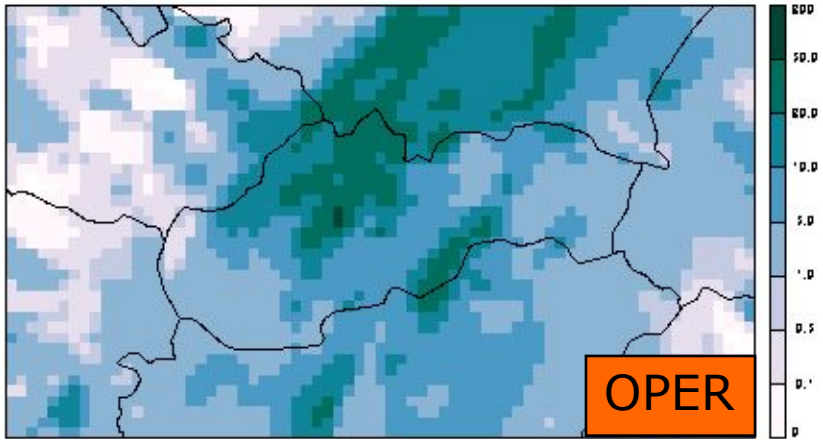




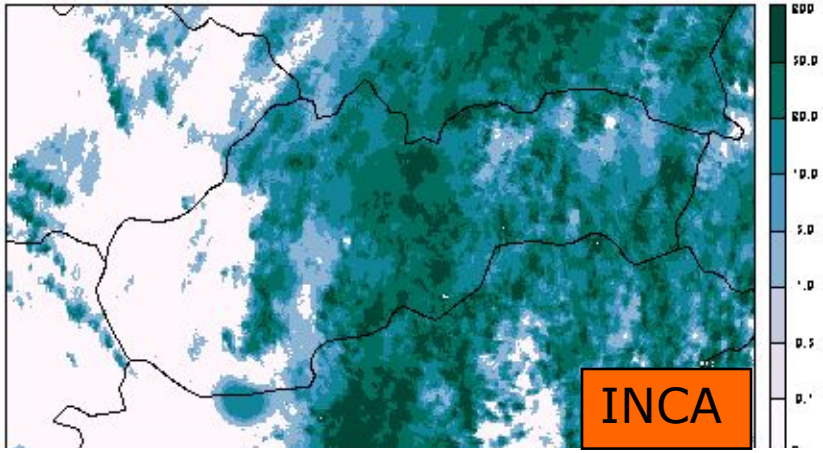
Validation & verification (6)

Example of 24h precipitation: patterns more structured, maximas better pronounced. Verification missing :(

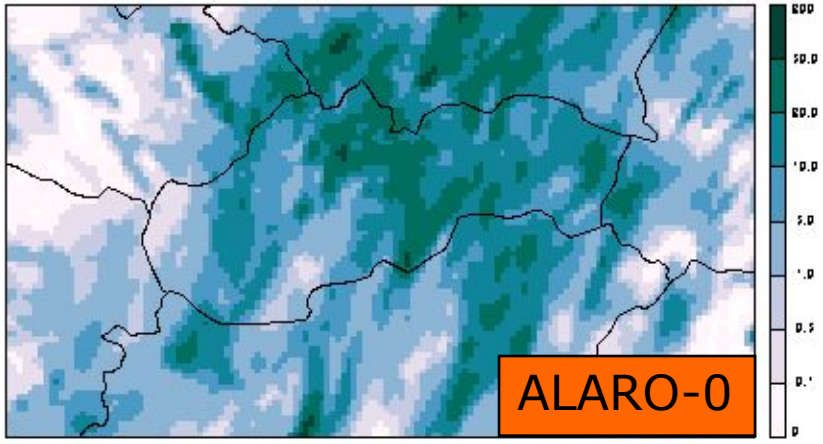
oper hpc1



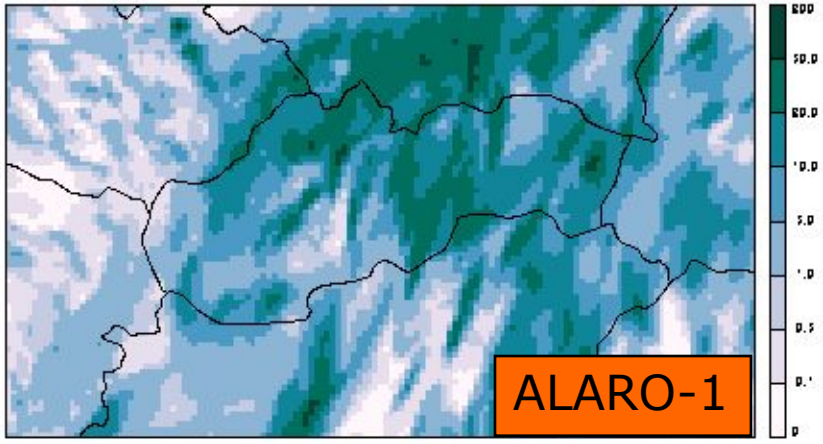
INCA



p012 hpc1

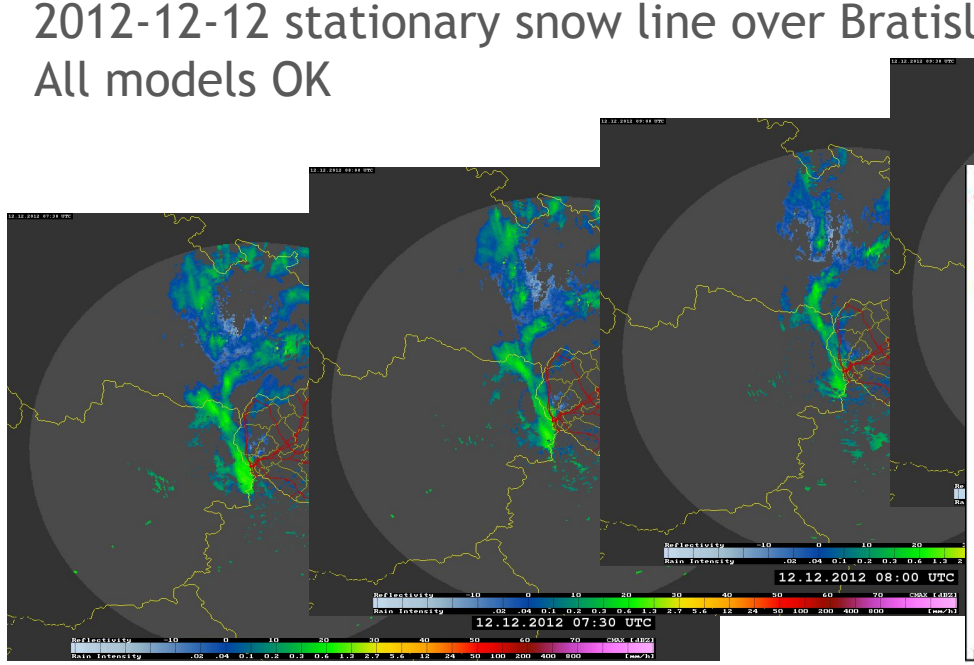


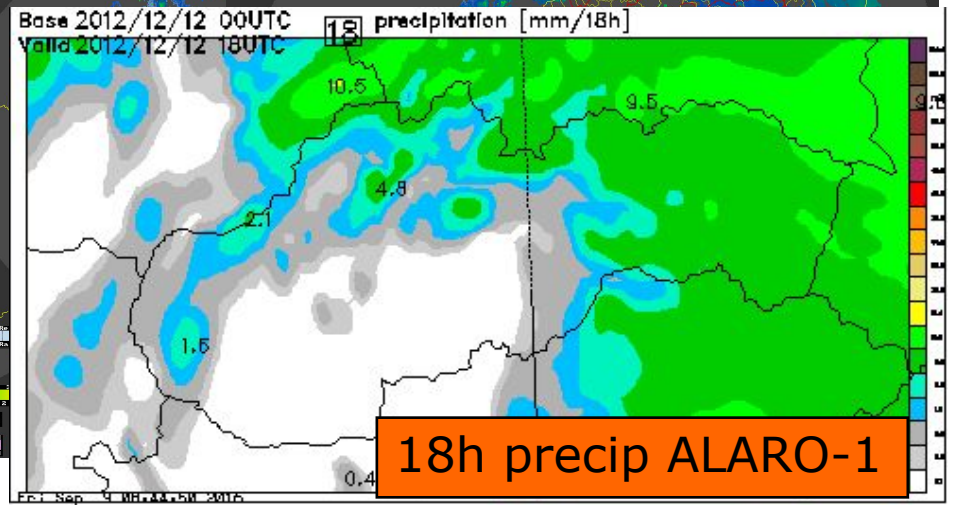
oper hpc2

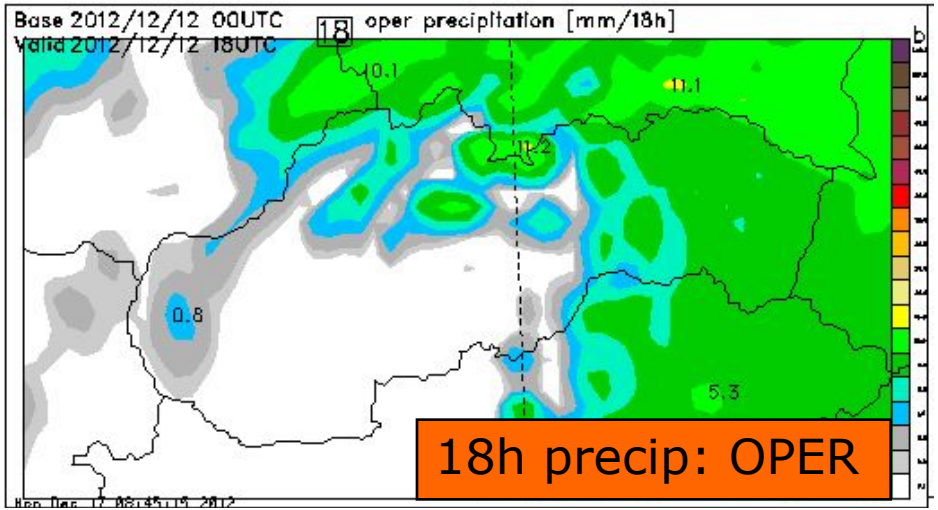


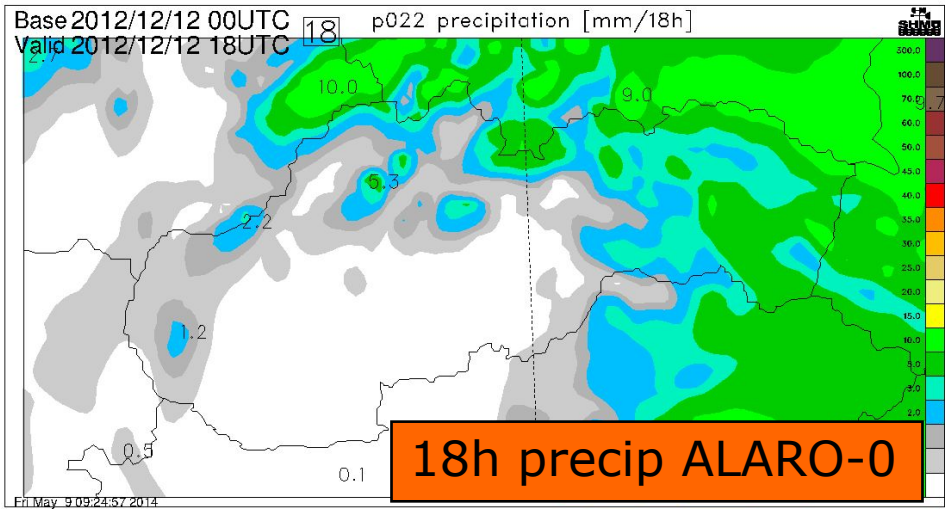
Case studies: stationary snow line

2012-12-12 stationary snow line over Bratislava
All models OK



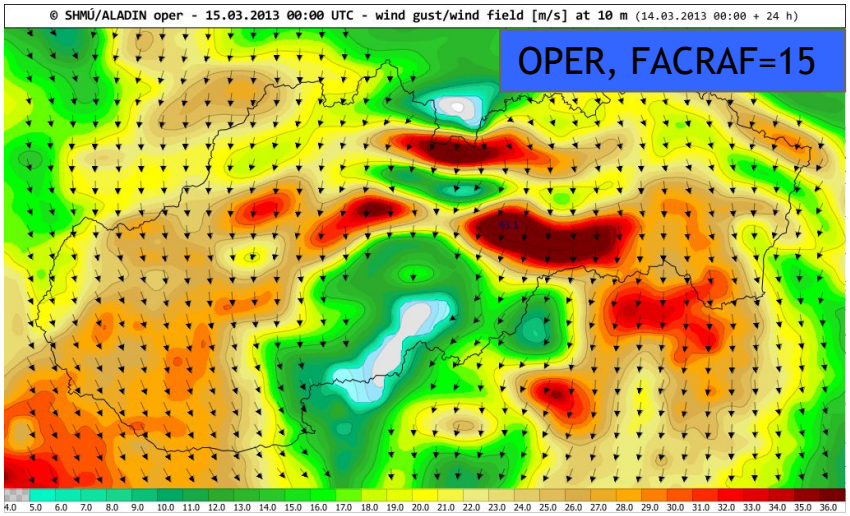


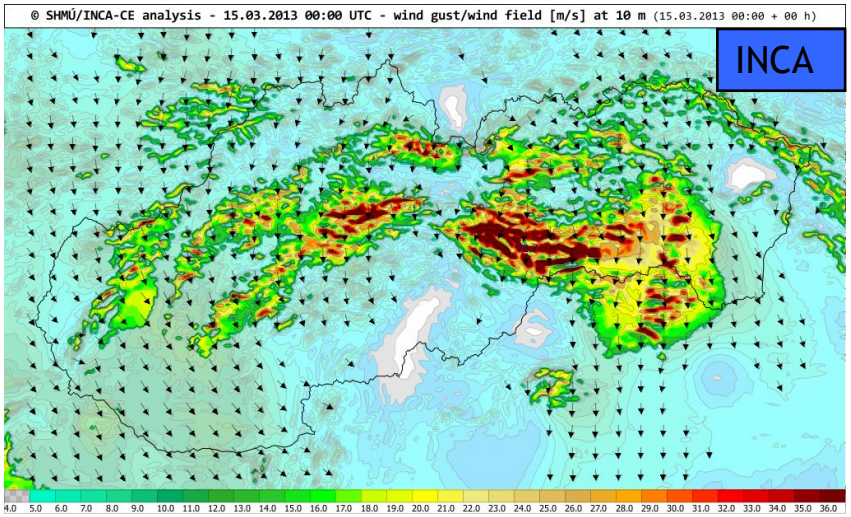


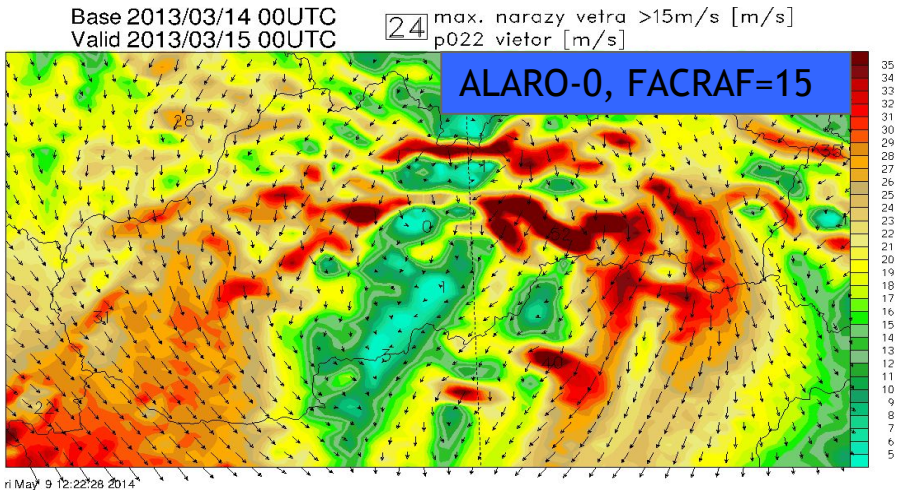


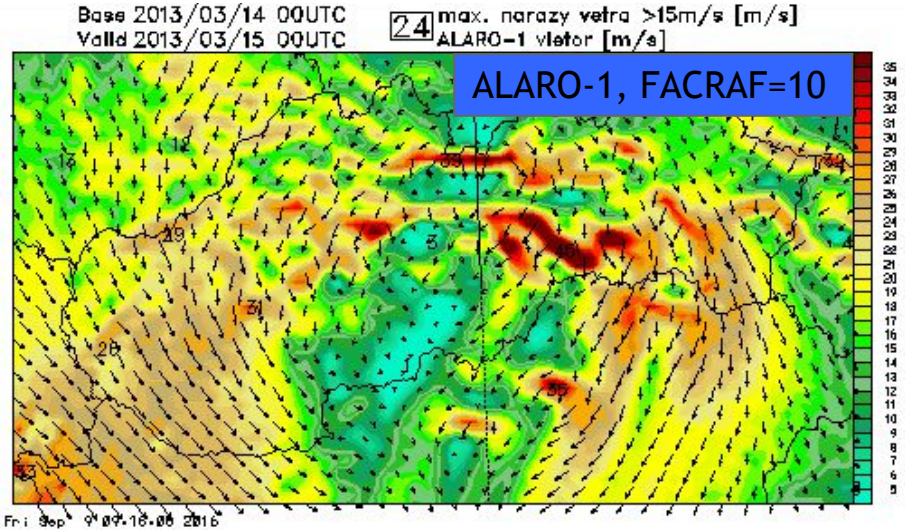
Case studies: strong wind

2013-03-15 strong wind + snow, well forecasted by operational models, still OK with ALARO-1 despite retuned FACRAF



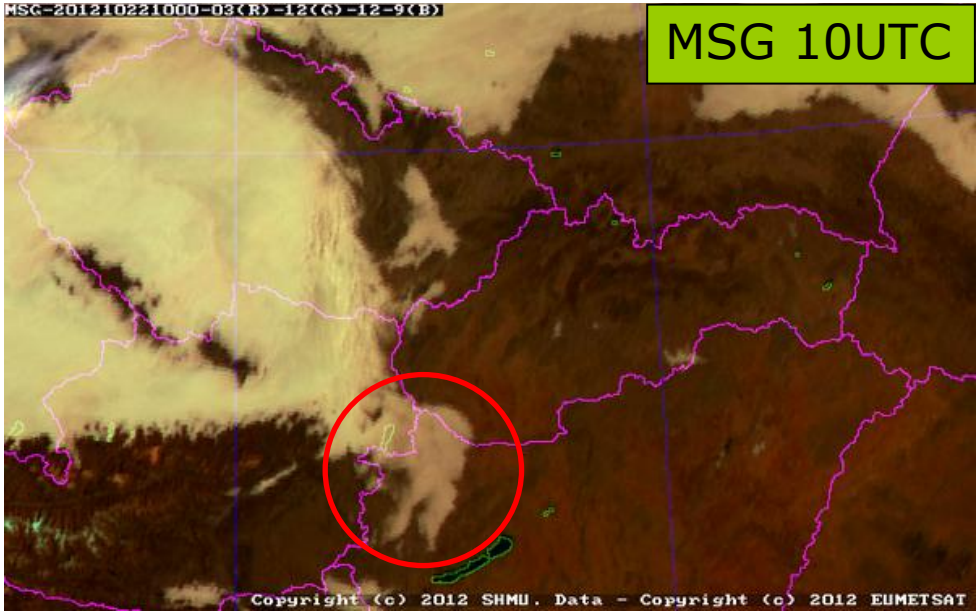


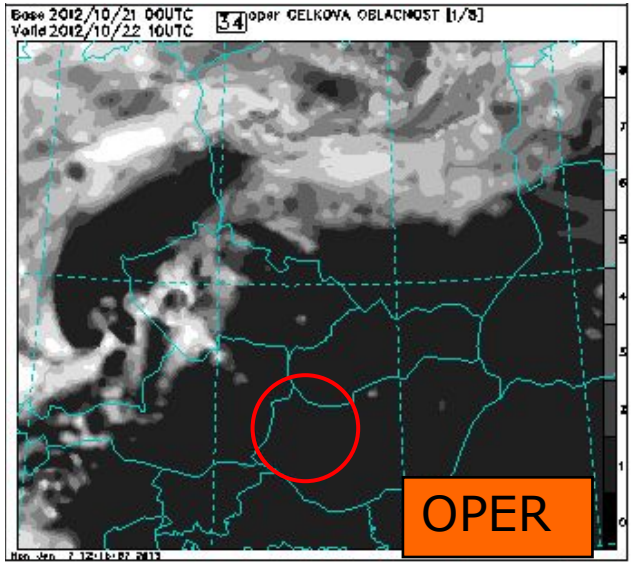


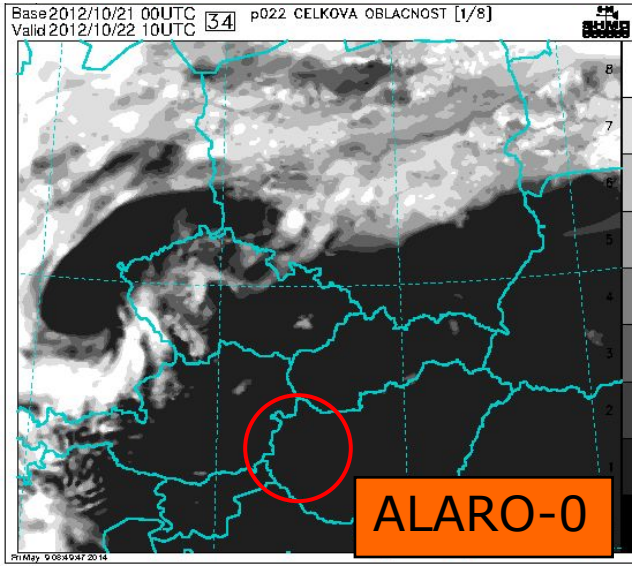


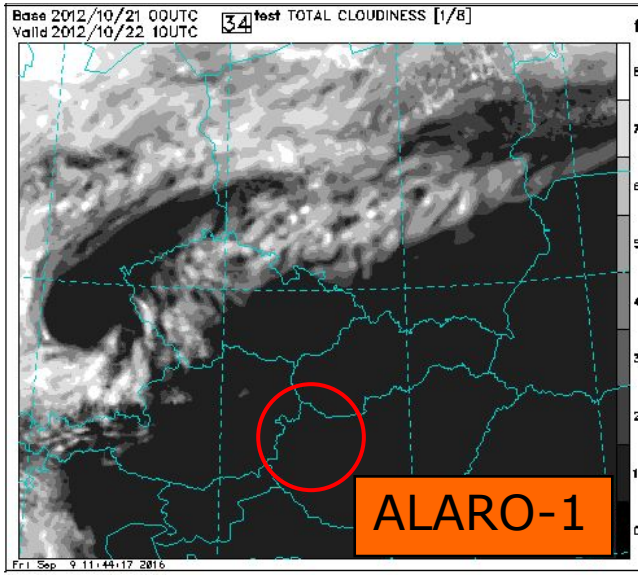
Case studies: fog in Danube valley (1)

22/10/2012
At 10UTC no fog/low clouds forecasted by OPER and in high resolution ALARO(0/1) tests in Danube valley



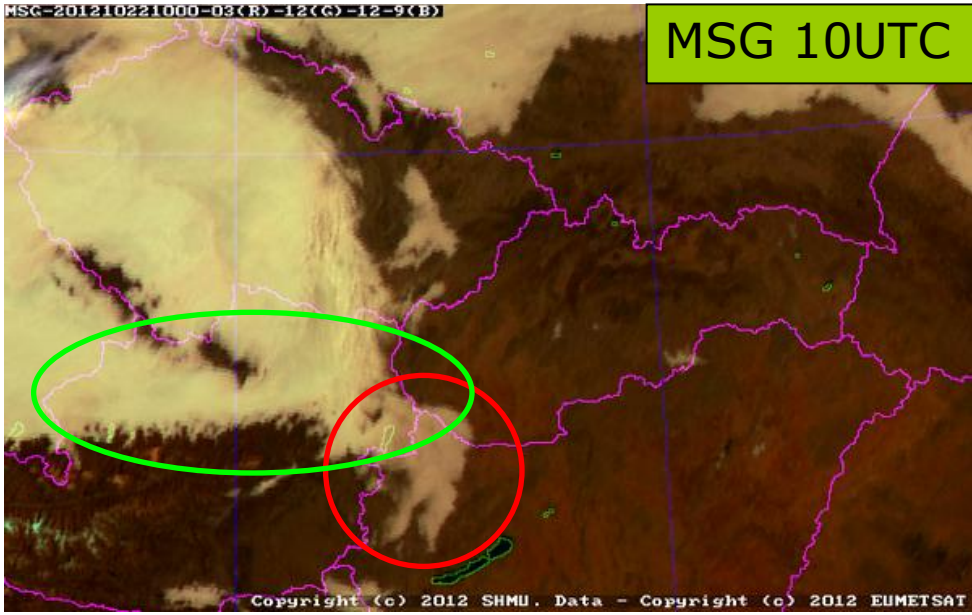


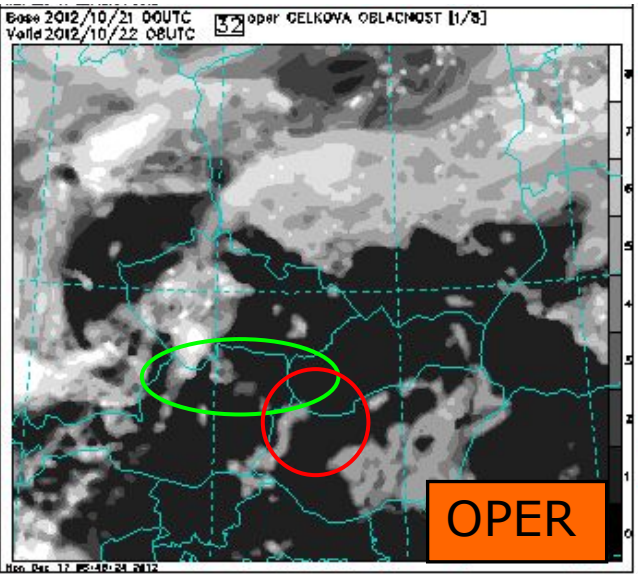


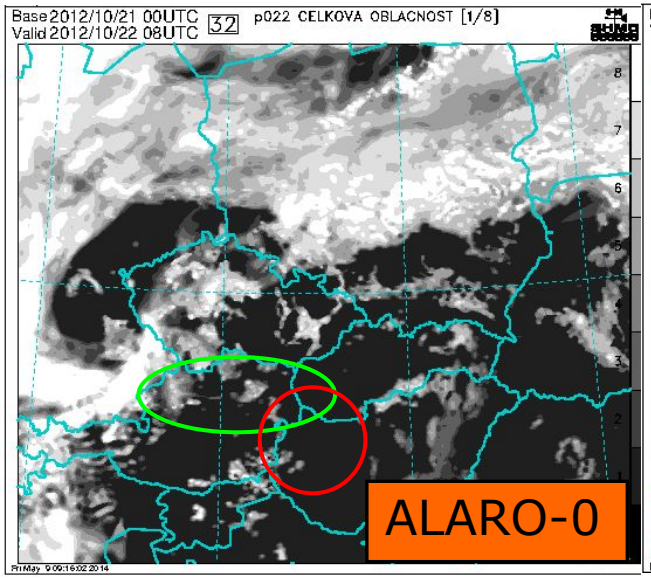


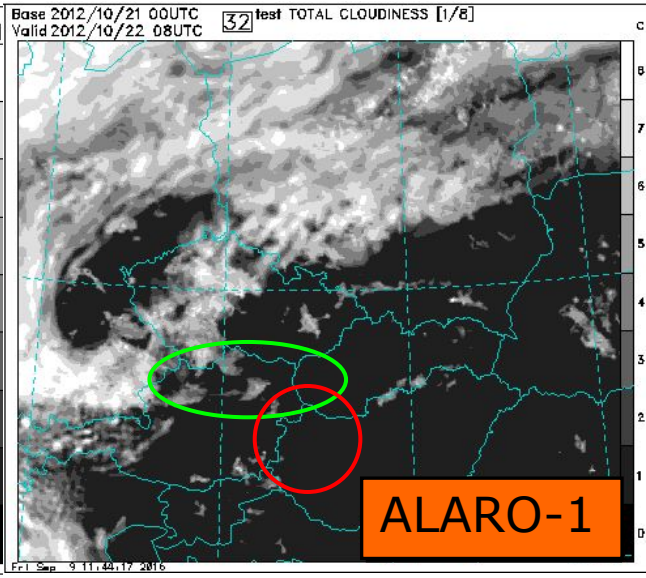
Case studies: fog in Danube valley (2)

22/10/2012
At 08UTC some traces of fog in Austria and Hungary can be found, but it gets worse with ALARO-1. Best results obtained in even higher resolution (not shown).



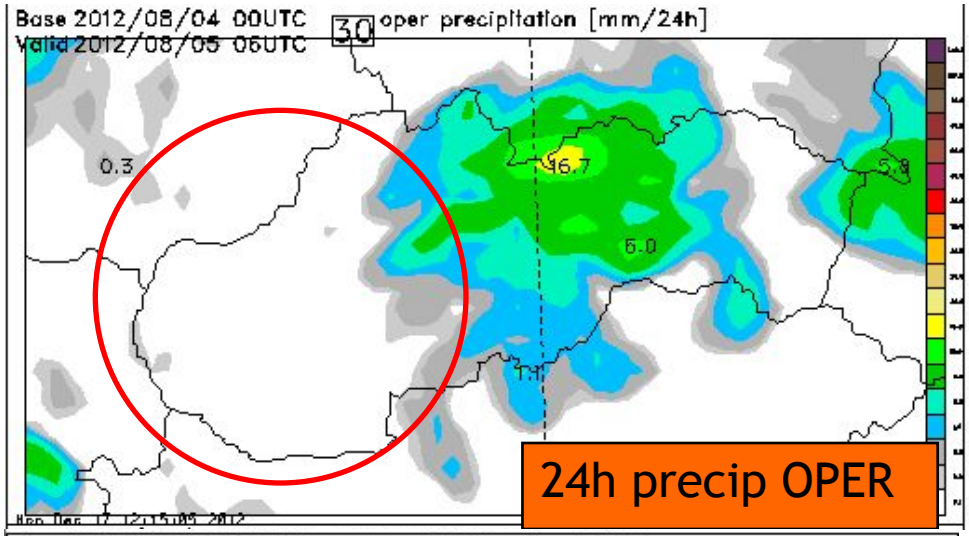




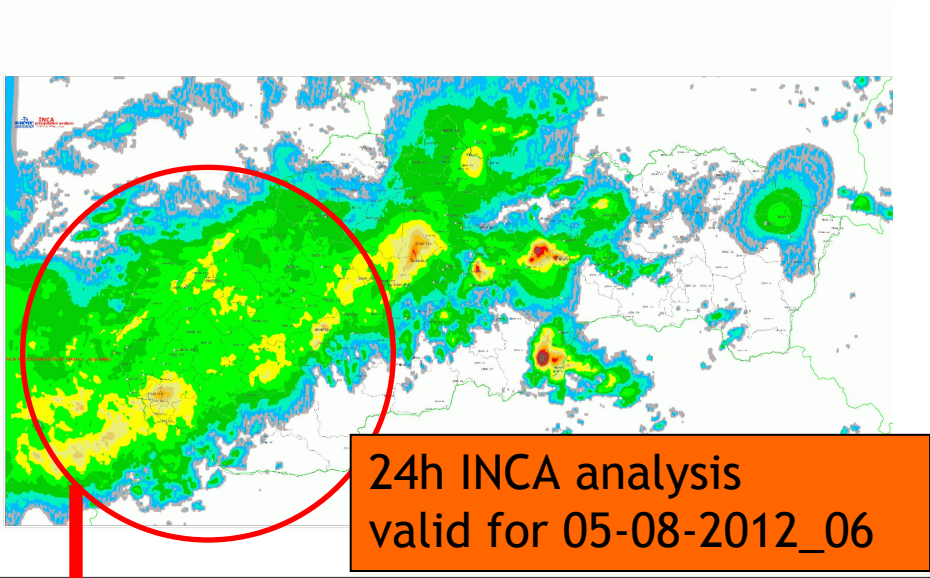


Case studies: missing precipitation

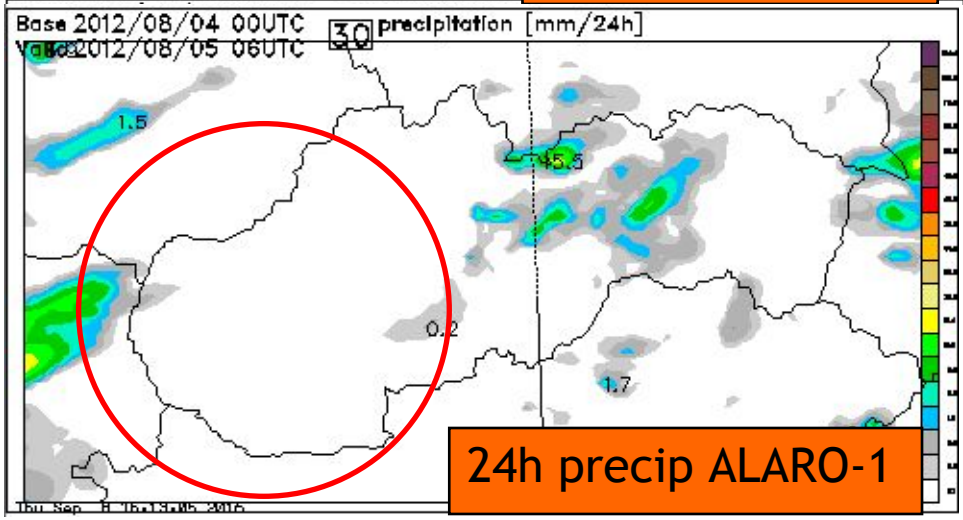
04-05/08/2012: missed precipitation for SW Slovakia, ALARO-1 not improved



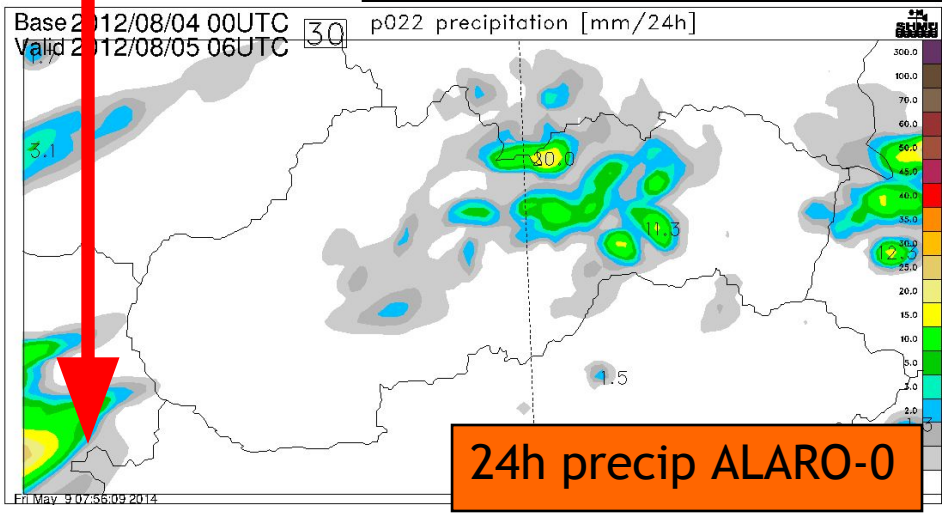
24h precip OPER



24h INCA analysis
valid for 05-08-2012_06



24h precip ALARO-1



24h precip ALARO-0

Case studies: Hot summer (1)

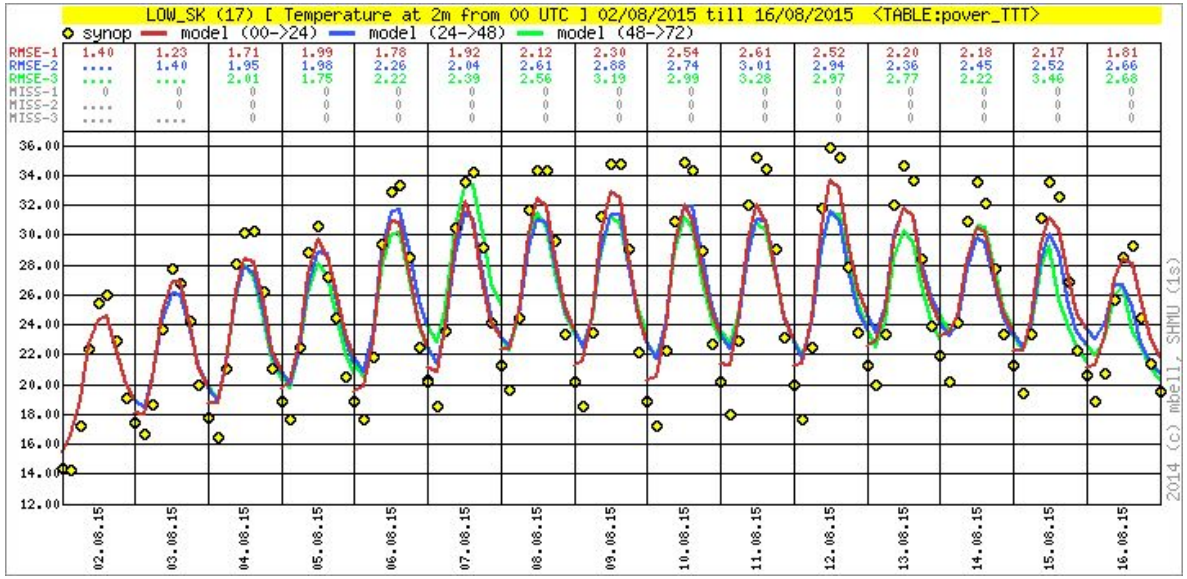
Atypically long periods of very hot weather during summer. 22 supertropical days in Hurbanovo, 15 in Bratislava (Tmax>35°C).

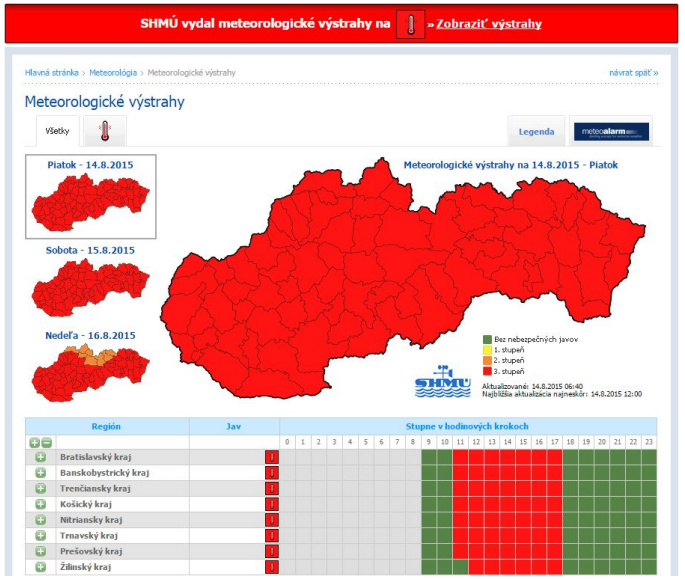
For the first time in history the 3rd category of warning was issued for three consecutive days for whole territory of Slovakia

Both operational ALADIN and the ALARO-0 esuite **underestimated Tmax** (~3°C) and **overestimated Tmin** (~2°C)

Partial improvement if retuned RCTVEG(3) coefficient assim & prod

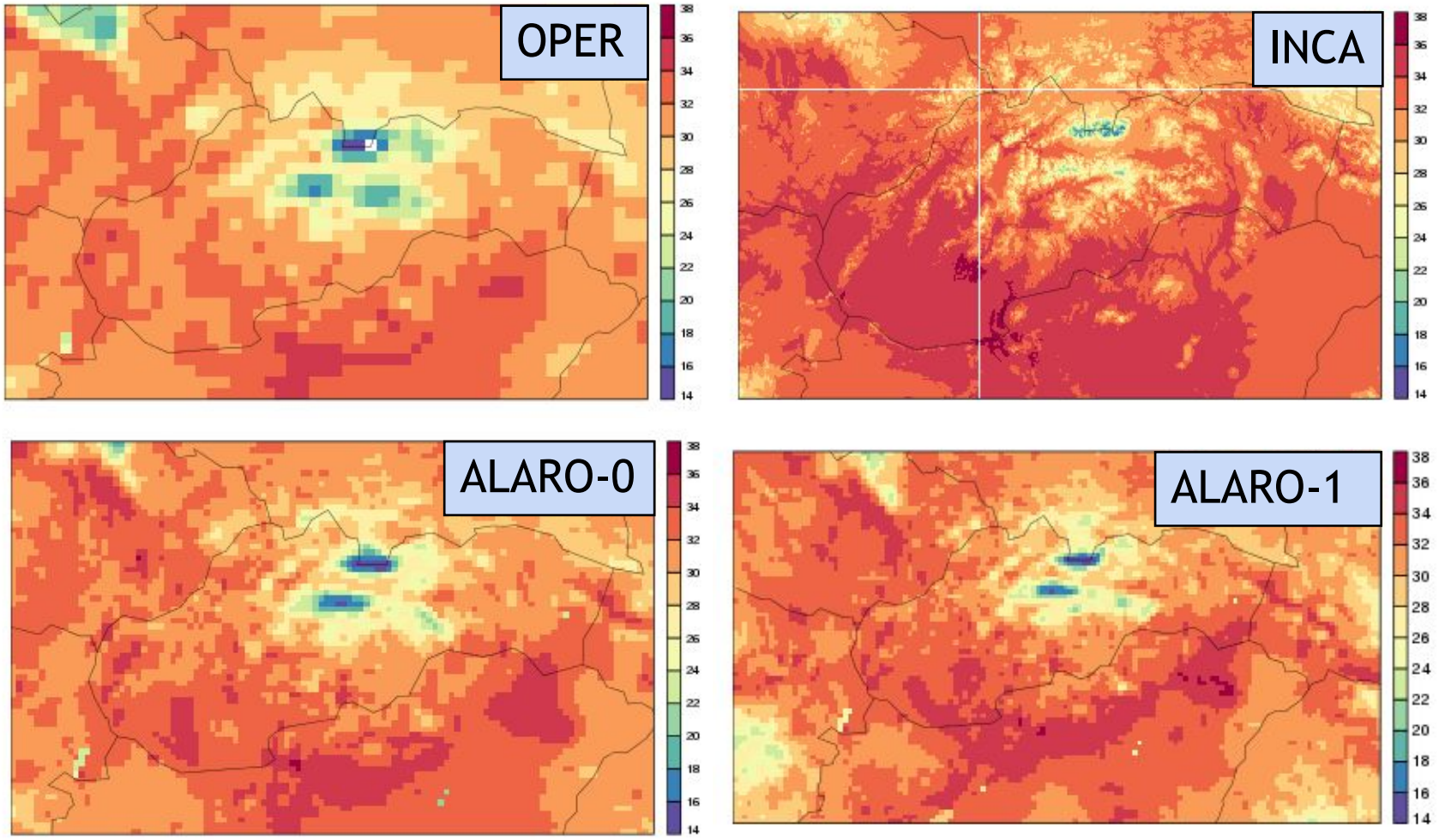
RCTVEG(3)=1.4E-05 instead of 0.8E-05 (1.1E-05 in ALARO1)





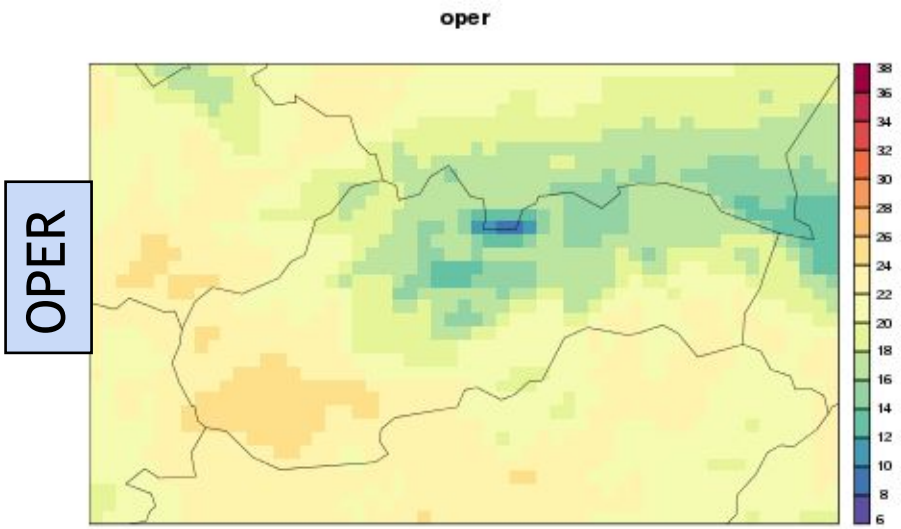
Case studies: Hot summer (2)

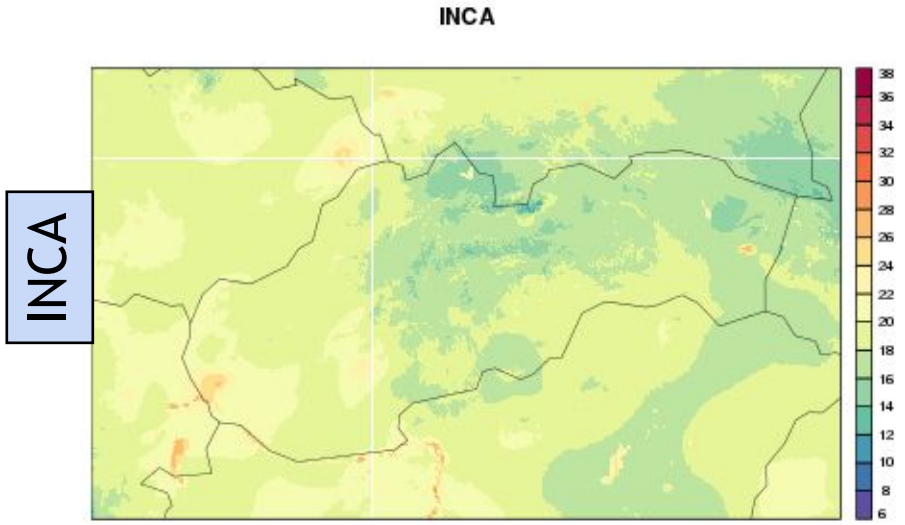
12h forecast of T2m from 2015-08-10_00: daily max improved with ALARO-1

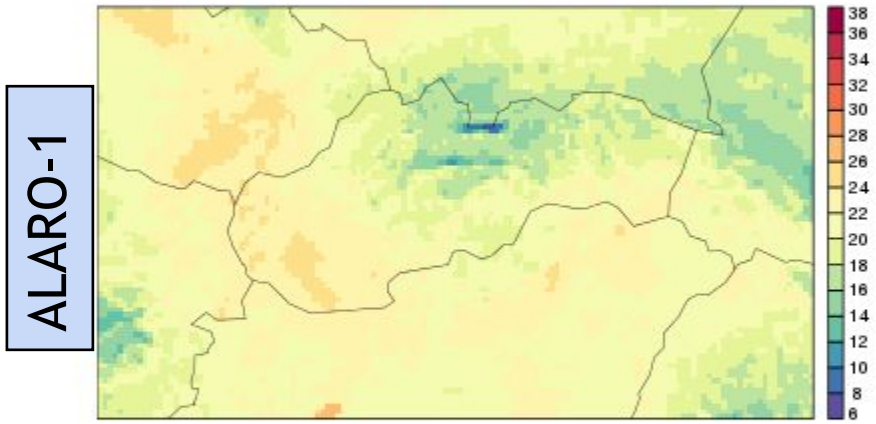


Case studies: Hot summer (3)

27h forecast of T2m from 2015-08-10_00: night min not better with ALARO-1

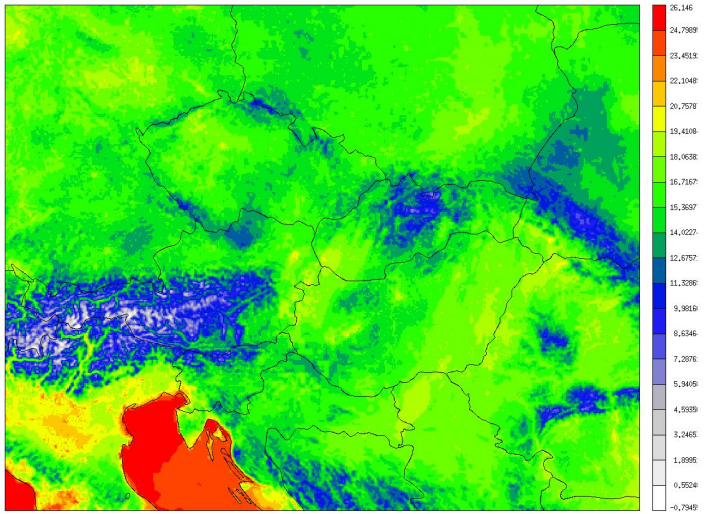


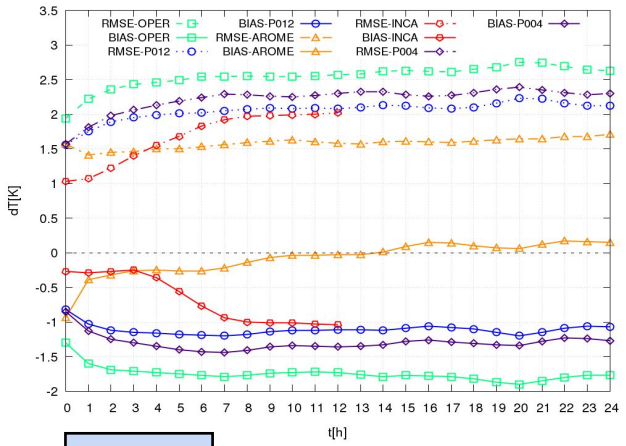




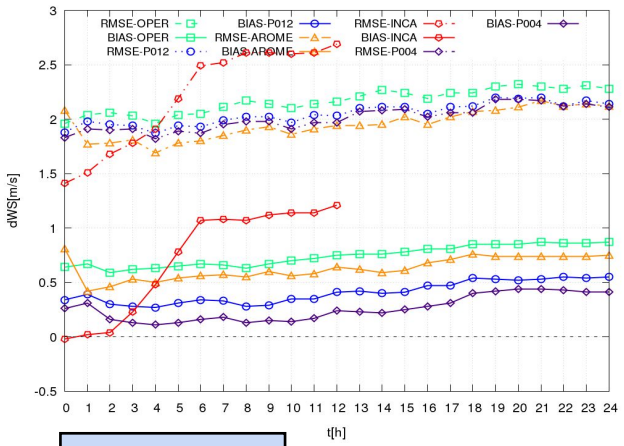
Scores w/r2 AROME

- 2.5km resolution, 63 levels (as ALARO)
- **15.-21.2.2016** (00, 06, 12, 18UTC)
- AROME, INCA, OPER, ALARO-0, ALARO-1
- scores w/r2 SK automatic stations
- ?? ALARO-1 T2m pb (LCLS_HS tuning?)
- ?? AROME RH2m

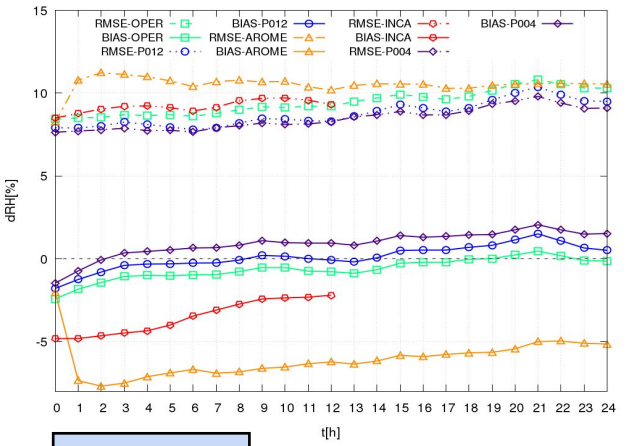




T2m



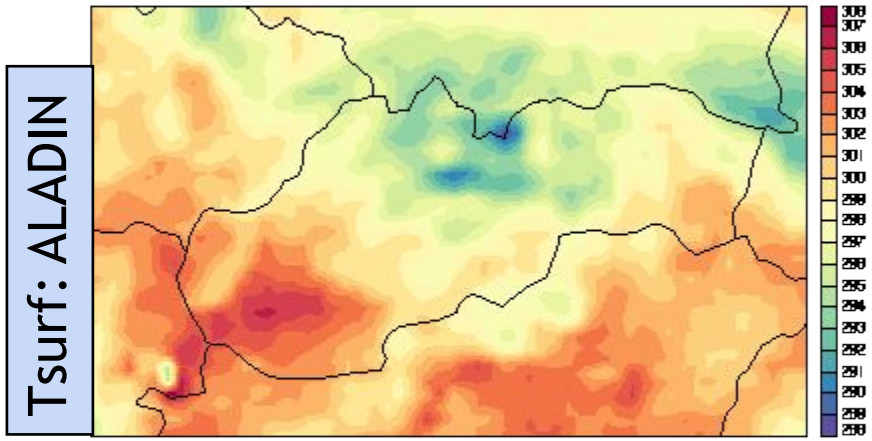
10mWS

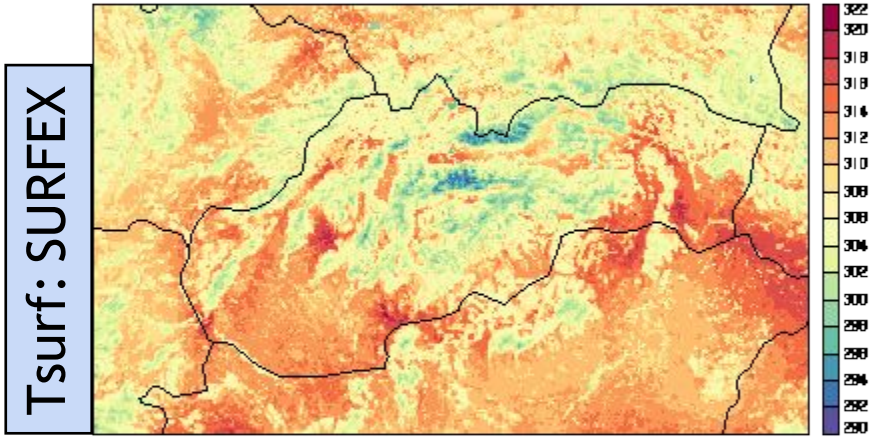


RH2m

Off-line SURFEX experiment

- Aim: to improve the snow cover description
- Experiment setup: **offline SURFEX** (1km) forced by analyses of INCA nowcasting system (2mT, 2mRH, 10m wind and precipitation). Radiative forcing (short and long wave) from the most actual ALADIN forecast. Forcing time step is 1 hour and SURFEX is initialized with the short-range ALADIN forecast.
- The snow profile evolution during last winter period have been re-analysed using the three alternative schemes: CROCUS, ES (explicit snow) and D95 (single-column and also full-domain experiments).





Conclusions & plans

ALARO-1 CY40T1

- successfully installed on new HPC
- running in quasi-operational mode

Still to solve:

- Wind at mountain stations;
- MSLP (initialisation?);
- precipitation verification
- Technical environment + applications

Plans:

- declare ALARO-1 operational
- SURFEX offline
- AROME