ALARO-0 experiences@SHMU

Maria Derkova
with contributions from other colleagues

ALARO-1 working days, Vienna, May 12-14, 2014

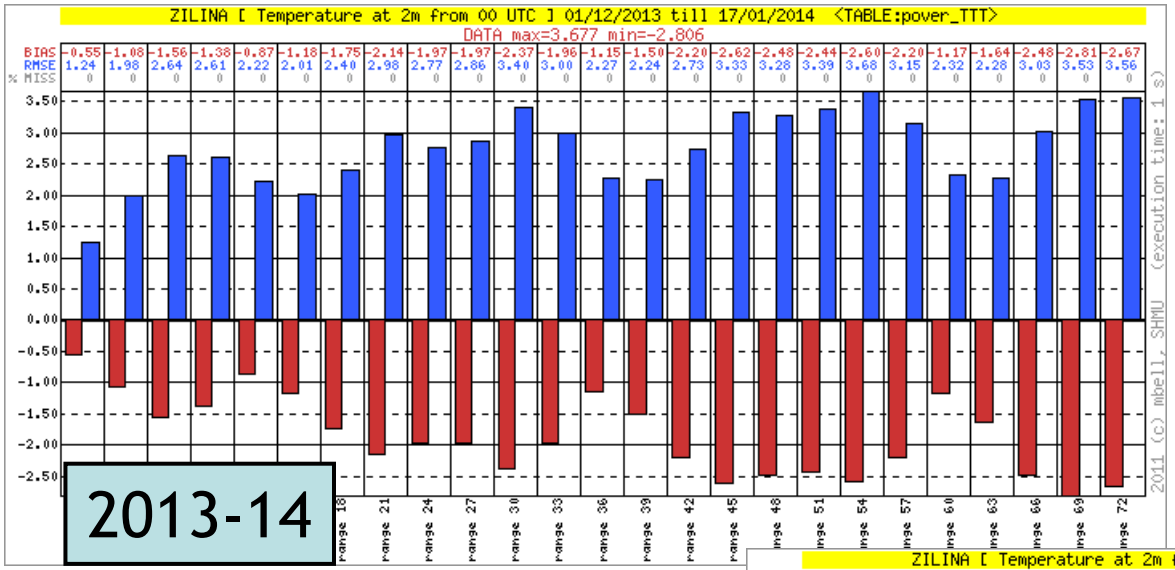
Outline

- Experiences & problems
  - Winter temperatures (negative BIAS)
  - Temperature forecast failures
  - Precipitation
  - Fog
  - Wind
- High(er) resolution studies
  - E923 & LZ0THER
  - Parallel suite scores
  - Case studies
- Plans

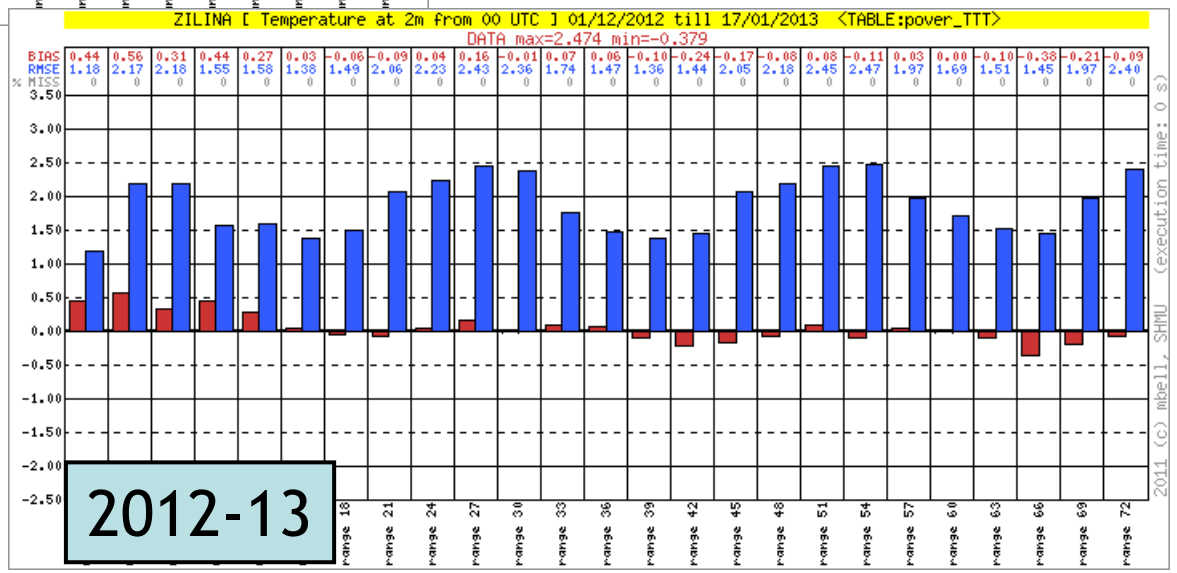
Experiments setup

operational	HighRes1 (p013)	HighRes2 (p022)
9km	3.3km	4.5km
320x288 pts	800x675 pts	625x576 pts
106x95 quad	399x336 lin	312x287 lin
37 levels	62 levels	63 levels
envelope orography	mean orography	mean orography (old Z0)
canari+DFI blending	dynamical adaptation	dynamical adaptation & assim (701+DFI_blend)
Arpege cpl a'3h	Arpege cpl a'3h	Arpege cpl a'3h
CY36T1 (3MT, SLHD)	CY36T1_op6 ("Prague")	CY38T1_bf03_export

Winter 2013-4: cold temperature BIAS (1)



2mT scores for Zilina, 01/12-17/01



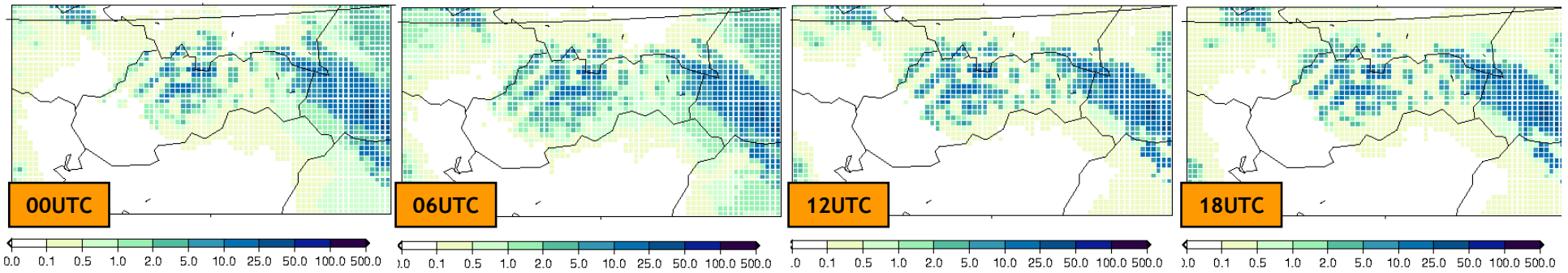
Winter 2013-4: cold temperature BIAS (2)

- Long-lasting negative temperature BIAS on almost all SK stations was observed, probably due to unrealistic snow cover in ALADIN.
- Not present last winter (despite no change in operational setup)
- Link with the snow cover & assimilation?
- In reality there was NO SNOW in January over whole Slovak territory except highest mountains
- There was much less snow in Arpege (in LBC), but its amount was changing forecast to forecast!
- Snow cover is not analyzed in CANARI, but it is cycled from the guess
- 2 (not very successful) experiments
  - RCLIMCA=0.045 - relaxation towards climatology
  - RSNSA=0.04; RSNSB=1. (default) – snow melting parameters

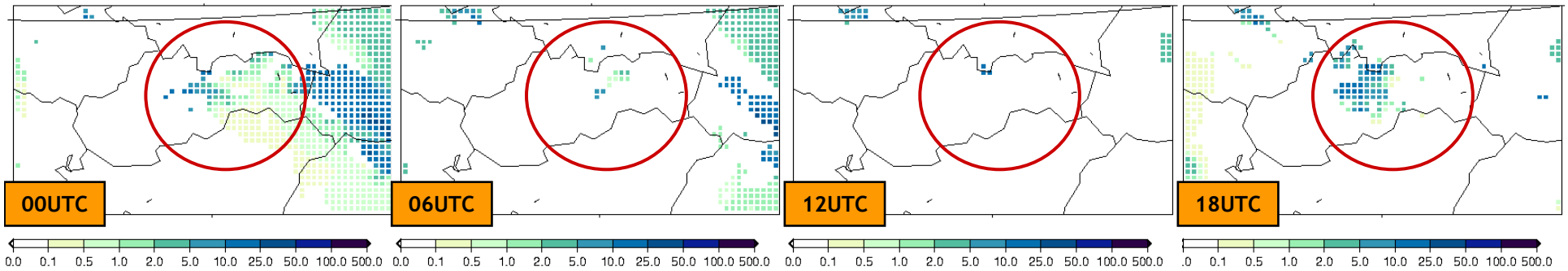
Winter 2013-4: cold temperature BIAS (3)

SURFRESERVOIR.NEIGE on 15/01/2014 in analyses files (no snow fall that day)

ALADIN: completely unrealistic, but consistent from NT to NT

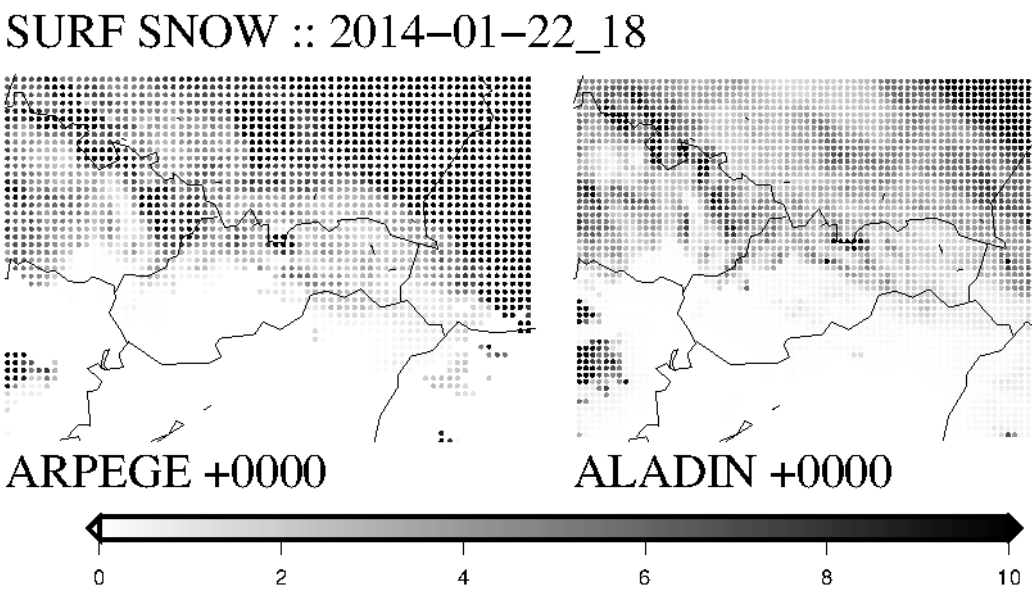


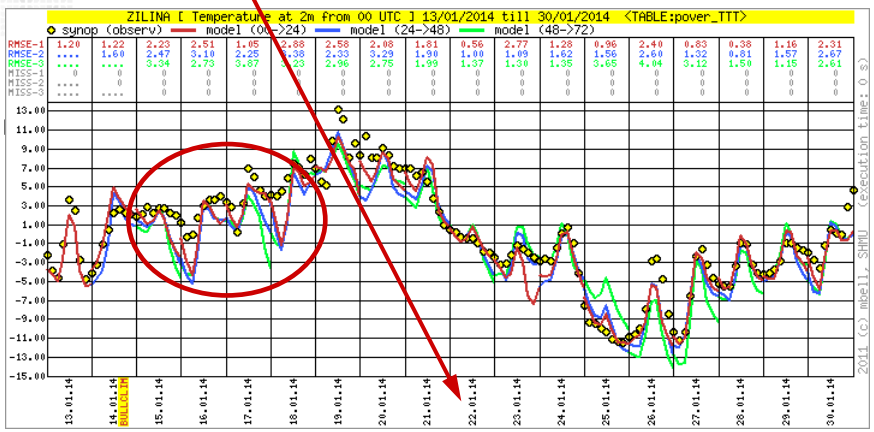
ARPEGE: more reasonable, but changing with network times (generally observed feature)



Winter 2013-4: cold temperature BIAS (4)

SOLUTION: It was snowing on 22/01/2014 in Slovakia => snow cover
=> T2m BIAS “under control”

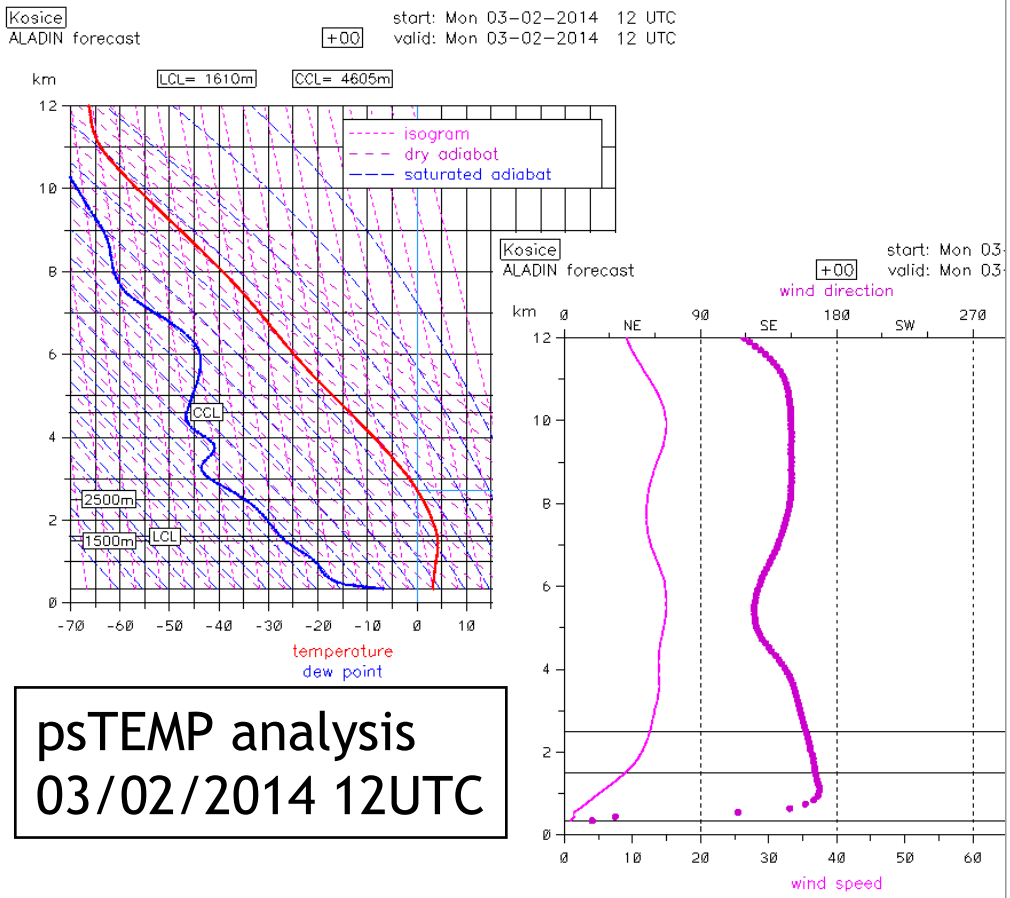




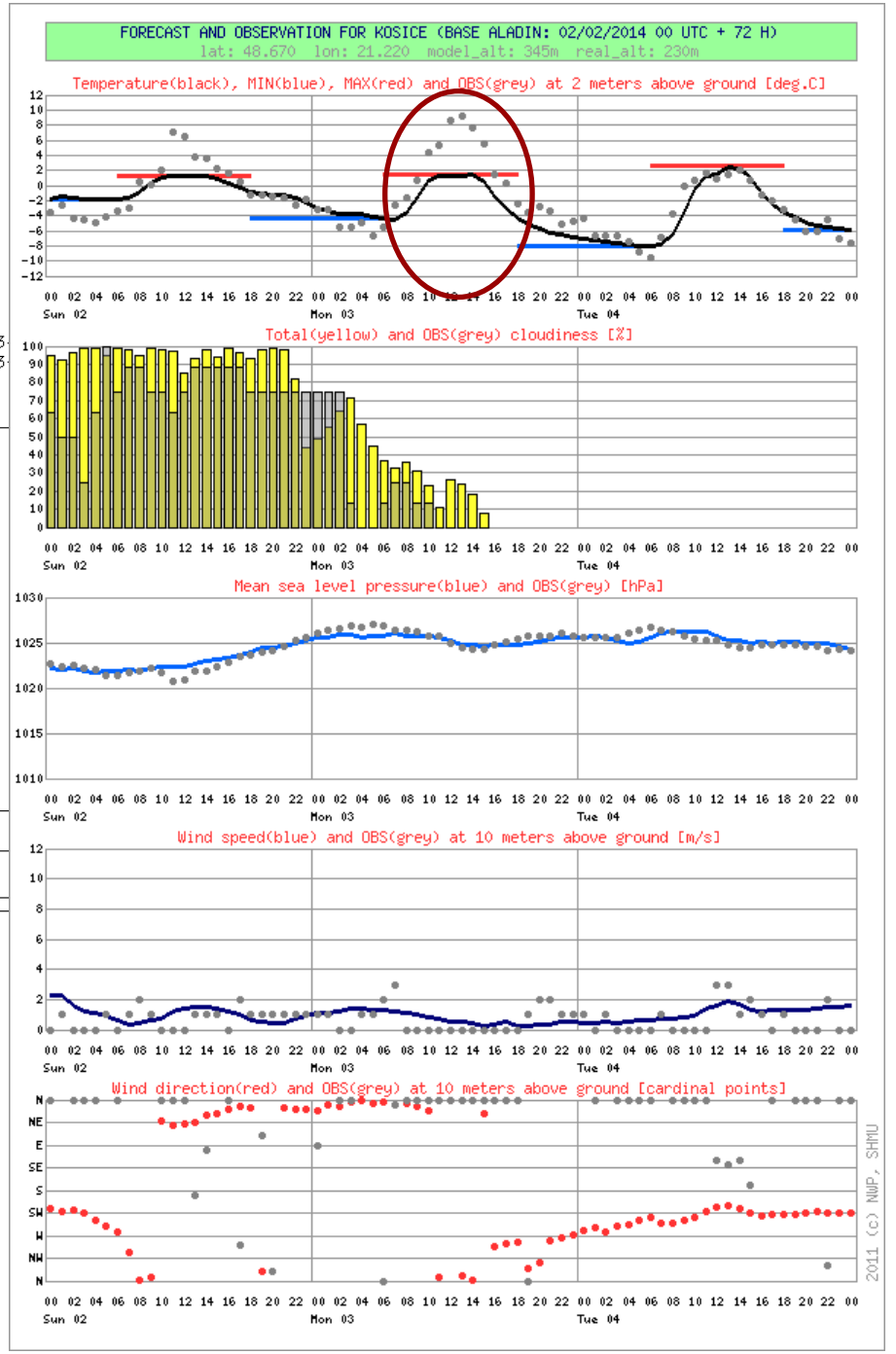
Case Feb 03-04, 2014; East Slovakia

- ~10°C maximum temperature underestimation in East Slovakia
- **BIG** problem because since Jan 2014 our forecasters are daily presenting the weather on TV
- Nice stable weather, warm at 850hPa (~5°C, correctly predicted by ALADIN), weak wind (N@surface, otherwice S), snow on ground (also in ALADIN), relatively correct forecast of morning temperatures
- It was expected that the inversion layer over snow will persist, leading to small daily temperature amplitude. But the inversion was broken and $2mT_{max}$ reached almost 10°C (on several stations).
- Why? Turbulence? Soil ice?.....under investigations

Example for Kosice station

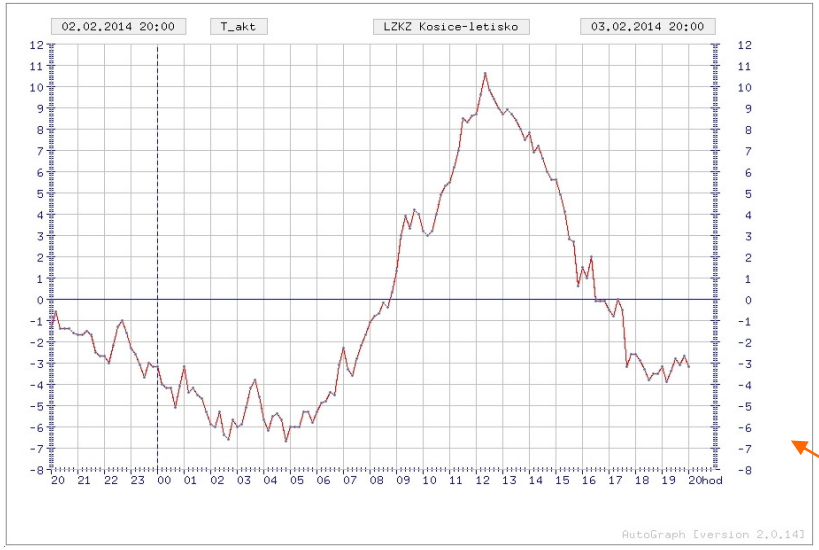


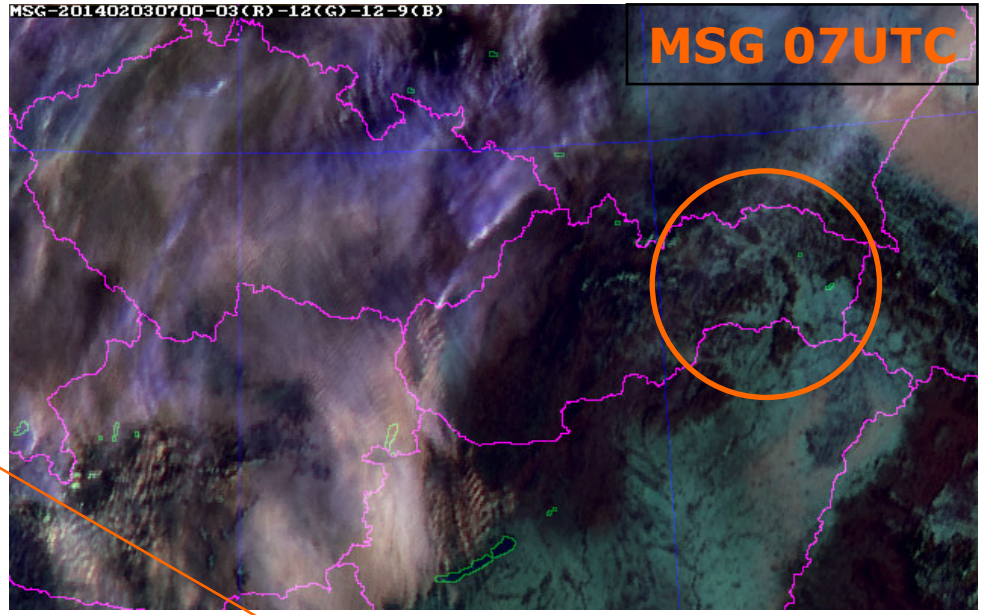
psTEMP analysis
03/02/2014 12UTC

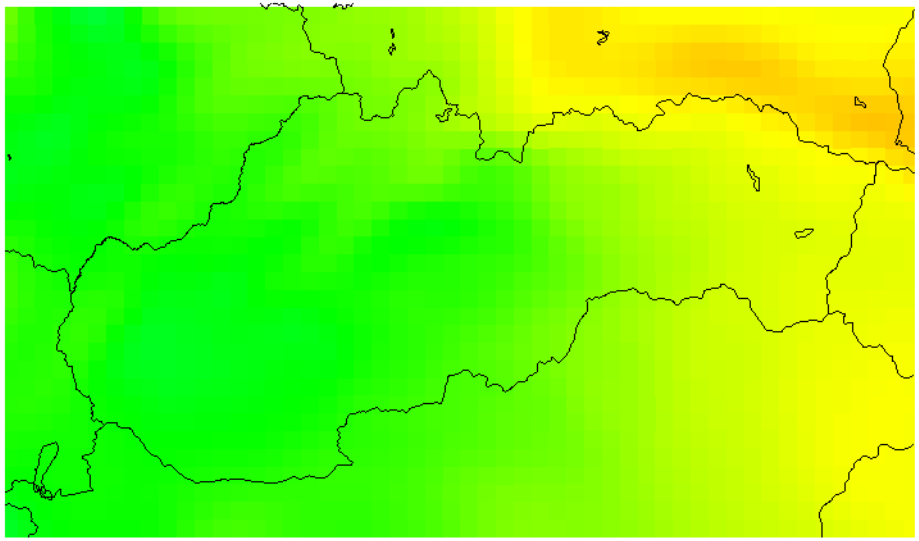


Vertical profiles: temperature inversion & weak wind.
Rather good forecast of cloudiness and wind, but the temperature maxima heavily underestimated.

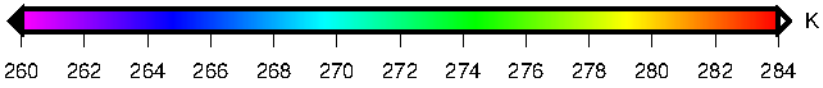
Snow covered East Slovakia on MSG

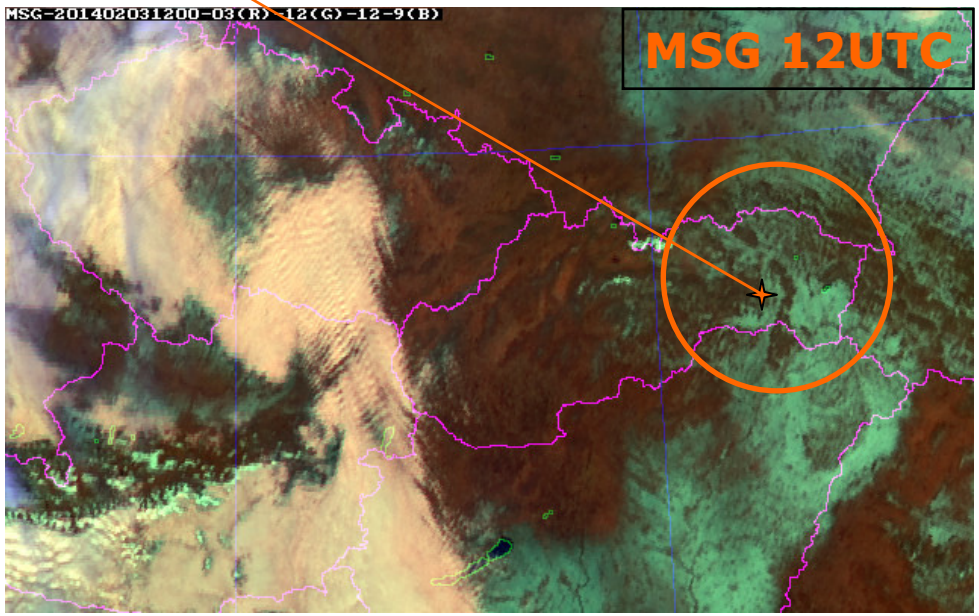


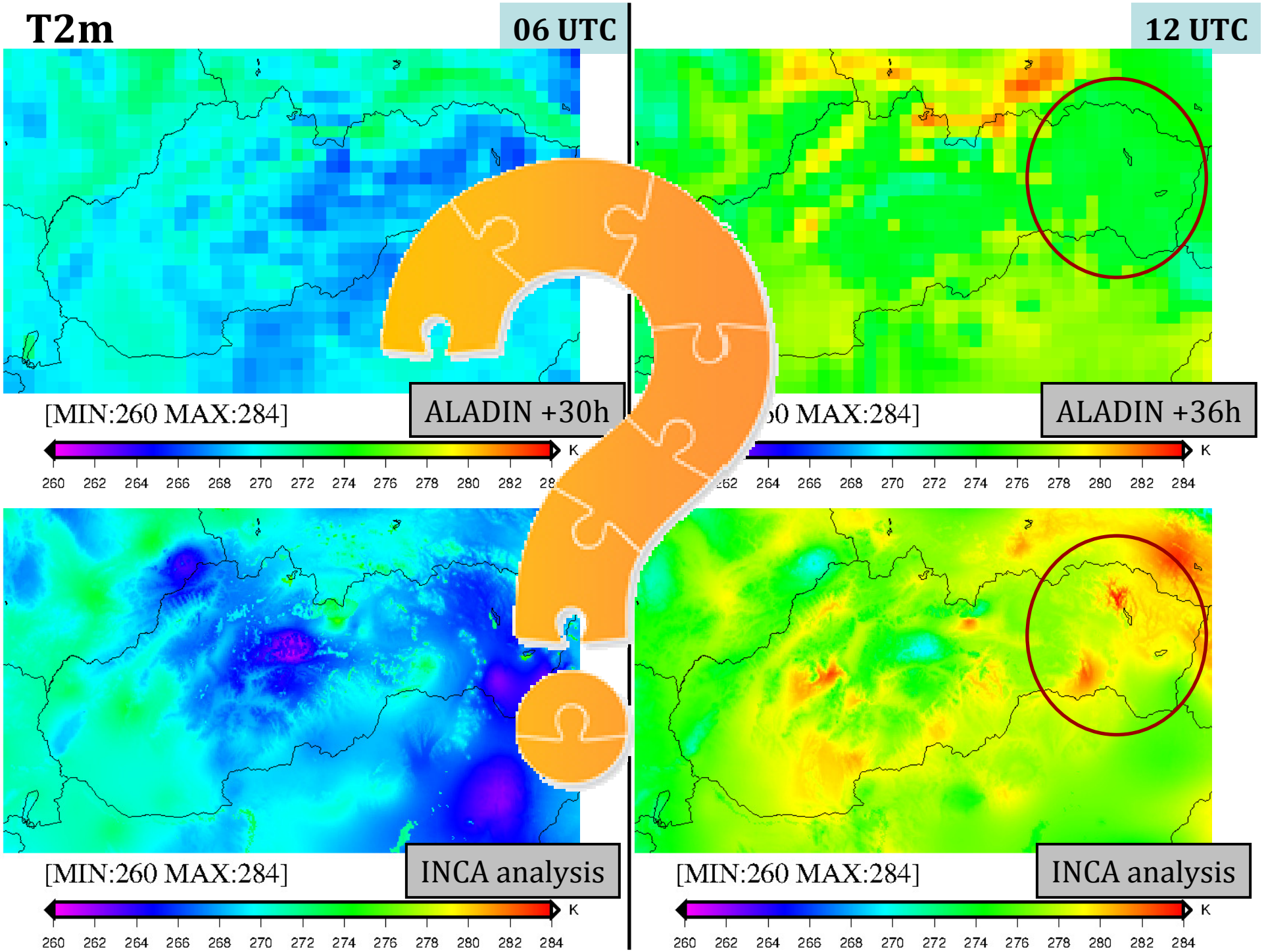




[MIN:260 MAX:284]






T2m
06 UTC
12 UTC
[MIN:260 MAX:284]
ALADIN +30h
ALADIN +36h
K
260 262 264 266 268 270 272 274 276 278 280 282 284
[MIN:260 MAX:284]
INCA analysis
[MIN:260 MAX:284]
INCA analysis

Experiments setup

operational	HighRes1 (p013)	HighRes2 (p022)
9km	3.3km	4.5km
320x288 pts	800x675 pts	625x576 pts
106x95 quad	399x336 lin	312x287 lin
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CY36T1 (3MT, SLHD)	CY36T1_op6 ("Prague")	CY38T1_bf03_export

Roughness lengths pb (1)

```
08:57:21 STEP  217 H=  10:51 +CPU= 21.805
   * 253 Invalid operation PROG=acntcls ELN=323(40590b37c) TASKID=1
   * 253 Invalid operation PROG=acntcls ELN=334(40590b414) TASKID=1
   * 253 Invalid operation PROG=achmt ELN=895(403f7f618) TASKID=1
   * 253 Invalid operation PROG=acptke ELN=535(4057d81e4) TASKID=1
****  99 Execution suspended PROG=acptke ELN=535(4057d81e4) TASKID=1
            Called from aplpar ELN=6536(403fe4c04)
            Called from mf_phys ELN=2907(403f585a4)
            Called from cpg$1 ELN=1543(403961c64)
            Called from cpg ELN=1394(4039474e0)
            Called from gp_model ELN=736(40320c294)
            Called from scan2m ELN=714(4011f894c)
            Called from stepo ELN=532(401193e50)
            Called from cnt4 ELN=1464(40122c7e0)
            Called from cnt3 ELN=436(4011c7034)
            Called from cnt2 ELN=82(400061320)
            Called from cnt1 ELN=157(40002f6f0)
            Called from cnt0 ELN=282(40002f0b4)
            Called from master ELN=95(400000d94)
```

As Marianno says: ”When the model blows up, there is always a problem in physics…”

Roughness lengths pb (2)

“new” feature in reference e923 scripts for Partners on beaufix: surface turbulent fluxes for heat & moisture are computed without contribution of subgrid orography (a’la SURFEX)

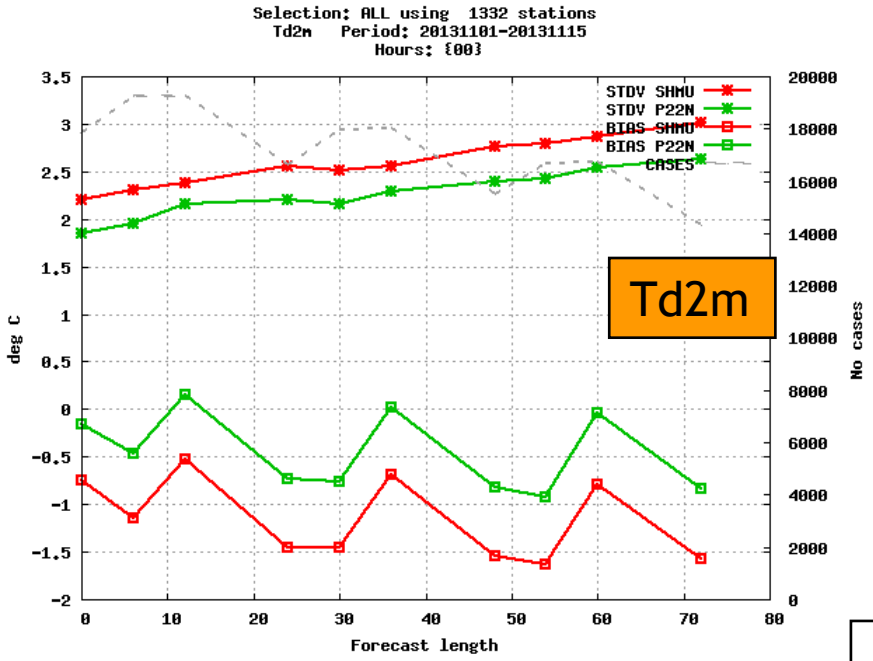
NEW	OLD
E923:LZ0THER=.F.	E923:LZ0THER=.T.
FACZ0=1.	FACZ0=0.53
NLISSZ=1	NLISSZ=3
E001: LZ0HSREL=.T.	E001: LZ0HSREL=.F.

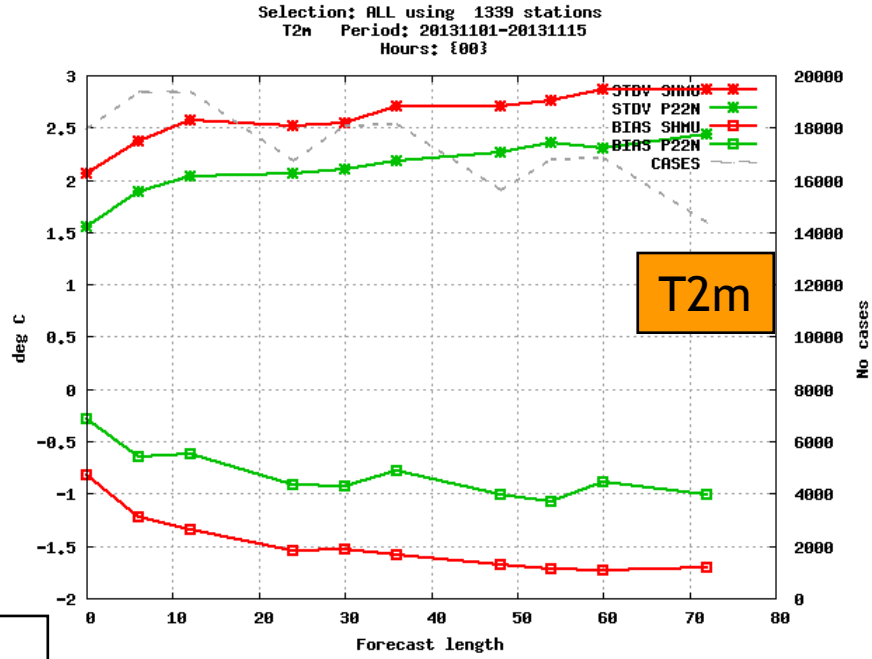
Smaller thermal Z0 and larger Z0 in new formulation

Documentation: presentation by F.Bouyssel and F. Taillefer

High resolution parallel suite

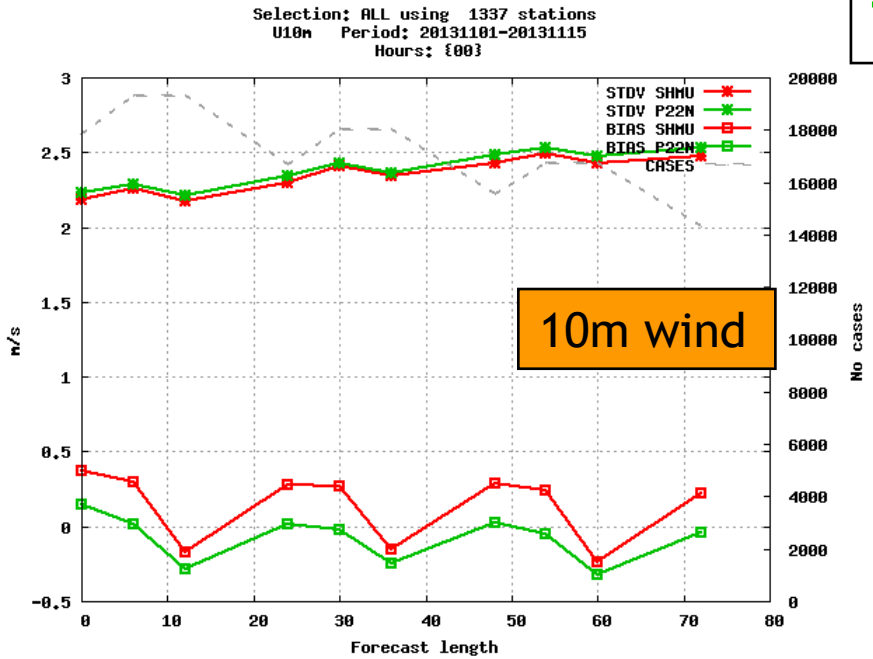
- Scores (CY38T1_bf03_export 4.5km)
- Weather cases (4.5 & 3.3km)

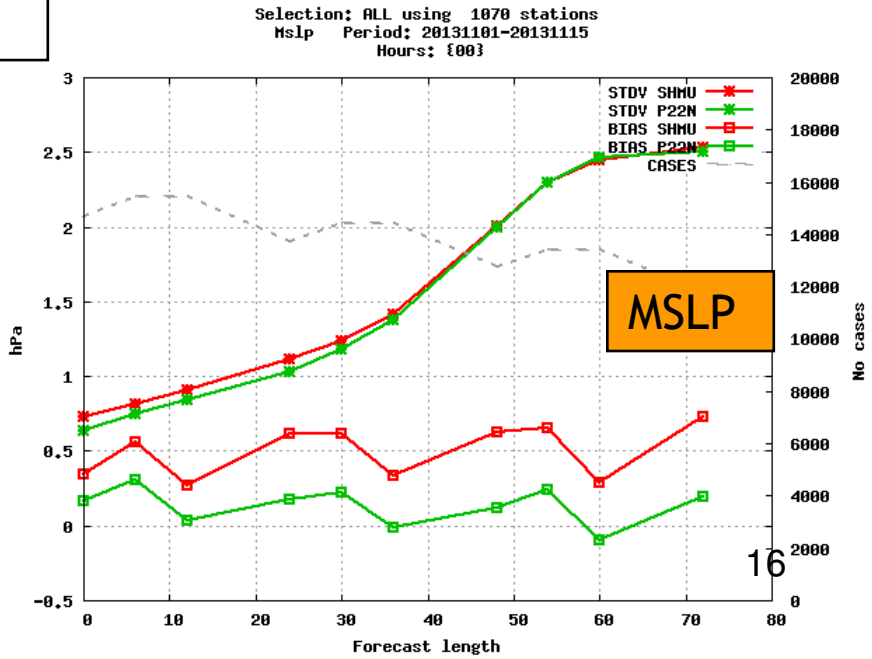

Selection: ALL using 1332 stations
Td2m Period: 20131101-20131115
Hours: {00}
STDV SHMU
STDV P22N
BIAS SHMU
BIAS P22N
CASES
Td2m
deg C
No cases
Forecast length

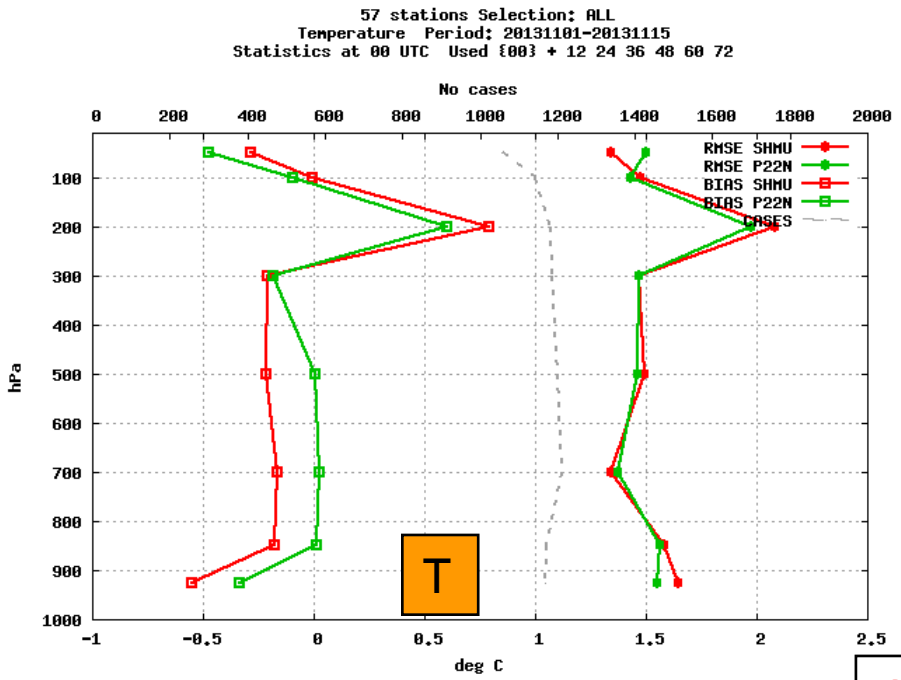

Selection: ALL using 1339 stations
T2m Period: 20131101-20131115
Hours: {00}
STDV SHMU
STDV P22N
BIAS SHMU
BIAS P22N
CASES
T2m
deg C
No cases
Forecast length

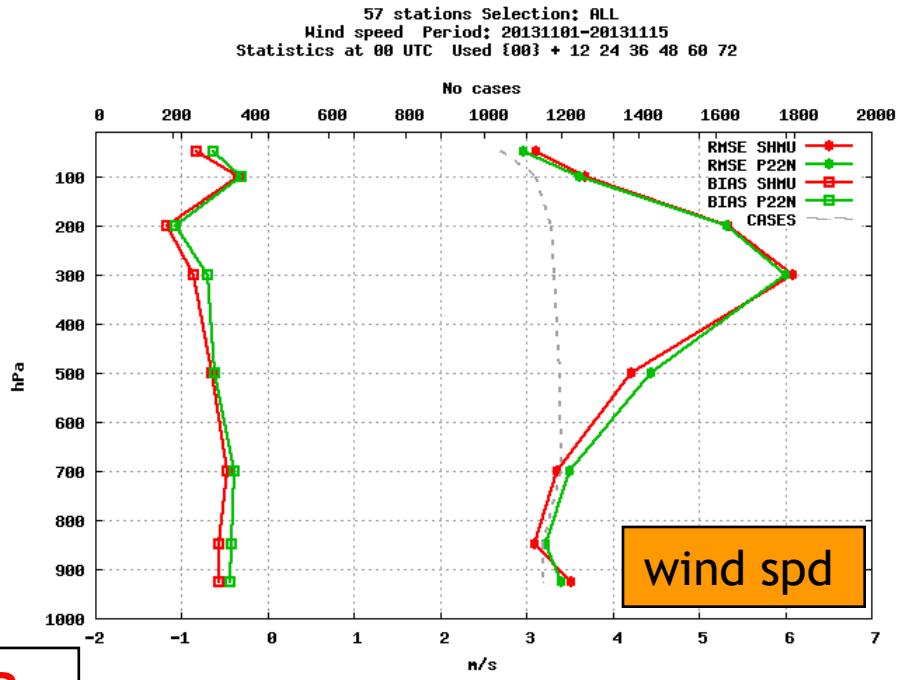
OPER

TEST


Selection: ALL using 1337 stations
U10m Period: 20131101-20131115
Hours: {00}
STDV SHMU
STDV P22N
BIAS SHMU
BIAS P22N
CASES
10m wind
m/s
No cases
Forecast length

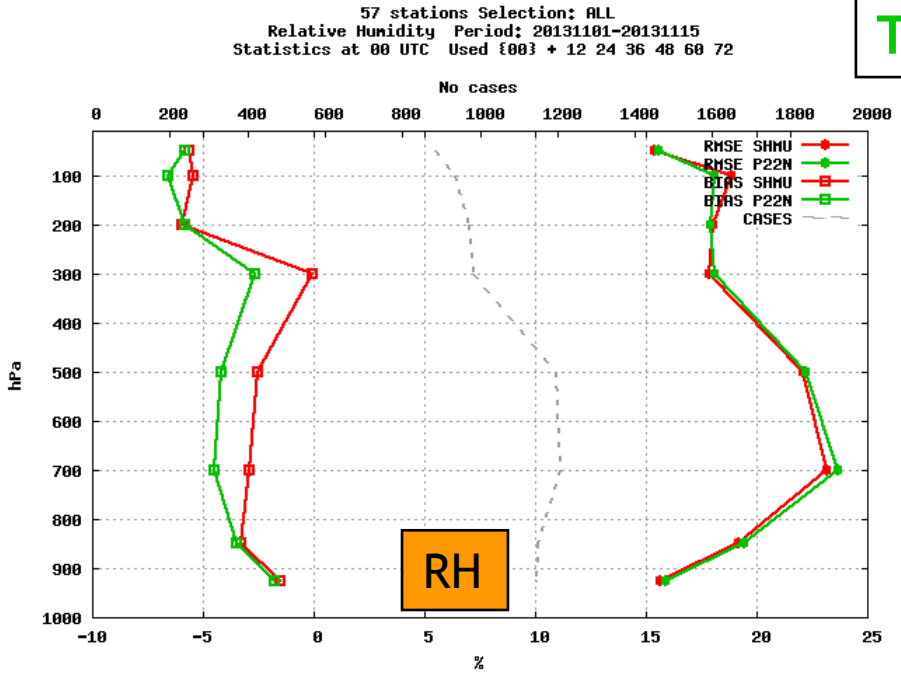

Selection: ALL using 1070 stations
Mslp Period: 20131101-20131115
Hours: {00}
STDV SHMU
STDV P22N
BIAS SHMU
BIAS P22N
CASES
MSLP
hPa
No cases
Forecast length

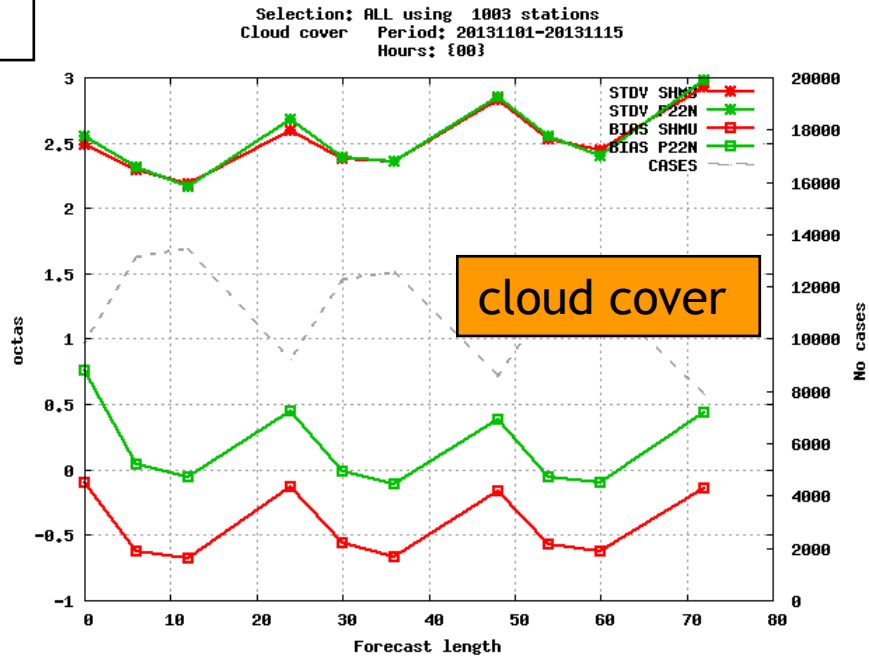

57 stations Selection: ALL
Temperature Period: 20131101-20131115
Statistics at 00 UTC Used {00} + 12 24 36 48 60 72
No cases
RMSE SHMU
RMSE P22N
BIAS SHMU
BIAS P22N
CASES
T
hPa
deg C


57 stations Selection: ALL
Wind speed Period: 20131101-20131115
Statistics at 00 UTC Used {00} + 12 24 36 48 60 72
No cases
RMSE SHMU
RMSE P22N
BIAS SHMU
BIAS P22N
CASES
wind spd
hPa
m/s

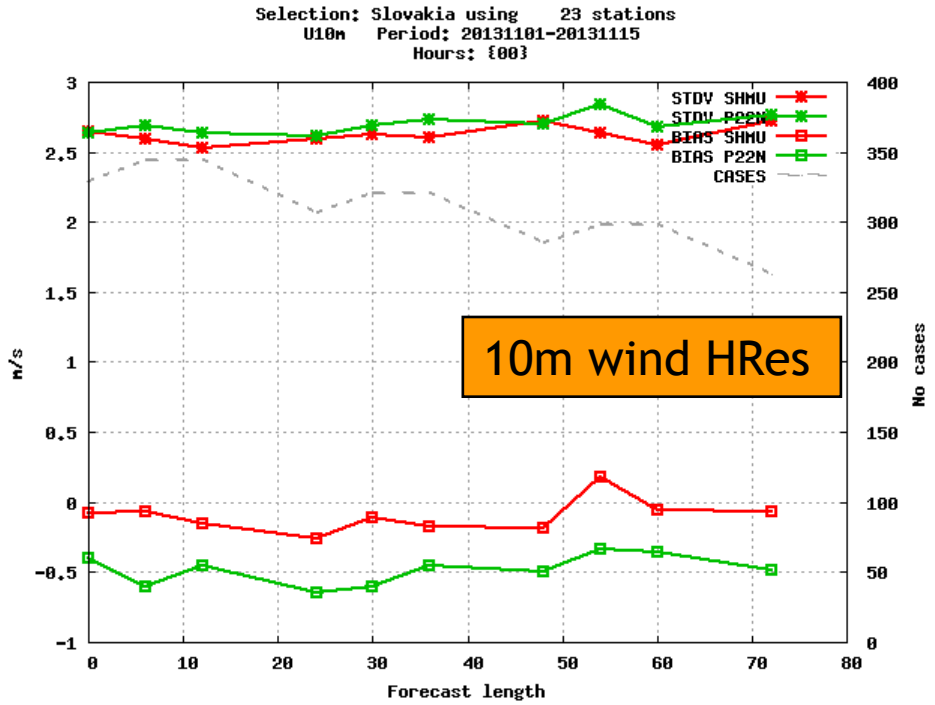
OPER

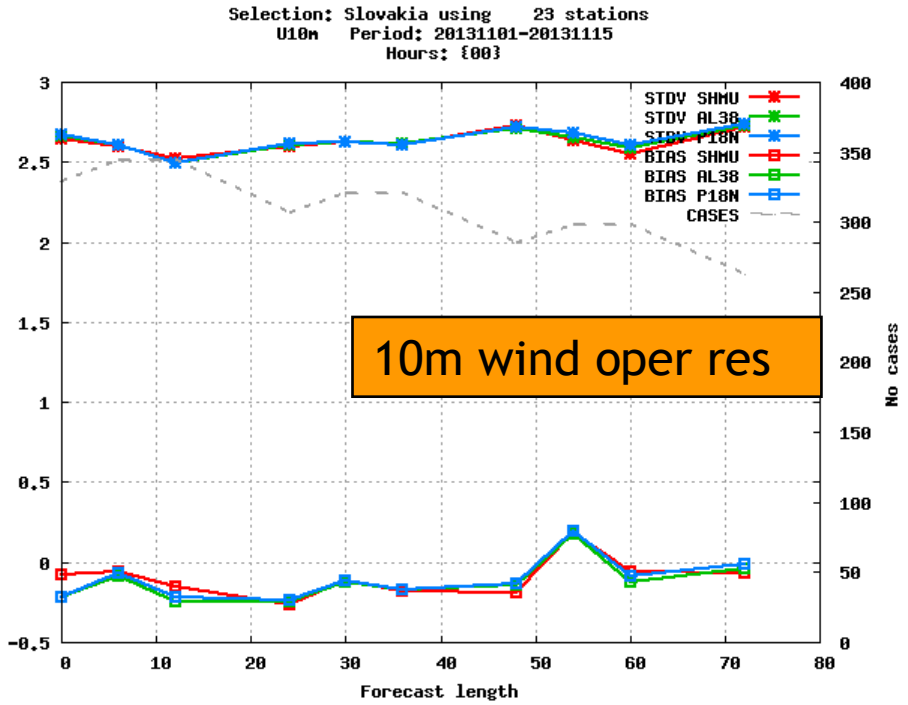
TEST


57 stations Selection: ALL
Relative Humidity Period: 20131101-20131115
Statistics at 00 UTC Used {00} + 12 24 36 48 60 72
No cases
RMSE SHMU
RMSE P22N
BIAS SHMU
BIAS P22N
CASES
RH
hPa
%


Selection: ALL using 1003 stations
Cloud cover Period: 20131101-20131115
Hours: {00}
STDV SHMU
STDV P22N
BIAS SHMU
BIAS P22N
CASES
cloud cover
octas
No cases
Forecast length

10m wind problem? (SK vs BELG)





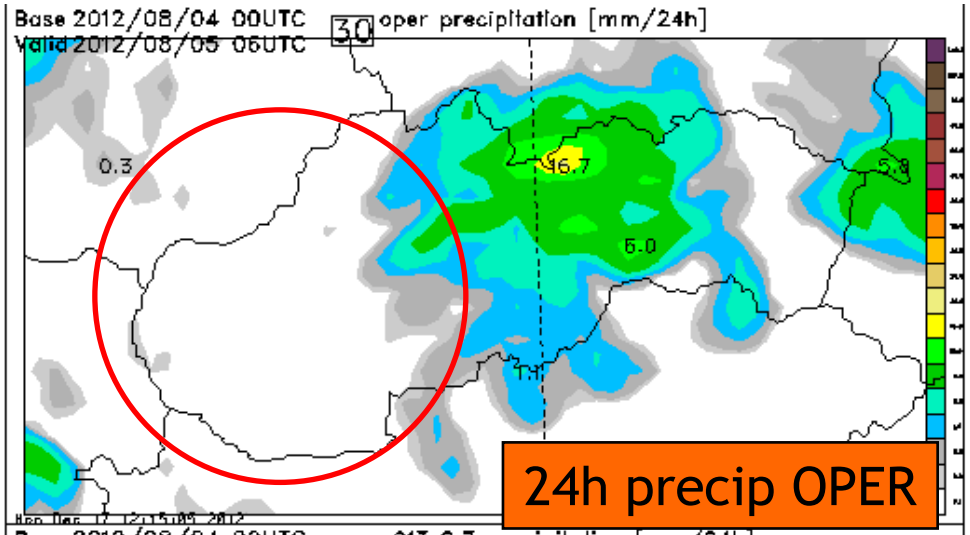
OPER

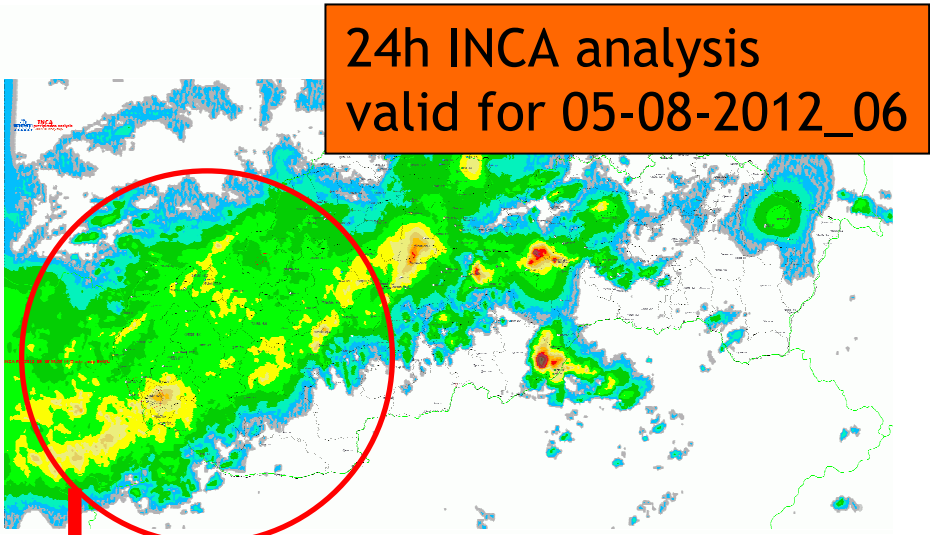
TEST HR; TEST OPER

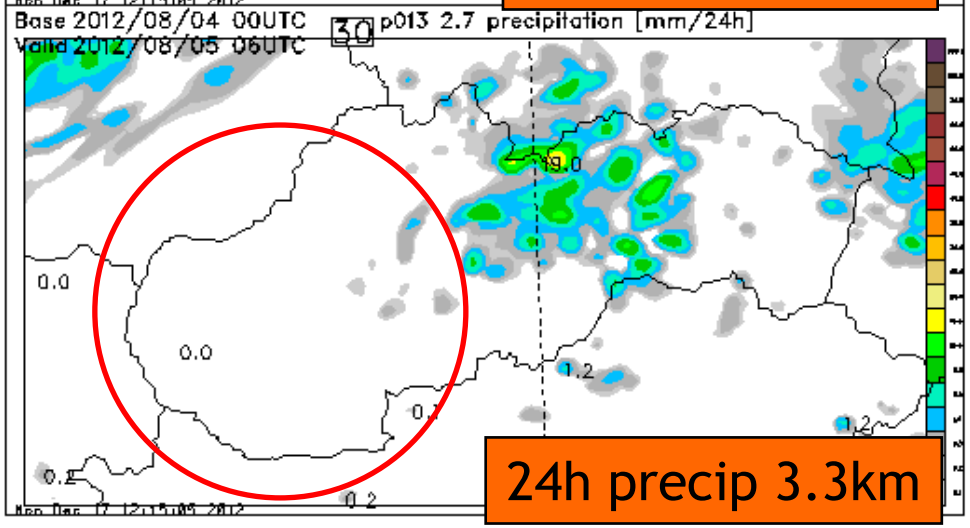
Case studies

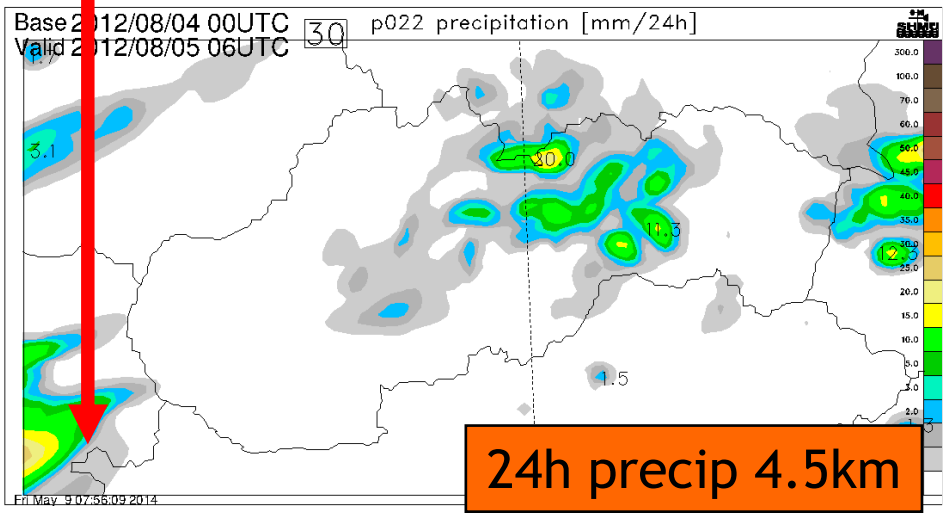
- Squall line: August 2012
- FOG: October 2012
- Snow: Dec 2012
- Temperature problems: Feb & March 2014
- Wind: March 2013

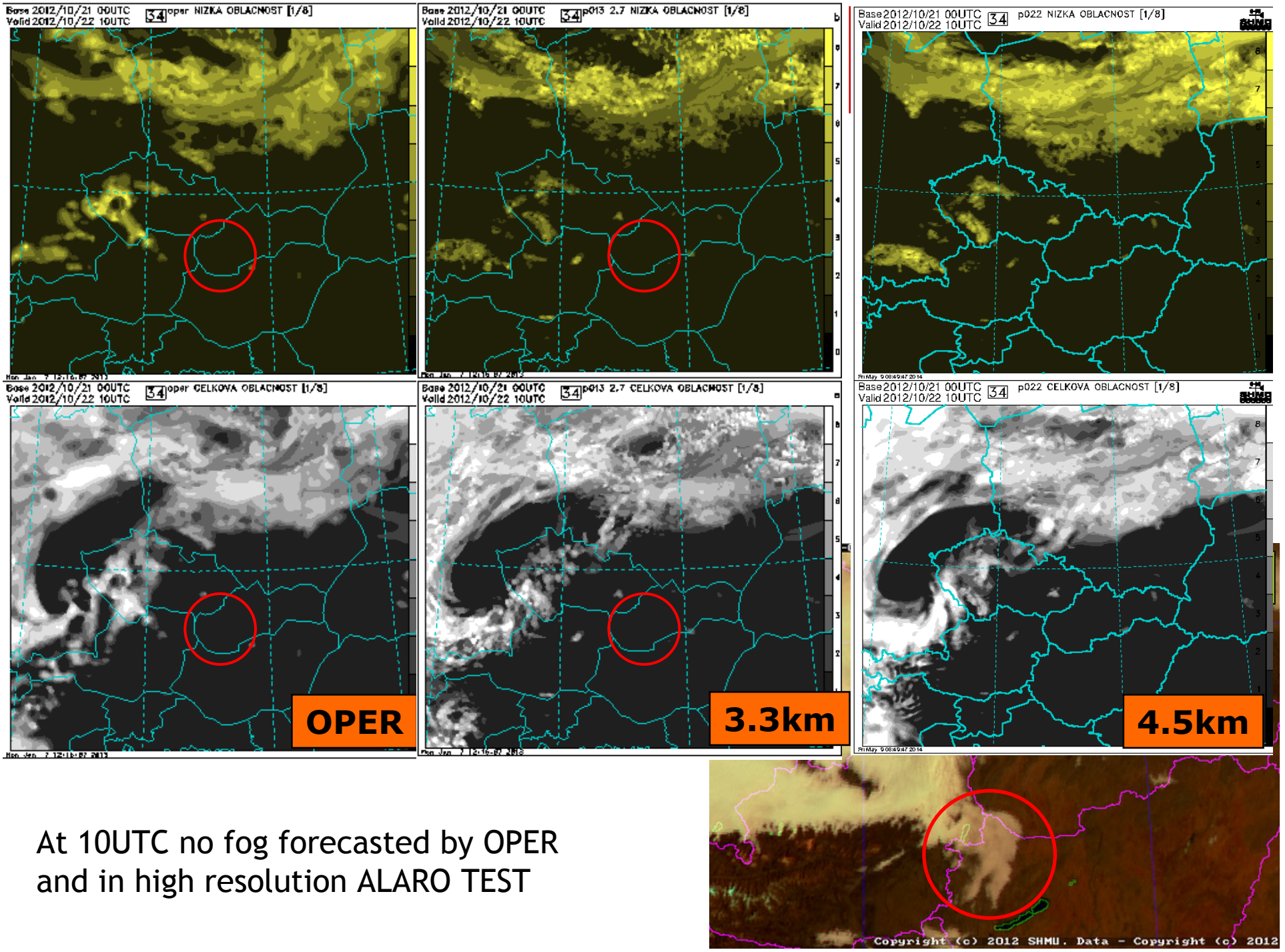
CASE 04-05/08/2012: missing model precipitation in SW Slovakia



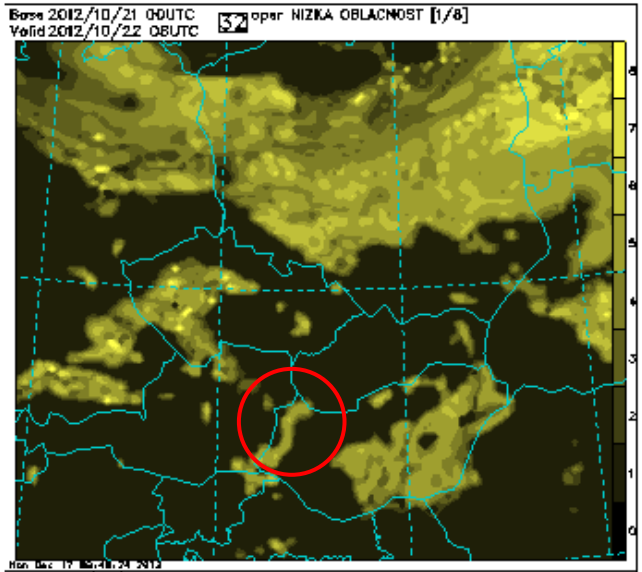


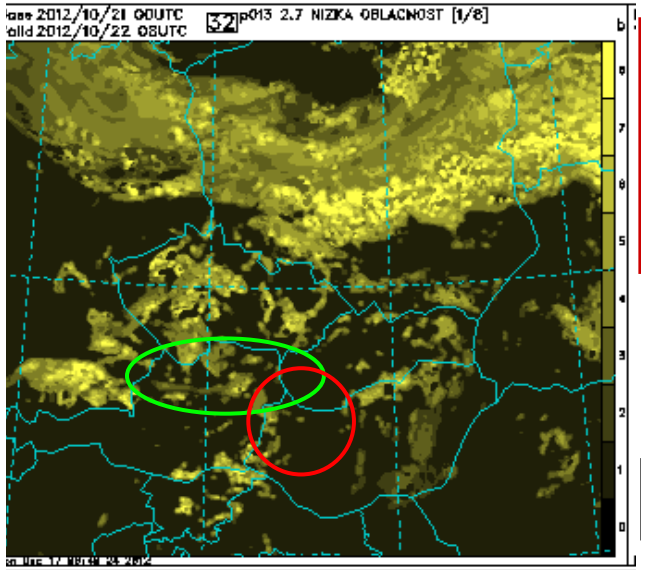


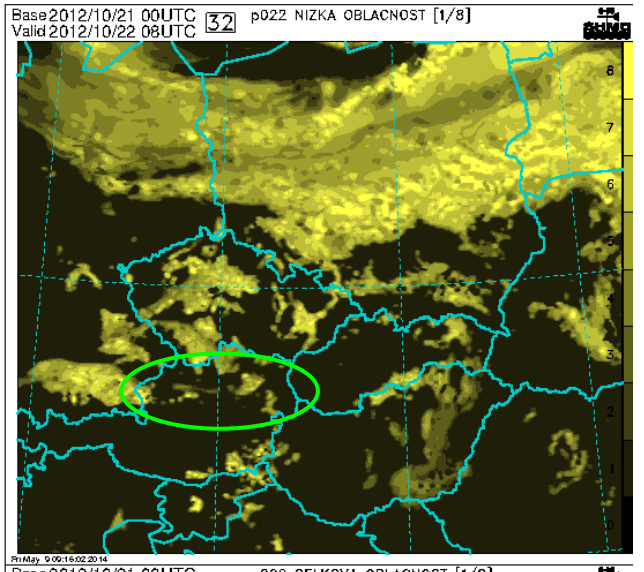


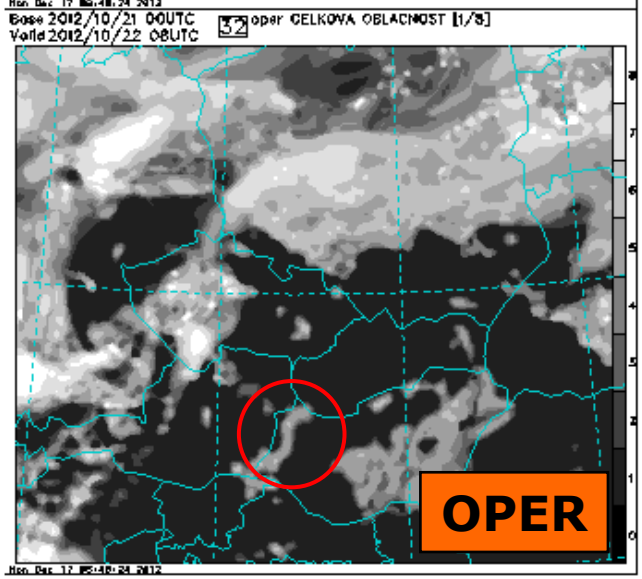


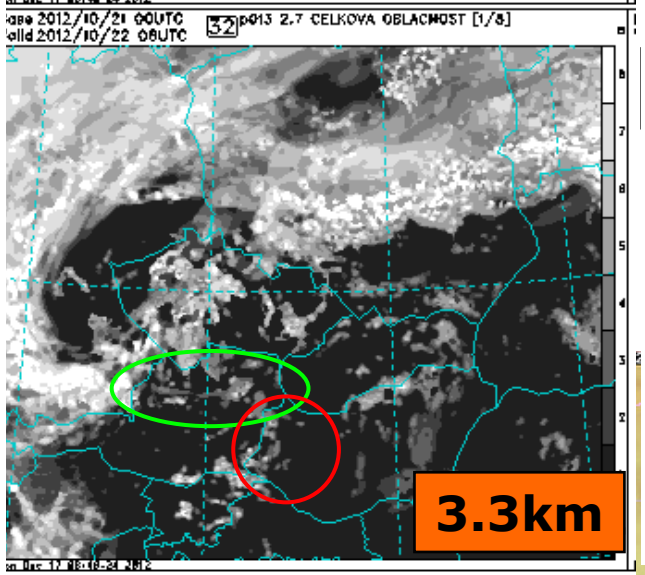
At 10UTC no fog forecasted by OPER
and in high resolution ALARO TEST

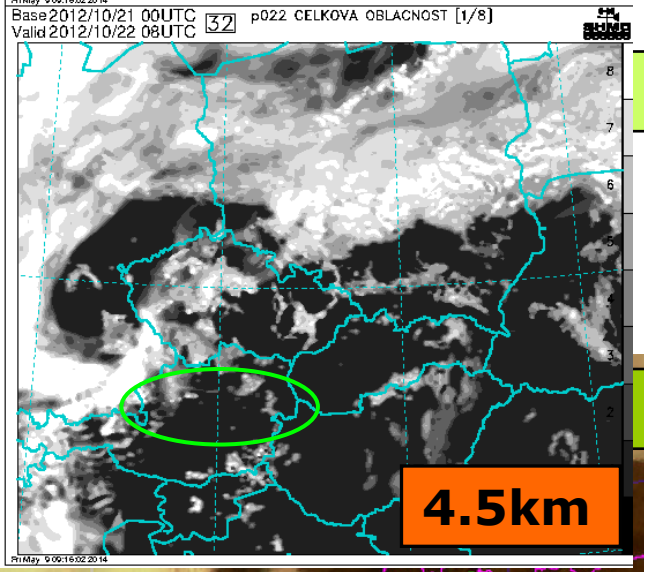


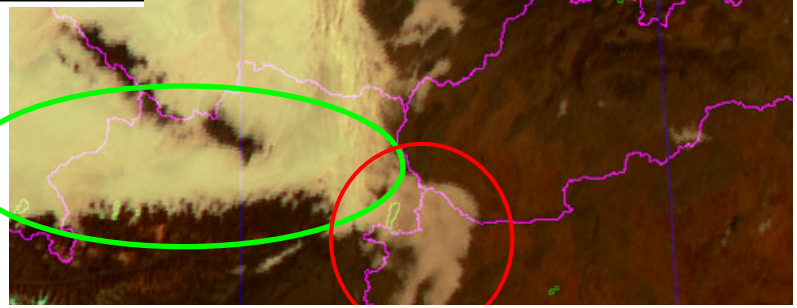






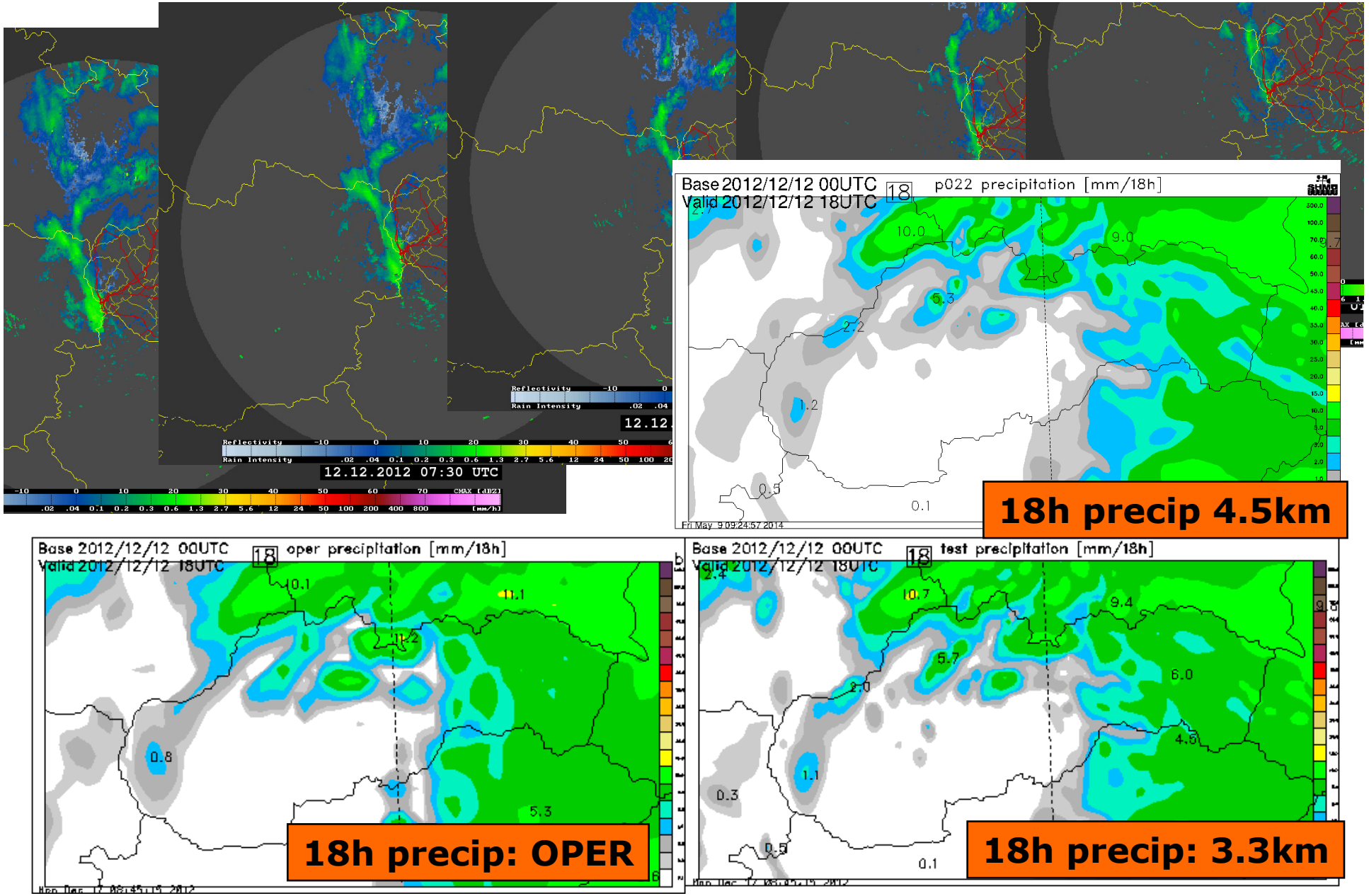




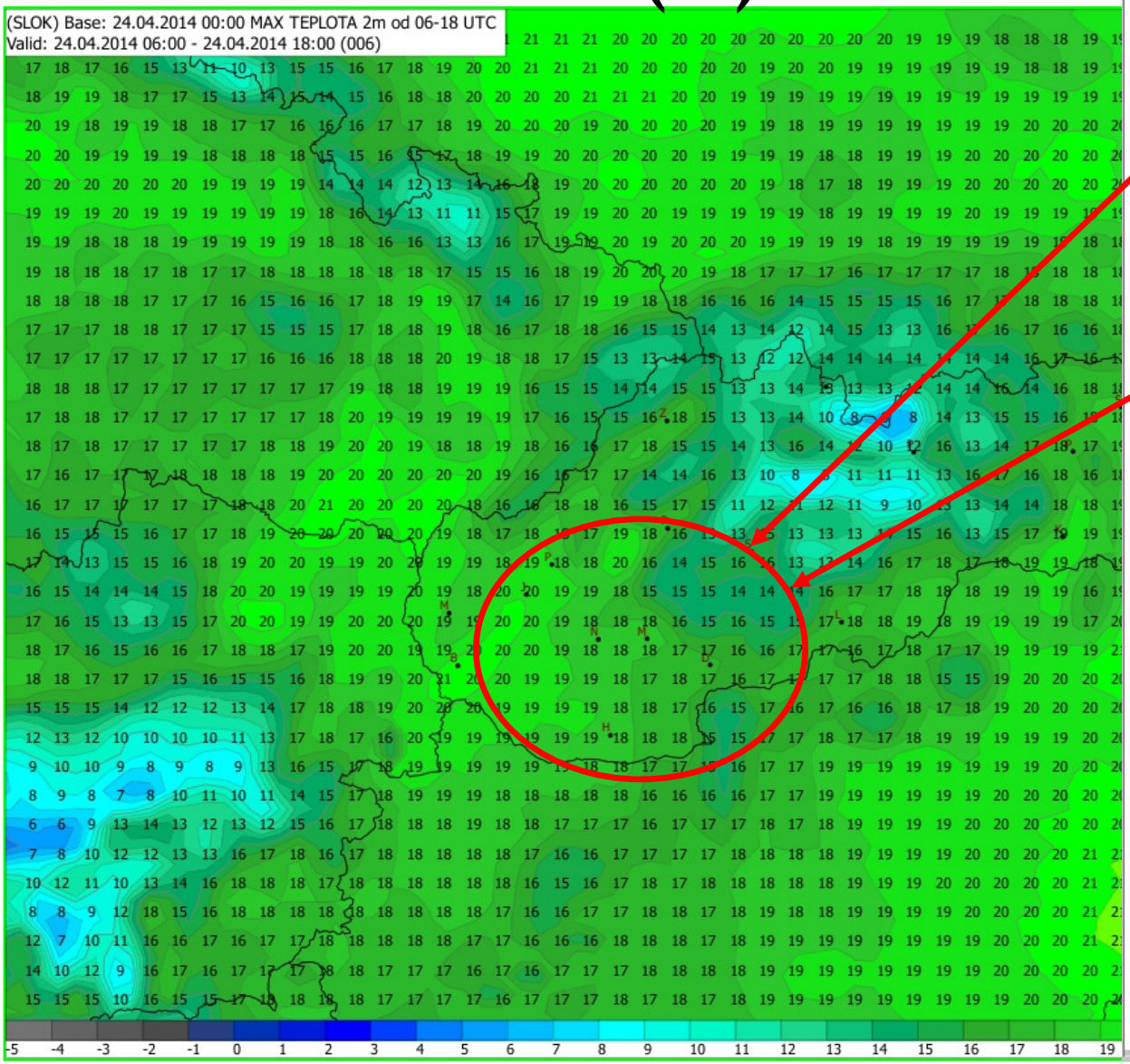


At 08UTC some fog forecasted by both runs
(OPER better?)
in TEST fog in AT Danube valley appears!

CASE 12/12/2012: local snow in BA



T2m underestimation 24/04/2014 (1)

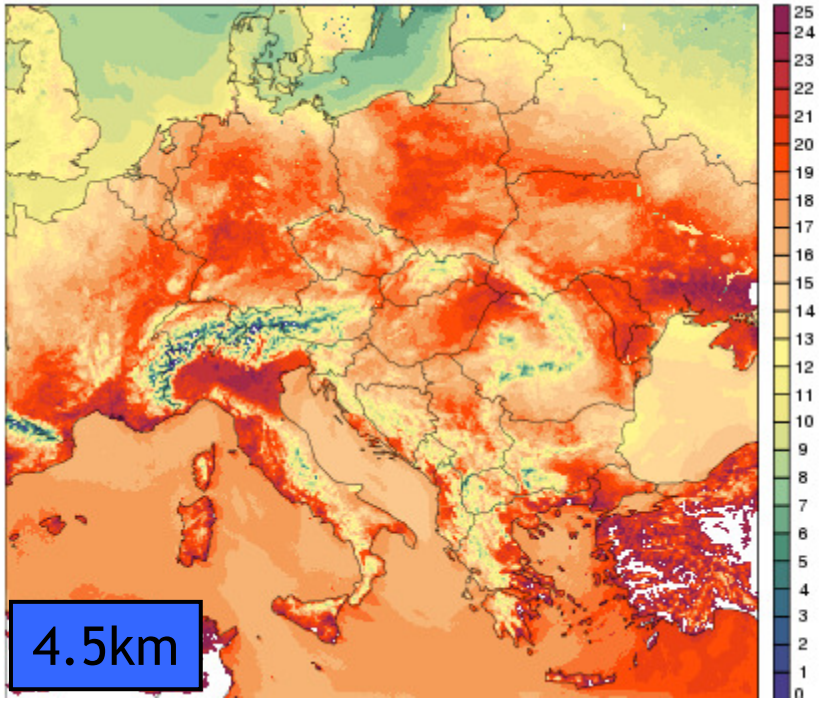


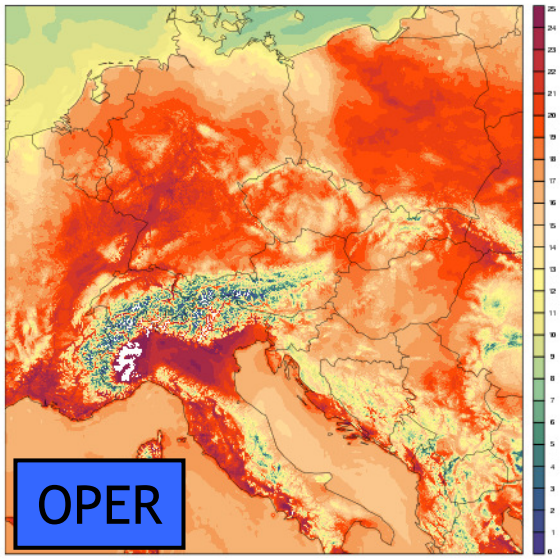
Autoview 2.0

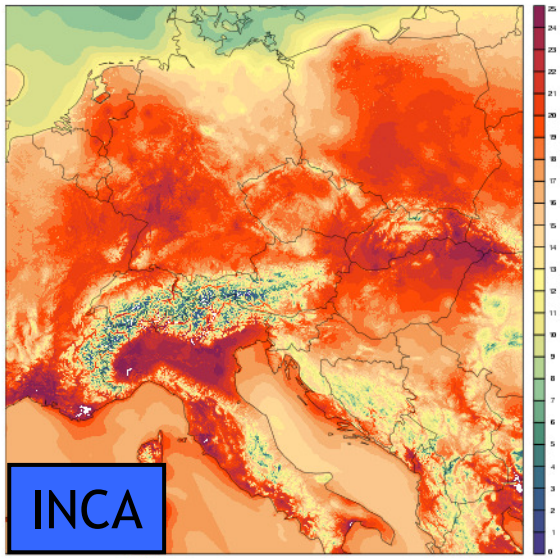
11:50 | 24.04.2014 11:51:37 | [1] 24.04.2014

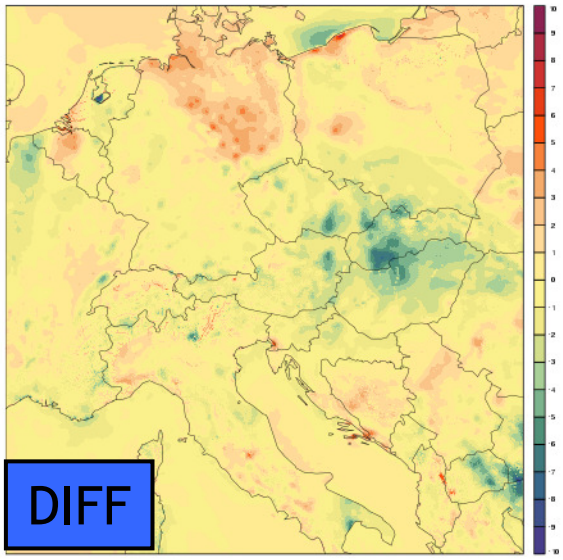
Stanica	T_max	RV_akt
Malacky-Kuchyna	21.6	49
Bratislava-Maly Javornik	18.3	57
Bratislava-Koliba	21.1	57
Bratislava-Letisko	23.2	39
Senica *	23.2	55
Jaslovske Bohunice	22.5	42
Piestany	22.4	48
Trencin *	21.1	55
Nitra-Velke Janikovce	24.1	40
Hurbanovo	23.6	40
Mochovce	23.8	41
Prievidza	21.8	41
Turzovka *	18.9	52
Zilina-Dolny Hricov	21.3	41
Liptovsky Mikulas *	19.9	42
Dudince	24.4	37
Ziar nad Hronom	23.1	36
Sliac	22.5	40
Donovaly *	NIL	NIL
Chopok	7.1	69
Liesek	18.5	54
Oravice	17.8	50
Brezno *	20.9	40
Lucenec-Bolkovce	22.5	93
Strbske Pleso	15.6	44
Lomnicky Stit	0.9	95
Telgart	NIL	NIL
Poprad	19.2	64
Ganovce	NIL	NIL
Kojsovska hola	14.3	58
Kosice-letisko	22.8	42
Bardejov *	21.4	47
Tisinec	24.0	39
Trebisov	24.2	41
Jakubovany *	21.2	38
Presov	NIL	NIL
Kamenica nad Cirochou	23.2	36

T2m underestimation 24/04/2014 (2)

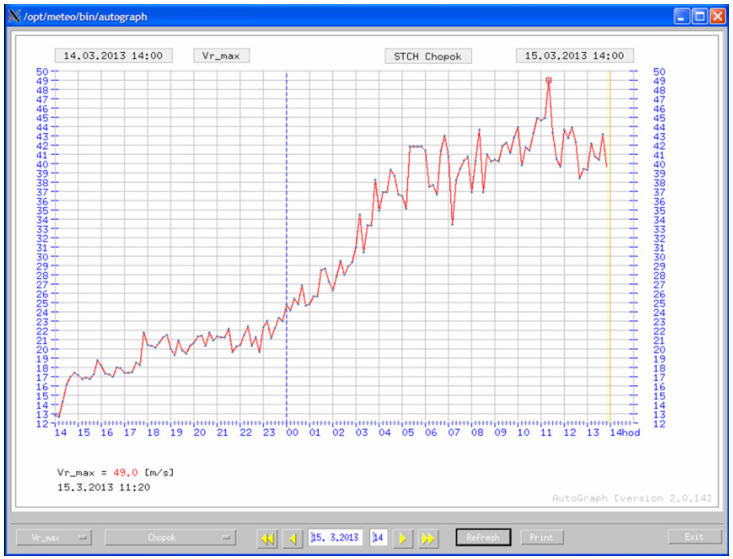


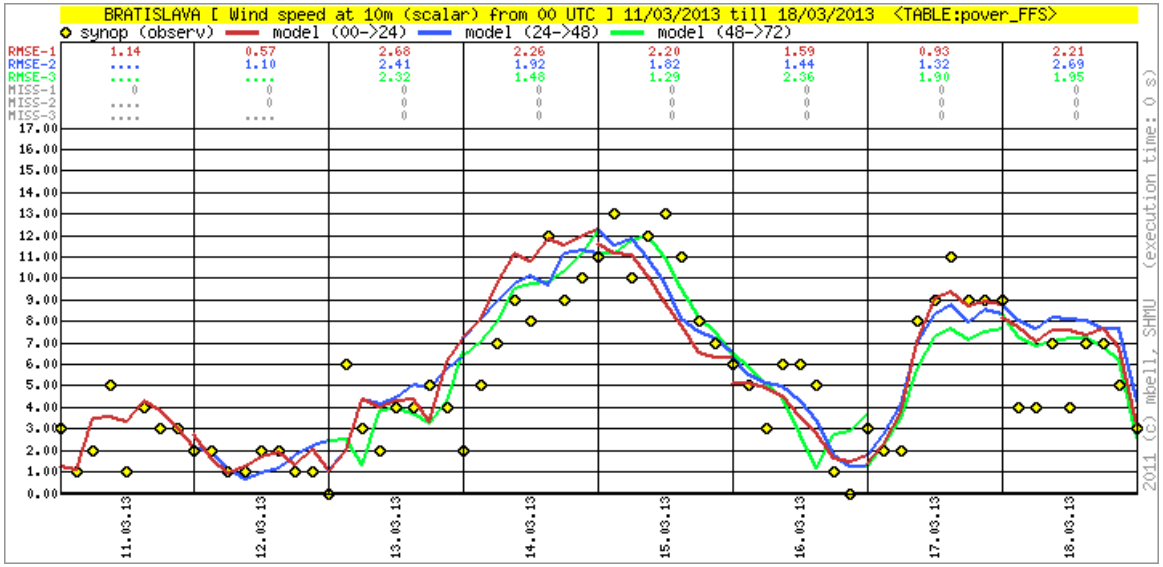


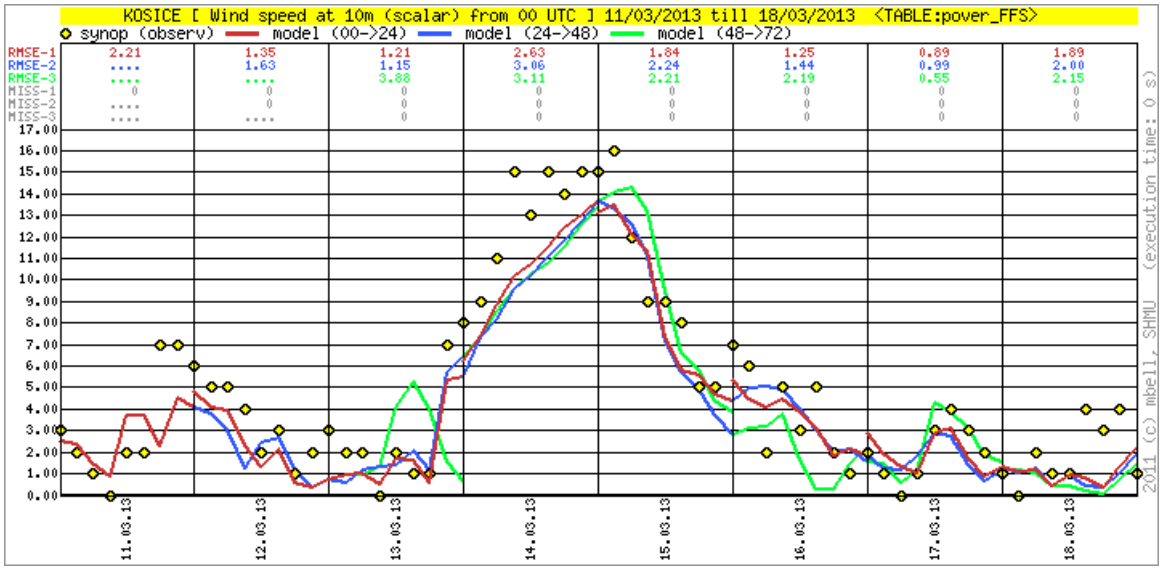




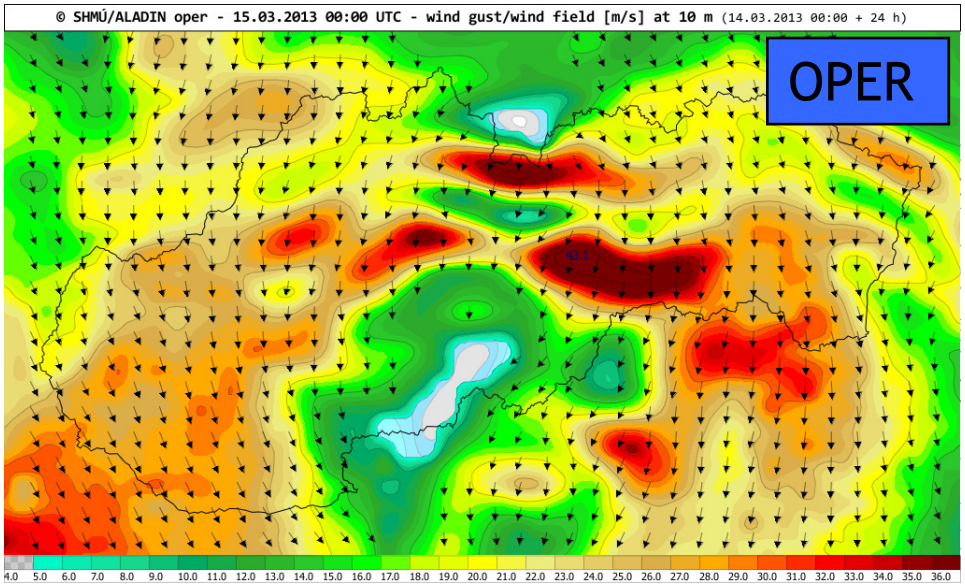
Case of strong wind 03/2013 (1)

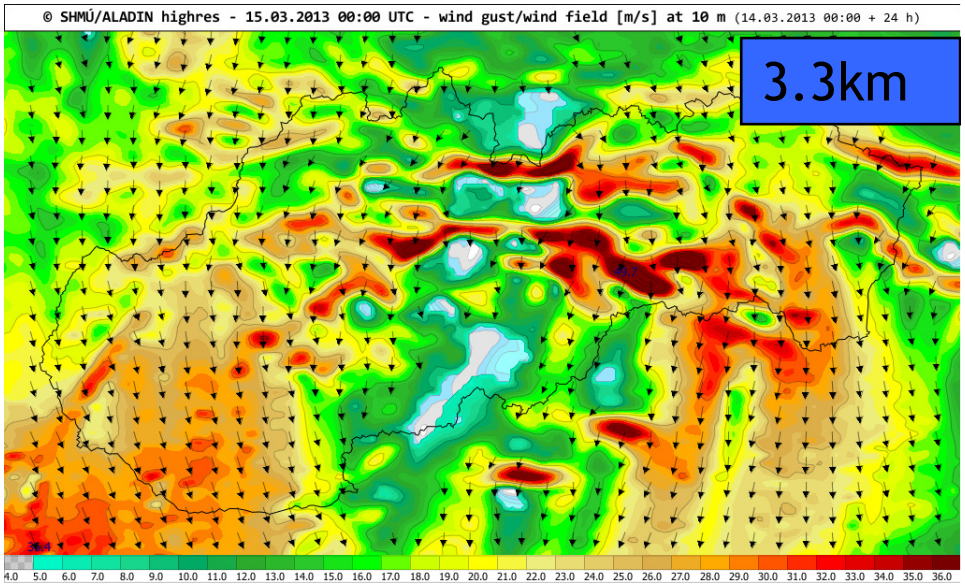


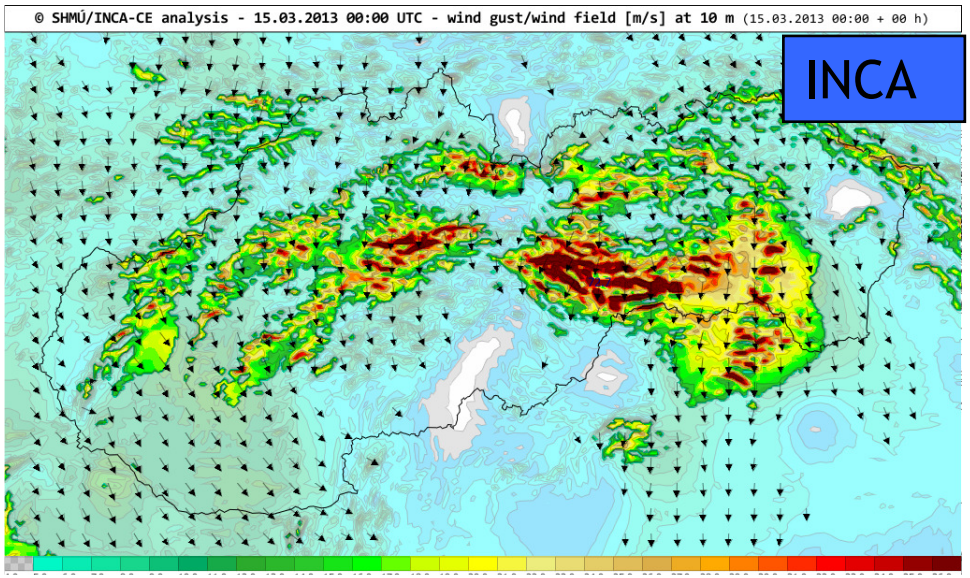


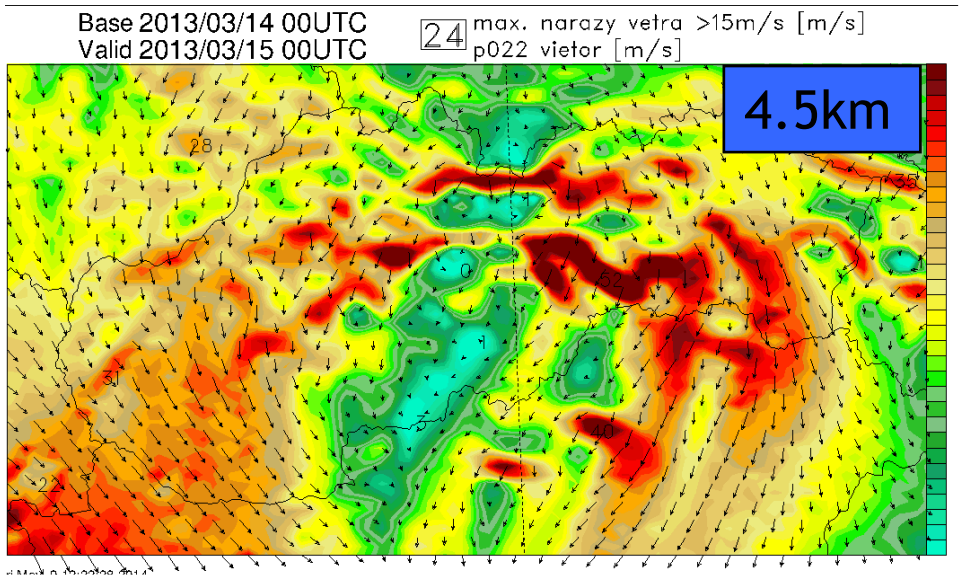


Case of strong wind 03/2013 (2)









Plans

- Closer look on problematic cases & scores (10m wind) => tuning?
- CY38T1_bf03 HighRes operational asap