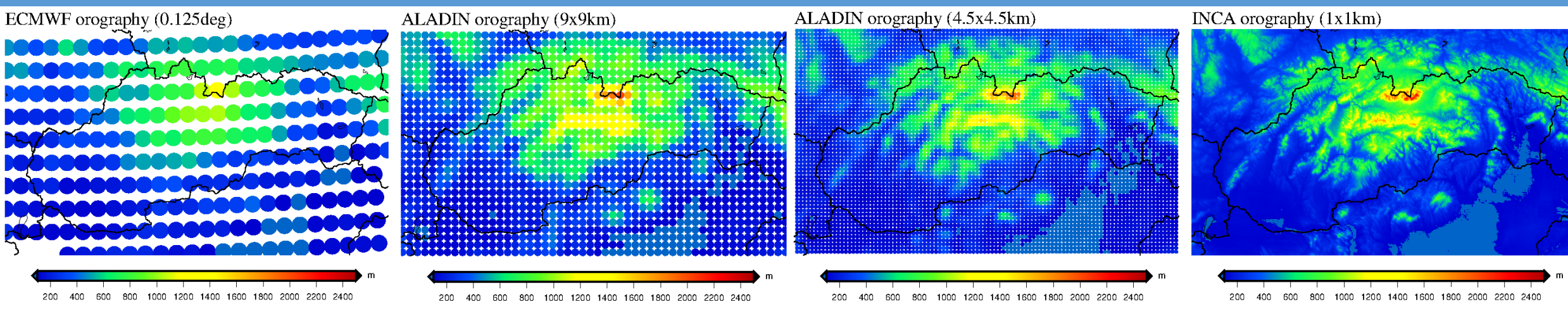# NWP related activities @ SHMU

37th EWGLAM & 22nd SRNWP Meetings, 4.-8.10.2015, Belgrade, Serbia

nwp@shmu.sk => Martin Belluš   Rastislav Bujňák   Mária Derková   Martin Dian   Richard Habrovský   Milan Káčer   Michal Neštiak   Oldřich Španiel   Viktor Tarjáni   Jozef Vivoda

ALADIN/SHMU	operational	E-suite
horizontal GP resolution	9 x 9km, 320 x 288 grid points	4.5 x 4.5km, 625 x 576 grid points
spectral resolution & grid	106x95 (quadratic)	312x287 (linear)
orography	envelope orography	mean orography (old Z0)
vertical levels	37	63
model cycle	CY36T1_bf10	CY38T1_bf03_export
physics	ALARO 3MT, SLHD	ALARO-0 baseline
assimilation & initialization	upper air spectral blending with CANARI surface assimilation, no initialization	
coupling model	ARPEGE (long- & short cut off), 3h frequency	
dynamics	2TL semi-implicit semiLagrangian	
timestep	400s	180s
networks 00,06,12,18UTC; ranges	72/72/72/60 (a' 1h)	78/36/72/36 (a' 1h)

IT and infrastructure upgrade in frame of the POVAPSYS project (Flood Warning and Forecasting System of the Slovak Republic) - to be completed in 2015

Current HPC	New HPC (~1.26x)
IBM p755	IBM Flex System p460
4x Power7 8core CPUs (3.6 GHz), 256 GB RAM	4x Power7+ 8core CPUs (3.6 GHz), 256 GB RAM
10 nodes	12 nodes
AIX 6 SE OS	Red Hat Enterprise Linux

Orography: zoom over the domains operationally used @SHMU

ECMWF orography (0.125deg)   ALADIN orography (9x9km)   ALADIN orography (4.5x4.5km)   INCA orography (1x1km)

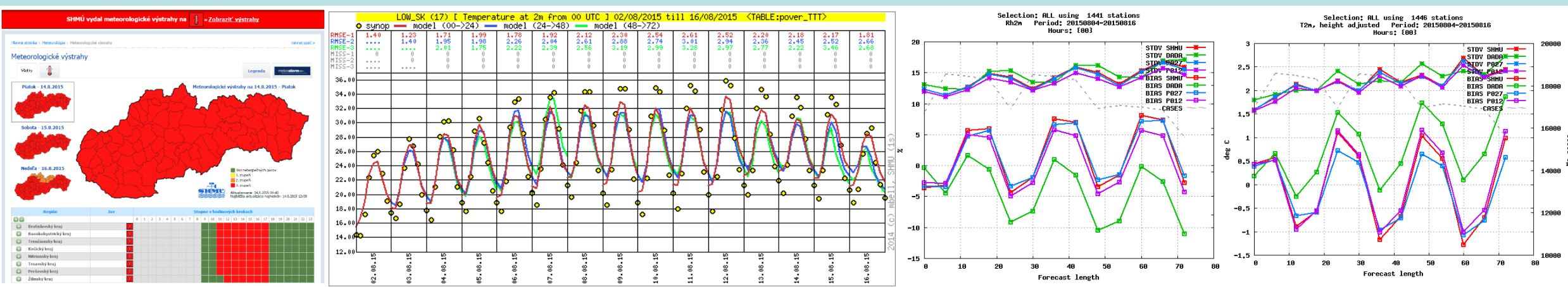### AWS network upgrade:70->137 APS, 32->91 AWS

OPERATIONAL HIGHLIGHTS

30/06/2015: telecom LBC and climate files upgrade to follow Arpege higher resolution (8km, 105 levels)
07/09/2015: high resolution e-suite runs 4x/day: +78h/+36h/+72h/+36h

Deficiencies in T2m forecasts during extremely hot summer 2015

Atypically long periods of very hot days – operational ALADIN underestimates Tmax (~3°C) and overestimates Tmin (−2°C), e-suite similar. Tests with dynamical adaptation (no assim) improved Tmax, but Tmin even worse. Retuning of thermal vegetation coefficient RCTVEG(3)=**1.4E-05** instead of 0.8E-05 in canari and e001: slight improvement (blue line on right pictures denoted **p027**). Problem still not fully solved.

Radar network: 2 upgraded + 2 new will be installed

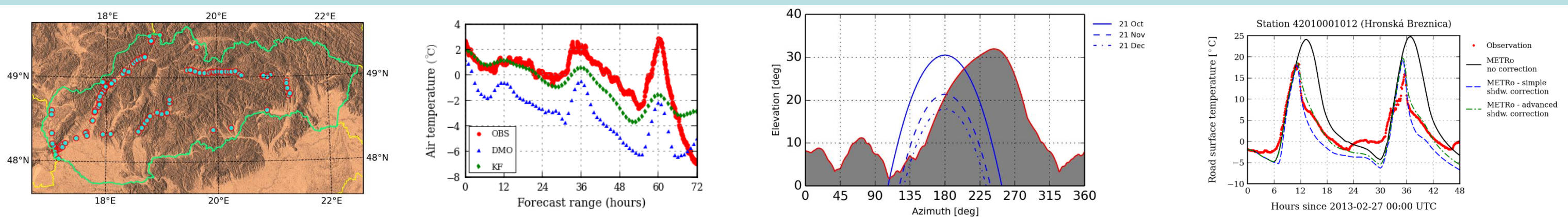SPANI LAZ   KUBINSKA HOLA   KOJSOVSKA HOLA

OPERATIONAL PLANS: CY40T1bf05 with ALARO-1 operational as soon as new HPC is available. Use of all new data as soon as they are operationally consolidated and their quality and reliability is assured.

Road weather forecast
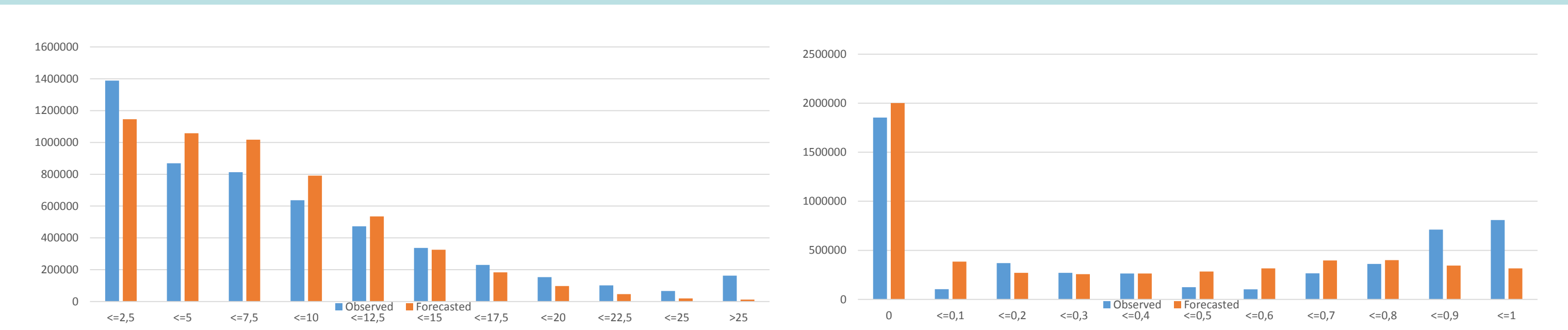[richard.habrovsky@shmu.sk, viktor.tarjani@shmu.sk, rastislav.bujnak@shmu.sk]

Specialized weather forecast for Slovak national motorway company are based on ALADIN/SHMU, INCA and METRo systems. 109 stations are covered (left figure). Forecasted quantities are Air temperature, Dew point, Relative humidity, Pavement temperature, Average wind speed, Top wind speed, Wind direction, Type of precipitation, Accumulation of precipitations, New Snow, Cloud cover, Cloud type, Global radiation. Hourly 12h forecasts and 4times per day +72h forecasts are issued. Kalman filter is applied to reduce systematic errors in air temperature (second from the left figure) leading to BIAS reduction up to +2°C. A package for incident solar radiation correction based on taking into account shadowing by surrounding terrain was developed and implemented (two figures on the right). Development of new heat diffusion model for road surface temperature is in progress.

Combination of IC and model uncertainties for the surface prognostic variables in ALADIN-LAEF system
[martin.bellus@shmu.sk, RC LACE stay @ZAMG]

There are two different sources of uncertainties in NWP modelling. The first one is the uncertainty of the initial and boundary conditions and the second one is the uncertainty of the numerical models themselves. In ALADIN-LAEF we have implemented several perturbation methods for IC and model uncertainty simulation. Stochastic physics, for the perturbation of surface prognostic fields through their parameterized tendencies, was introduced into the ALADIN-LAEF R&D version last year. Nevertheless, it was tested only in dynamical adaptation mode without any other ALADIN-LAEF components. The main aim was to link together the initial (ESDA) and model perturbations (SPPT) of the surface prognostic variables and to verify their combined effect on the regional ensemble system quality.

Long-term verification of ALADIN/SHMU
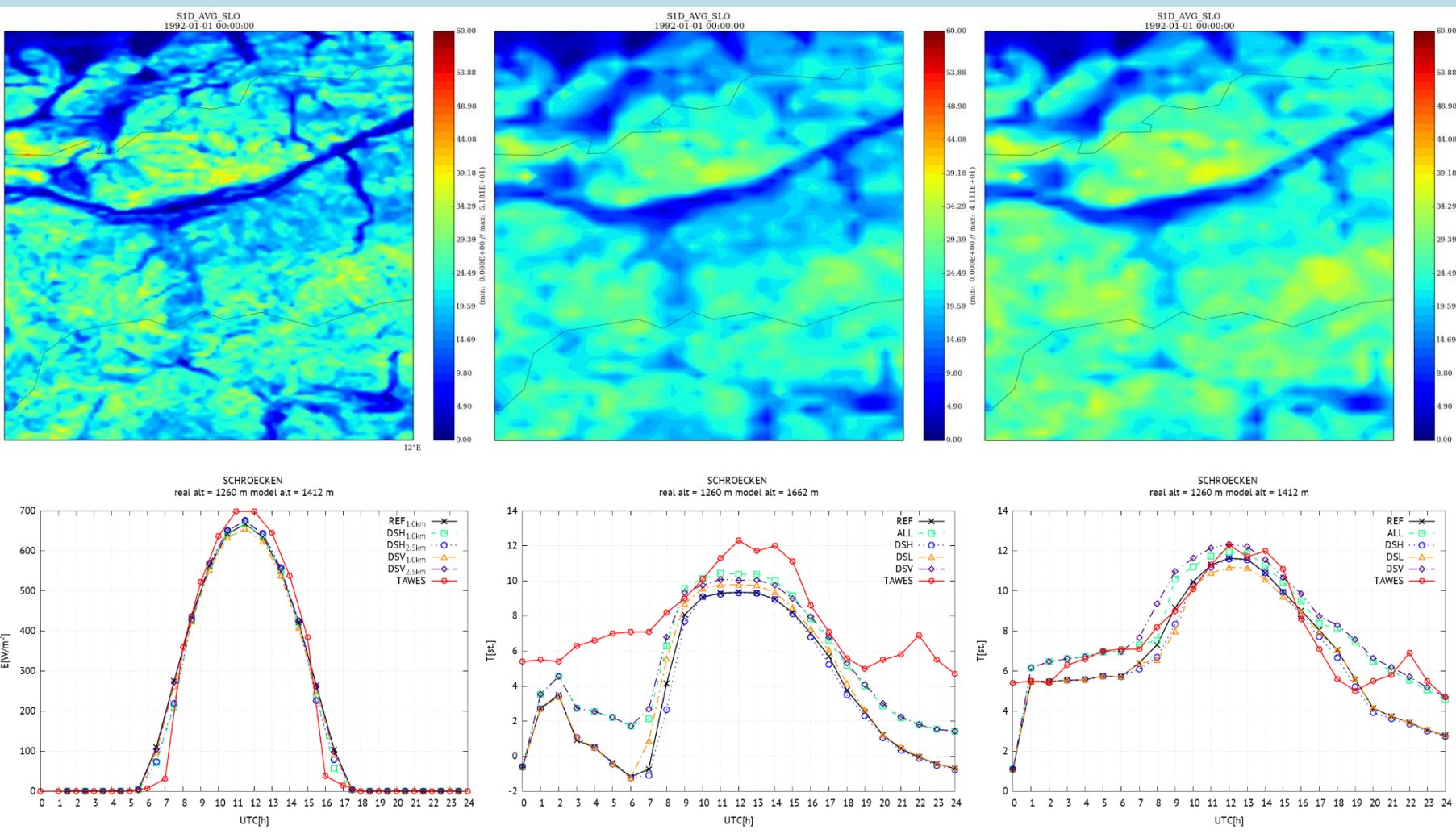[milan.kacer@shmu.sk, jozef.vivoda@shmu.sk]

Ongoing project. Histograms from hourly data for T2m, wind speed (left) and total cloudiness (right) recently available.

Parametrization of orographic effects on surface radiation in AROME
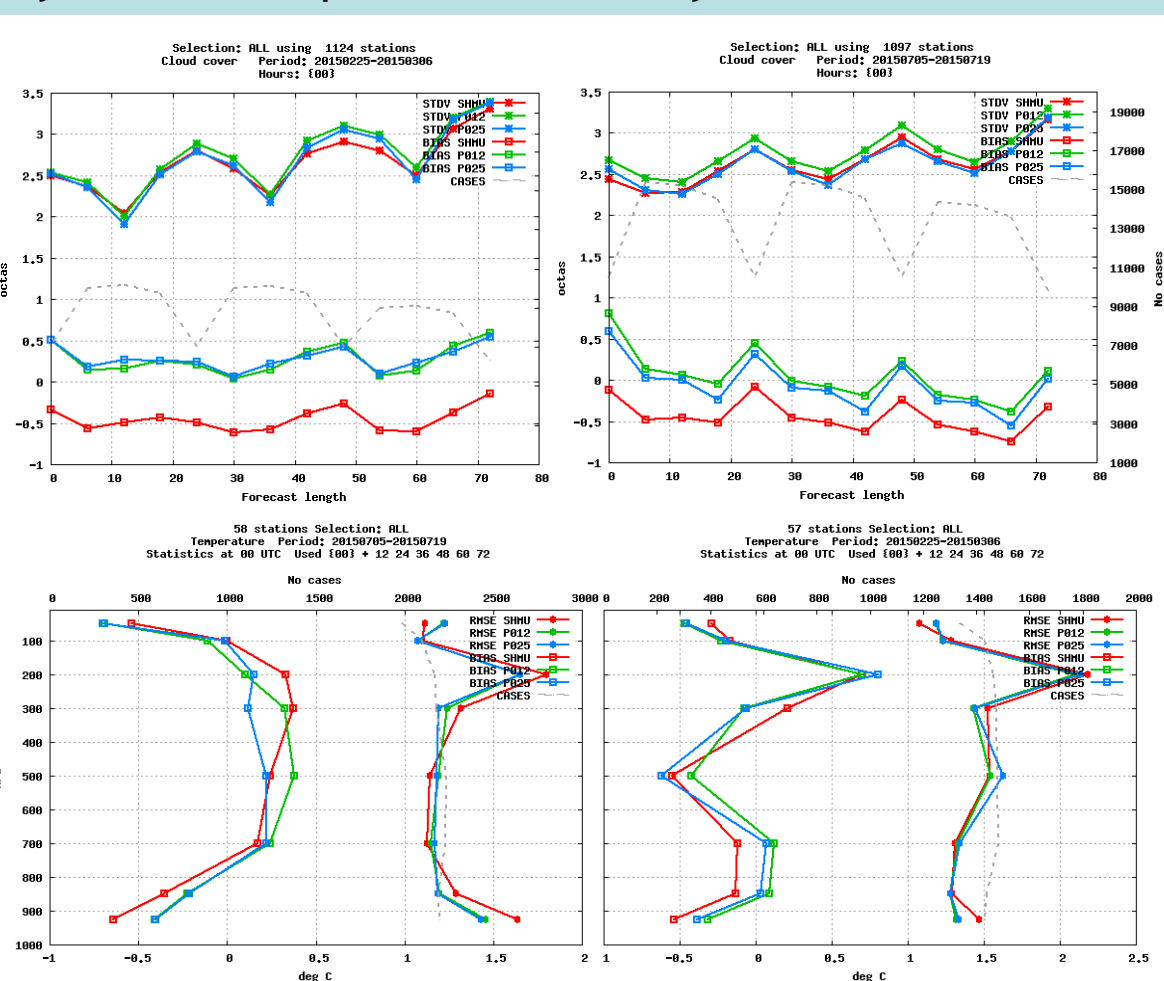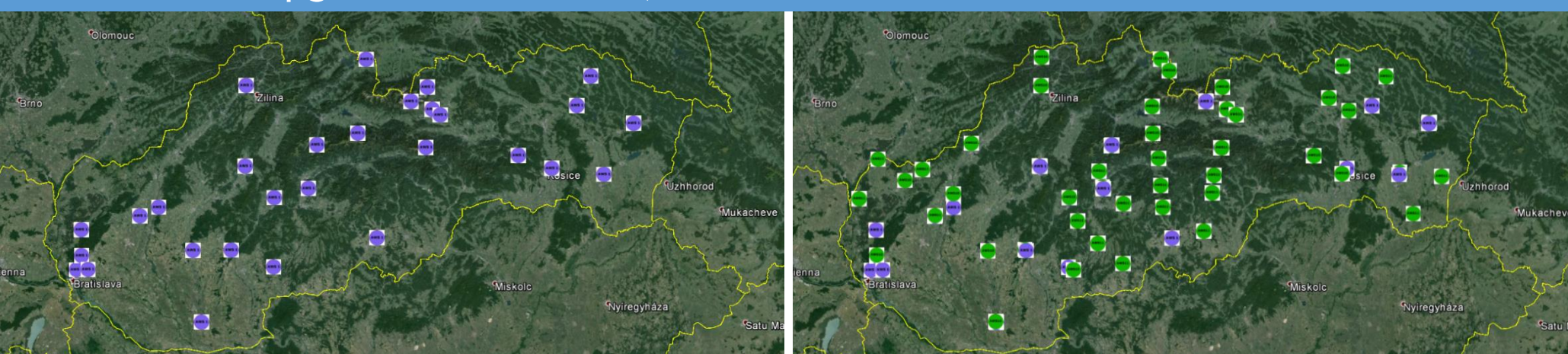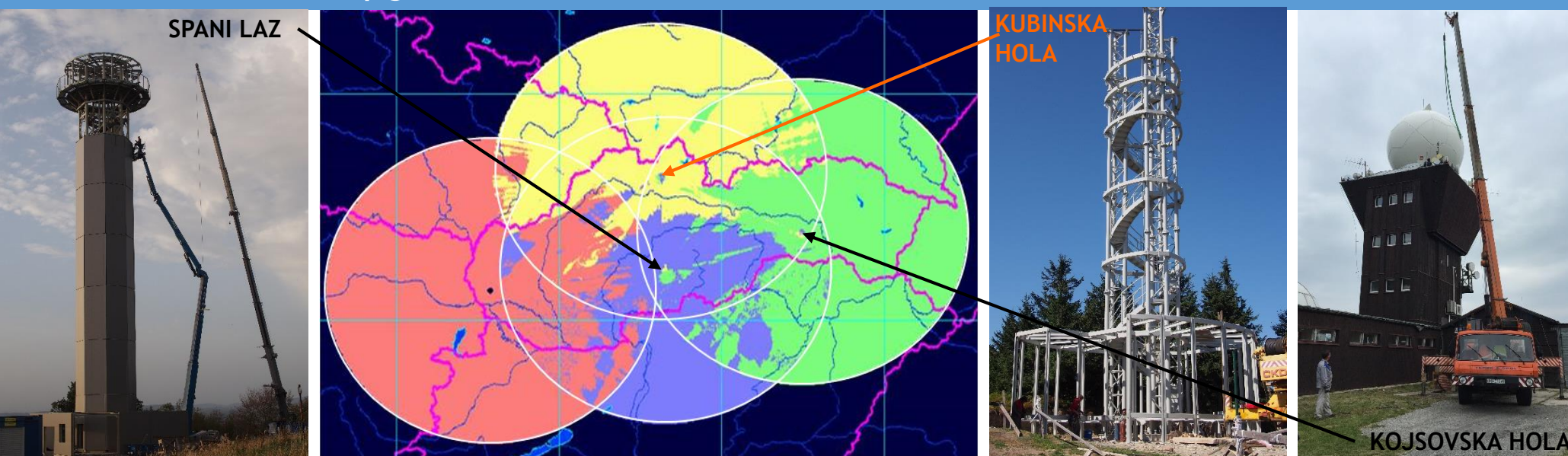[martin.dian@shmu.sk, RC LACE stay @ZAMG]

New radiation parametrization in AROME including the effects of sky view factor, slope effects and local horizon (shadowing) - in total 34 new fields in .pdg file - was studied and tested. The parametrized fields were checked in 2.5km and 1.0km resolution in the area of Inn valley (example of averaged mean slope on top figure). Results for selected case of 12/03/2014 +24h are presented for Schroecken station (real sky view factor 80%) for global radiation (left), and 2m temperature at 2.5km (middle) and 1km (right). More details in the dedicated report, to be available on RC LACE web page soon.

ALARO-1
[oldrich.spaniel@shmu.sk, maria.derkova@shmu.sk]

ALARO-1 was installed on CY38T1.bf05_export and validated in full assimilation & production cycle for 2 periods: FebMarch2015 (left) and July2015 (right) in 4.5km/63lev e-suite resolution (ALARO-1, e-suite, operational suite). Results are mostly neutral w/r to e-suite, cloudiness is slightly better.
ALARO-1 was tested in CY40T1bf05 as well, but in dynamical adaptation mode only.