NWP related activities @SHMU

38th EWGLAM & 23rd SRNWP Meetings, 3.-6.10.2016, Rome, Italy

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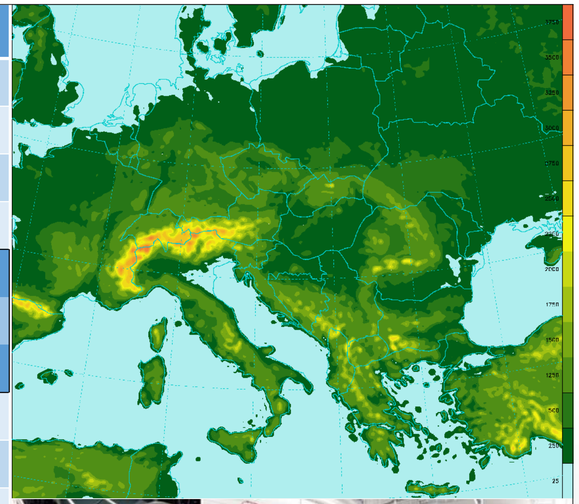
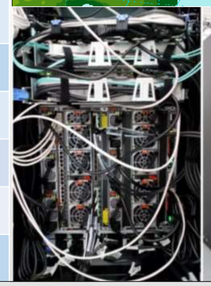
ALADIN/SHMU system	old system	new system	
HPC	IBM p755	IBM Flex System p460	
HW	4x Power7 8core CPUs (3.6 GHz), 256 GB RAM	4x Power7+ 8core CPUs (3.6 GHz), 256 GB RAM	
nodes	10	12 (total ~1.26x)	
SW	AIX 6 SE OS; xlf 13.1.01	Red Hat Enterprise Linux; gfortran 4.9.3 (xlf 15.1.0)	
status	operational	(mirror) e-suite	quasi-operational
model	CY36T1_bf10	CY38T1bf03_export	CY40T1_bf05_export + pre-bf06
physics	ALARO 3MT, SLHD	ALARO-0 baseline	ALARO-1vA
horizontal resolution	9km, 320x288pts	4.5km, 625x576pts	4.5km (exactly), 625x576pts
spectral trunc & grid	106x95 quadratic	312x287 linear	
vertical levels	37	63	
tstep	400s	180s	
orography	envelope	mean (old Z0)	
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)	

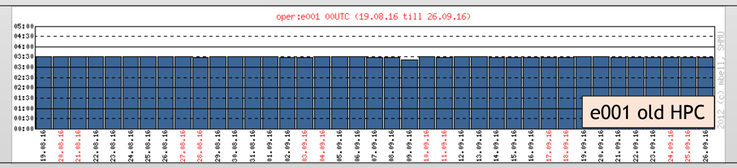


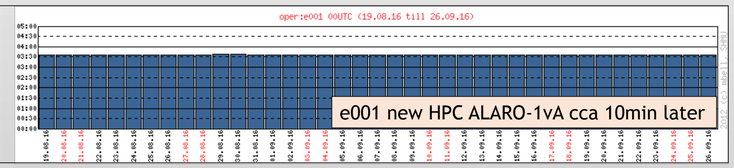


OPERATIONAL MILESTONES

29/04/2016 mirror of the CY38T3 ALARO-0 baseline e-suite on new HPC

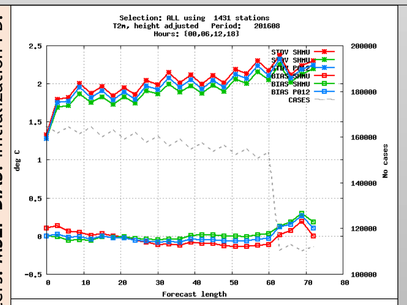
28/07/2016 quasi-operational status of CY40T1pre-bf06 ALARO-1vA

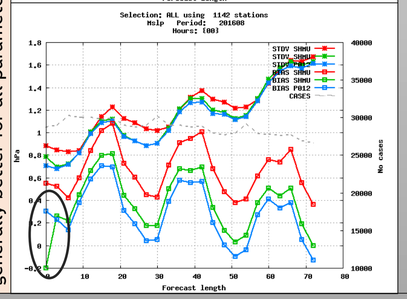




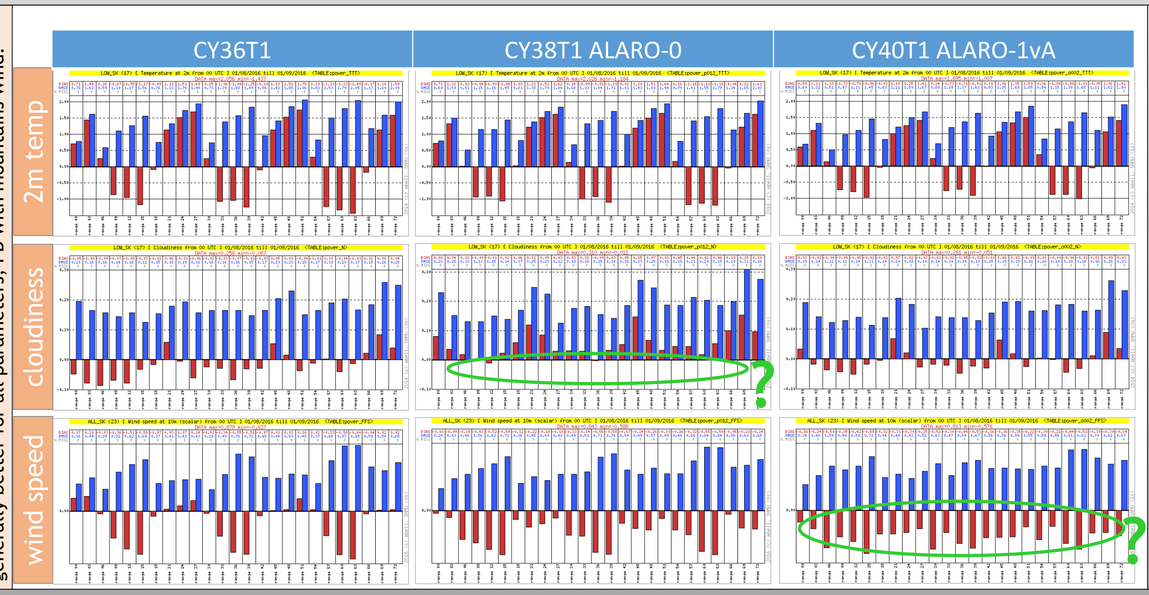
Validation of ALARO-1vA

OPER, ALARO-0, ALARO-1vA August 2016 scores, whole domain: generally better for all parameters. **MSLP BIAS**: initialization PB?

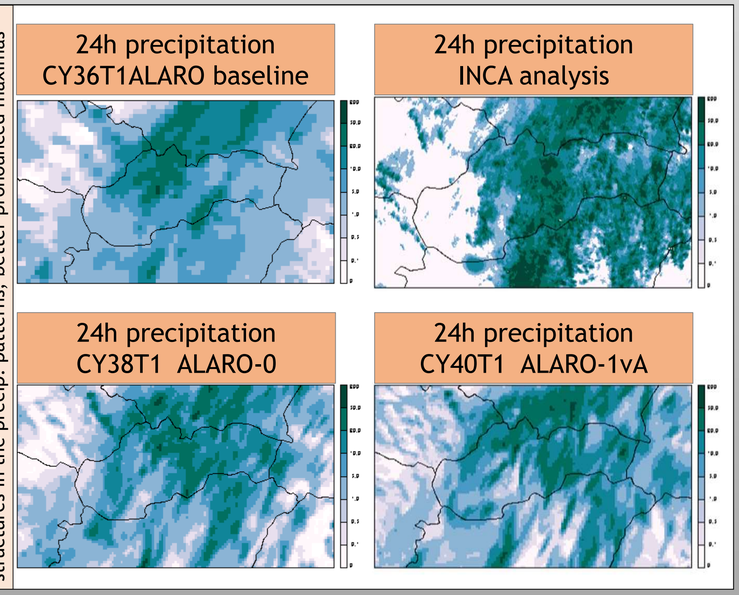




Verification against SHMU stations, BIAS and RMSE, August 2016: generally better for all parameters, PB with mountains wind?



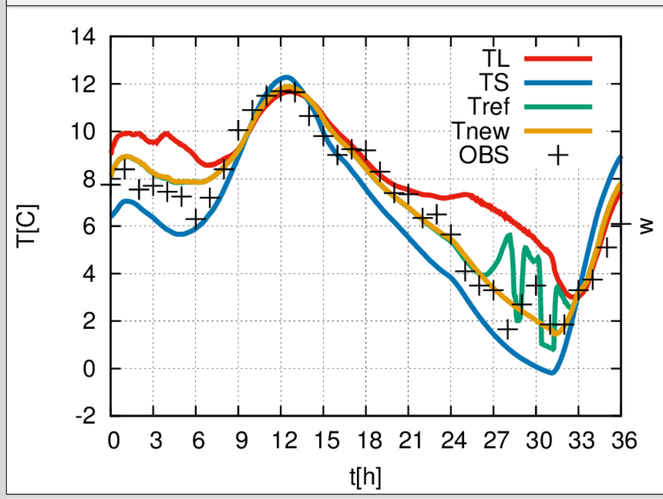
Example of the p24h precipitation forecast, 28.07.2016: more structures in the precip. patterns, better pronounced maximas

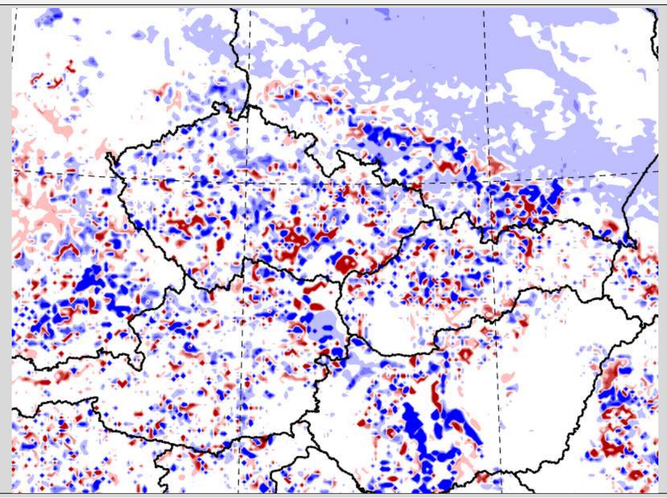


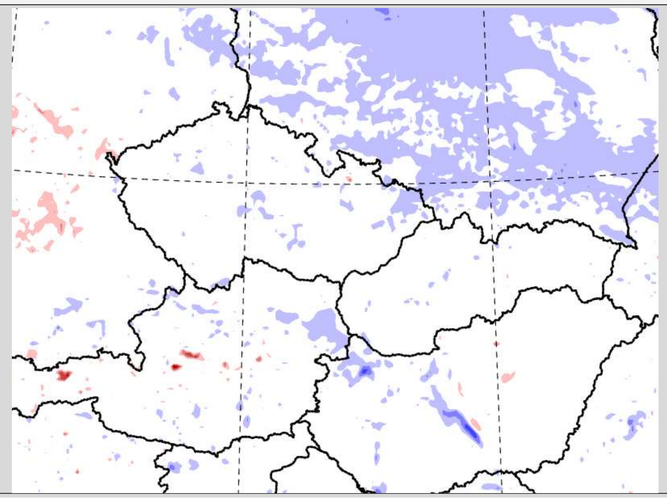
Improving the screen level parameters computations in ALARO-1

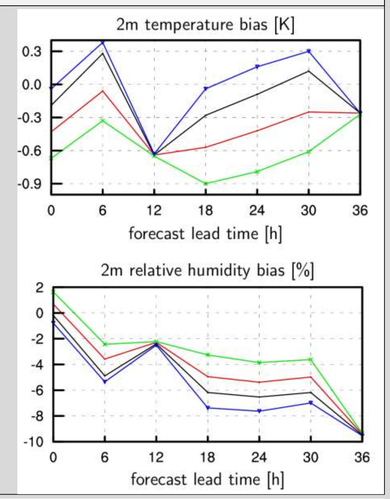
[M. Dian, RC LACE stay => report on www.rclace.eu]

The temperature at 2m (computed from lowest model level TL and Tsurf) showed oscillating behavior in stable conditions with ALARO-1/TOUCANS, as illustrated on the graph and map (T2m: 29h-28h forecast) on the left Figures. New interpolation formula was proposed, following Geleyn 1988 methodology to simplified Gratchev et. al. 2007 solution (see the LACE report for more details). The oscillations disappeared (see the map on the 3rd figure). Single run (Dec 23rd 2015) verification scores for different tuning parameters are plotted on last figure (black: reference, green: basic Geleyn 1988 formula, red and blue: new formula with different tuning parameters).





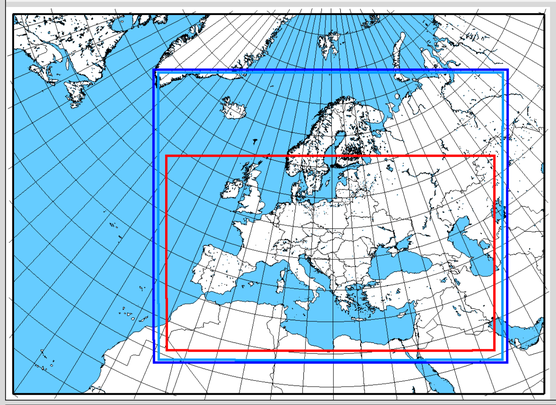


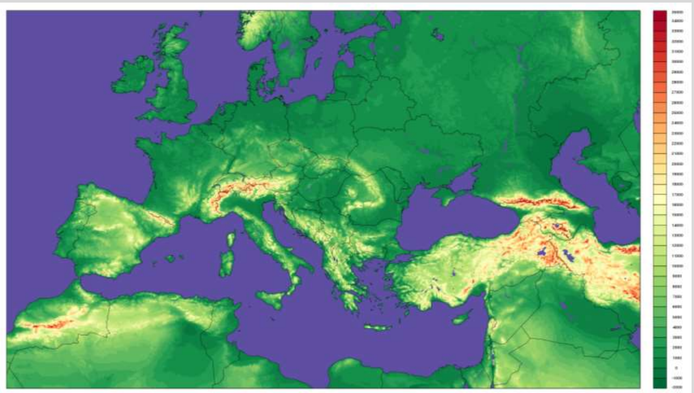


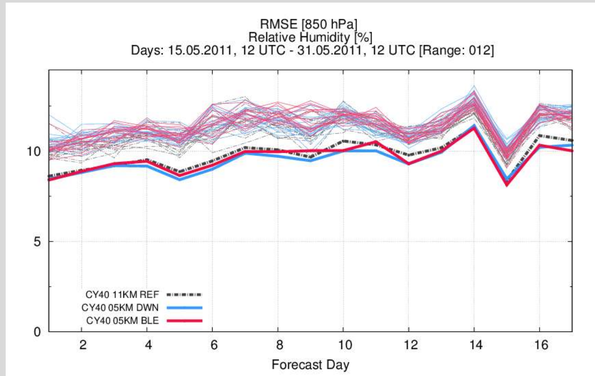
Upgrade of ALADIN-LAEF

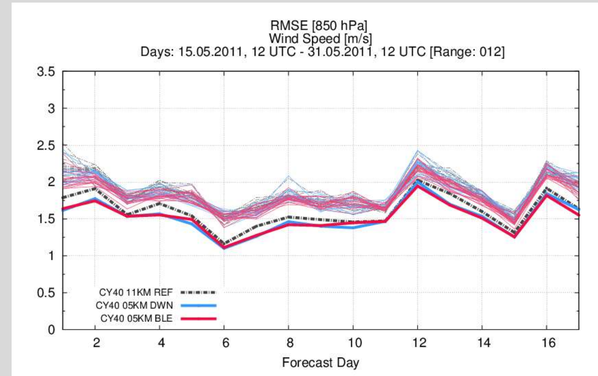
[M. Bellus, RC LACE stay => report on www.rclace.eu]

The ALADIN-LAEF domain has been upgraded to 5km/60levels and reduced as displayed on very left figure (OLD vs NEW LAEF domain). The topography is shown on the second figure. The scores for the **old domain**, new domain only downscaled and new setup including blending are shown on figures on the right for RH and wind speed at 850hPa.





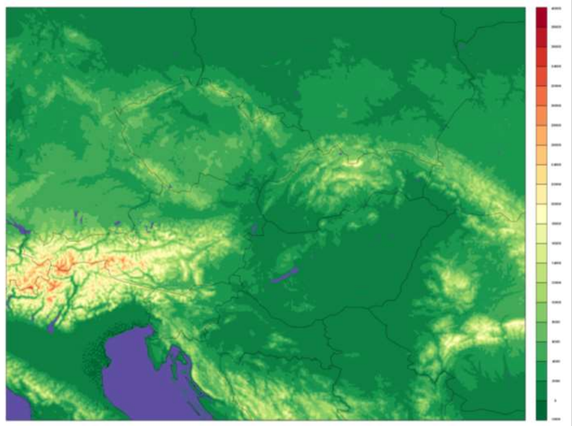


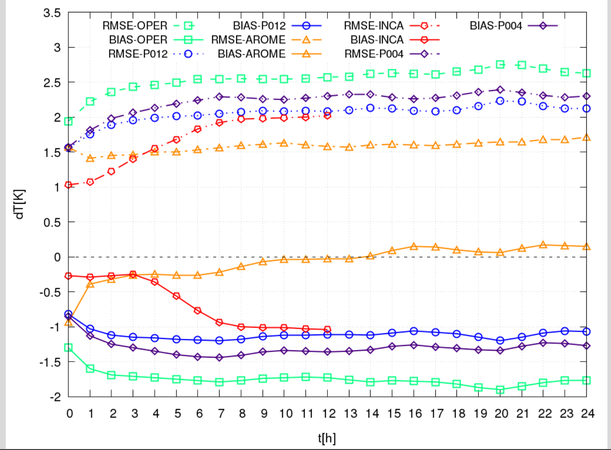


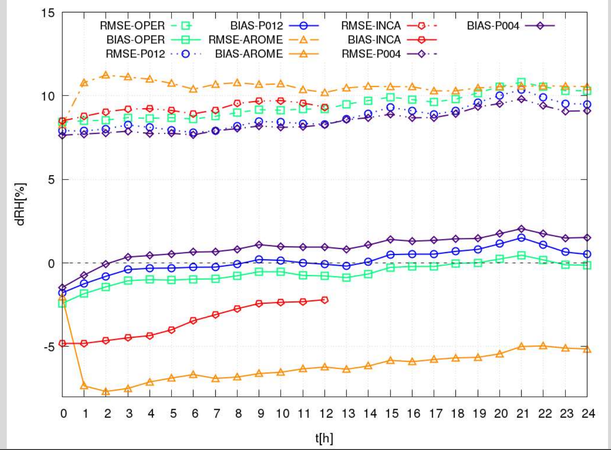
AROME experiment

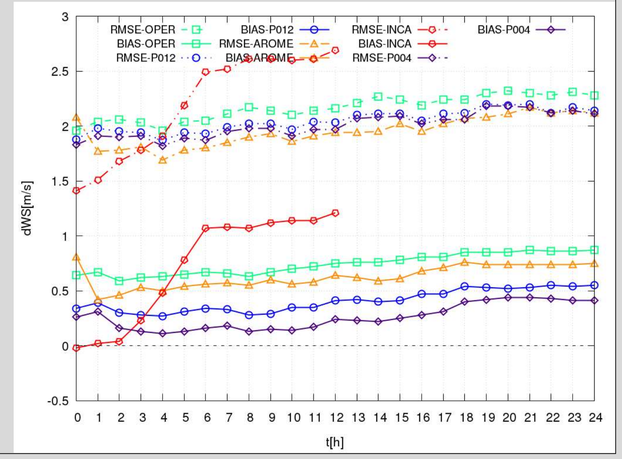
[J. Vivoda, M. Nestiak, M. Dian]

The AROME configuration was ported for CY40T1_bf05. The experimental domain with 2.5km/63 levels (the same as for ALADIN) has been prepared (very left figure). 1 week experiment (15.-21.2.2016) has been run in downscaling mode (sanity check) for 00, 06, 12 and 18UTC networks. The outputs were verified against Slovak automatic stations and compared to **INCA**, **operational**, **ALARO-0** and **ALARO-1** versions for T2m (left), RH2m (middle) and 10m wind speed (right). 3DVAR assimilation is being technically tested.





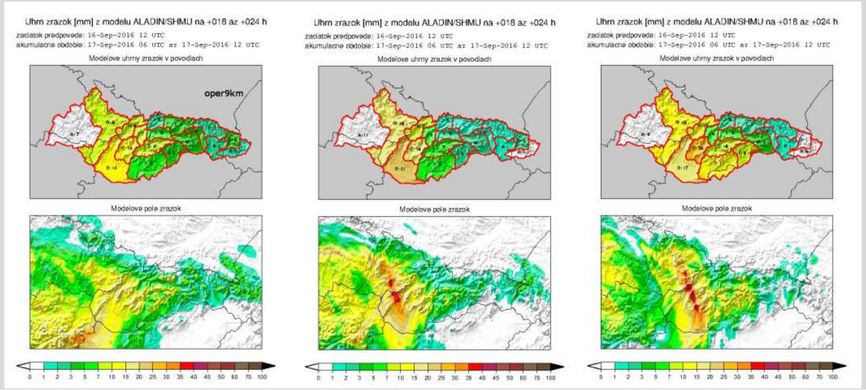




Nowcasting for hydrology

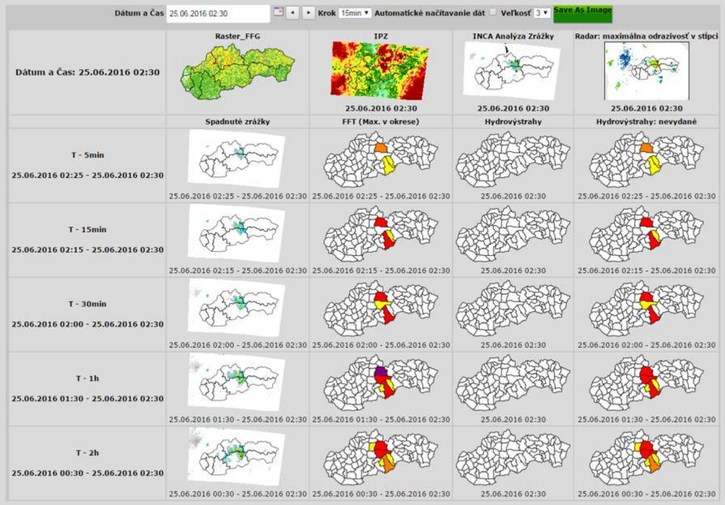
Precipitation by river catchments [M.Nestiak]

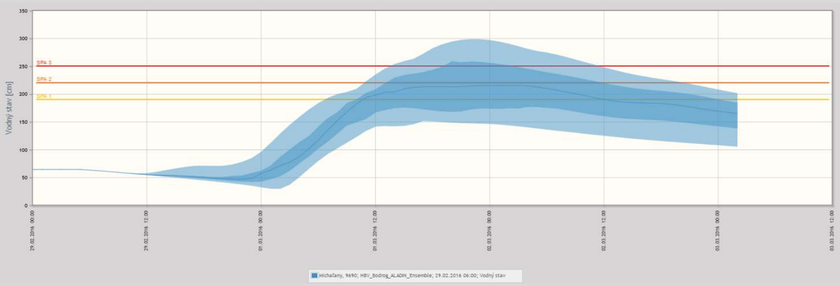
Cumulated precipitation averaged for predefined river catchments, as an input for old version of the hydrological flood forecasting system. Example of the outputs from different ALADIN versions: old 9km system (left), ALARO-0 and ALARO-1 on 4.5km (middle and right respectively)



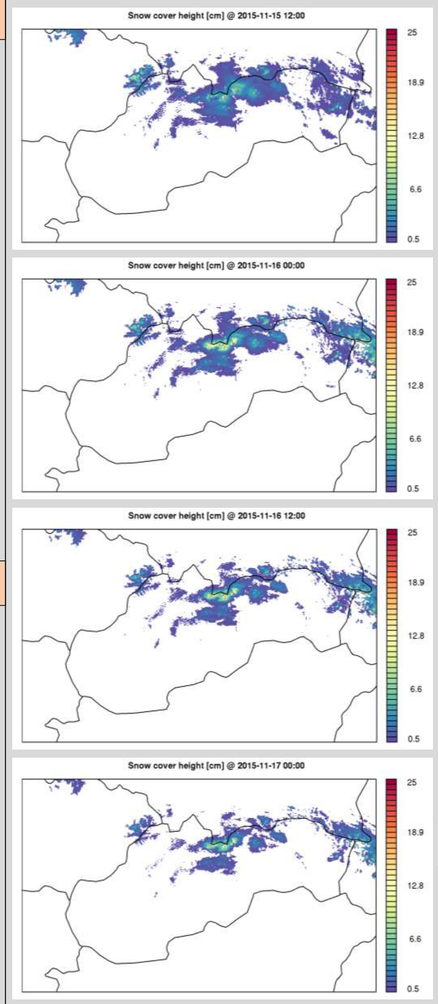
Data for HYPOS system [O. Spaniel, M. Nestiak, R. Zehnal]

HYPOS is the Hydrological flood forecasting system of the POVAPSYS project. The software integrates all available data from the monitoring networks and numerical models to provide complex information about current hydrometeorological situation and its evolution together with automatic alert generation in case the predefined thresholds are exceeded. Meteorological data comprise measurements (stations, radars, satellites), and outputs from the nowcasting (INCA) and NWP systems (ECMWF, LAEF, ALADIN). An example of the Flash Flood Threat products is shown on top Figure, where INCA analysis enters the system. The bottom figure shows the hydrological model output based on the ensemble from ALADIN-LAEF, for Ronava-Michalany station.

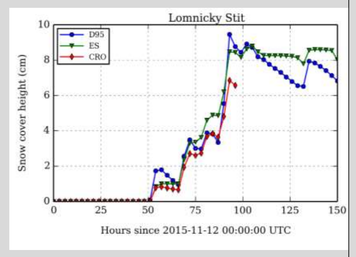


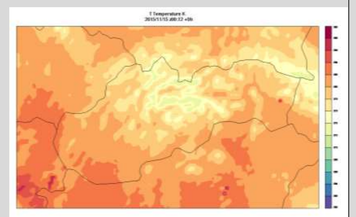


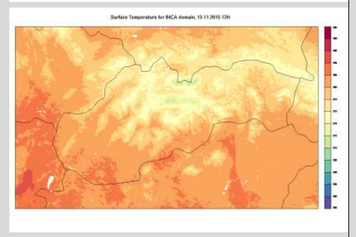
Offline SURFEX forced by INCA analyses (and ALADIN) [V. Tarjani, J. Vivoda, R. Habrovsky, I. Prcuch]



Test suite based on the offline SURFEX (v7.3 from CY40T1) forced by analyses of INCA-SK nowcasting system aiming to improve the snow cover description was prepared. 2mT, 2mRH, 10m wind and precipitation (rain, snow based on radar measurements and conventional observations) analyses are used to drive the SURFEX offline. Radiative forcing (short and long wave) is taken from the most actual ALADIN-SK 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 and compared with measured data where possible. Single-column and also full-domain (INCA-SK) experiments were carried out. SURFEX tuning and verification is now in progress. The preliminary results indicate that all 3 schemes give comparable results (top left Figure).
Experiment aims to prepare a detailed analysis/forecasts of snow profiles in mountain regions of Slovakia (interest for the avalanche prevention center). Possibility to carry out the snow cover analysis as a part of more general SODA assimilation system (based on offline SURFEX) will be considered. Experiences gained with offline-SURFEX will be applied to in-line runs (SURFEX coupled with ALADIN model).
Figures: The snow cover evolution for 3 consecutive days and for another date with new snow in column of figures on the left. Example of snow cover height for Lomnicky stit station (2634m) with three tested snow schemes (top right); surface temperature field from the ALADIN model and the output from the SURFEX experiment respectively (bottom right).







Nowcasting for aviation [J. Vivoda, R. Bujnak]

INCA nowcasting system is exploited operationally to predict wind speed and wind gusts in the vicinity of 3 main airports in Slovakia (Bratislava, Kosice and Poprad-Tatry). The computation is performed at grid resolution of 100m in horizontal and 500m in vertical (up to 5km). The sensors on each side of runway are used as an input into the analyses. Their distance is often less than 1km therefore a resolution of 100m was chosen to capture small scales changes in the wind field.
3D wind gust field is analyzed and predicted, computed from wind speed and TKE field. Analysis is scaled with regression parameters computed from the model forecast and measurements from short period prior to analysis time. The background fields are from 4.5km operational ALARO model. The wind speed is first adjusted to 100m resolution orography using diminishing divergence assumption. TKE field is rescaled using wind gust observations (maximum value within last hour) and prediction.
The algorithm was tuned on High Tatras wind storm case from 2004-11-19 from 15h – 19h. The results with relevant observations are presented on figures on the left. The picture on the right presents *Changing Weather*, the new visualization interface being developed at SHMU.