

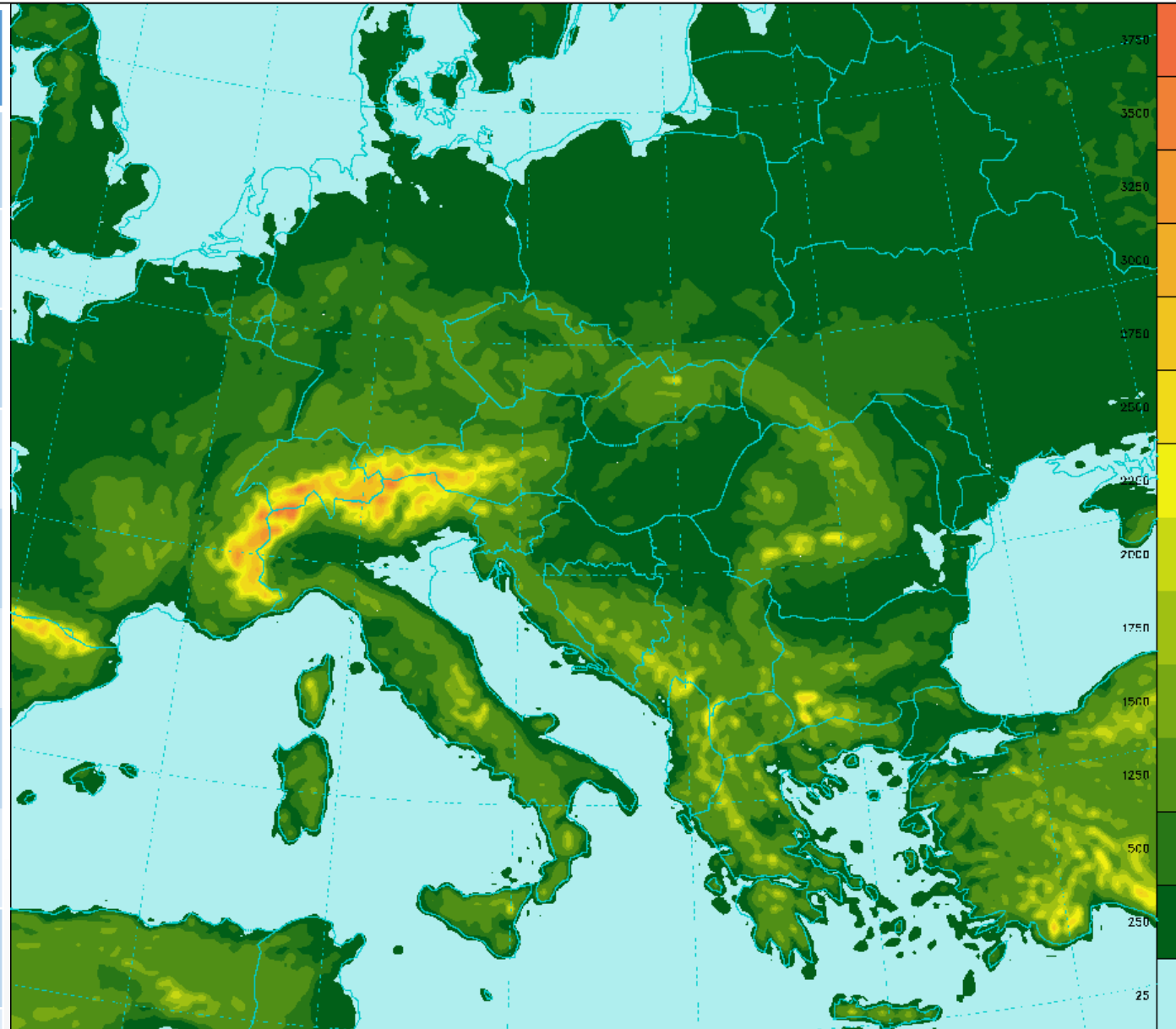
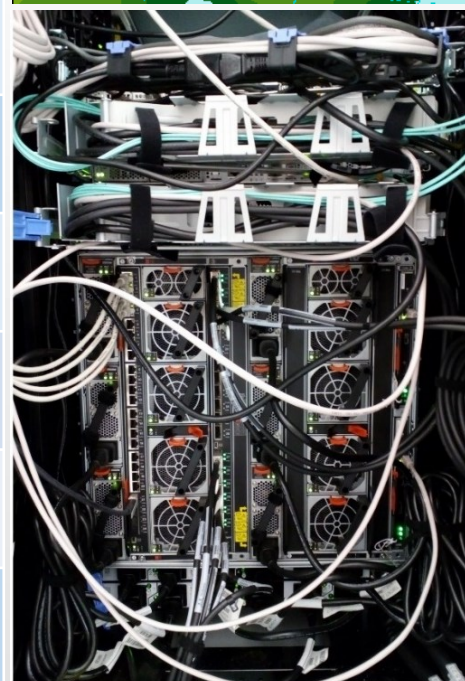



# NWP related activities @SHMU

39<sup>th</sup> EWGLAM & 24<sup>th</sup> SRNWP Meetings, 2.-5.10.2017, Reading, GB



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ALADIN/SHMU system	new system	old system (still running)	
HPC	IBM Flex System p460	IBM p755	
HW	4x Power7+ 8core CPUs (3.6 GHz), 256 GB RAM	4x Power7 8core CPUs (3.6 GHz), 256 GB RAM	
nodes	12 (total ~1.26x)	10	
SW	Red Hat Enterprise Linux; gfortran 4.9.3 (xlf 15.1.0)	AIX 6 SE OS; xlf 13.1.01	
Status	operational	to be switched off asap	
model	CY40T1bf07_export	CY36T1_bf10	
physics	ALARO-1vB	ALARO 3MT, SLHD	
horizontal resolution	4.5km, 625x576pts	9km, 320x288pts	
spectral trunc & grid	312x287 linear	106x95 quadratic	
vertical levels	63	37	 
tstep	180s	400s	
orography	mean (old Z0)	envelope	
coupling model	ARPEGE (long- & short cut off), 3h		
assimilation, initialization	upper air spectral blending with CANARI surface assimilation, no initialization		
forecast ranges	78/72/72/60 (a' 1h)	72/72/72/60 (a' 1h)	

## OPERATIONAL MILESTONES

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

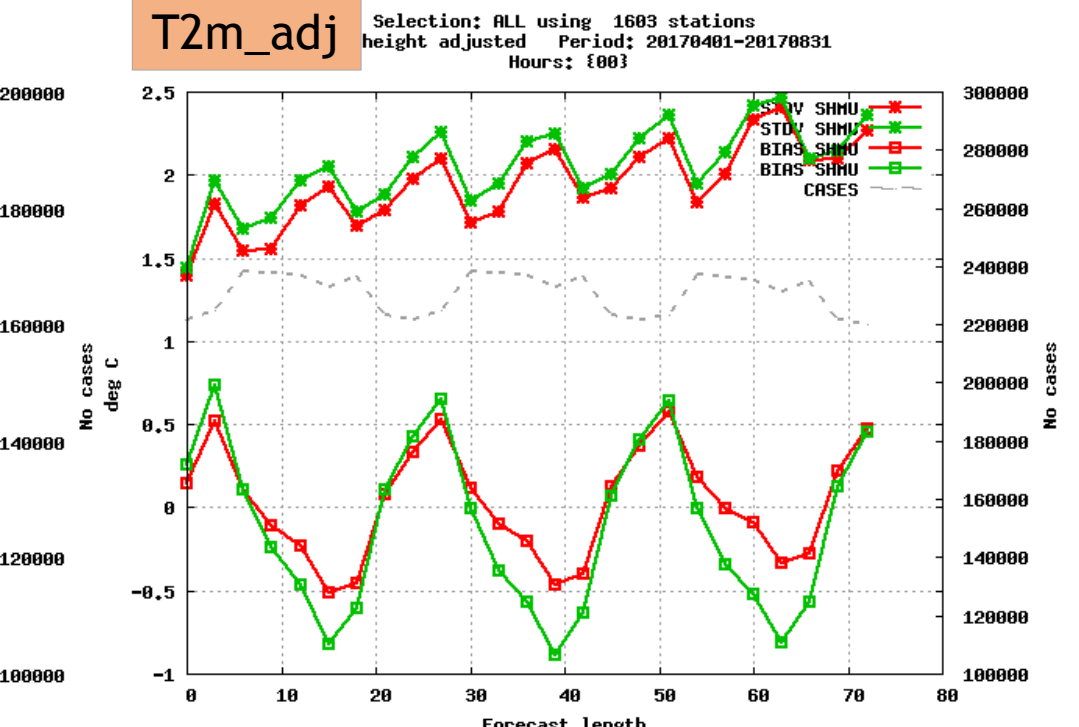
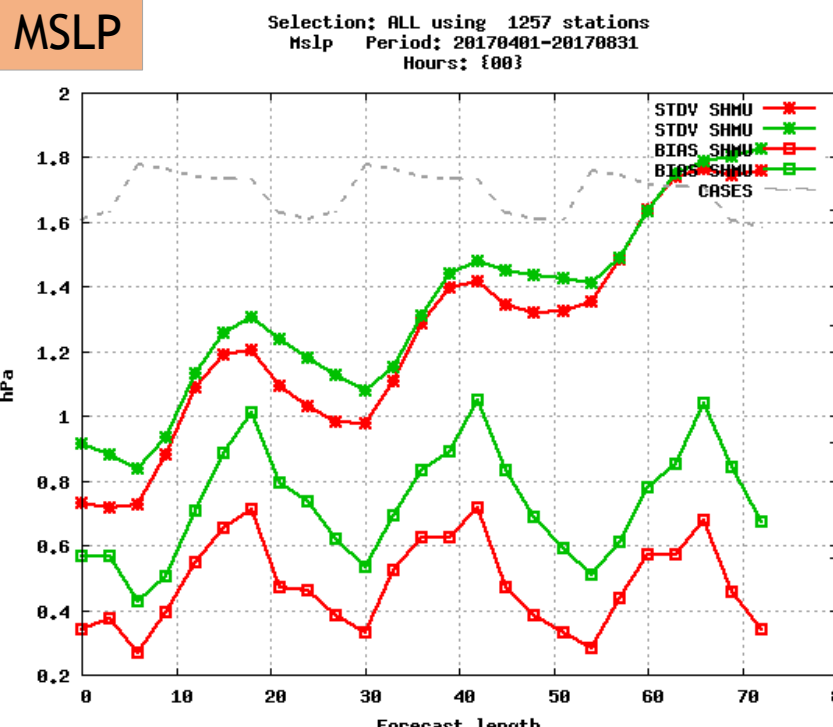
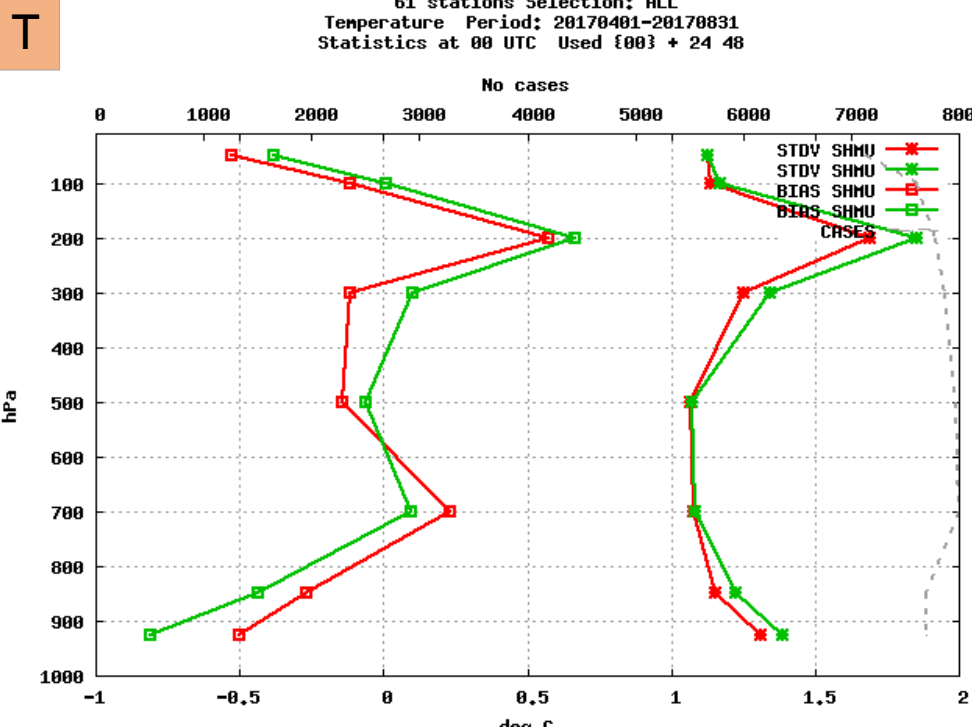
28/07/2016 quasi-operational status of CY40T1pre\_bf06 ALARO-1vA

02/02/2017 ALARO-1vB in CY40t1\_(pre)bf07 + ventilation index introduced

15/02/2017 bug in the quadratic coupling (LQCPL) fixed

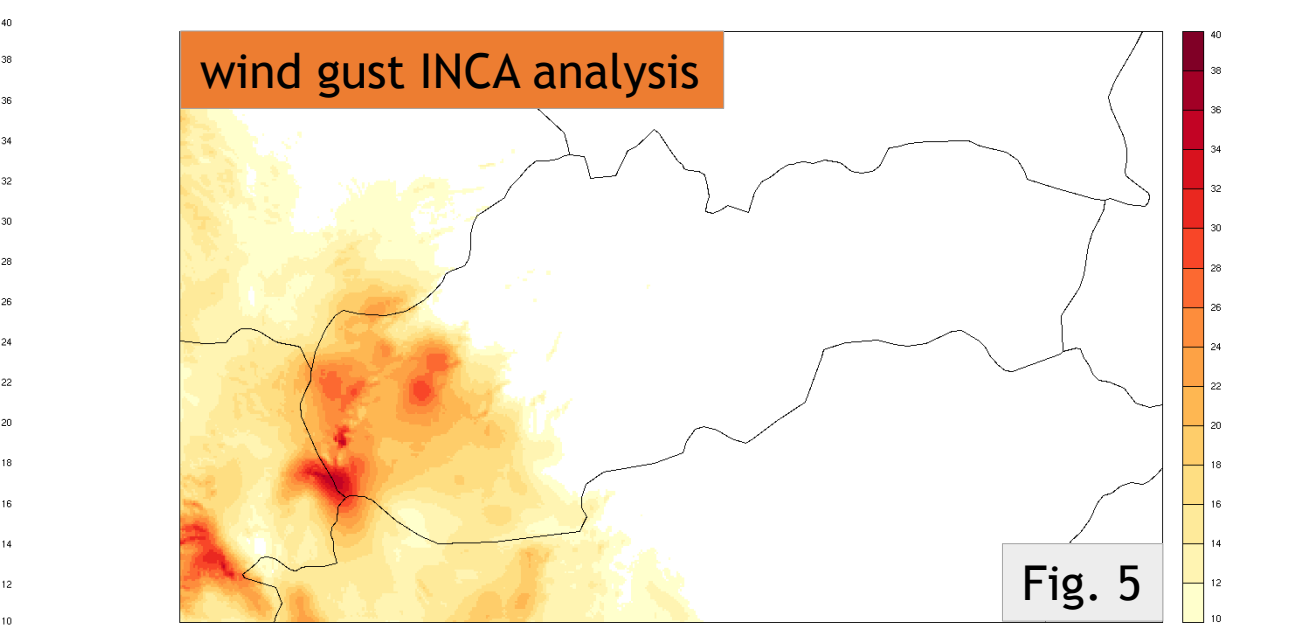
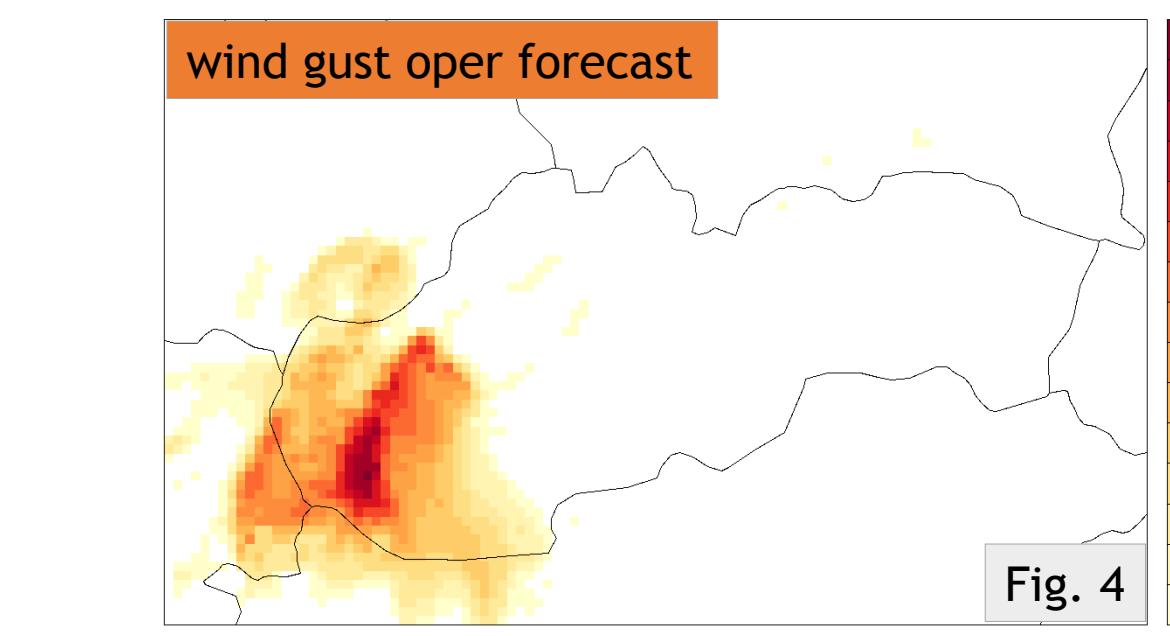
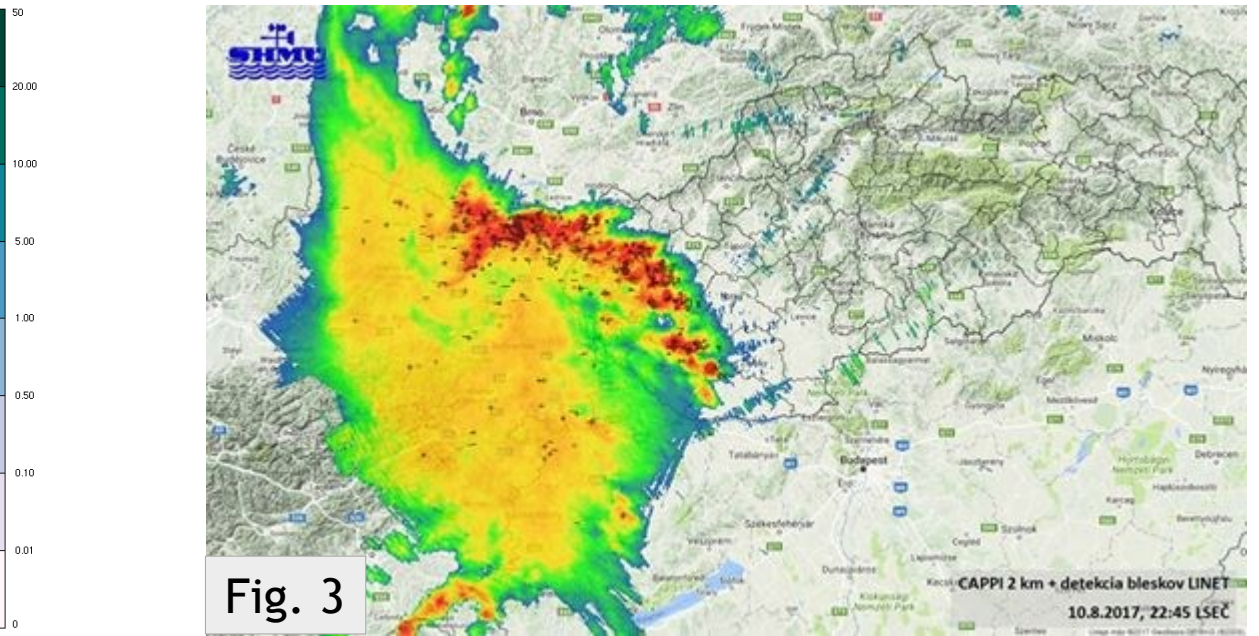
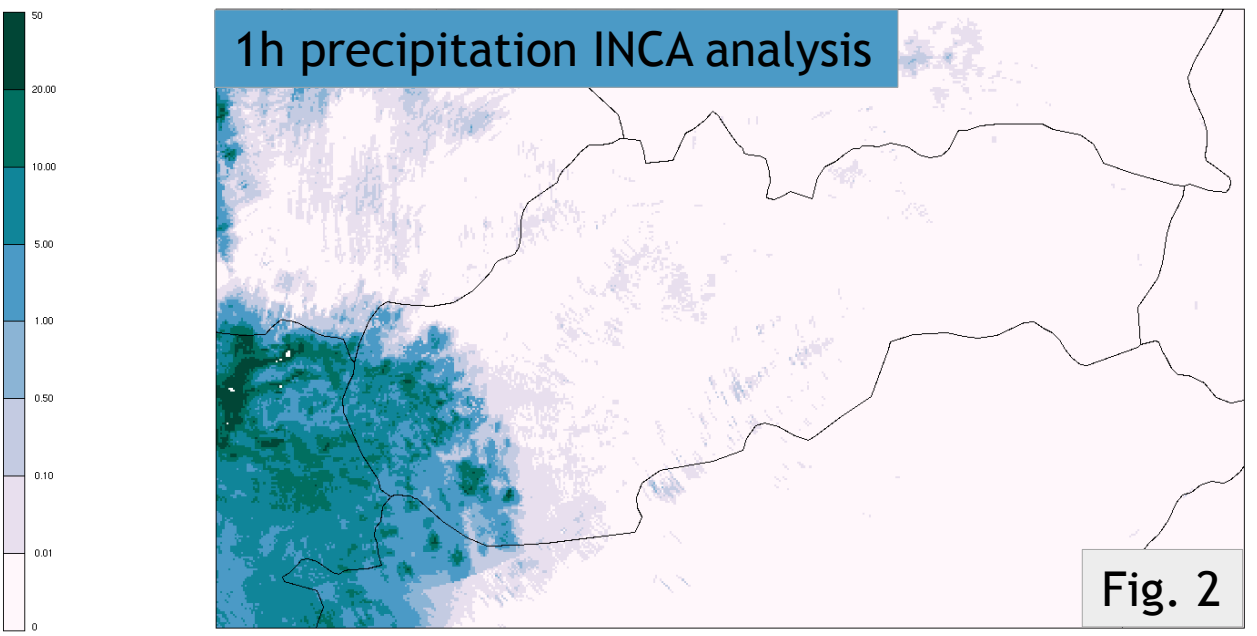
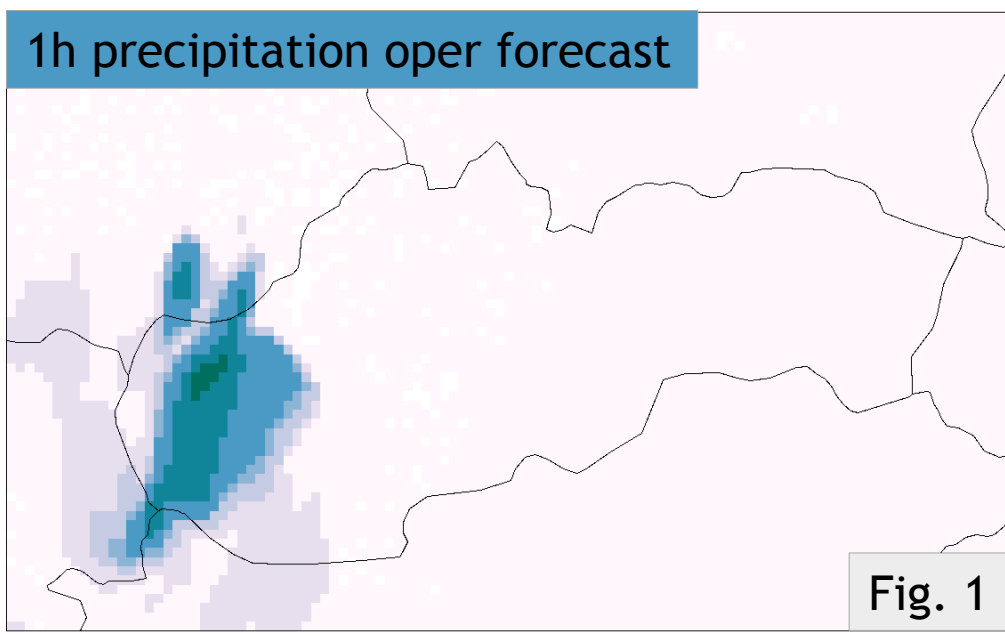
20/03/2017 data from new ALARO/SHMU setup available on SHMU web for public

Validation of ALARO-1vB  
ALARO-1vB is compared  
to ALARO-0 over the 5  
months period April-Aug



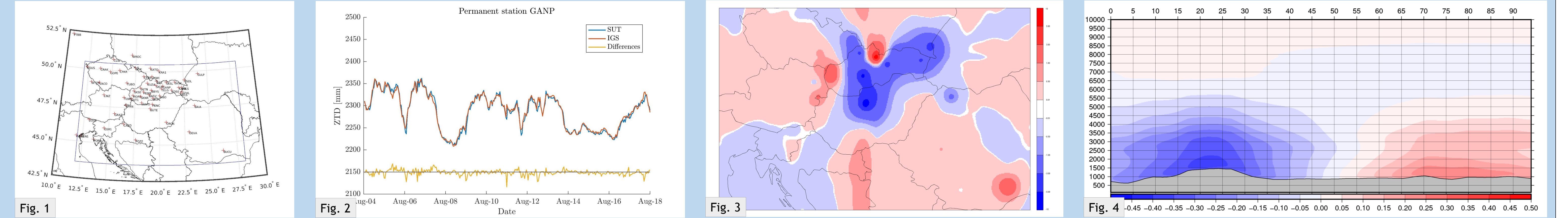
## SEVERE WEATHER EVENT case study

A linear storm system associated with strong wind and wind gusts had been passing through SW Slovakia on 10/08/2017 evening - see a bow echo on the radar image (Fig. 3). Measured wind gust exceeded 35m/s, causing lot of damages. The operational forecast was rather good as an event indication - see +21h forecast of 1h precipitation (Fig. 1) and a maximum wind gust (Fig. 4) and corresponding INCA analyses (Fig. 2 and 5), however the intensity and localization of the extreme weather patterns was not excellent.

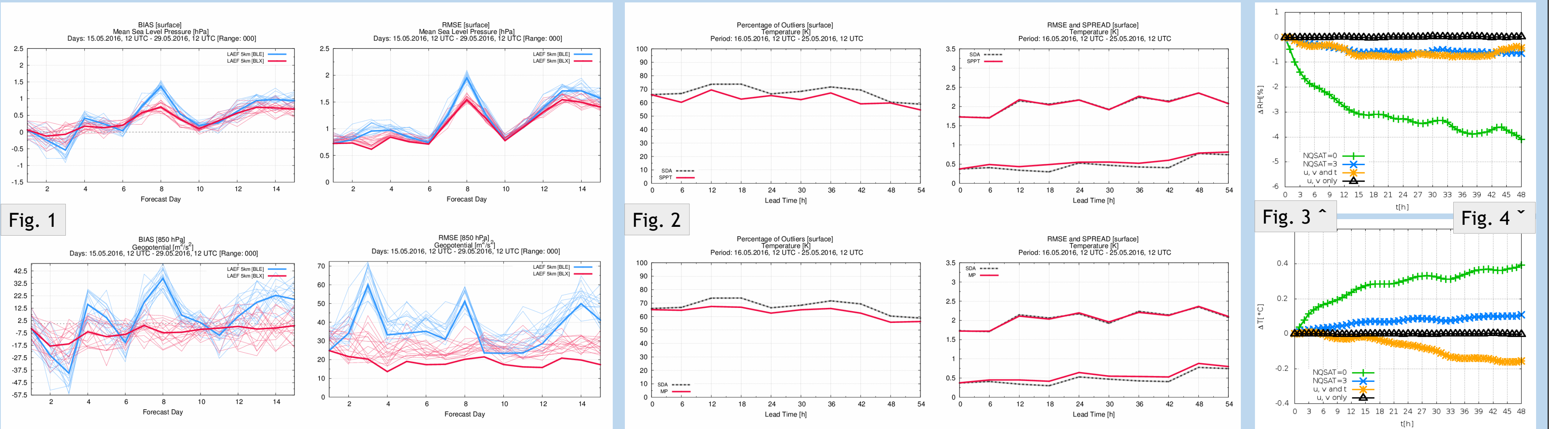




Local processing of 59 GNSS stations is performed within a cooperation with the Slovak University of Technology, Department of Theoretical Geodesy (space.vm.stuba/pwvgraph). The station list comprises 40 stations from Euref network, 6 stations from IGS network and 13 from national permanent GNSS stations of AT, CZ, HU and SK, as shown on Figure 1. Obtained ZTD are comparable with IGS final PPP product, as illustrated on Figure 2 for Ganovce station. Technical 3DVAR runs over an AROME/HU domain using locally processed ZTD data look reasonable, as illustrated on Figures 3 and 4. The specific humidity analysis increments are plotted on the surface (Fig. 3) and over a vertical cross-section (Fig. 4). Experiments are to be continued.



The SHMU contribution to the ongoing work on the ALADIN-LAEF system is documented. The upgrade of the system to new model version and with new components is displayed. Figure 1 shows the improvement in the scores of MSLP and geopotential at 850 hPa after the bug in quadratic coupling in CY40t1 was discovered and corrected. Blue line represents the bugged experiment, red line the corrected version. Figure 2 illustrates the enhancement of ALADIN-LAEF statistical scores - percentage of outliers, RMSE and ensemble spread - due to stochastic perturbation of physics tendencies (1st row) and new ALARO-1 multiphysics (2nd row) over the reference (gray dashed lines). A drying issue in the upper-air when SPPT scheme is applied is shown. Negative RH bias is observed (Fig. 3), invoking an associated T bias (Fig. 4), if Q and/or T are perturbed. The only unbiased solution is obtained when solely the wind field is perturbed. The difference between various supersaturation checks in SPPT scheme (see legend) and the reference run averaged over 8 members and over 4 days is plotted. The work is to be continued.



The SHMU convection-permitting system is under preparation. Two identical domains for AROME and ALARO CMCs with 2km grid were defined (see Table below and Fig. 1), running in a downscaling mode. Generally their performance is comparable, even in the high impact weather situation (illustrations on the right). Preliminary objective verification indicates a tuning problem of **ALARO-1 2km** with respect to **ALARO-0 9km**, **ALARO-1 4.5km** and **AROME 2km** (Fig. 2).

	AROME	ALARO
HPC	IBM Flex System p460	IBM p755
model	CY40T1bf07_export	
physics	AROME-France CMC	ALARO-1vB CMC
horizontal resolution	2.0 km, 512x384pts	
vertical levels	73	
tstep	144s	100s
coupling model	ALARO-1vB (4.5km), 1h	
assimilation, initialization	downscaling, no initialization	
forecast ranges	+78h at 00UTC/+72h at 12UTC (a' 1h)	

