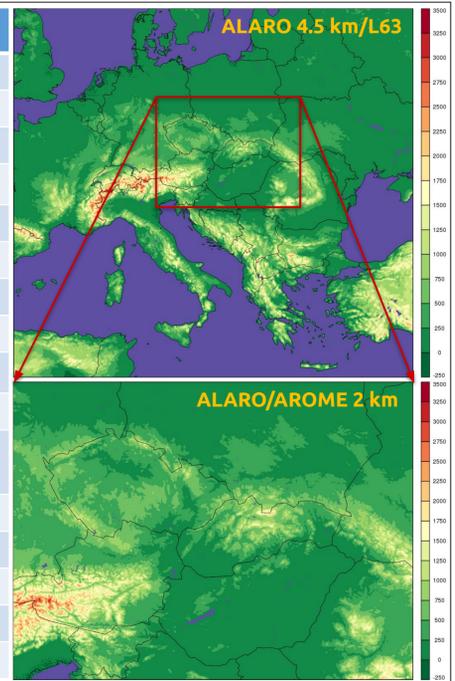


ALADIN/SHMU systems

CMC	ALARO	ALARO	AROME
status	operational		experimental
code version	CY40T1bf07_export	CY43T2bf11	CY40T1bf07_export
physics	ALARO-1vB	ALARO-1vB	AROME-FRANCE
dx	4.5 km		2.0 km
points	625 x 576		512 x 384
vertical levels	63	87	73
tstep	180 s	120 s	144 s
forecast ranges	78/72/72/60 (a' 1h)	78/72/72/60 (a' 1h)	-
coupling model	ARPEGE (long- & short cut off), 3h	ARPEGE, 1h	ALARO-1vB (4.5 km), 1h
assimilation	upper air spectral blending by DFI CANARI surface assimilation		downscaling
initialization	no initialization	DFI	no initialization
HPC	IBM Flex System p460, linux		IBM p755 running with 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	12		6
SW	Red Hat Enterprise Linux; gfortran 4.9.3 (xlf 15.1.0)		Gentoo 4.4.111 Linux, gfortran 7.3.0

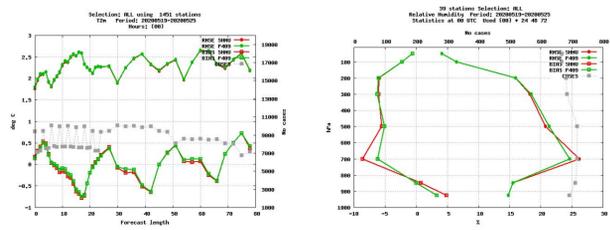


Update of operational suite to CY43t2bf11

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CY43t2bf10 has been ported to SHMU HPC. All operational configurations (ee927, e001, DF Blending, CANARI) have been validated. Several local problems linked to the (old version of) gcc compiler on the IBM platform had been identified and solved. Some of the fixes have been promoted for CY43t2bf11.

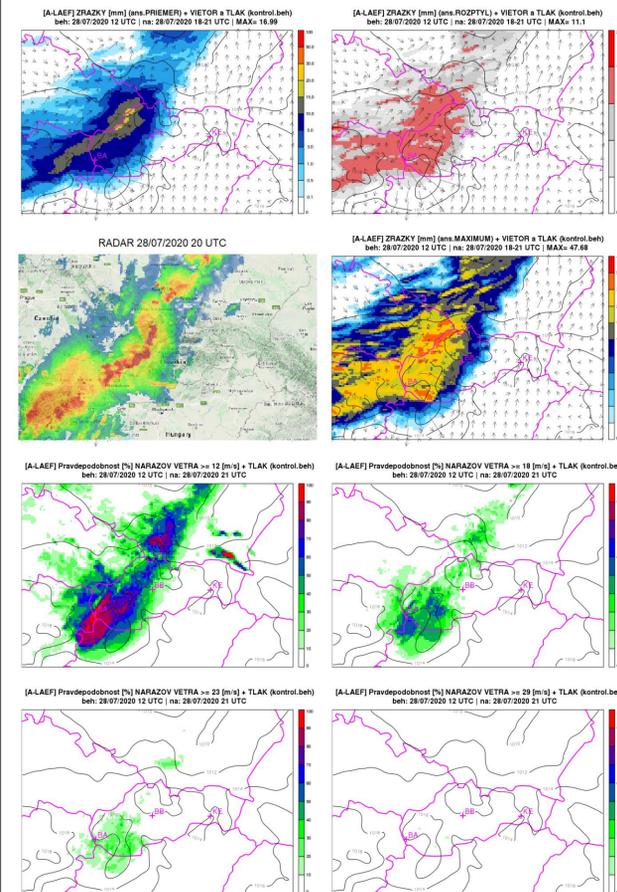
CY43t2bf11 in the e-suite gives neutral to slightly positive scores. It is ready to be implemented operationally in the nearest future.



Update of A-LAEF

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A-LAEF operational suite reached TC2 status on 22/07/2020. A-LAEF products are regularly uploaded to ARSO/SI and SHMU/SK. Distribution to other LACE NMSs & Turkey is under preparation. Local SHMU visualisation based on R and perl was developed. Maps are available at <http://www.shmu.sk/produktv/nwp/alaef/>. An example of A-LAEF products is shown for a case study of night storms on undulated cold front associated with strong wind gusts (28/07/2020).



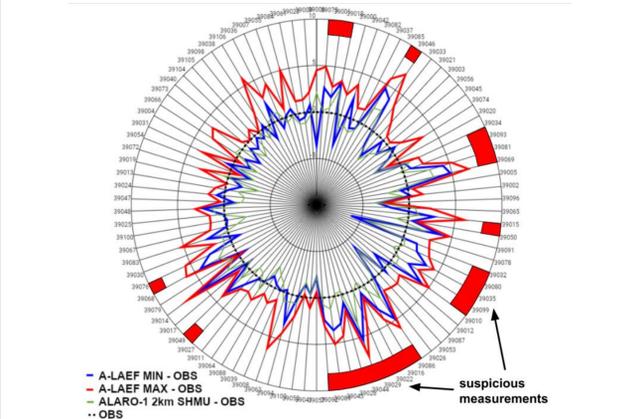
A-LAEF 3-hour precipitation totals (mean, spread, max) compared to the RADAR reflectivity (top panels) and probabilities for wind gust for threshold values of 12, 18, 23 and 29m/s (bottom panels).

Local QC based on A-LAEF

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A physically consistent spread of the meteorological fields provided by the A-LAEF ensemble can be used in an automatic QC procedure of the AWS measurements.

As a first attempt the QC of 2m temperature was tested at SHMU (new software layer above MySQL database). The suspicious AWS measurements with values out of the A-LAEF spread were identified.

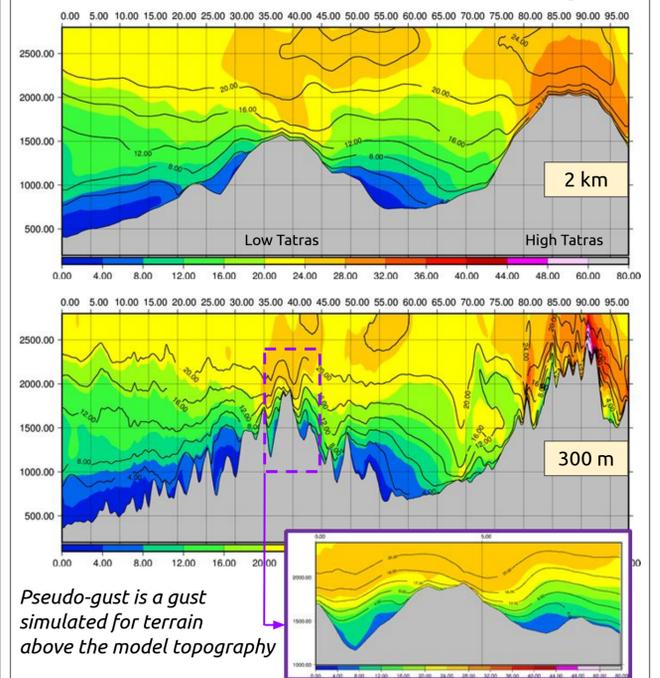


Very high resolution experiments

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Very high resolution experiments are being conducted, motivated by a case study of an underestimated wind speed in the mountains on 22/02/2020. Together with an increased horizontal resolution a special attention is paid to the correct representation of the physiography fields (orography, roughness...). Impacts of physical parametrizations, namely turbulence, are studied as well.

Wind velocity (isolines, m/s) and pseudo-gust (color shades) VCS forecasts from ALARO-1 with 300m and 2 km resolution for 22-02-2020 18 UTC are shown below. In contrary to 2km model, at 300m res. there are already sharper peaks "penetrating" the boundary layer around the mountain. The experiments show that even at 300m resolution with improved surface roughness the wind at mountain crests is still underestimated in situations with gale.



Pseudo-gust is a gust simulated for terrain above the model topography

Radar data assimilation of radial winds

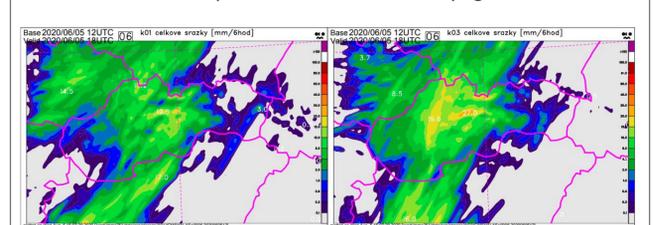
katarina.catlosova@shmu.sk, RC LACE stay

A pilot experiments to assimilate radial wind velocity (VRAD) were performed. OPERA OIFS VRAD data with NI>30 m/s over the LACE domain were analyzed for their availability and for their spatial and statistical properties (OMG, OMA).

Few technical bugs in the HOOF tool were found and reported/fixed. Possible inconsistencies in the SI and DK data were identified.

"Proof of concept" case study with VRAD data assimilated was run for 05/06/2020 12 UTC, with noticeable impact on meteorological fields, as shown below.

More details in the report on the RC LACE web page soon.



6h precipitation

Exp without VRAD DA (top left)
Exp with VRAD DA (top right)
INCA nanalysis (right)

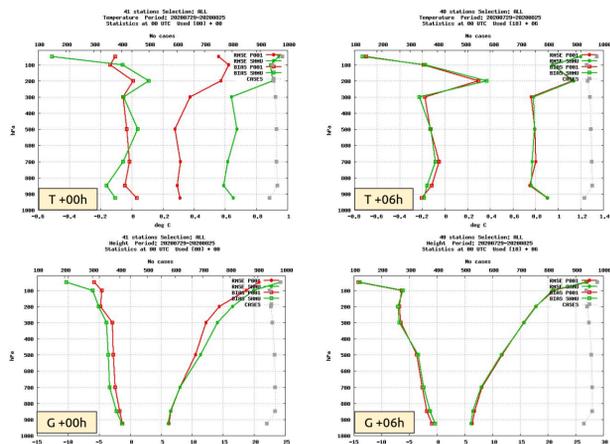


3D-Var and BLENDVAR implementation

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DA configurations (bator, e002, e701, e131) for conventional observations (SYNO, TEMP, AMDAR) have been upgraded and validated for operational ALARO 4.5 km/L63 domain with CY43t2. Several local problems linked to the (old version of) gcc compiler on the IBM platform had been identified and solved. OMP issue in shuffle still open. 3D-Var scripts were adapted for operational environment (run_app in perl) => milestone for SHMU 3D-Var.

One month (29/07-25/08/2020) BLENDVAR experiment has been run and 6h scores have been compared to operational BLENDING setup. For 3D-Var only conventional observations were utilized. B-matrix = downscaled ARPEGE EPS. BLENDVAR was neutral for near-surface parameters. Scores of large scale parameters were improved for the analysis, but the positive impact was lost after 6h. Experiments are to be continued with longer forecast check and tuning of relevant 3D-Var parameters.



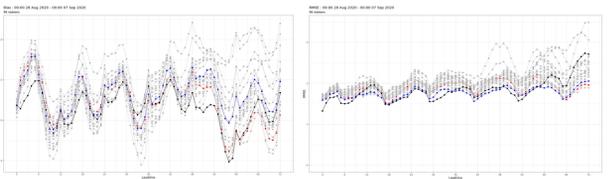
SHMU: operational BLENDING CY40t1, P001: BLENDVAR CY43t2

HARP implementation

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HARP verification package was implemented at SHMU's HPC and tested on the operational A-LAEF grib files. Point verification is working, enhancement for deterministic ALADIN/SHMU and extension to spatial verification scores will follow.



2m temperature BIAS (left) and RMSE (right) of ALADIN/SHMU (black), individual A-LAEF members (gray), EPS mean (blue) and control run (red) for lead times up to 72 hours. Verification against Slovak OBS network for the period of August 28 - September 7, 2020.