Status of ALADIN operational activities at SHMU
(changes between III/2016 and IX/2016)

SUMMARY

A mirror of the e-suite based on CY38T1bf03_export (ALARO-0) has been installed on new HPC on 29/04/2016. It was upgraded to CY40T1bf05_export (+ future bf06) with ALARO-1 on 28/07/2016. The 4.5km domain was slightly optimized (dx=4.50km exactly). Other downstream applications are gradually being transferred onto new HPC.

	operational	**(mirror) e-suite**	**future operational**
HPC	old HPC	new HPC	
model	CY36T1_bf10	CY38T1bf03_export	**CY40T1_bf05_export (+locally installed future bf06)**
horizontal resolution	9km	4.5km	4.5km (exactly)
number of grid points	320 x 288	625 x 576	
spectral resolution	106 x 95 (quadratic)	312x287 (linear)	
orography	envelope orography	mean orography (old Z0)	
number of levels	37	63	
time-step	400s	180s	
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)	
physics	ALARO 3MT, SLHD	ALARO-0 baseline	**ALARO-1**

HARDWARE

NWP system ALADIN is exploited on SHMU supercomputers. Currently there are 2 IBM clusters available:

- 10 nodes of IBM p755, each node contains 4 processors POWER7 8 core CPU 3.55 GHz and 256 GB RAM, connected via 2x InfiniBand switch IBM 7874-024, and 2 management servers IBM POWER 750 with processor POWER7 6 core, 64 GB RAM, operational system is AIX 6 SE OS
- 12 nodes of IBM Flex System p460, each node contains 4 processors Power7+ 8 core CPUs (3.6 GHz), 256 GB RAM, operational system is Red Hat Enterprise linux

Each cluster has its own disk array
- For IBM p755 disk storage IBM System Storage DS5100 with
    - 32x 300GB 15k rpm FC Disk
    - 32x 2TB 7.2k rpm SATA Disk
- For IBM p460
    - 5TB fibre channel discs
    - 177 TB sas disks

Archiving is ensured by tape library based on IBM System Storage - Tivolli S3310 (120 date tapes LTO5 1.5TB). Two UPS 60kVA are installed.

ACTIVITIES:

Technical and operational activities were mostly concentrated on porting and validation of NWP stuff to new HPC.
- The necessary environment and the technical and supporting tools to run operational and user applications are gradually being ported to new hpc, with emphasis to use grib_api whenever possible (lambert and latlon projections).
- Mirror of the e-suite based on CY38T1_bf03 with ALARO-0 baseline was ported and validated on new HPC as a basis for new operational environment, declared on 29/04/2016.
- CY40T1.bf05_export version was ported to new HPC including future bf06 and newest development of T2m/RH2m interpolation in ALARO-1 ACTKECLS (by M. Dian and J. Masek + bf of L. Gerard).
- In this configuration whole assimilation and production chain works under the operational environment (so called run_app system), declared pre-operational on 28/07/2016.
- The 3DVAR environment based on shell scripts (aka CHMI) was ported and validated on CY40t1bf05_export
- SURFEX was technically ported (see below)

Research and development activities
- ALARO physics (Martin Dian): work on T2m/RH2m interpolation in ALARO-1 (ACTKECLS) - continuation of the Prague stay + report (soon available on RC LACE web pages)
- VFE (Jozef Vivoda): work on (a) definition of knots and explicit values of eta on half and full levels (from B-spline basis of order C-1 and C, when levels are located either in spline maximas or in so called Greville points); (b) reimplementation of variation diminishing method for approximative operators; (c) redefinition of full level A and B
- LAEF (Martin Bellus): The first revision of the manuscript "Perturbing surface initial conditions in a regional ensemble prediction system" (Bellus, Wang, Meier) was carried out and submitted to the AMS/MWR in May. The paper was accepted for the publication in June and after the pre-edit processing was published in Monthly Weather Review, vol. 144, no. 9, in August 2016.

- SURFEX (Viktor Tarjani, Richard Habrovsky, Ivan Prcuch): Test suite based on the offline SURFEX 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 (all three are part of the SURFEX export) 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. Using the CROCUS with INCA-SK would allow to prepare a detailed analysis/forecasts of snow profiles in mountain regions of Slovakia which could be interesting to avalanche prevention center.

PLAN

After porting all relevant applications declare CY40T1bf06 operational in early autumn 2016.

SURFEX: Continuation of the experiments. 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, e.g. SURFEX coupled with ALADIN model.
AROME: individual tests, 1 quasi-operational run/day.
3DVAR: include radar observations, 3h RUC with AROME.