

Status of ALADIN operational activities at SHMU (III/2019 - IX/2019)

SUMMARY

The operational version is based on CY40t1_bf07_export, 4.5km/63levels, ALARO-1vB physics. In parallel two experimental convection resolving configurations (ALARO-1vB and AROME with 2 km/L73) are running over the same - smaller - domain on old HPC nodes (see Table 1.). On 02/07/2019 new LBC from the Arpege HR suite were introduced. The bug in the BLENDING/CANARI settings (missing LXSOIL parameter to have evaporation fluxes in guess was missing) was corrected on 20/08/2019. Otherwise there were no changes in the operational model version.

Table 1: The current and former ALADIN/SHMU system setup.

CMC	ALARO/SHMU	ALARO/2km	AROME/2km
status	operational	experimental	
code version	CY40T1bf07_export	CY43T2_pre.bf10	CY40T1bf07_export
physics	ALARO-1vB	ALARO-1vB	AROME-FRANCE
dx	4.5 km	2.0 km	
pts	625 x 576	512 x 384	
vertical levels	63	73	
tstep	180 s	120 s	144 s
forecast ranges	78/72/72/60 (a' 1h)	+78h at 00UTC/+72h at 12UTC (a' 1h)	
coupling model	ARPEGE (long- & short cut off), 3h	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, linux	

HARDWARE

NWP system ALADIN is exploited on SHMU supercomputers. Currently there are 2 IBM clusters unified, with shared file system and common load leveler queueing system:

- NEW HPC: 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

- OLD HPC: 10 nodes of IBM p755, each node contains 4 processors POWER7 8 core CPU 3.55 GHz and 256 GB RAM. These nodes were reconfigured and plugged into a cluster with NEW HPC - now running with IBM Flex System p460, operational system is Gentoo Linux

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

New archiving machine is being installed: IBM TS3310 Tape Library, 5 PB.

ACTIVITIES:

Technical and operational activities:

The ITT for new HPC system has been finalized. The contract with NEC was signed. More details in the next status report.

Research and development activities:

Update of A-LAEF (Martin Bellus):

A-LAEF operational suite [4.8km/L60, 16+1 mem, ESDA+blending IC perturbation, surface SPPT+ALARO-1vB MP model perturbation, coupled to ECMWF ENS via c903] was implemented in ecFlow under TC user. It is regularly running since July 2019.

Testing of visibility parameterization in ALARO (Andre Simon):

The visibility parameter originally coded for AROME (MF) and later implemented for ALARO (CHMI, ARSO) was tested. Both visibility with respect to cloud liquid water (fog) and precipitation were examined. Default parameters settings and their tuning according to literature review and real measurements were evaluated. Preliminary conclusions revealed that obtained visibility seems to be reasonable, but further validation and tuning is welcome.

Revisit of CANARI settings (Maria Derkova):

The bug in missing evaporation fluxes in guess was corrected. In an attempt to improve too high near surface moisture leading to unrealistic CAPE values that were reported by SHMU forecasters full set of local AWS measurements available from LACE countries was experimentally assimilated into ALARO/SHMU 4.5 km/L63 CANARI analysis over 13-21/06/2019 period. Neutral to slightly positive impact was noticed, notably for T2m_min, T2m_max.

Assimilation of ZTD data (Martin Imrisek):

Work is carried out in cooperation with the Slovak University of Technology, Dpt. of Theoretical Geodesy, where the local independent near real-time processing system of GNSS network of permanent stations is running. GNSS ZTD data are experimentally assimilated into AROME/SHMU 2 km/L73 model version together with SYNOP, TEMP, AMDAR and AMV data. Simple white list method and static correction based on OMG statistics was applied for each permanent GNSS station. Evaluation is ongoing.

Assimilation of Mode-S data (Katarina Catlosova)

Two months (January-February 2018) data sample of Mode-S data (EHS & MRAR) from four radars provided by Slovak ATC was analyzed in frame of diploma thesis at the Faculty of Mathematics, Physics and Informatics, Dpt. of the Atmospheric Physics. Statistical approach based on OMG departures using AROME/SHMU 2 km/L73 model was used to select reliable data. Then the aircraft whitelist was created based on ICAO addresses. Evaluation is ongoing.

SURFEX (Viktor Tarjani):

Offline surface assimilation cycling using the EKF method was implemented within SODA framework for oper (614x565 points/4.5 km resolution) and inca (501x301 points/1 km resolution) configurations using SURFEX V8.1. Outputs from CANARI or INCA analyses of T2M and HU2M are used as gridded observations, having the same regular mesh as the target domain. Forcing (upper boundary condition for SURFEX) is taken from the level at 20 m above the surface (via fullpos). EKF analysis cycling was carried out for 12 days of August 2019 with analyses performed daily at 12 UTC. The feasibility of cycled EKF analysis implementation was demonstrated. Temporal evolution of analysis increments and observation innovation show physical relevance. Thorough performance evaluation is planned.

Radar data assimilation (Michal Nestiak):

Ongoing work on improved radar data reading and processing.

2020 and longer term PLANS

1. Porting of operational suite to new HPC (once available)
2. Development of 3h RUC with 3DVAR on convection resolving scales
3. Offline SURFEX operational
4. Development of SURFEX data assimilation
5. Case studies of extreme weather events