ALADIN in Poland

Małgorzata Szczęch-Gajewska,Bogdan Bochenek, Marcin Kolonko, Marek Jerczyński, Jadwiga Woyciechowska Piotr Sekula

Institute of Meteorology and Water Management, Poland

OPERATIONAL

ALARO-1 (CY40T1) Operational Domain:

E040 domain: 4.0 km horizontal resolution, 789x789 grid points,

60 vertical model levels on a Lambert projection with 3h coupling frequency and 3h output, coupling zone with 16 points;

Runs 4 times per day (00,06,12 and 18) with 66 hours forecast

range; LBC from ARPEGE with 15.7km horizontal resolution;


ALARO 4km
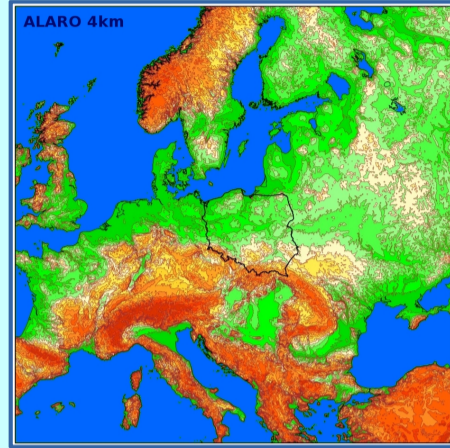
Operational machine characteristics

Cluster of HP BL460c_GEN8 servers connected with Infiniband network, OS Scientific Linux 6, Intel Xeon E5-2690 processors – with maximum 1552 cores (97 nodes with 16 cores each), each core RAM 128 GB, disc array – 64 TB.

Data assimilation

Surface data assimilation with CANARI is ready, and first tests are in progress

Work on implementation of 3D VAR is still in progress

AROME 2.0km
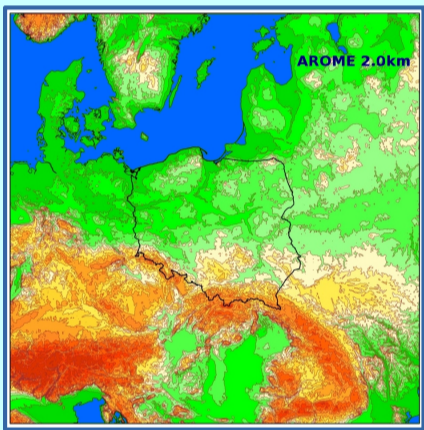
AROME Operational Domain:

P020 domain: 2.0km horizontal resolution, 799x799 grid points,

60 vertical model levels on a Lambert projection with 3h coupling frequency and 1 hour output

2 runs per day (00 and 12UTC) with 30 hours forecast range; LBC from ALARO-1;

GRIB format, every 1h – for LEADS system;

ALARO-1vB

E-suite of ALARO1-vB is running for several months now. Basic scores are better, compered to ALARO1-vA. We plan to switch to new version in November 2017.
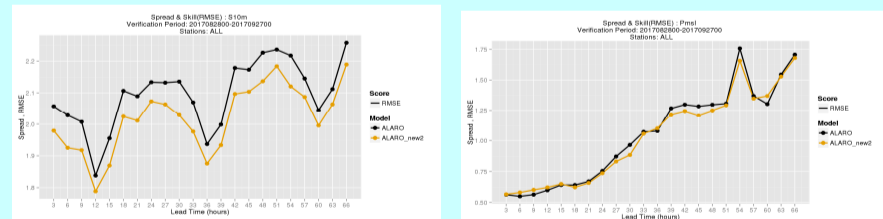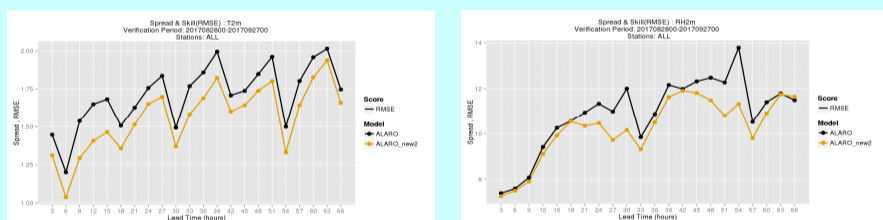
RMSE for September Top left – temperature at 2 m, top right – relative humidity at 2 m, bottom left – wind speed at 10 m, bottom right – mean sea level pressure
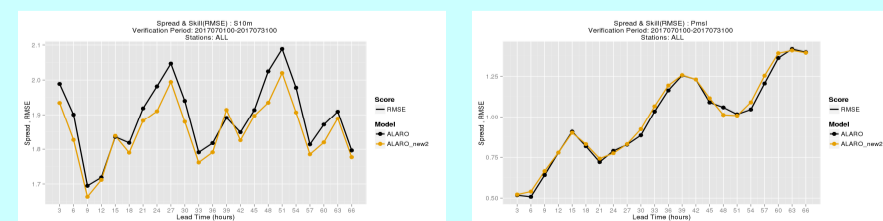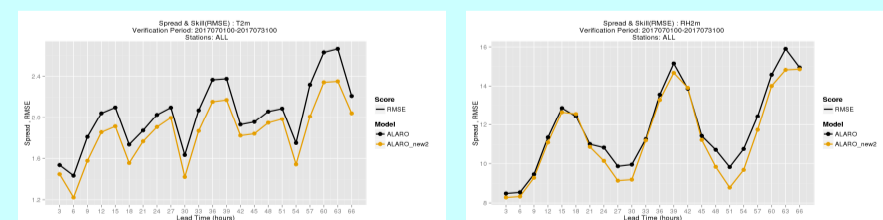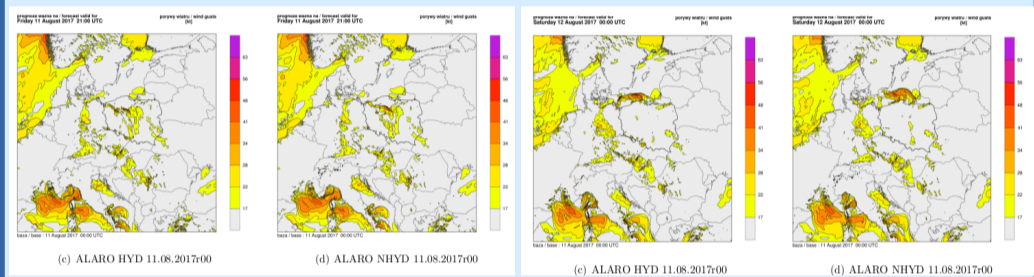

RMSE for July Top left – temperature at 2 m, top right – relative humidity at 2 m, bottom left – wind speed at 10 m, bottom right – mean sea level pressure

ALARO NHDYN test

Tests of non-hydrostatic version of ALARO-1 started in IMWM-NRI in Krakow. First we check for proper namelist settings to reduce artificial noise in forecasts. The we tested new version for synoptic situation in 20170811. In consequence of strong storm with wing gusts over 40 m/s, 6 people were killed.
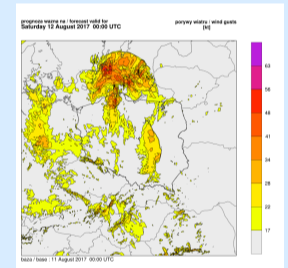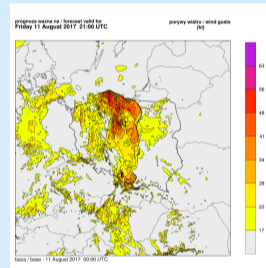

Observed wind gusts on sinoptic stations.
From left: between 12-15 UTC, between 15-18 UTC, between 18-21 UTC and between 21-24 UTC.

(c) ALARO HYD 11.08.2017r00   (d) ALARO NHYD 11.08.2017r00   (c) ALARO HYD 11.08.2017r00   (d) ALARO NHYD 11.08.2017r00

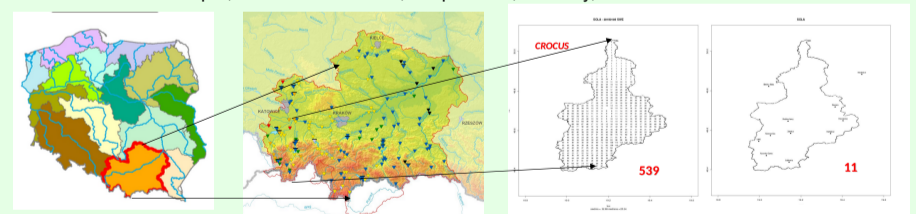20170811 21 UTC   20170811 24 UTC

AROME model – bottom row, predicts hight values of wind gusts, but movement of the storm was too fast. ALARO HYD – top left, predicts better speed of storm, but values of wing gust were too small. ALARO NHDYN – top right, gives good storm movement and higher values of wind gusts that ALARO HYD.

Crocus

With implementation of AROME model with surface model SURFEX for Poland domain (2.0x2.0km) was adapted and installed snow model CROCUS with ISBA-ES module. It was done with cooperation with Meteo France. As an input data for CROCUS are used AROME model forecasts.
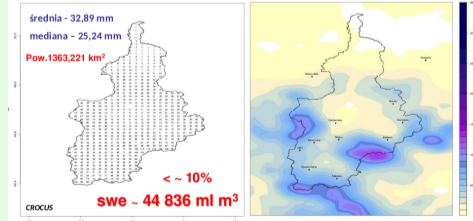
For validation we used historical climatological and SYNOP values of snow cover depth. Model was recalculated for winter season 2008/2009, 2015/2016, 2016/2017 for values of snow cover depth, snow water content, temperature, humidity, etc.

05.01.2015 r.

Zapas wody w pokrywie śnieżnej [mm] prognoza 8PH - 49 870 ml m³

Zlewnia Soły

średnia - 32,89 mm
mediana – 25,24 mm
Pow.1363,221 km²

< ~ 10%
swe ~ 44 836 ml m³

CROCUS

River Sola in south of Poland was tested with results from CROCUS model. In this river basin there are 11 stations measuring snow cover, but only in lover altitudes. CROCUS with 2 km resolution has more then 500 points in this region.

In tested period differences between estimation of SWE by hydrologists and CROCUS were less then 10%

Pre-operation version of CROCUS in running from September 2017 with some first snow results in Tatra Mountains.

River Sola and validation of CROCUS results
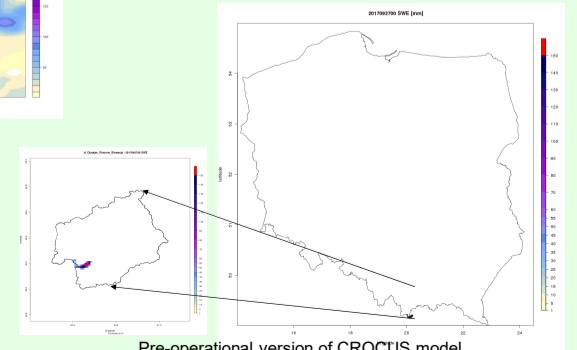
Pre-operational version of CROCUS model