ALADIN in Poland – recent operational and research activities

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Current status of the operational suite

Computer characteristics

SGI Altix 4700, system SUSE Linux Enterprise Server 10, configuration: 32 processors Intel Itanium 2, clock 1.66 GHz, RAM 64 GB, disk space – 1.8TB, peak performance - 212 Gflops

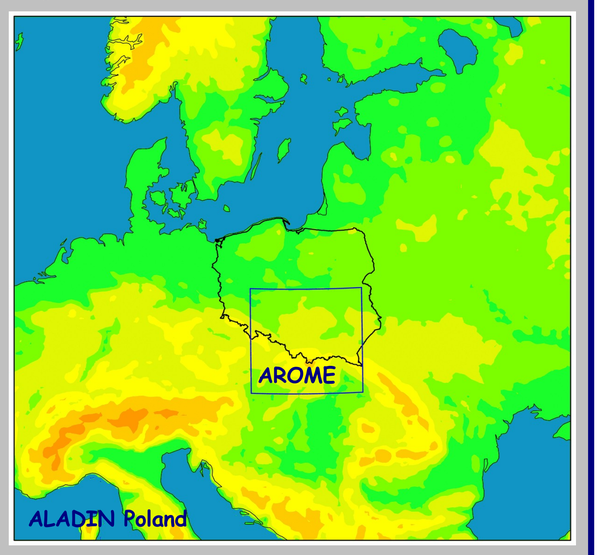
Domain characteristics

horizontal resolution 13.5km

grid 169x169 points

vertical levels 31

Lambert projection



Operational suite and products

Model version: AL29t2mxl/AL35

2 runs per day (00 and 12UTC) with 54 hours forecast range

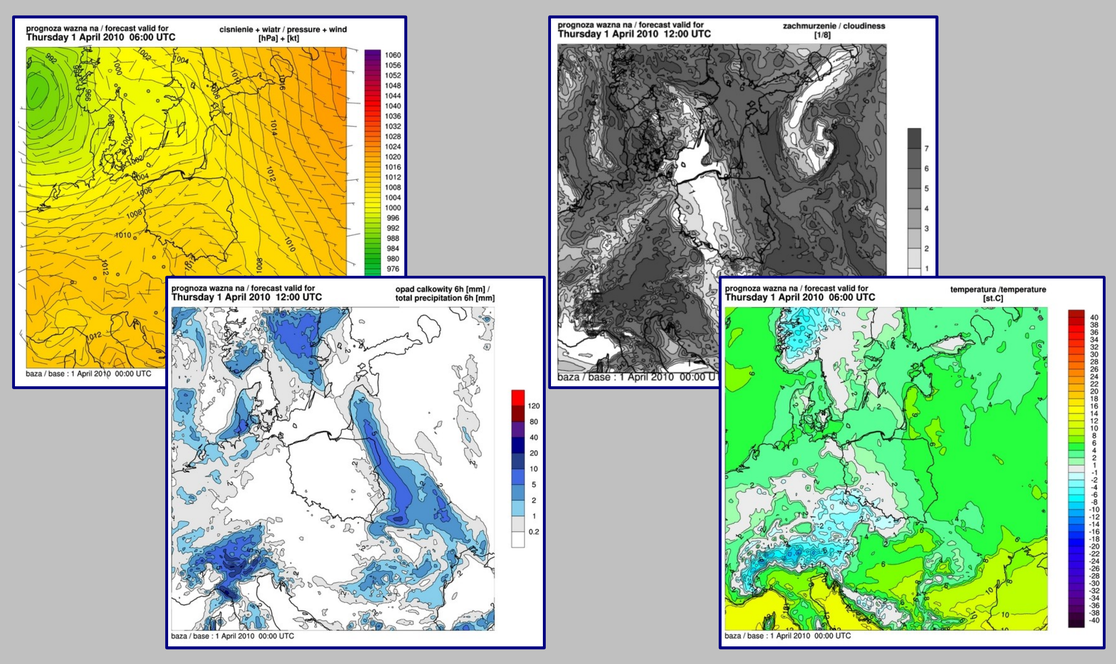
LBC from ARPEGE (3h coupling frequency)

in line Fpos on model grid, every 3h – for operational database

off line Fpos on geographical regular grid, every 3h – for LEADS system

graphical products (maps, meteograms, tables) on the Aladin intranet web site

From begining of April we ran in test mode new system for graphical presentation of results based on NCAR Graphics/NCL tools. Examples of them you can see below.



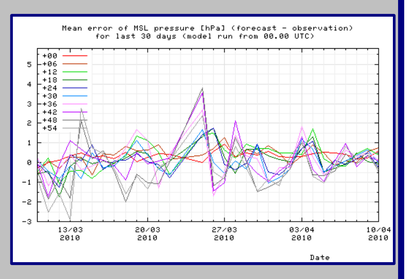
Verification

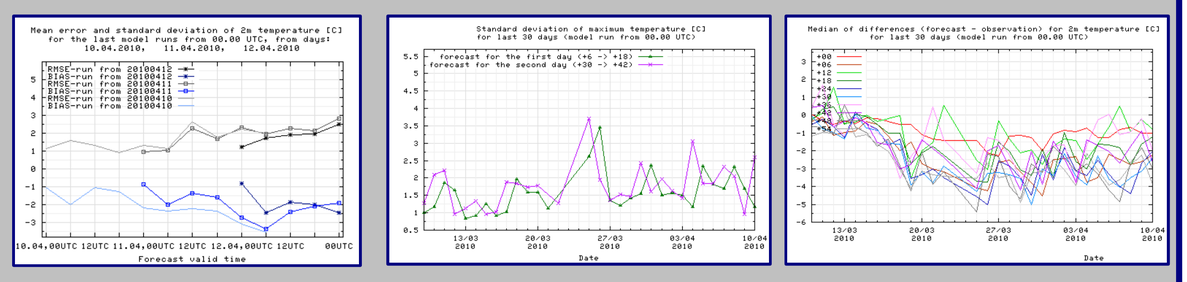
Operationally, few times per day we run verification of ALADIN model numerical weather forecast: BIAS and RMSE and MEDIAN and MAD.

Observational values from each station are compared with model values at the grid point which is nearest to the given station. Verification is carried out for both runs of model (initial time 00.00 and 12.00 UTC respectively). The forecasts of following meteorological elements are evaluated:

MSL pressure, air temperatury at 2 m AGL,wind speed at 10 m AGL, wind direction at 10 m AGL, relative humidity at 2 m AGL, air maximum temperature at 2 m AGL, air minimum temperature at 2 m AGL, accumulated precipitation, cloud cover.

Quality of forecasts of cloud cover and accumulated precipitation is evaluated using contingency tables, and for others elements the differences between model and observed values are counted.





INCA

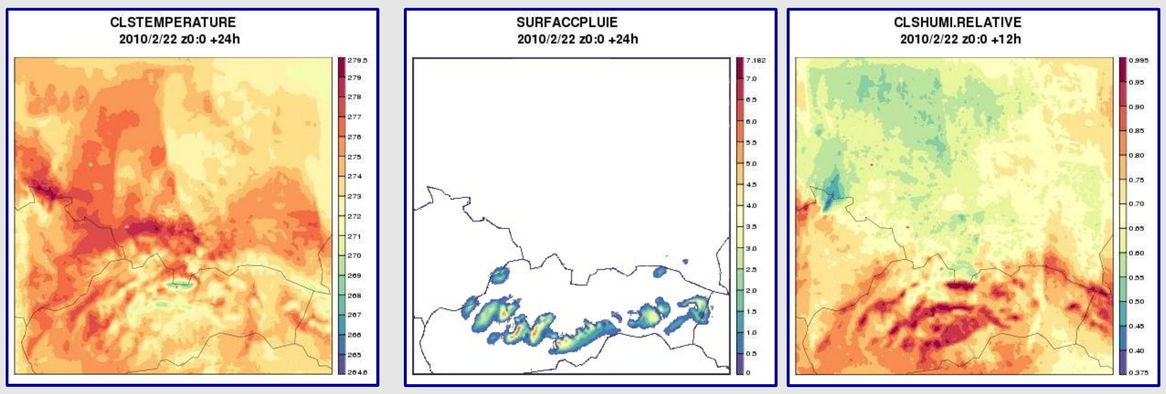
In pre-operational mode we prepare input files in GRIB format for nowcasting model INCA. For this we run 30h forecast on special domain: 144x144 points, 31 vertical levels, 7.7km horizontal resolution, Lambert projection. Initial an lateral boundary conditions from ARPEGE with coupling every 3h, tested also with LBC from ALADIN. With output and conversion to GRIB of 1 hour.

Research activities

Arome – preliminary tests

Model version: CY33t1

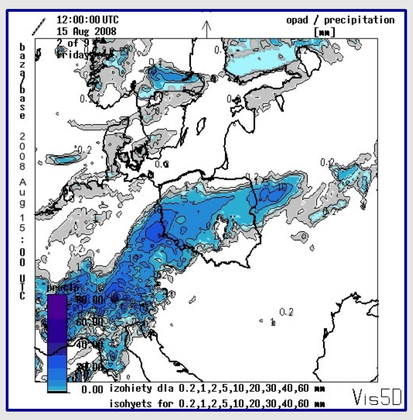
Domain: 169x169 points, horizontal resolution 2.7km, 31 veritcal levels. Time step of the model is 60s. We run 30h forecast with 1 hour output.

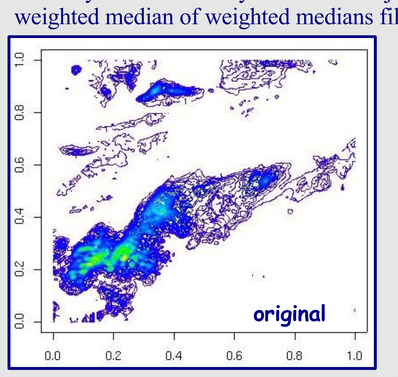


CWM Filters

Simple median filters are widely applied in image processing for noise removal. Median filter is effective, robust tool and it keeps contrast untouched. That suggest that median filter is good basis for search for new scale separation method applicable to non-smooth meteorological fields e.g. precipitation, cloudiness.

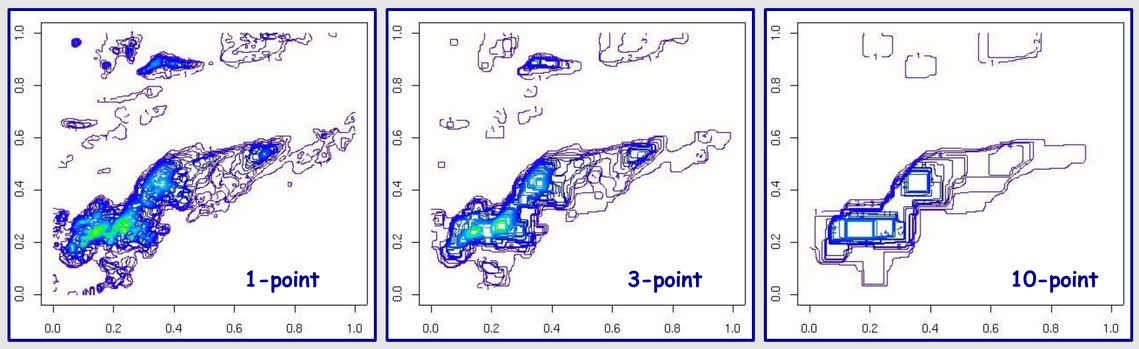
Proposed new tool for scale separation is a set of **Composite Weighted Median Filters** i.e. complex filters which are superposition of weighted median filters with different sizes and weights. There are proposed two kinds of such filters: 1-D and 2-D CWM filters for gridded data. 1-D CWM filter is superposition of 2 kinds of elementary bricks:A-brick and B-brick. 2-D CWM filter is built similarly but elementary brick in not just weighted median filter but weighted median of weighted medians filter .





On the left and above is original 6-hour cumulated precipitation field .

Below are examples of CWM filters work. From left: 1-point features filtered out, 3-point features and 10-point features are filtered out.



Fuzzy Methods

There were performed first tests of use of fuzzy methods in verification and comparison of high resolution forecasts. First, tests were used for the forecast of precipitation. Fuzzy methods rely on the comparison of one single prognosis (or one domain of prognoses) with the set of observations. Various matching strategies are used and also the decision model specification is required. For example, we take into account the upscaling, minimum coverage and multi-event contingency table:

Upscaling matches neighborhood of observations and the neighborhood of forecast. Useful forecast in this case resembles the observations when averaged to coarser scales.

Minimum coverage method matches also both neighborhoods (of observation and of forecast) and the forecast is useful when predicts the event over a minimum fraction of the region of interest.

Multi-event contingency table compares single observation with the neighborhood of forecast. Useful forecast predicts at least one event close to an observed event.

Details on poster of J.Woyciechowska: "Use of fuzzy methods in verification and comparison of high resolution forecasts (first tests)". Many more examples of results may be found there.

	ETS minimumcoverage cum 24h									
165km	NaN	0.43	0.19	0.34	0.65	0.44	0.48	NaN	NaN	NaN
85km	NaN	0.32	0.37	0.52	0.65	0.44	0.48	0.00	NaN	NaN
45km	NaN	0.32	0.43	0.33	0.55	0.44	0.48	0.00	NaN	NaN
25km	NaN	0.35	0.36	0.27	0.65	0.55	0.48	0.00	NaN	NaN
15km	NaN	0.39	0.36	0.21	0.54	0.55	0.48	0.00	NaN	NaN
10km	NaN	0.39	0.36	0.12	0.54	0.77	0.48	0.00	NaN	NaN
1km	NaN	0.39	0.36	0.12	0.54	0.77	0.48	0.00	NaN	NaN
	0.0	0.1	0.2	0.5	1.0	2.0	5.0	10.0	20.0	50.0

The example of results for the precipitation thresholds [in the units of mm / 24 hours]

INNOVATIVE ECONOMY
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Project realised within Innovative Economy Operational Programme and coofinanced by European Regional Development Fund

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