5.1 Tour d'ALADIN

P. Termonia

Algeria

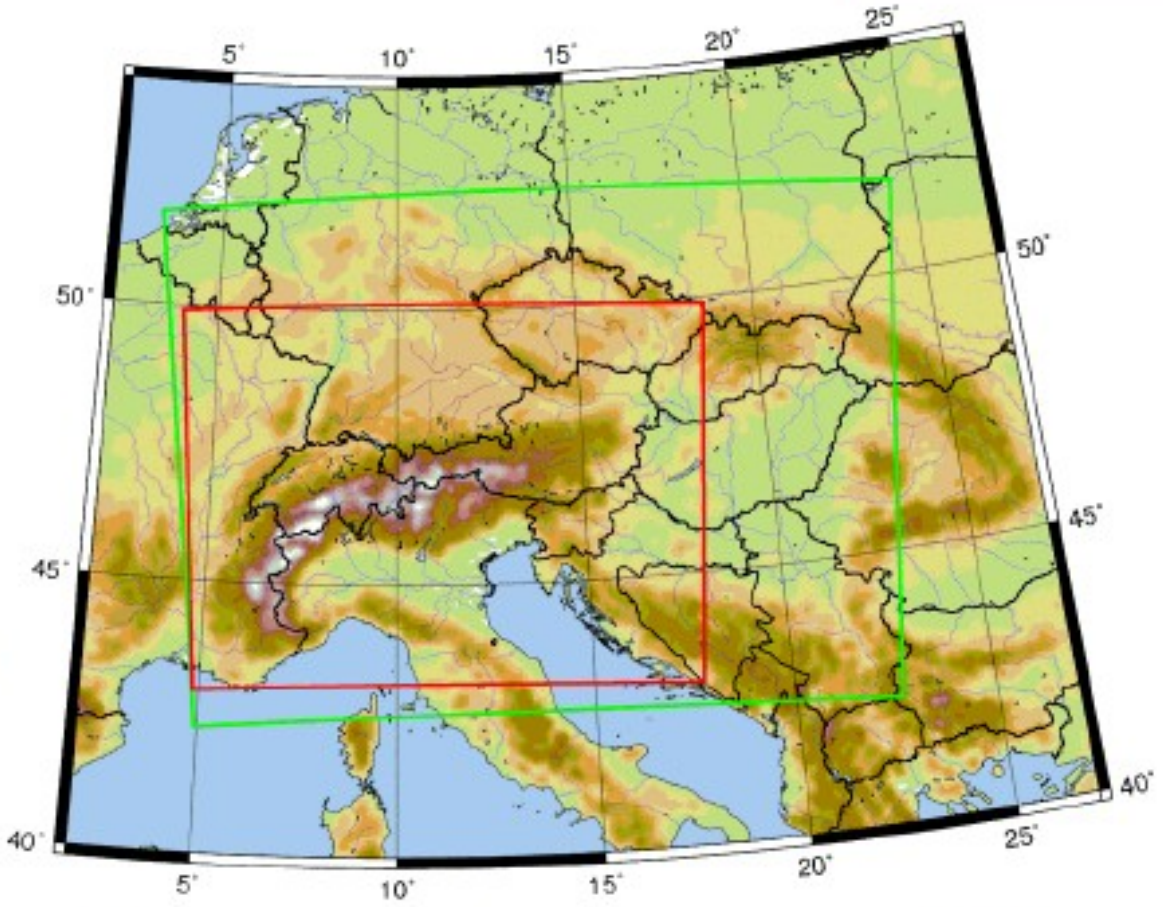
- Activities:
  - Research on radiative impact in dust in the desert;
  - Validation of AROME using a radar based classification
  - Evaluation of short-wave radiation in ARPEGE
- **Has the ambition to make step forward (new machine) and invites the GA next year (renewal of the ALADIN MoU)**

AUSTRIA: Major Upgrade of AROME

Highlight 2014: Major Upgrade of AROME system at ZAMG

What's new?:

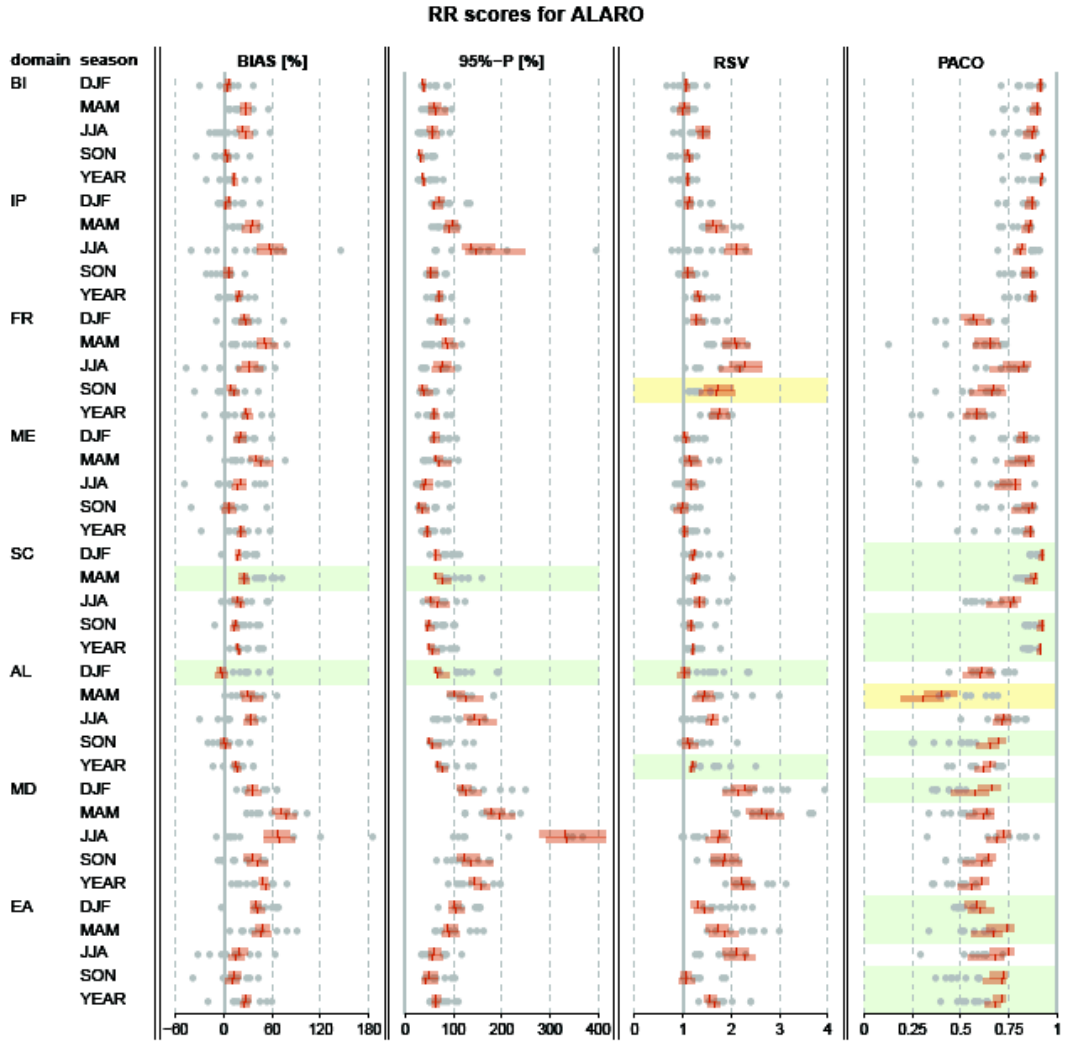
- Extended domain
- Extended forecast range (from +30h to +48h)
- Increased vertical resolution (from 60 to 90 levels)
- Extended product catalogue to meet growing user requirements



old (red) vs. new (green) domain

ZAMG
Zentralanstalt für Meteorologie und Geodynamik

Belgium: ALARO contribution to CORDEX at 12 km

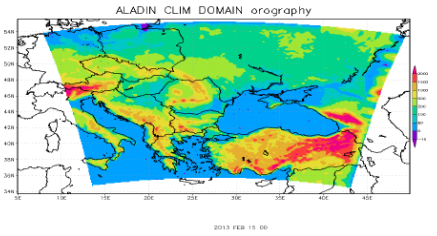


- Validation of the RMI ALARO regional climate model precipitation in a ERA-Interim "long" climate run according yo Kotlarski et al., GMD.
- No color: ALARO is in the spread of the "accepted" RCMs.
- Orange: outside of the ensemble and worse
- Green: outside the ensmble and better

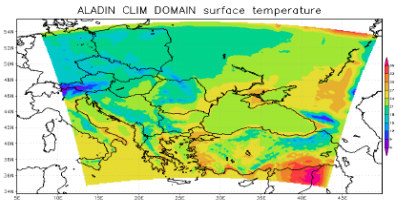
"Seamlessness: improvements at the short scale (3MT) improve climate runs.

Bulgaria

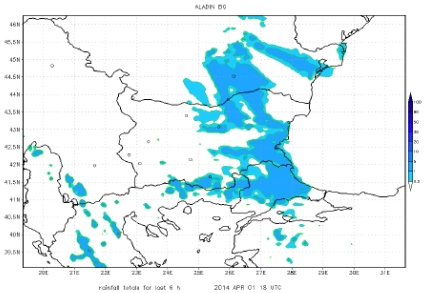
- Porting of cy38t1.bf03 – April 2014
- Building of parallel suite and run it in pseudo operational mode – June 2014
- 16 of October cy38t1 became operational
- NIMH-BAS participates the FP7 Project "Increasing Resilience through Earth Observation" as a partner of METEO-FRANCE(MF), as executors of the Work Package (WP) 202 – Winds, waves and storm-surges. The ALADIN group is responsible for the downscaling of the reanalysis of historical meteorological observations for storm situations to be simulated with the aim to examine potential coastal hazards.



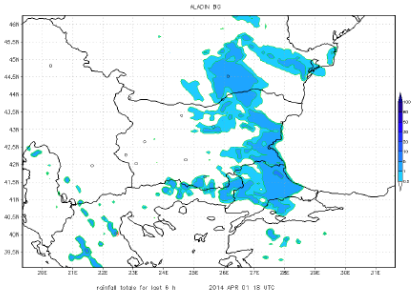
Orography of new clim-telecom file



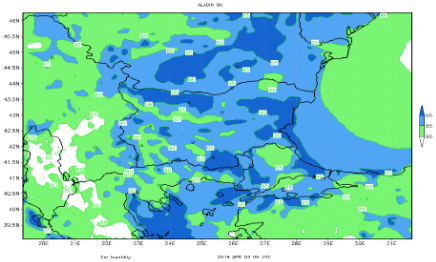
Suface temperature of the new clim-telecom file for July



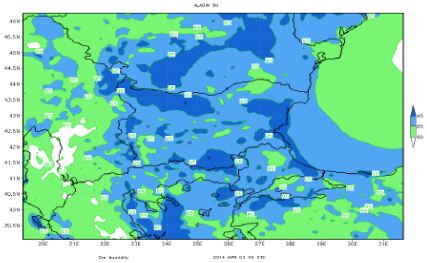
Precipitation from control forecast with export of cy38t1



The corresponding precipitation forecast from operational suite



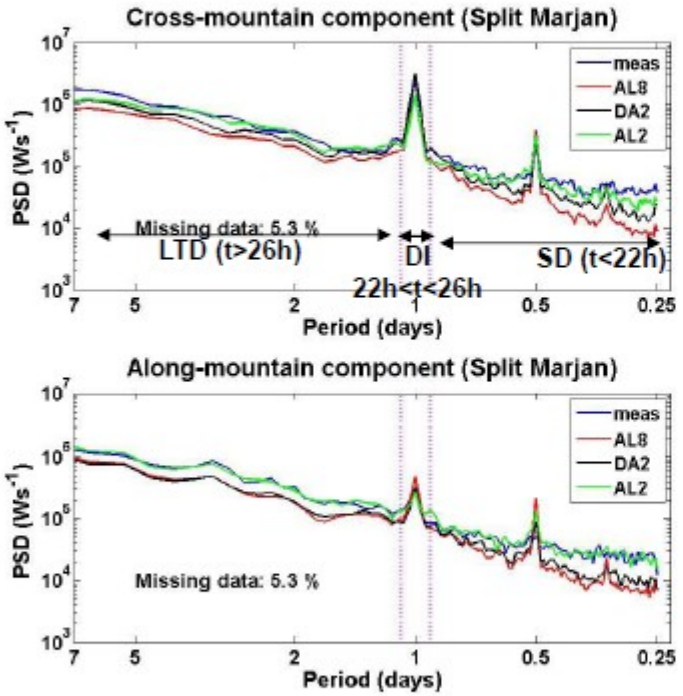
Humidity from control forecast of export cy38t1



Humidity forecast from operational suite

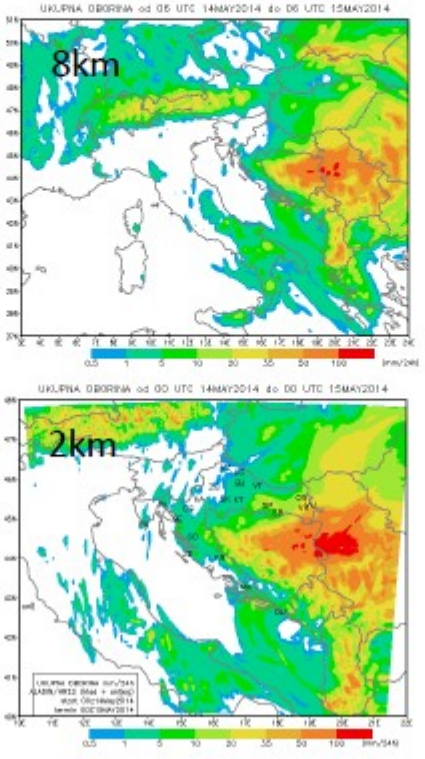
CROATIA

EU IPA project:
"Weather intelligence for wind energy"
aim – improving local wind forecast for energy sector



Spectral analysis and phase-error tolerant measure in spectral space
Split Marjan 2010-2012

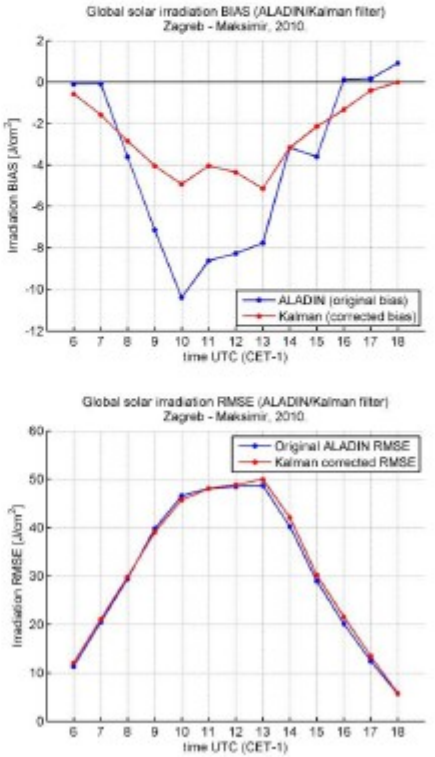
Successfull ALARO0 (2 km resolution) forecast of 24h acc prec using before the severe flooding of Bosnia and Herzegovina, Serbia and



EU IPA Project: "ENHEMS-Building"

Postprocessing of solar irradiance on horizontal surface using Kalman filter

Motivation: Developement of system for efficient use of energy in buildings



Only global horizontal irradiance is used as predictor

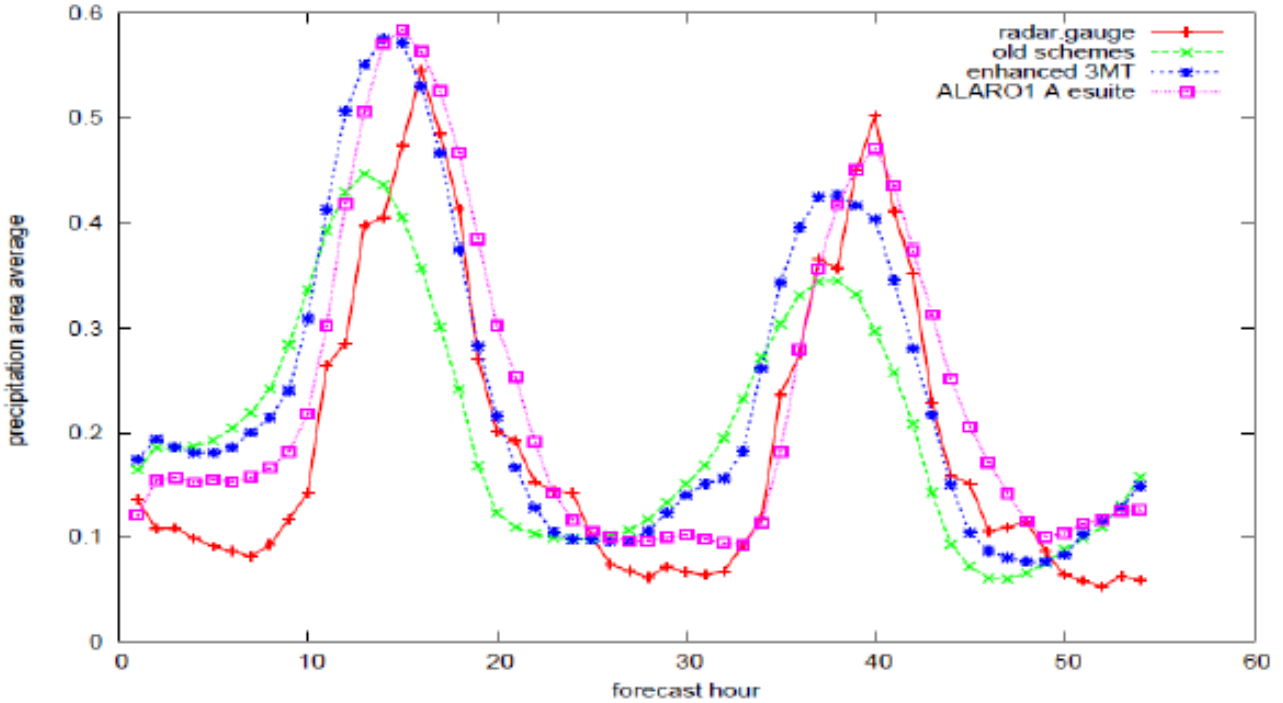
The problem: RMSE is not diminished for all times

Plan: find predictors that can reduce RMSE

Czech Republic: the ALARO-1 baseline

Diurnal cycle of convection

- Diurnal cycle of convection at mid latitudes is now mastered in ALARO-1;
- Onset and decay phase shifts have been removed in step-by-step improvements to get the ***multi-scale physics***;
- Last touch is the new radiation scheme interacting with clouds at every time-step and TOUCANS with the prognostic moist Total Turbulent Energy (currently in the e-suite at CHMI).

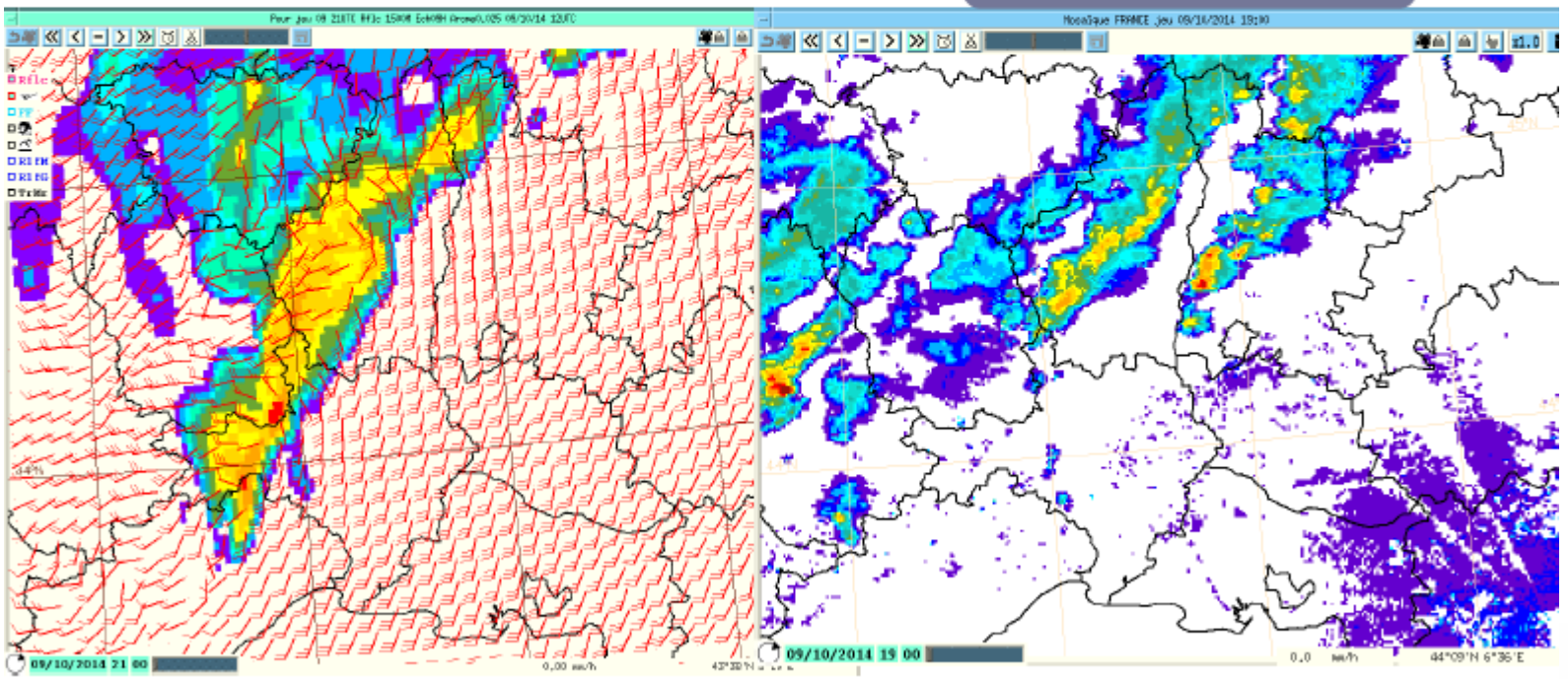


France: ahead in radar data assimilation and resolution

9-10 october 2014: radar reflectivities forcasted by AROME at 1500 m and observed

AROME starting at 09/10/12Z from 09-21 UTC au 10-12UTC

Observed radar reflectivities from 09-21 UTC au 10-12UTC

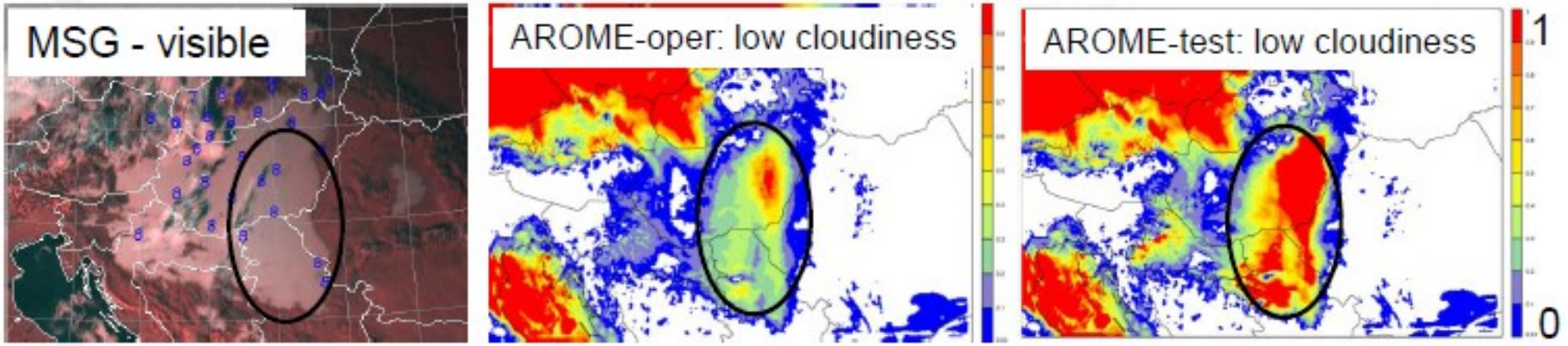


100 km

Activities at the Hungarian Meteorological Service

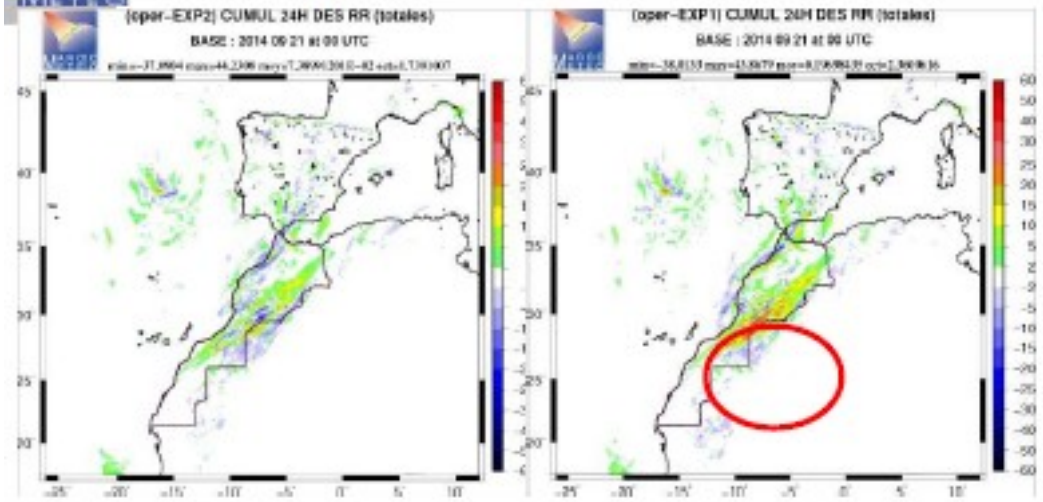
- Wintertime stratus cases: low cloudiness is underestimated by AROME (and other operational models) → French—Hungarian Bilateral Project (2 years)
- These cases are often associated with light drizzle in AROME
- Above freezing point: liquid drizzle in AROME is close to measurements and other models
- Below freezing point: amount of solid drizzle is higher than in observations or other models → investigation of microphysics (snow processes)
- By increasing the critical value for autoconversion (cloud ice to snow) → snowfall decreases → stratus does not dissolve in AROME

2011-11-30 14 UTC (+14h forecasts)



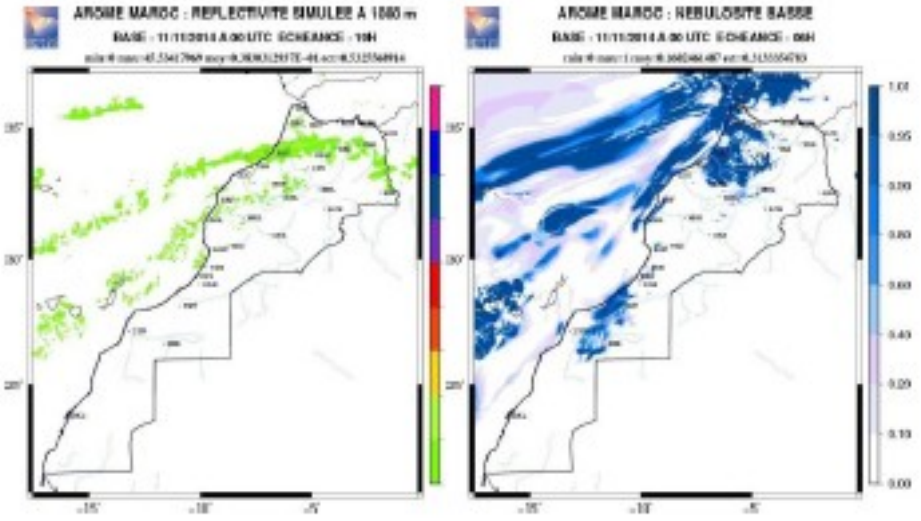
- Modification tested on selected case studies and longer periods (summer and winter)
- Double suite currently running at the Hungarian Met Service

cy38t1bf03 with SURFEX in ALADIN-MAROC



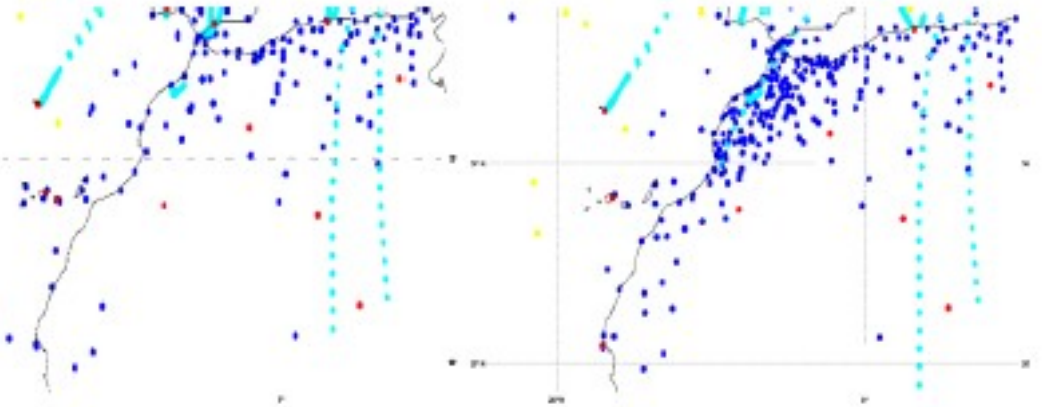
- ALADIN-MAROC, NORAF, AROME models are used in the forecasting practice. The cycle 38t1bf03 with surfex in ALADIN-MAROC was implemented locally at the Moroccan Meteorological Service (DMN) on an IBM HPC cluster.
- The execution time has been reduced by passing to cy38t1bf03 cycle which shows that the code parallelizing is improved than in cy36t1
- It appeared during the operation of the new cycle for three months, that there was a problem of underestimation of rainfall. With the help of our colleagues in the GMAP team of Meteo-France, the problem was solved

Implementation of AROME-MAROC 2.5 km Over Morocco



- AROME-MAROC model with the cycle 38t1bf03 was implemented locally at the Moroccan Meteorological Service (DMN) on an IBM HPC cluster.
- The AROME ultra-short range forecasting model is executed on the IBM machine two times a day (at 00, 12 UTC network times) providing 36h forecasts, respectively

Integration of AWSs data in 3Dvar assimilation in ALADIN-MAROC

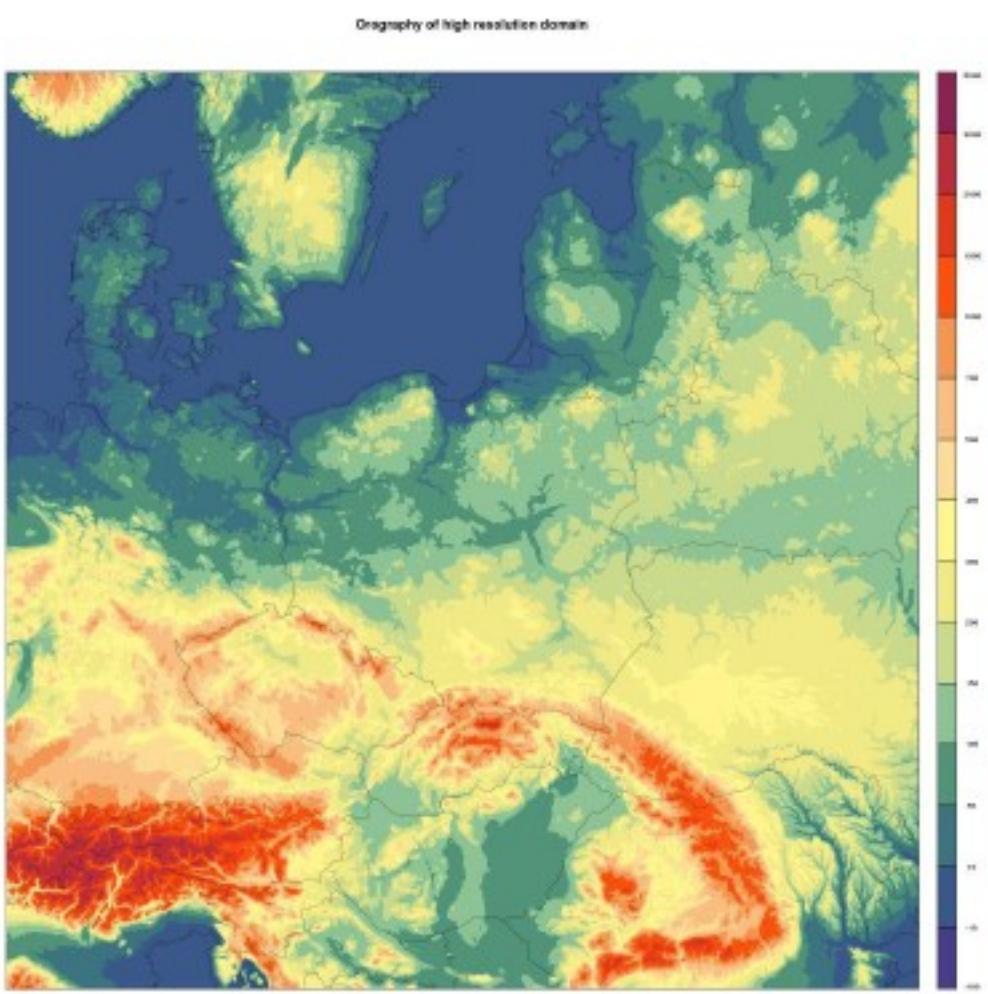


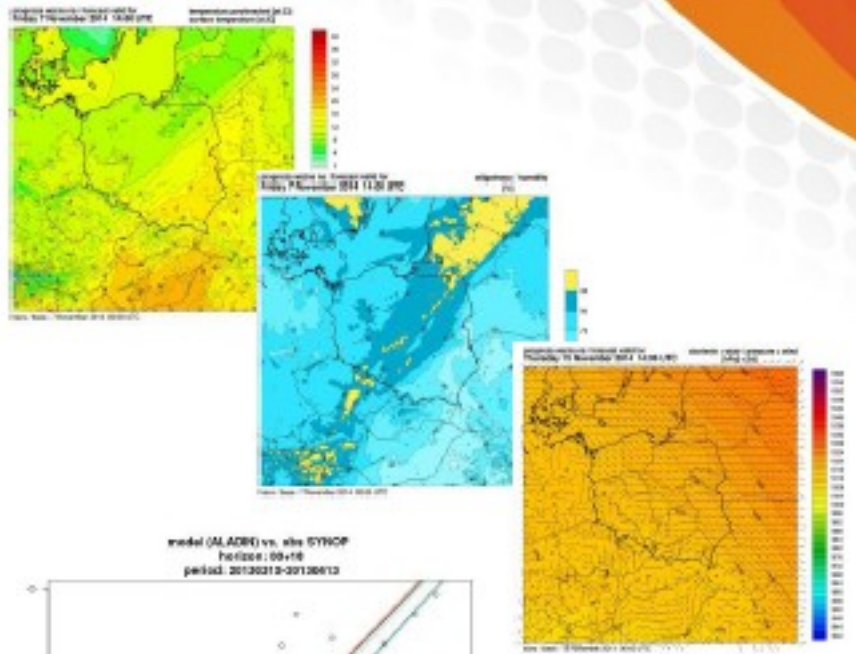
OBSOUL INI

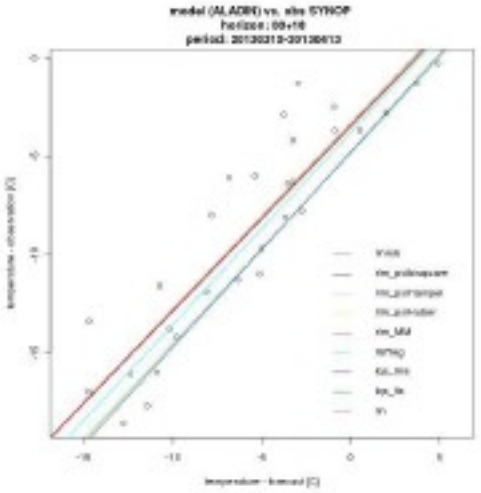
OBSOUL with AWSs

Instytut Meteorologii i Gospodarki Wodnej

Państwowy Instytut Badawczy







At IMWM main efforts in 2014 were mainly focused on the following tasks: putting 7.4 km ALARO and 2.5km AROME into operational service on new 97-node cluster, preparation of new set of NWP products and on developments in robust D-MOS statistical adaptation.

ipma

Portugal

Operations: new HPC

→ 8+1 IBM Power 7+ nodes, 24 cores each of 3.4 GHz, 128 GB (model p260) memory, 15TB disk space

→ CY38 migration

Development: radar data assimilation

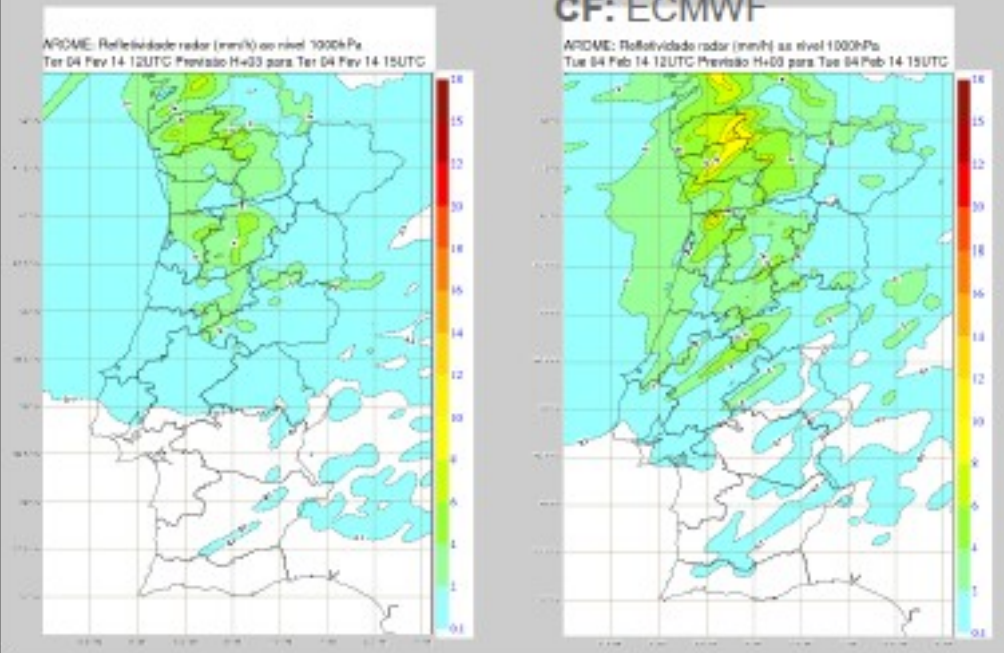
AROME/PTG oper

CI + CF: ALADIN/Portugal

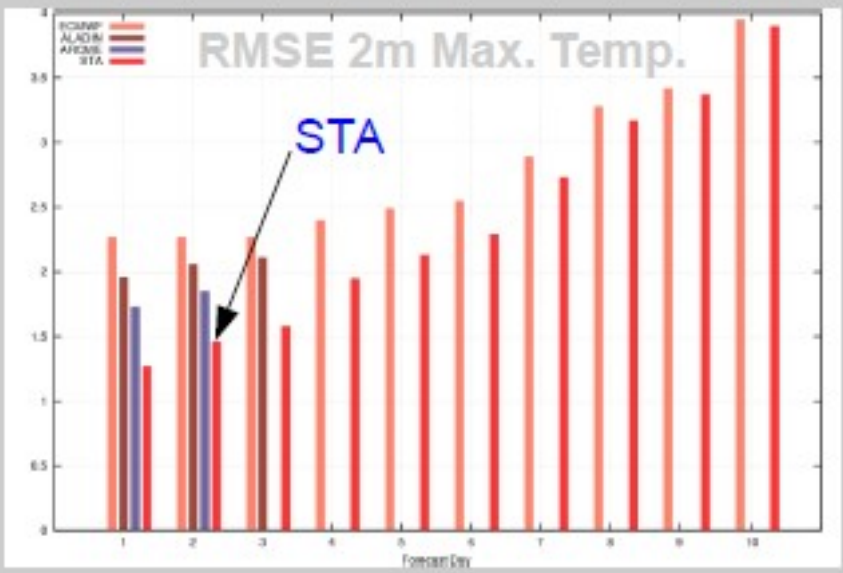
HARMONIE-AROME/PTG test

CI: SURFEX analysis + 3D_var with obs conv + LISBON radar

CF: ECMWF



Post-processing: statistical adaptation of hourly forecasts (STA) – several parameters



Impact of data assimilation on precipitation forecast over Romania – case study (15th May 2014, 00 run)

Assimilation settings:

- 6h assimilation cycle
- 3DVAR and CANARI/OI
- downscaled ensemble background error covariances
- IDFI, ARPEGE LBC files at every 3 hours
- Δx = 6.5km, L49, Δt=240s

Observation: OPLACE system

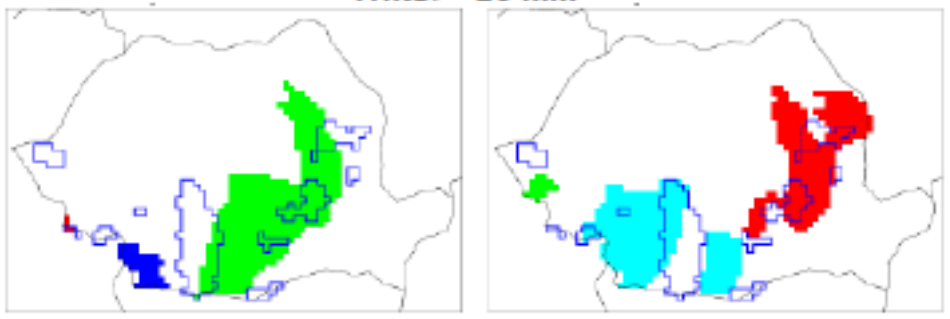
- conventional data including all surface local data
- satellite data: radiances from ATOVS/AMSU-A, ATOVS/AMSU-B (NOAA 18), METEOSAT 9/SEVIRI, GEOWIND, AMDAR (T,u,v)

Precipitation verification: MODE

Method for Object-based Diagnostic Evaluation

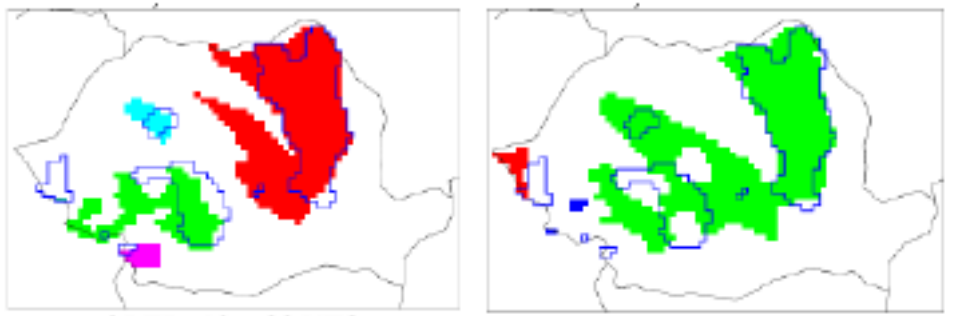
License: "Model Evaluation Tools (MET) was developed at the National Center for Atmospheric Research (NCAR) through a grant from the United States Air Force Weather Agency (AFWA). NCAR is sponsored by the United States National Science Foundation."

Forecast Objects with Observation Outlines, THRS>=20 mm



OPER. 06 – 18 UTC

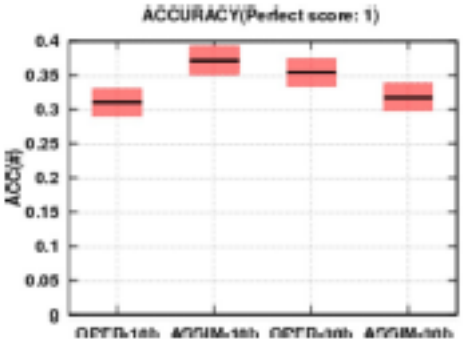
ASSIM. 06 – 18 UTC

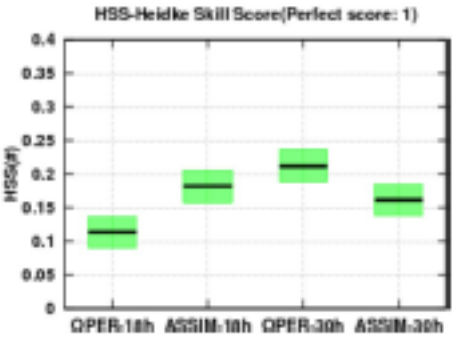


OPER 18 – 30 UTC

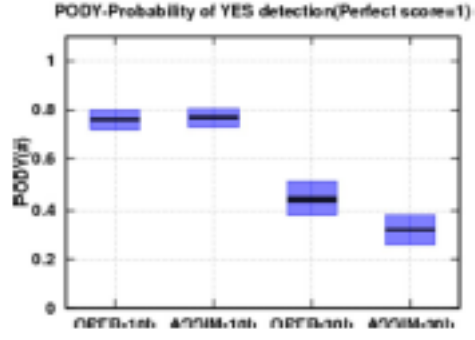
ASSIM. 18 – 30 UTC

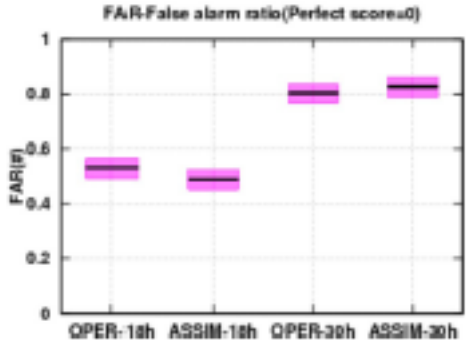
MULTI-CATEGORY SCORES and confidence limits

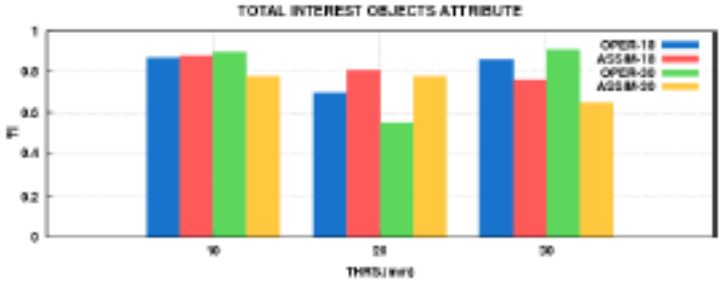




CATEGORICAL SCORES and confidence limits, THRS>=20 mm







ASSIM better than OPER for 06 – 18 UTC

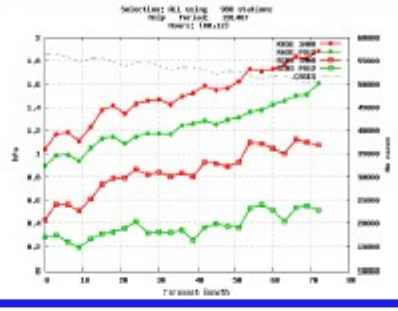
- more accurate
- higher degree of correct forecasts
- discriminates better between "yes"/ "no"
- for 10, 20 mm thrs, higher total interest object attribute

Slovakia

Operational activities

High-resolution e-suite based on CY38T1bf03_export running since 01/07/2014 in full assimilation/production mode

OPER	E-suite
9x9km & 37 levels	4.5x4.5km & 63 levels
envelope orography & quadratic grid	mean orography & linear grid
CY36T1	CY38T1.bf03_export
CANARI + DFI blending & Arpege boundaries a'3h	



R&D

Dynamics

J. Vivoda: Vertical Finite Elements

Data Assimilation

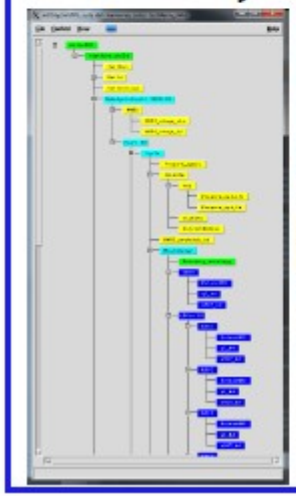
M. Nestiak: Radar quality control & data assimilation

EPS/LAEF

M. Bellus: Experiments with the size of the ensemble & Stochastically perturbed physics tendencies

Collaboration

HARMONIE system Working Week, 13-17/10/2014 Bratislava



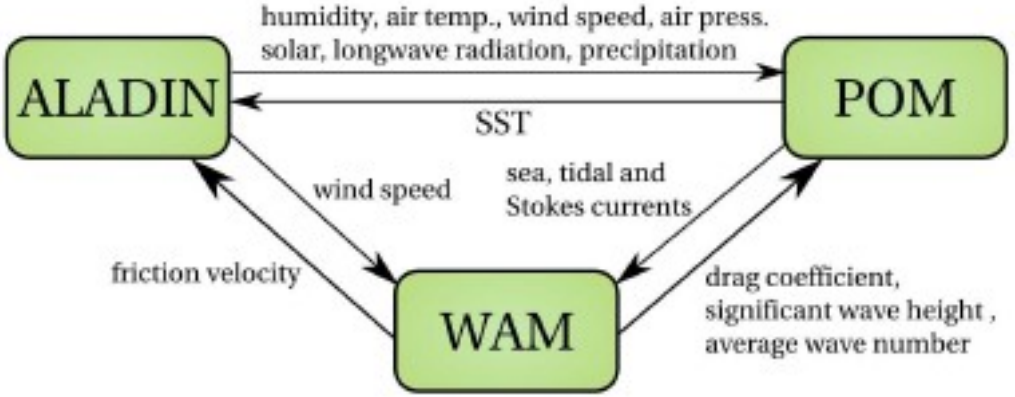
Slovenia

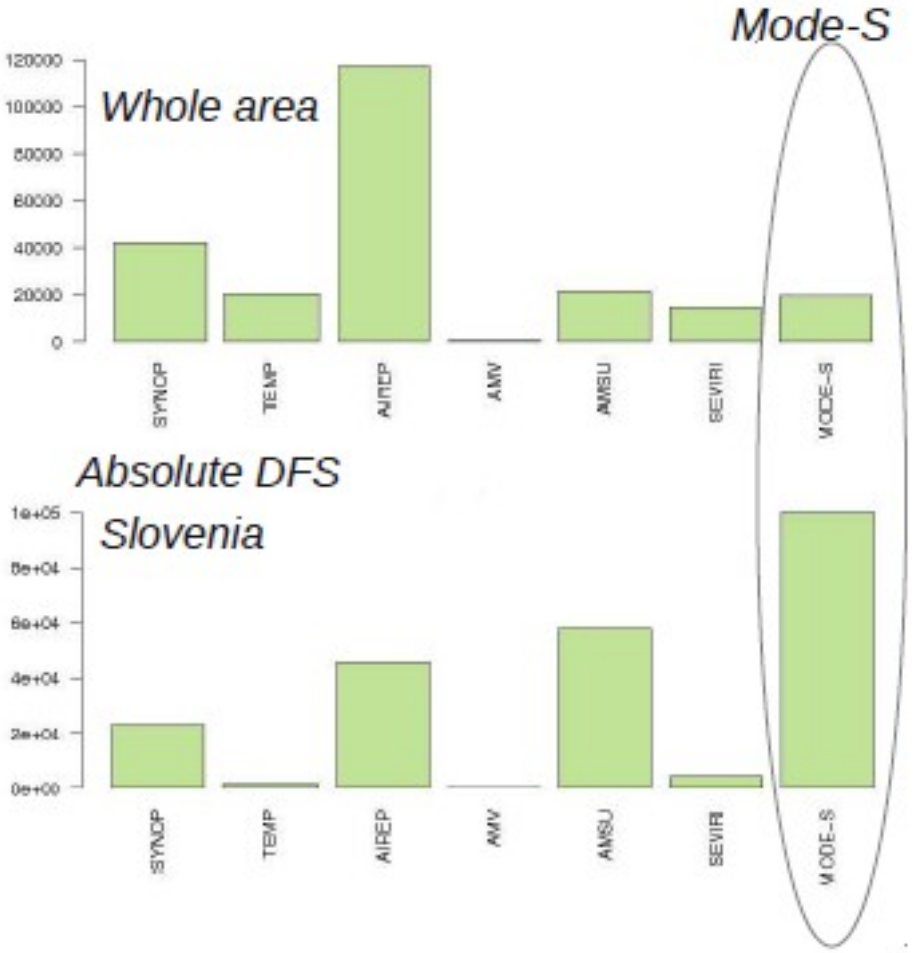
Operational

- **HPC**: SGI ICE X (992 compute cores).
- NEW **main operational suite** (June 2014)
  - 3-hourly analysis and forecast,
  - assimilation of the Mode-S MRAR,
  - improved vertical resolution.

Development

- 3-way atmosphere ocean wave coupling.



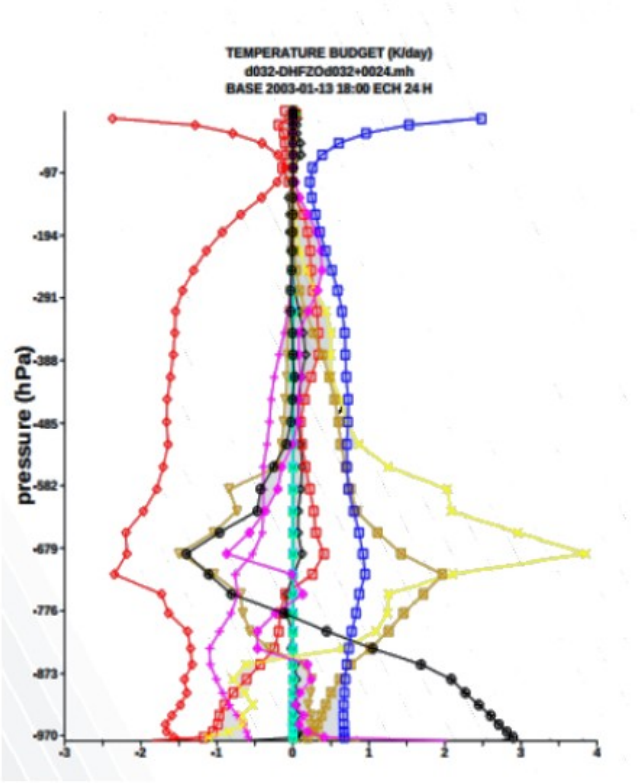


Mode-S data have large impact on local analysis

Turkey: DDHFLEX

thread-safety and memory usage

- DDH (**D**iagnostics in **H**orizontal **D**omains)
- Made to provide on user-defined domains the budget of prognostic variables of the model for searchers and model's developers.



OpenMP usage was not possible for DDHFLEX, since it was not a thread-safe. To overcome this, data is transferred by arguments, instead of by global variables.

DDH comes at an additional memory cost, but multi-threaded runs shows different results for a given domain sizes. Memory monitoring of individual usage of DDH is not so easy to analyze.

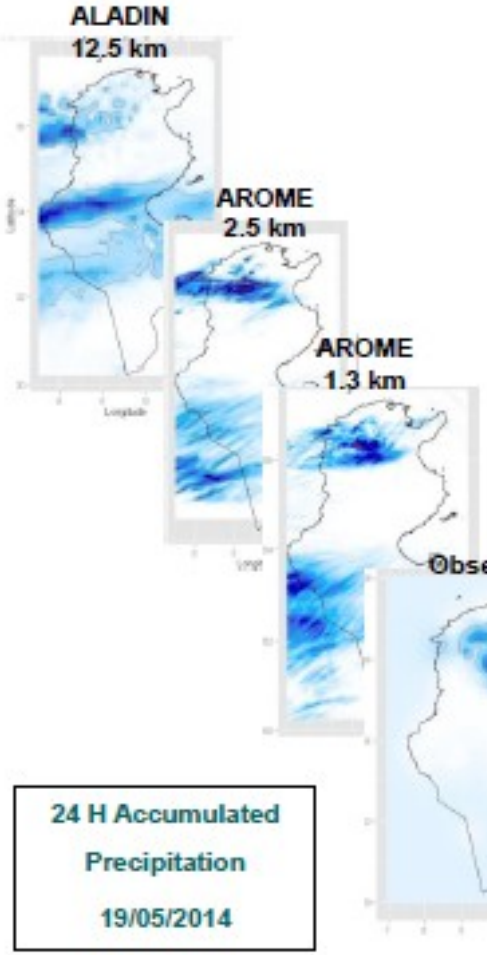
National Institute of Meteorology (INM) - Tunisia

Configuration of AROME-Tunisia prototype 1.3Km resolution

(CY38t1, Coupled to ARPEGE 10Km, Time step 45s,90 vertical levels)

Developing a new Numerical Weather Forecast Verification System

Environnement	Scripts **Shell / R / Fortran**
Tools	▪explorative methods ▪numerical descriptive measures ▪Categorical verification scores ▪Spatial Verification Method



24 H Accumulated Precipitation 19/05/2014

AROME 2.5 km 24 hour accumulated precipitation contingency table at 10 mm threshold on 19/05/2014

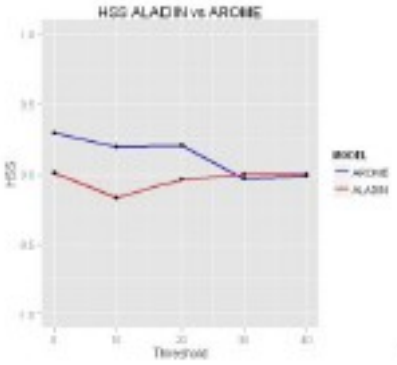
		Observation		Marginal Total
		Yes	No	
Forecast	Yes	7	11	18
	No	17	85	102
Marginal Total		24	96	Sample = 120

ALADIN 12.5 km 24 hour accumulated precipitation contingency table at 10 mm threshold on 19/05/2014

		Observation		Marginal Total
		Yes	No	
Forecast	Yes	0	14	14
	No	24	82	106
Marginal Total		24	96	Sample = 120

AROME 2.5 km and ALADIN 12.5 km categorical verification scores for the 24 H accumulated precipitationat 10 mm threshold on 19/05/2014

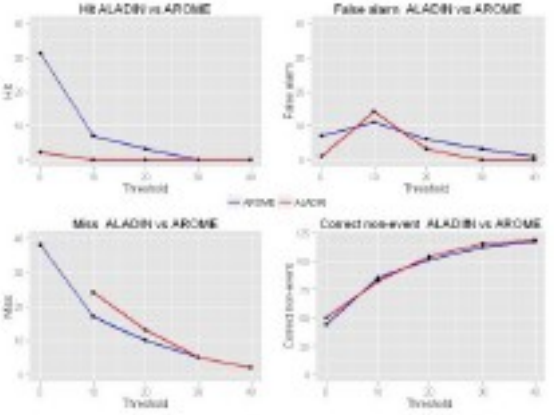
	AROME	ALADIN
POD	0.291	0
FAR	0.611	1
BIAS (Frequency)	0.75	0.583
CSI	0.2	0
ETS	0.108	-0.079
HSS	0.195	-0.172
FA	0.114	0.145
KSS	0.177	-0.145
EDS	0.132	-1



Comparison between AROME 2.5 km and ALADIN 12.5 km

24 H Accumulated Precipitation

19/05/2014



Some conclusions

- Partners who do not have a the capacity to develop a full NWP system, can rely on the consortium to,
  - run state-of-the art NWP systems
  - are preparing to run at high resolution (strategy meeting needed).
  - produce seamlessness, but in the sense of code (we accommodate two canonical models), multiscale applications (Czech Republic) and in pay off of NWP to climate (Belgium)
  - Individually can set up systems to assimilate non conventional data (Morocco and Portugal)
  - are capable to find European funding in relevant applications: renewable energy (Bulgaria, Croatia) and downscaling for hazarduous risk assessment.
  - Can draw on extra funding to solve issues that are pretinent to others (cfr. Hungary-MF)