Strategy meeting

http://www.cnrm.meteo.fr/aladin/

Doc 4.3 Strategy meeting

21st ALADIN General Assembly, Darmstadt, 8 December 2016

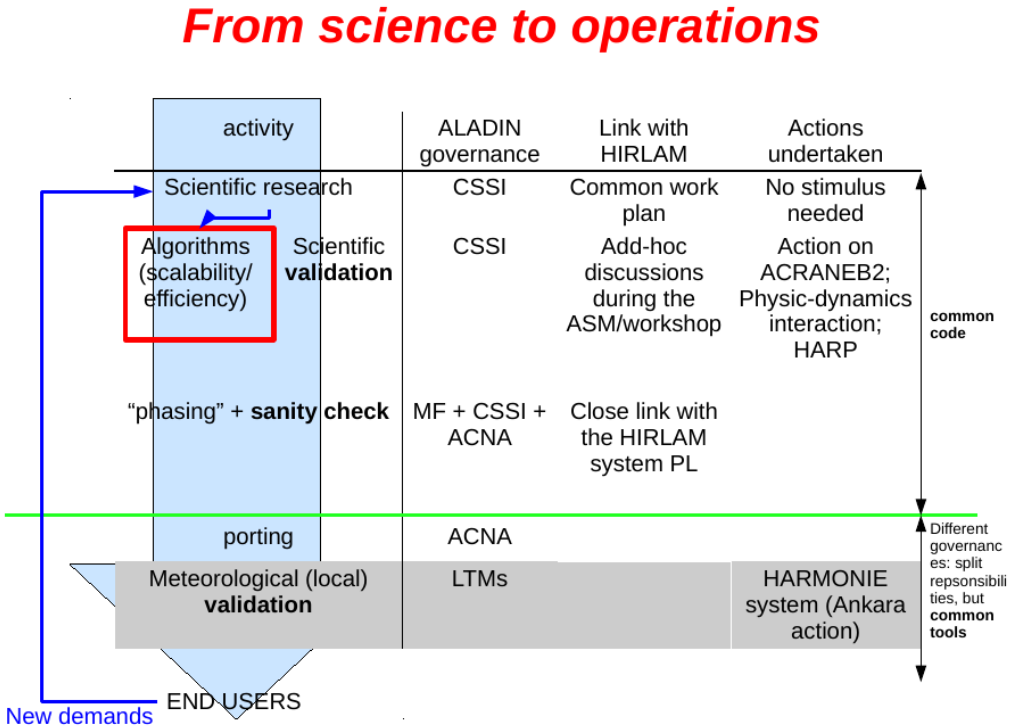
It was a technical meeting

Topics for strategic objectives	Technical topics needed
• fog/aerosols (this can be linked to chemistry) • chemistry (<-> conservative dynamics) • probabilistic products • warnings (extreme precipitation) • use of national/local data (e.g. radar data) • resolution (with respect to global models) • external couplings, e.g. coupling to sea/ocean models • climate (this is currently outside of the scope of the ALADIN collaboration)	• microphysics • conservative dynamics • perturbation methods • convection-permitting runs • installation of DA in ALL countries • scalability/numerics/HPC coding • interfaces

The goal was to check the technical/scientific requirements on the topics (right) to implement the strategic objectives (left)

Goal of the workshop (26-28/4/2016)

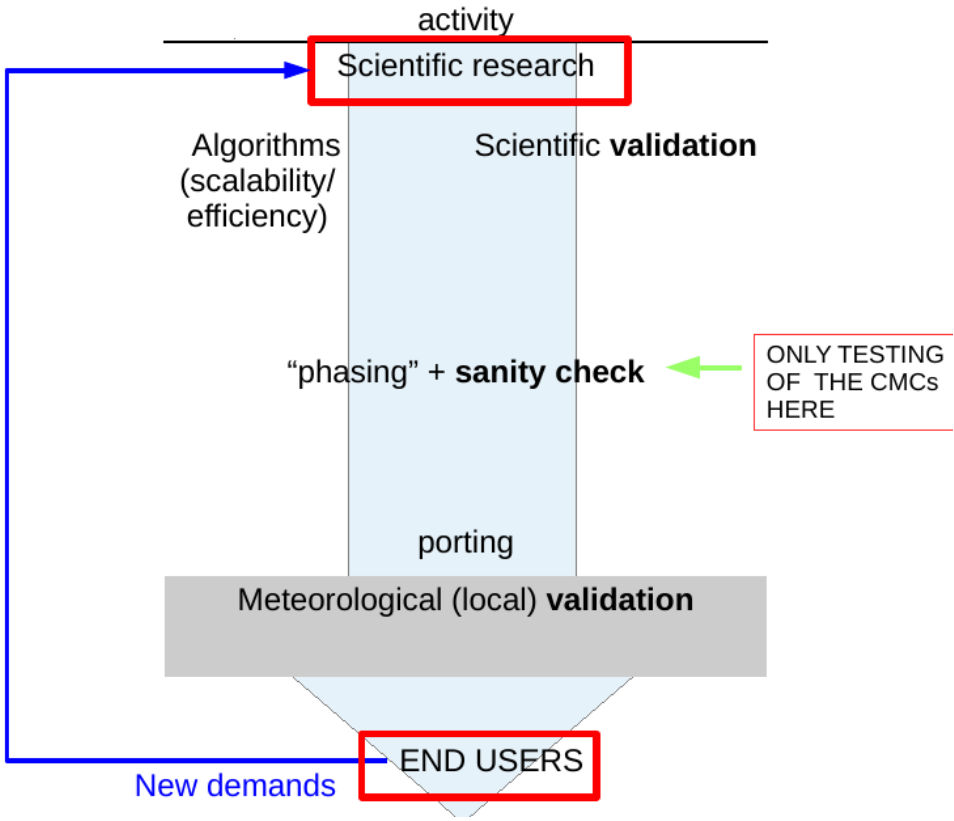
- The goal of this workshop was to
  - to identify which topics are candidates for common core activities and which activities can be optional;
  - and to estimate the implications in terms of technical and scientific code management on the algorithms development part and on the “sanity check” part in the diagram presented here.



Identification of common and specific activities (possibly of core and optional programs)

Common activities	Are necessary to create the export versions: code architect (CA), coordination (ACNA), Code Versioning (CV) for the export cycles. Basically activities to execute the "***From science to operations***" diagram. These are subject to **ToRs.**
Core programs	commonly agreed program of recognised strategic importance that will benefit all partners
Specific activities	all activities carried out outside of the core programs that, 1. are needed by a limited group of member states who invest resources in it. (this include initiatives by one single Member). **OR** 2. do not lead in the short term to the creation of a new CMC or a major extension of the sanity check **OR** 3. are not needed to guarantee operations

From science to operations



development of tools for verification of local applications (1, 2)	Two tools have been developed HARP and the APMT. It is available for all ALADIN Members. However, the use of this tool is not mandatory. It could be good if we could make an estimate of the person months that went into this (see one of the request of the estimates of the contributions in the 2014 Declaration).
scientific development of the existing CMCs (1)	Even if the definition and the monitoring of the CMCs is part of the common activities. The scientific R&D is, in practice planned and executed by a smaller groups within the consortium. For instance, the development of the ALARO CMC is managed and executed by LACE and Belgium. Remark: the implementation of a double moment scheme **coupled with aerosol advection, requires special attention, since it might help improving the forecasts of fog.** Concrete activities are going on to implement the LIMA scheme in the NWP code.
use of the code for scientific research (1, 2)	Examples are: downscaling for renewable energy applications, process studies at universities, impact studies, … The codes of the ALADIN System can be used for this, possibly subject to licenses. But here we mean studies where the needed code modifications do not enter the CMCs after the projects are finished, at least not in the short term (within the next 5 years).
OPLACE (1)	There is a major effort by the LACE consortium to process observation data for data assimilation. LACE has put a considerable amount of resources in this. This is one of the contributing factors of LACE to have data assimilation running in the LACE countries, see Fig 1. The use of this tool by other countries should be discussed. Remark: this tool could be helpful of the core program on data assimilation (DA starters kit).
LETKF, EDA (1)	Some countries and scientists have been using these techniques. The role of this can be discussed at HMG/CSSIlevel
4D-var (1)	Within the ALADIN consortium, only Météo France has development activities on 4Dvar. It is however, not considered as a target for operational applications (the main reason is that there are no resources to develop a non-hydrostatic TL/AD version of the code).
4DEnvar research	During the strategy workshop there was a consensus that this is the target application instead of 4Dvar (so expected to become part of the core activities) but, given the needed computing resources and data handling issues, there is no guarantee to port this to all the countries within a time frame of the next five years (1, 2)
EnKF (2)	There is a consensus among the surface specialists that this should be the target for the future. It has been demonstrated that an EKF (and declinations like STAEKF) can substantially increase model performance. So EKF should be the first step. It is also a good candidate to become part of the DA starters kit.
Operational EPS (1)	Not all countries have the resources to run an EPS system. In practice there are two systems: LAEF and GLAMEPS developed by different groups (the latter together with HIRLAM). For the convection-permitting EPSes there will be a need for smaller domains, so a pan-European EPS becomes more difficult to develop.
two-way chemistry inline (1)	Not all countries agree on the strategy here. The (open) question is whether the CMCs could get an interface that would allow to plug a limited number of chemistry schemes. This question was not clarified during the strategy workshop. It could become a question/task for the ALADIN CA.
development of a climate model (1, 2, 3)	The ALADIN system is used for CORDEX runs, see e.g. Giot *et al.* (2016), where a climate version of ALARO-0 was and validated according to the guidelines of the CORDEX project. This activity happened outside the perimeter of the ALADIN program. Note that HIRLAM created a HARMONIE climate community. At this stage these activities in ALADIN are specific activities. No feedback is expected from the ALARO climate modifications to the future CMC(s), except maybe some cleaning of the code to remove the memory leaks.
extended model state/coupling	There was an impressive work presented during the strategy workshop by M. Ličer who presented a collaboration with the ARSO Institute in Slovenia of an in-line coupling in the ALADIN model with different ocean models. The ALADIN code was modified for this quite deeply (representing) a work of several person months. This is a very nice example of a valorization of the ALADIN consortium works and a nice example of collaborations with the academic community. It should be investigated how such developments can enter into the cycles as part of the common activities in future releases. An idea has been put forth to embed the OASIS coupler within the SURFEX scheme. This can offer an elegant way to deal with this. If this option is maintained in the future, this

The ALADIN strategy 2008-2017

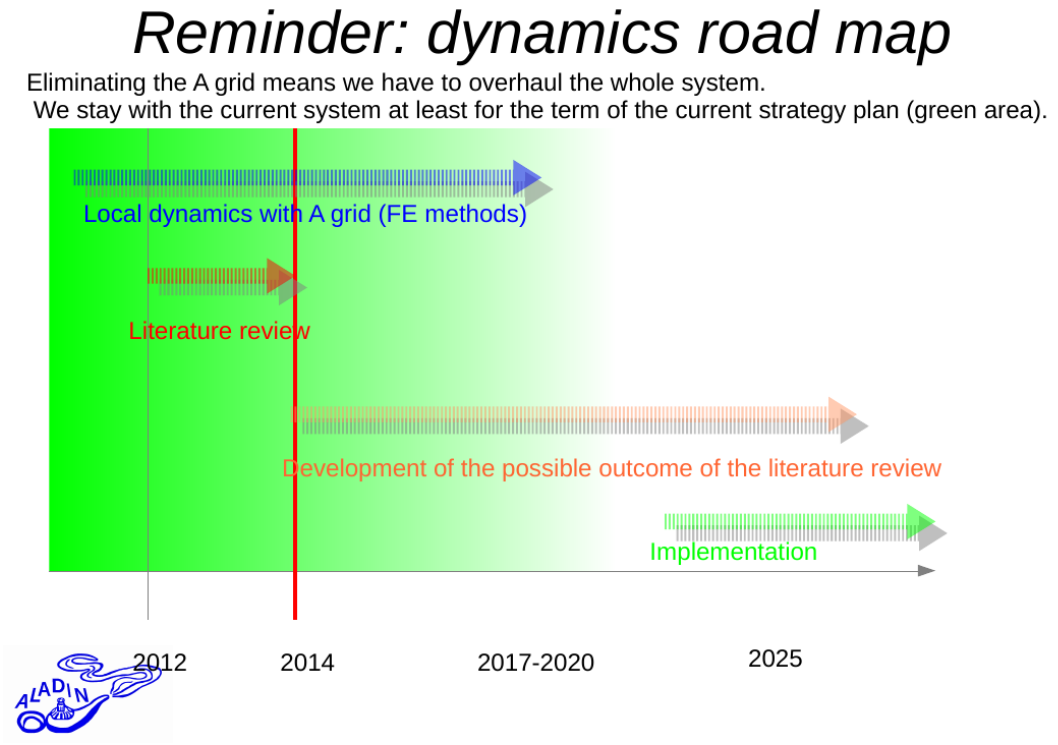
2008:

"as regional observing systems develop, data assimilation will become the main factor in the short range forecast performance of NWP institutes: most partners will run their own 3D-Var data assimilation, use a neighbouring country's assimilation, or face increasing challenges about their national NWP activity. **The use of regional data assimilation means a growing interdependence between NWP and regional observing system deployment & processing.** The bigger NWP centres will start using simplified versions of 4D-Var and ensemble data assimilation;"

Operational configurations		RUN OVER															
		Algeria	Belgium	Bulgaria	Morocco	Poland	Portugal	Tunisia	Turkey	Austria	Croatia	Czech Rep	Hungary	Romania	Slovakia	Slovenia	France
RUN BY	Algeria	ALADIN 12					ALADIN 12	ALADIN 12			ALADIN 12					ALADIN 12	
	Belgium		ALARO 4														
	Bulgaria			ALADIN 7													
	Morocco	ALADIN 18	ALADIN 18	ALADIN 18	AROME 2.5		ALADIN 10	ALADIN 18	ALADIN 18	ALADIN 18	ALADIN 18	ALADIN 18	ALADIN 18	ALADIN 18	ALADIN 18	ALADIN 18	ALADIN 18
	Poland		ALARO 4	ALARO 4		AROME 2.5				AROME 2.5	ALARO 4	AROME 2.5	AROME 2.5	ALARO 4	AROME 2.5	AROME 2.5	
	Portugal						AROME 2.5										
	Tunisia							ALADIN 12									
	Turkey			AROME 2.5					AROME 2.5		ALARO 4.5			ALARO 4.5		ALARO 4.5	
	Austria		ALARO 5							AROME 2.5	AROME 2.5	AROME 2.5	AROME 2.5		AROME 2.5	AROME 2.5	
	Croatia									ALARO 8	ALARO 2	ALARO 8	ALARO 8		ALARO 8	ALARO 2	
	Czech Rep		ALARO 4.7	ALARO 4.7		ALARO 4.7				ALARO 4.7	ALARO 4.7	ALARO 4.7	ALARO 4.7	ALARO 4.7	ALARO 4.7	ALARO 4.7	
	Hungary		ALARO 8	ALARO 8		ALARO 8				ALARO 8	ALARO 8	ALARO 8	AROME 2.5	ALARO 8	AROME 2.5	AROME 2.5	
	Romania			ALARO 6.5									ALARO 6.5	ALARO 6.5	ALARO 6.5		
	Slovakia		ALARO 9	ALARO 9		ALARO 9				ALARO 9	ALARO 9	ALARO 9	ALARO 9	ALARO 9	ALARO 9	ALARO 9	
	Slovenia		ALARO 4.4							ALARO 4.4	ALARO 4.4	ALARO 4.4	ALARO 4.4		ALARO 4.4	ALARO 4.4	
	France		AROME 1.3														AROME 1.3

ALADIN/ALARO/AROME configurations horizontal resolution in km with DA without DA

Core program on Dynamics



- A meeting took place om 25/11/2016 to define the follow up of this
- See point 6.2 on the agenda

ALARO CORDEX runs (12 km)

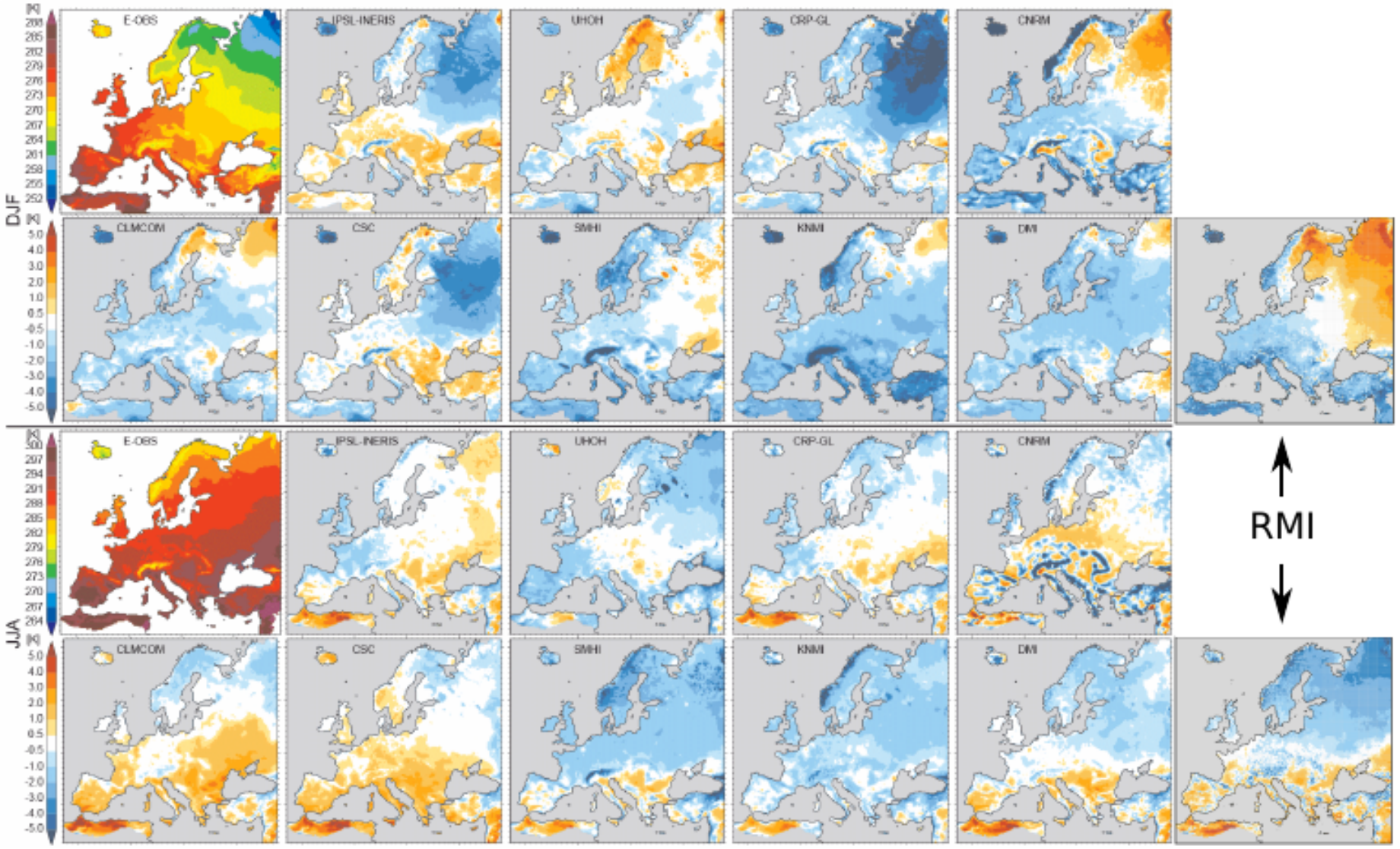


Figure 2. Mean seasonal temperature bias (K) for all experiments of the EUR-11 ensemble and the period 1989–2008. Upper rows: winter (DJF), lower rows: summer (JJA). The upper-left panel of each section shows the horizontal pattern of mean seasonal temperature as provided by the E-OBS reference (K).

ALARO CORDEX runs (12 km)

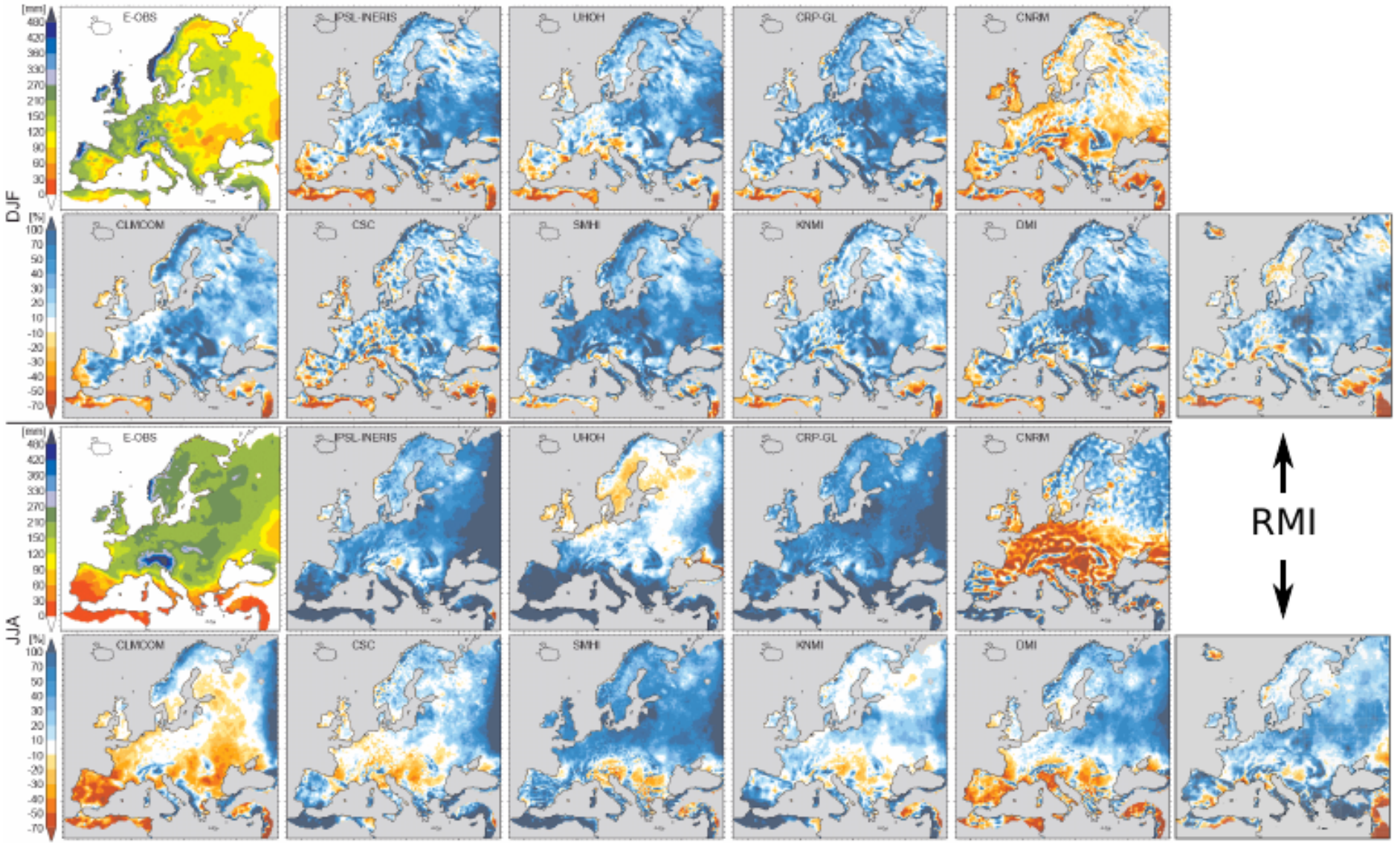


Figure 3. As Fig. 2 but for the mean relative seasonal precipitation bias (%). The upper-left panel of each section shows the horizontal pattern of mean seasonal precipitation as provided by the E-OBS reference (mm month^{-1}).

Geosci. Model Dev., 9, 1143–1152, 2016
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Validation of the ALARO-0 model within the EURO-CORDEX framework

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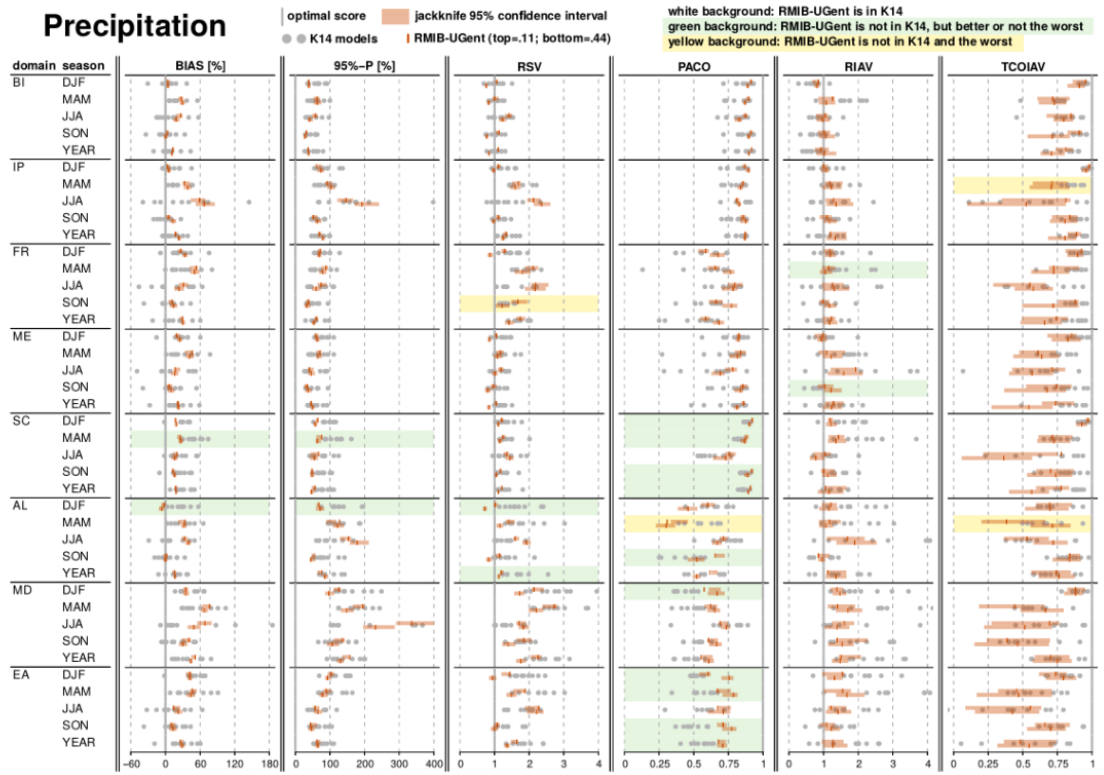
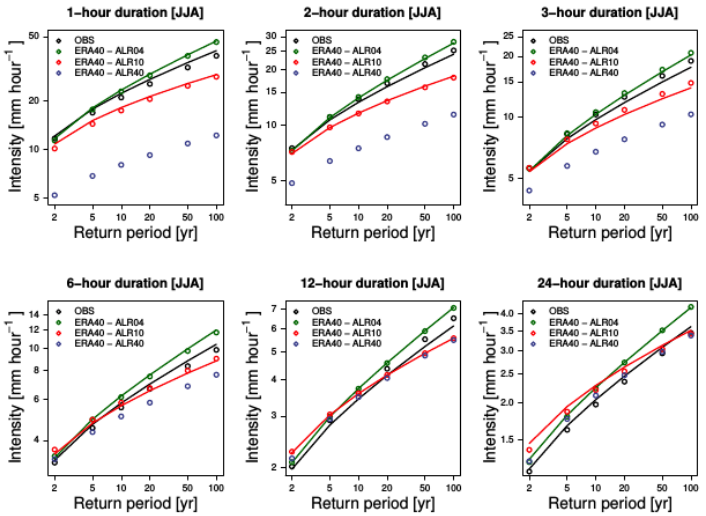


Figure 5. Scores for precipitation for all domains (first column), seasons (second column) and metrics.

IDF relationship based upon power law



Courtesy R. De Troch

Conclusion: ALARO has been validated for CORDEX runs compared to "established models, but

- ***Is doing better for (extreme) precipitation than the CORDEX ensemble***
- ***and adds value in the subdaily temporal scale (1h)***

Action(s) required

- Taken notice
- Approve/comment on the proposed list of activities in the appendix.
- Take notice of the proposed 2 core programs.
- Comment on the remaining strategic items such as climate modeling and chemistry.
- *Propose a task force for the redaction of a high-level strategic document or clarify the link with HIRLAM first (see points 5 and 7 of this meeting)?*