Joint Declaration

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

Doc 5 Joint Declaration

21st ALADIN General Assembly, Darmstadt, 8 December 2016

Diagram presented in 2014

	Reanalysis	Numerical Weather Prediction		Climate
Global	ERA-40 ERA-Int, ...	IFS	ARPEGE	ARPEGE-clim, CNRM CMIP runs
Meso scale	Downscaling		ALADIN	ALADIN-climate ENSEMBLES, CORDEX, ...
Convection permitting			***HFS, LFS?*** ALARO AROME	ALARO-climate AROME-climate

ALADIN-HIRLAM community, seen from the outside

ESCAPE European impact map

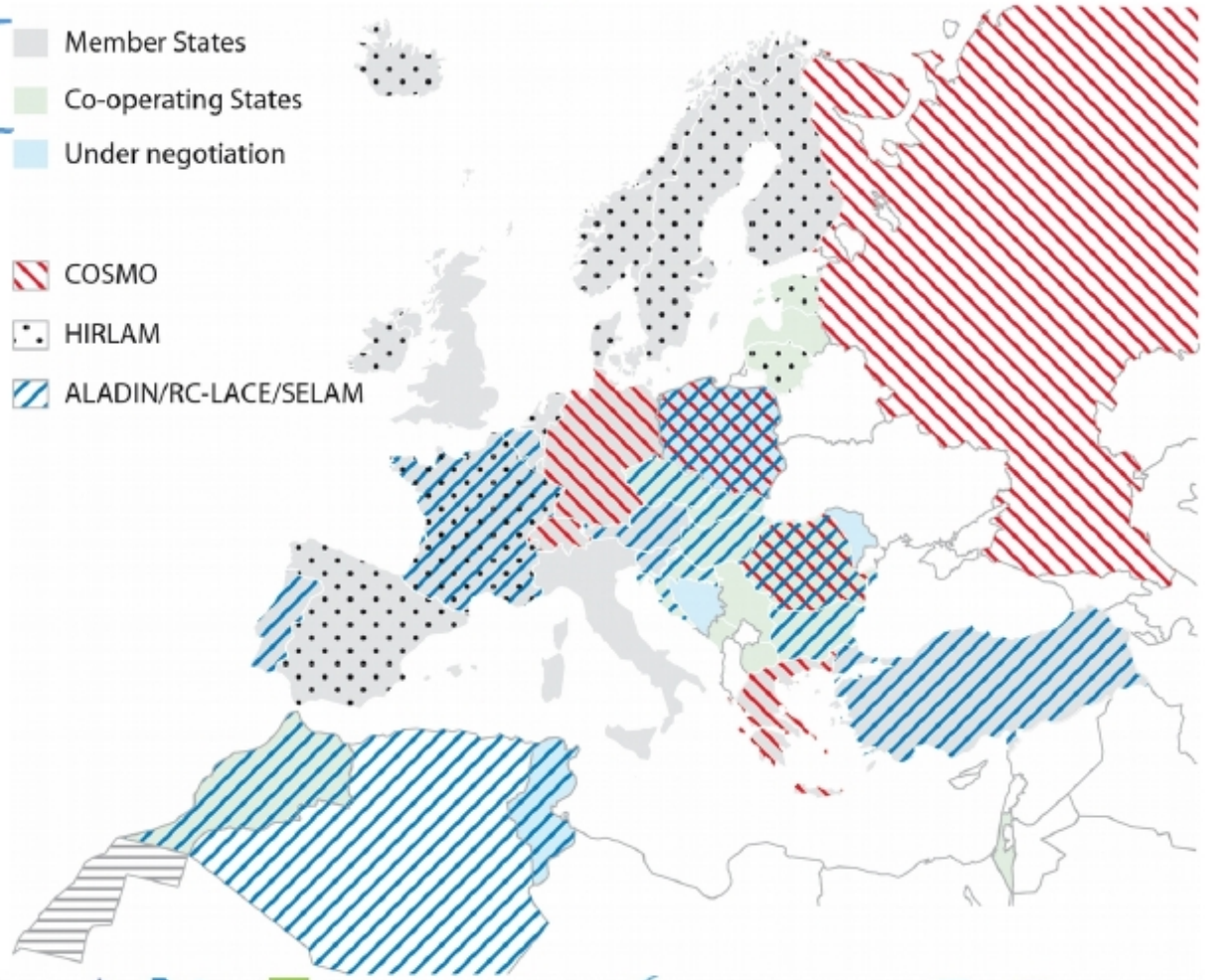
by the
an Union

34 countries

- Member States
- Co-operating States
- Under negotiation

7 countries
11 countries
16 countries

- COSMO
- HIRLAM
- ALADIN/RC-LACE/SELAM



Five issues to be clarified

2. ALADIN and HIRLAM consortia will work together with the aim of forming one single consortium by the end of the 2016-2020 MoUs. To this aim, the following issues have to be resolved:

- code ownership (software IPR) : current situation and suitable evolutions. In particular advantages vs drawbacks of open source solutions should be assessed;
- data policy (access to model outputs) ; to this aim a map of the various current operational configurations of the limited area system should be produced and scenarios for data dissemination should be assessed;
- global picture of annual contribution of countries to the various types of activities (from fundamental research to code implementation);
- identification of common activities and specific activities (possibility of core and optional programs);
- branding (including suitable evolution of the name of the system).

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The ALADIN System and its Canonical Model Configurations of cycles t40 and t41

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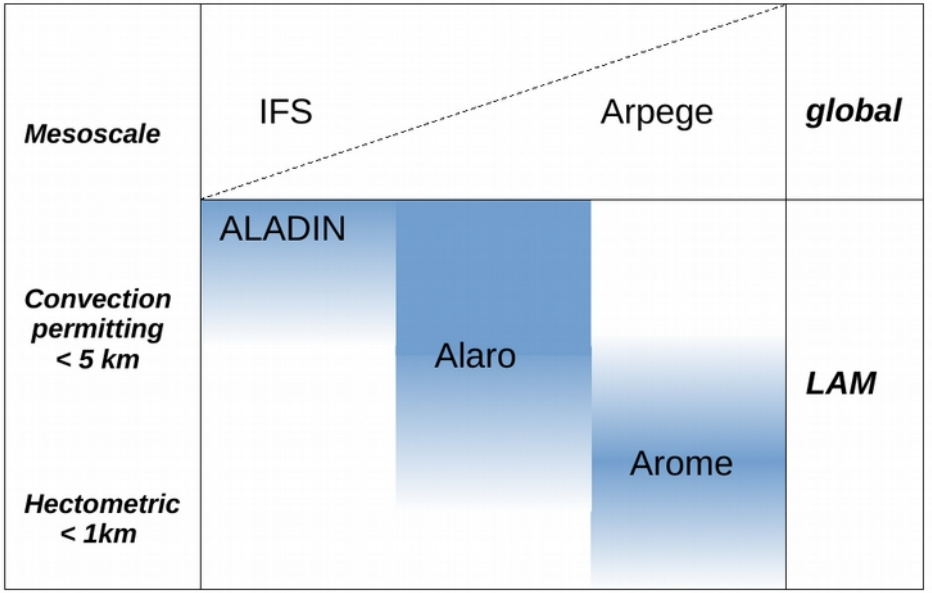


Abstract.

The ALADIN System is a numerical weather prediction system (NWP) developed by the International ALADIN consortium for research and operational weather forecasting purposes. It is based on a code that is shared with the global model IFS of the ECMWF and the ARPEGE model of Météo France. Today, this system can be used to configure a multitude of high-resolution limited-area model (LAM) configurations. A few configurations are thoroughly validated and prepared to be used for the operational weather forecasting in the 16 partner Institutes of this consortium. These configurations are called the ALADIN Canonical Model Configurations (CMCs). There are currently two CMCs: the AROME CMC and the ALARO CMC. Other configurations are possible for research, such as process studies and climate simulations.

The purpose of this paper is (i) to define the ALADIN System in relation to the global counterparts IFS and ARPEGE, (ii) to explain the notion of the CMCs and to document their most recent versions, and (iii) to illustrate the process of the validation and the porting of these configurations to the operational forecast suites of the partner Institutes of the ALADIN consortium.

This paper is restricted to the forecast model only, data assimilation techniques and postprocessing techniques are part of the ALADIN System but they are not discussed here.

Ownership (what is the common code?)

AH agreement:

5.1 For the duration of this Agreement the definitions shall be the following:

The shared ALADIN-HIRLAM System shall mean the complete code that is necessary for executing all configurations that are part of the agreed collaboration according to this Agreement. The ALADIN-HIRLAM System is composed of shared codes of four different types:

the ALADIN Common Codes, defined as the codes jointly developed, maintained and owned by the ALADIN Consortium;

the HIRLAM Common Codes, defined as the codes jointly developed, maintained and owned by the HIRLAM Consortium;

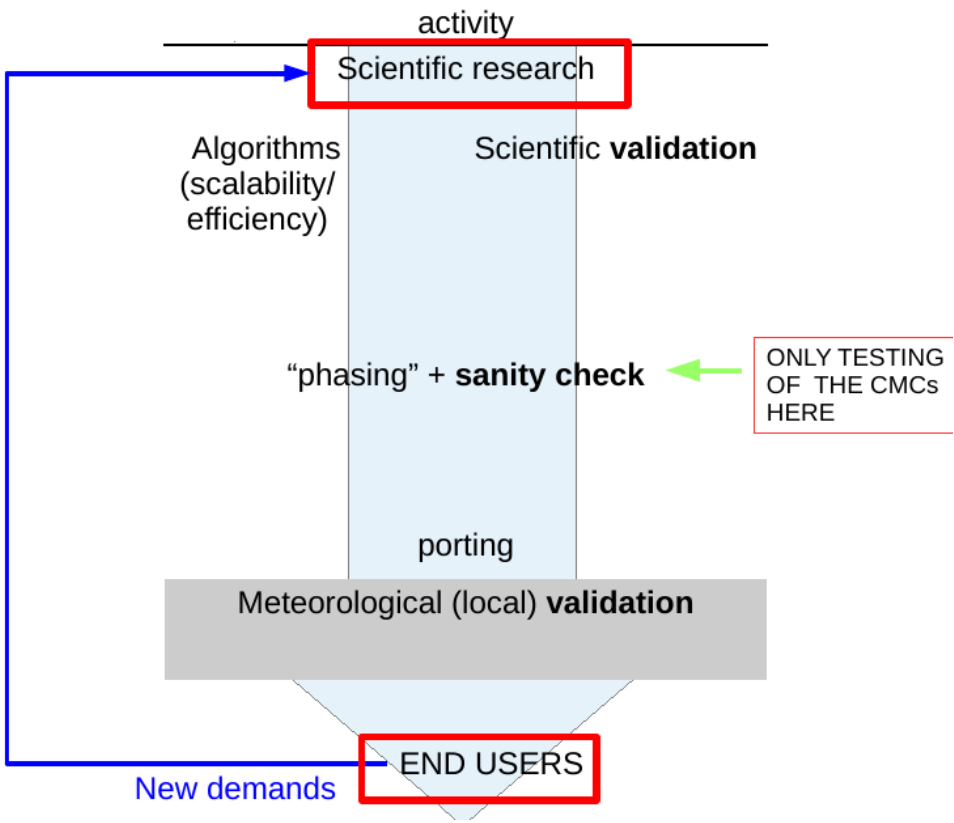
the ALADIN-HIRLAM Common Codes defined as the codes jointly developed and maintained by both consortia;

- These definitions are based on ***configurations.***
- There is an endless number of configurations.
- We only commit (both in sanity checks as in support for porting) to a limited number of configurations: the ***Canonical Model Configurations.***
- ***The ALADIN-HIRLAM Common Codes*** should be based on the CMCs.
- I propose to define ***common activities*** as the activities that lead to ***common codes***.

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. However it was decided that a road map for DA should include a basic DA (starters kit); further 3Dvar developments; 4DenVar as the future target, see below.
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

Proposal

- Write the work plan and the reporting according to this:
  - Core programs in a separate chapter
  - Common activities in ALADIN are handled by PM, CSSI, ACNA, and CA.
  - Specific activities by various leading entities to be joined to the work plan,
- Once the common activities are well identified in this, work out a proof of concept:
  - Aim: document the process of generated Common Codes and identify the need for structure or governance.
- A ***road map*** can be provided rather quickly

In conclusion: to structure in the request of the 2014 Declaration

- I propose to address the request from 2014 in the following logical order:
- We need an update of the ALADIN/HIRLAM agreement
- A roadmap can be provided (rather soon)

Configurations	Current AH agreement
Canonical Configurations	New AH agreement, define ***Common AH Codes***
*Catologue of the **activities** and the **common activities** to produce the canonical configurations*	ALADIN (PM, PAC) made a proposal. We need a proof of concept
A further road map can be provided	Work out by CSSI/HMG and to be discussed by PAC/HAC

Roadmap steps

step	action	remarks
S0	Sign a new ALDIN-HIRLAM Agreement	This is the basis for the steps below.
S1	publish papers to deal with legacy	Two manuscripts exist, one submitted to MWR.
S2	agree on core, common, specific proposed in the appendix	See Doc 4.3
S3	make a step forward on the ***common*** activities as a proof of concept, see appendix 1 for the proposal present to PAC and HAC in Brussels meeting.	The identification and the feasibility of the organization of the ***common*** activities are key. The concrete proposal is to make the following steps: • extend the sanity-check testing ("mitraillette") in Toulouse to include a proposed HIRLAM CMC with one responsible contact person, common validation; target cy43, • delivery of the contributions and bug fixes as packages (example ACNA), • Address the following question: • *(I) Is it possible to see the H repository as a mirror of the T repository, while keeping the official version of the HIRLAM CMC in the T repository so it is available for everyone?* • *(ii) We will focus on the forecast model configurations first and treat the data assimilation later (as part of the core program)*
S4	Write the work plans for the two core programs: • dynamics/scalability • data assimilation for all	
S5	extend "code universe" to include a HIRLAM CMC	The ALADIN System paper describes the definition of the LAM system in relation to the global models, see appendix 2. This could be extended to describe the ALADIN-HIRLAM System. The action to be taken is to write a document or a paper.

Possible roadmap/track (to be discussed)

		2017		2018		2019		2020	
	Sem 2	Sem 1	Sem 2	Sem 1	Sem 2	Sem 1	Sem 2	Sem 1	Sem 2
S1: papers	redaction								
S2: define activities	decision								
S3: proof of concept for new CMC		Proof of concept of a third CMC for physics							
S4: core programs	redaction	1. Dynamics (scalability/efficiency) 2. Data assimilation basic kit							
S5: ext. code universe				Redaction AH System paper					
Longer term			Follow up at GA/Council and PAC/HAC level						

Terminology (for the time being)

- HARMONIIE is the HIRLAM RCR
- Use ALADIN-HIRLAM System for the rest