ALADIN status overview

http://www.umr-cnrm.fr/aladin/

EWGLAM 2019 virtual meeting, 28/9/2020

Recognizing the capabilities and achievements of the NMHS belonging to Aladin and Hirlam consortia:

1. The NMHS present at the joint Aladin-Hirlam meeting (dec 2, 2014) share the same objective to jointly develop and maintain the best possible skilled limited area weather forecasting system, building on the developments of the IFS/Arpege global forecast system and on the Aladin and Hirlam limited area systems. This limited area system is defined as a set of data pre-processing, data assimilation, atmospheric model and postprocessing tools for producing the best possible operational mesoscale weather forecasts.

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).

3. Human resources to support the work will be identified.

4. Both PM will report every six months on those issues to the consortia governing bodies.

5. Joint meeting of governing bodies of both consortia will be held at least once a year.

2014	2015	2016	2017	2018	2019	2020	2021
		5th ALADIN MoU & HIRLAM-C MoU : 2016 -2020					COMMON GOVERNANCE
Joint decla.	MoUs redaction CA, 2 CMCs AROME & ALARO	A-H Coope agree.	***2. data policy***				
	legacy	2 Papers: ALADIN system HARMONIE-AROME	Proof of concept of a 3rd CMC for physics				
4. identification of common activities and specific activities (possibility of core and optional programs)		Core progr.	1. Dynamics (scalability/efficiency) 2. Data assimilation basic kit		***CMCs for DA ?***		
		Comm /Specif activ.	Restructuration of the common A-H Work plan	***3. global picture of annual contribution of countries to the various types of activities***			
		List of the common codes		ALADIN-HIRLAM System Paper			
	1. code ownership & IPR		Estimation of a starting ownership Evolution according to the future manpower contributions (manpower reporting to be defined)				
			Working Group to propose needed ToRs for the governance of the common activities => then, seek a manageable governance, to achieve these goals at reasonable costs			***5. branding***	

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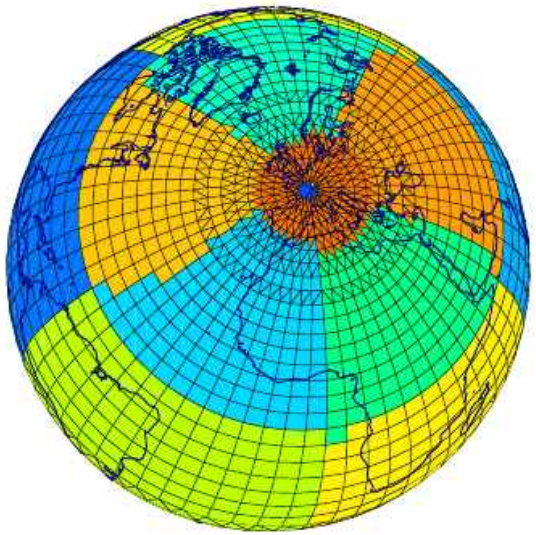
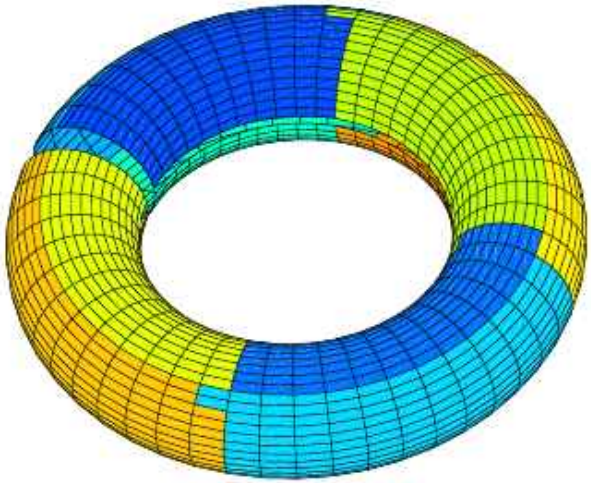
Strategy and ToR of the management

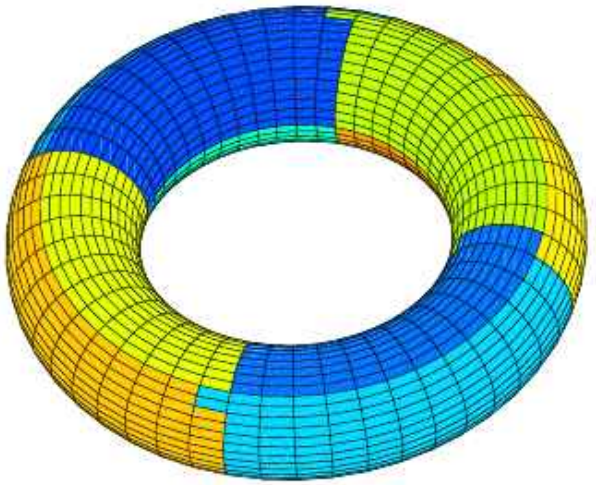
- Strategy meeting organized on 3-4 February 2020 in Toulouse. The opportunity was taken to use the outcomes of it to define the scope of the future management.
- Area's
  1. **Transversal work package: addressing future evolutions of software infrastructure**
  2. **Dynamics**
  3. **Physics**
  4. Surface
  5. Ensemble forecasting
  6. Data assimilation
  7. Meteorological quality assurance
  8. **System**
- The structure of the 2021 work plan has been adapted to this structure.
- The content was adapted to the outcomes of the strategy meeting

Addressing future evolutions of software infrastructure

- Adopt the notion of "***separation of concerns***": low level code to the local computing platform are not visible to the high-level scientific developer, thus separating the scientific concerns from the computing ones.
- Strengthen the collaboration with ECMWF (shared code)
- Work already started on Atlas to include LAM geometry
- Need to increase knowledge/efforts on DSL and Claw







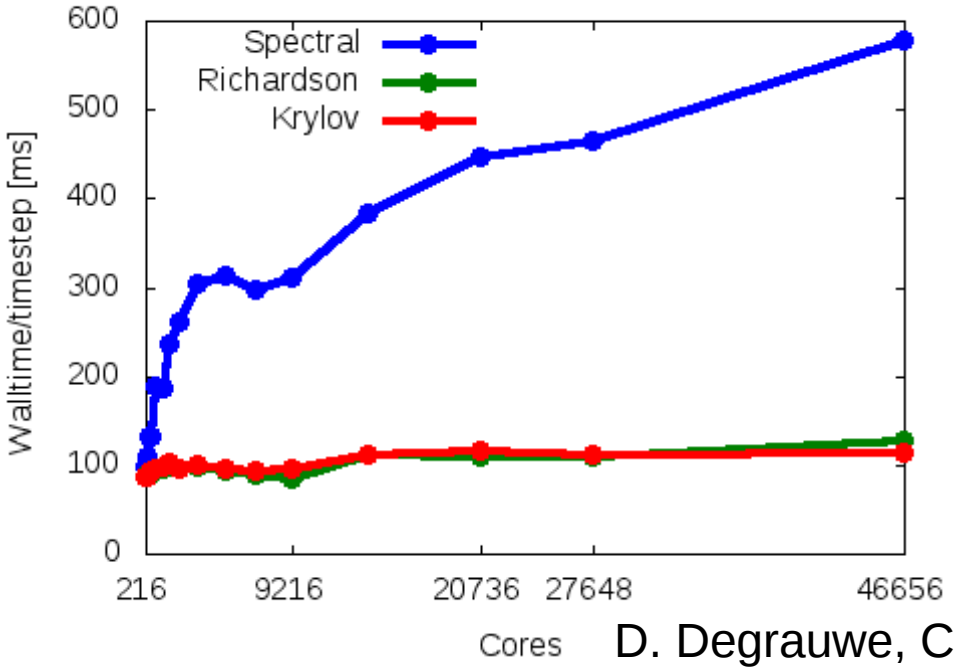
Dynamics

1) Continue with improvements of the present dynamical core towards the hectometric scale:
   - Refinement of the LBC formulation
   - More stable treatment of the orography
   - Vertical finite elements
   - Transport: e.g. more conservative SL

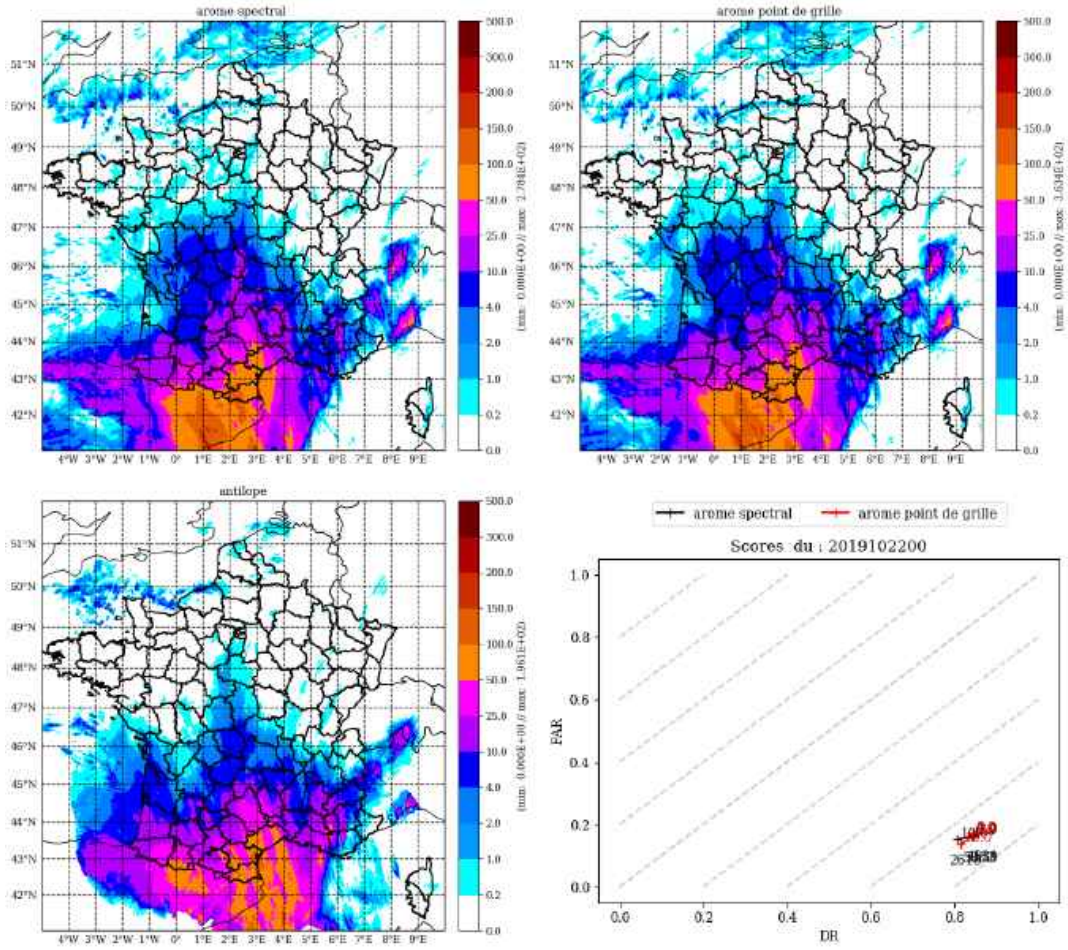
2) The long-term dynamical core strategy for the LAMs is based on a twofold approach:
   - Develop a LAM solution based on a finite-volume approach following the FVM developments of ECMWF (a.o. LAM Atlas).
   - Finalize a gridpoint (finite difference) dynamics solver as a scientific testbed, as a backup solution and as an alternative to the spectral dynamics.

Gridpoint solver

	Step	Options (LAM vs. global)
1.	Horizontal derivatives (vorticity, divergence and pressure–temperature gradients)	
2.	Inverse spectral transform: spectral to grid point	bi-FFT^{-1} / Legendre, FFT
3.	Computation of the physics contributions	AROME physics / ALADIN/ALARO physics
4.	Calculation of the tendencies of the prognostic variables of the model state	INTFLEX
5.	Computation of the explicit grid-point dynamics and adding it to the total tendencies of the prognostic variables	IFS–ARPEGE–ALADIN hydrostatic / ALADIN-NH
6.	Computation of the semi-Lagrangian departure points and Interpolation of the tendencies to these points	SLHD
7.	Addition of the interpolated tendencies to the model state	
8.	Lateral boundary coupling	bi-periodic LBC conditions
9.	direct spectral transforms	bi-FFT / Legendre, FFT
10.	solving the semiimplicit Helmholtz equation	IFS–ARPEGE–ALADIN hydrostatic / ALADIN NH



D. Degrauwe, C. Clancy



T. Burgot, L. Auger

Physics

- Work towards a greater level of interoperability (enabling exchange of individual parameterizations across AROME, ALARO, HARMONIE-AROME)
- Develop the model physics to be fit to represent the hectometric scales.
- Improve the model forecast performance through (i) the introduction of more realistic physics descriptions and (ii) assessment of the underlying causes of systematic model errors.

System

- Develop a more distributed, efficient and continuous process for the integration and validation of new developments for the T-codes.
- Explore what could be the elements of a more common working environment
- Assess the potential of the VORTEX library as the basis for a future common system.

Ready for a new consortium

- Last joint meeting of the ALADIN General Assembly with the HIRLAM Council (25-26 June 2020):
  - Strategy and management were accepted
  - Last version of the MoU accepted
  - Last chance to check with legal advisors
  - Both LACE and HIRLAM will, at least in the short term, continue their activities embedded within the new consortium.
  - Decide to open the call for Program Managers, deadline 15/9/2020
- High-Level meeting (22 September 2020):
  - Minor corrections of the MoU
  - Planning of the procedure for the jury of the selection of the PM
  - Practicalities

Next steps

1) Decide on the name. For the time being the consortium has a working title ALADIN-LACE-HIRLAM (ALH). An enquete is ongoing within the community to propose a new name.
2) Selection of the PM
3) ALADIN General Assembly/HIRLAM Council meeting planned on 26-27 November 2021
4) Selection of the rest of the management

Thank you for your attention!