

From Research to Operations in European LAM's: experience at IPMA

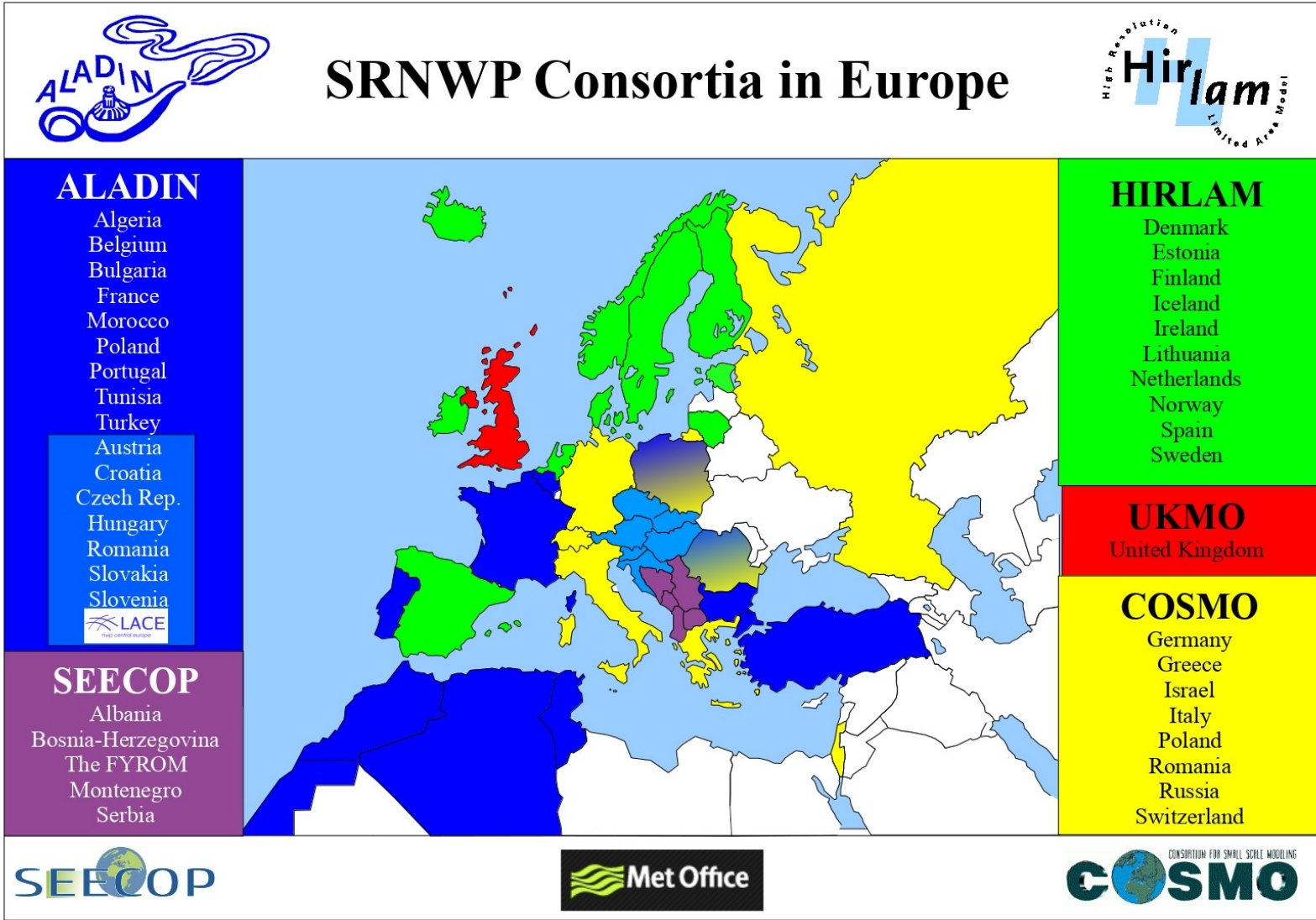
2017

Maria José Monteiro
IPMA, 26 nov 2018

IPMA

A previsão numérica do tempo de Portugal: estado da arte e novos desafios
IPMA – Lisboa 26 e 27 de novembro de 2018

1. SRNWP consortia in Europe
2. ALADIN project at IPMA
3. Local on-going activities



* Coordination by C-SRNWP (EUMETNET)

* Annual meeting EWGLAM/ SRNWP



- * Top-down decision
- * 2014-2020 → preparation of one single consortium starting in 2021



Convergence road map

2014	2015	2016	2017	2018	2019	2020	2021
5th ALADIN MoU & HIRLAM-C MoU : 2016 -2020							
Joint decla.	MoUs redaction CA, 2 CMCs AROME & ALARO	A-H Coopee agree.	▼ 2. data policy				COMMON GOVERNANCE
	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 documentation				
		1. code ownership & IPR	Estimation of a starting ownership Evolution according to the future manpower contributions to the Common codes (manpower reporting to be defined)				
		5. branding	Working Group to propose needed ToR for the governance of the common activities => then, seek a manageable governance, to achieve these goals at reasonable costs				



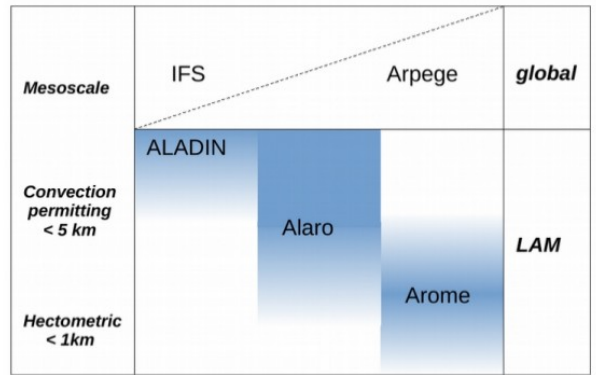
Manuscript prepared for Geosci. Model Dev.
with version 2015/11/06 7.99 Copernicus papers of the L^AT_EX class copernicus.cls.
Date: 30 November 2016

* Revised paper form in Jan 2018

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

Piet Termonia^{1,2}, Claude Fischer³, Daan Degrauwe^{1,2}, Maria Derkova⁴, Patricia Pottier³, François Bouyssel³, Radmila Brožková⁵, Pierre Bénard³, Ryad El Khatib³, and ...⁴

- ¹Royal Meteorological Institute, Brussels, Belgium
- ²Department of Physics and Astronomy, Ghent university, Ghent, Belgium
- ³Météo France, Toulouse, France
- ⁴Slovak Hydrometeorological Institute, Bratislava, Slovakia
- ⁵Czech Hydrometeorological Institute, Prague, Czech Republic



Abstract.
The ALADIN System is a numeric system (NWP) developed by the Intern sortium for research and operational w poses. It is based on a code that is si model IFS of the ECMWF and the ARI France. Today, this system can be use tude of high-resolution limited-area r rations. A few configurations are tho prepared to be used for the operatio in the 16 partner Institutes of this cons urations are called the ALADIN Cano rations (CMCs). There are currently tw CMC and the ALARO CMC. Other co ble for research, such as process stud tions.

The purpose of this paper is (i) to del tem in relation to the global counterpa (ii) to explain the notion of the CMCs most recent versions, and (iii) to illu validation and the porting of these cor erational forecast suites of the partne ADIN consortium.

This paper is restricted to the foreca similation techniques and postprocessi of the ALADIN System but they are n

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 The HARMONIE–AROME Model Configuration in the ALADIN–HIRLAM NWP ...
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The HARMONIE–AROME Model Configuration in the ALADIN–HIRLAM NWP System

Lisa Bengtsson^a, Ulf Andrae^a, Trygve Aspelien^b, Yurii Batrak^b, Javier Calvo^c, Wim de Rooy^d, Emily Gleeson^e, Bent Hansen-Sass^f, Mariken Homleid^b, Mariano Hortal^g, Karl-Ivar Ivarsson^a, Geert Lenderink^d, Sami Niemelä^h, Kristian Pagh Nielsen^f, Jeanette Onville^d, Laura Rontuⁱ, Patrick Samuelsson^a, Daniel Santos Muñoz^g, Alvaro Subias^g, Sander Tjmm^d, Velle Tollⁱ, Xiaohua Yang^f, and Morten Ødegaard Koltzow^b

^a Swedish Meteorological and Hydrological Institute, Norrköping, Sweden
^b Norwegian Meteorological Institute, Oslo, Norway
^c Agencia Estatal de Meteorología, Madrid, Spain
^d The Royal Netherlands Meteorological Institute, De Bilt, Netherlands
^e Met Éireann, Dublin, Ireland
^f Danish Meteorological Institute, Copenhagen, Denmark
^g Agencia Estatal de Meteorología, Madrid, Spain
^h Finnish Meteorological Institute, Helsinki, Finland
ⁱ University of Tartu, Tartu, Estonia

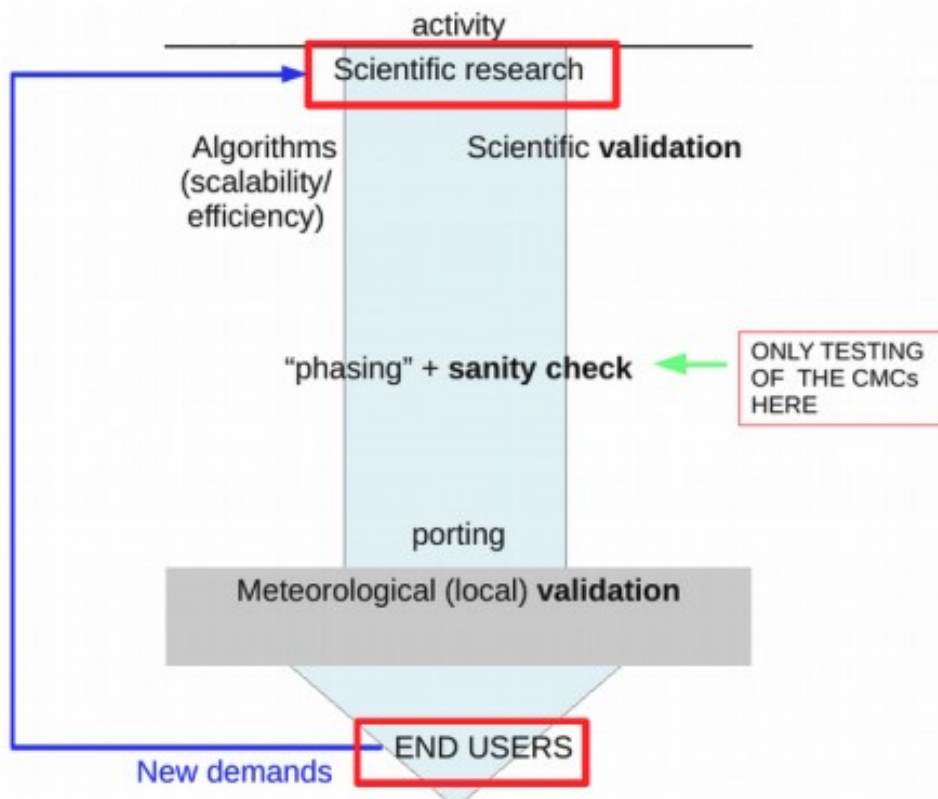
<https://doi.org/10.1175/MWR-D-16-0417.1>
 Received: 1 November 2016
 Final Form: 27 January 2017
 Published Online: 26 April 2017



Abstract Full Text References Cited by PDF

Abstract
 The aim of this article is to describe the reference configuration of the convection-permitting numerical weather prediction (NWP) model HARMONIE-AROME, which is used for operational short-range weather forecasts in Denmark, Estonia, Finland, Iceland, Ireland, Lithuania, the Netherlands, Norway, Spain, and Sweden. It is developed, maintained, and validated as part of

From science to operations

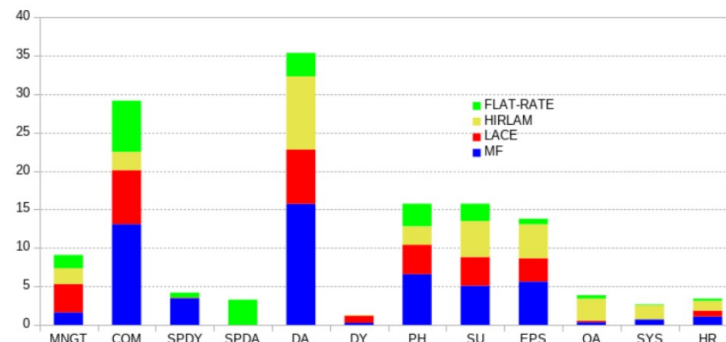


Common activities	Are necessary to create the export versions: code architect (CA), coordination (ACNA), Code Versioning (CV) for the export cycles. Basically activities to execute the "From science to operations" diagram. These are subject to ToRs .
Core programs	commonly agreed program of recognised 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



CSSI: Redaction of the RWP2019

Commitments in the RWP2019 by Work Packages, in F.T.E.

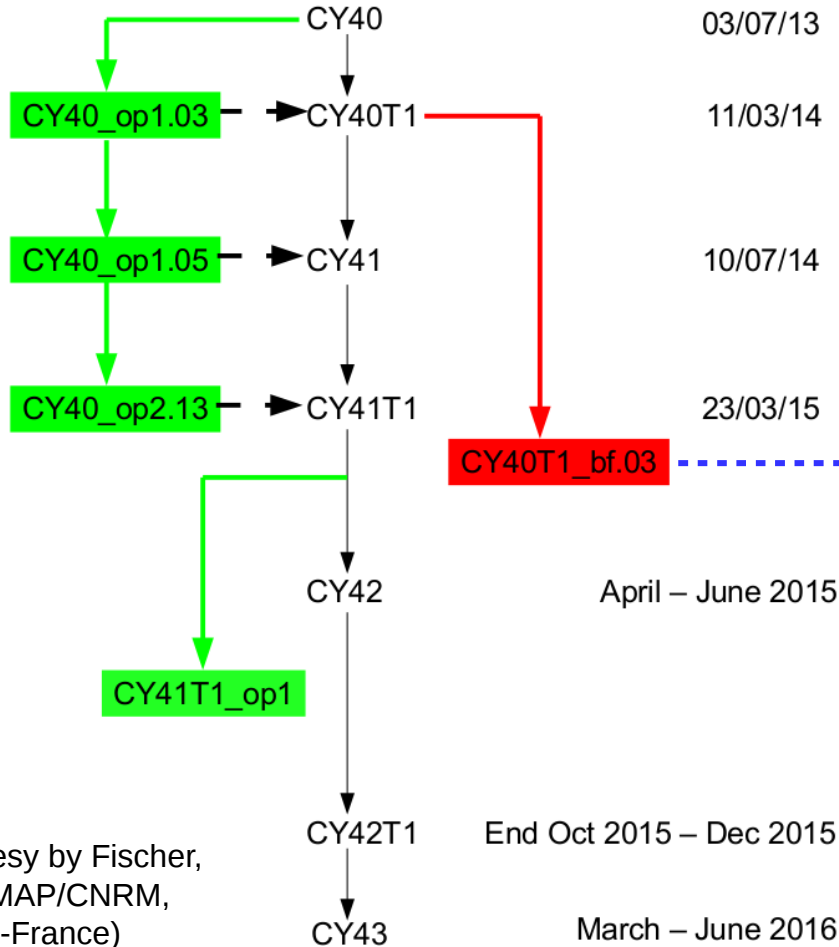


AROME-France (LAM) cycles

Common ECMWF-ARPEGE releases

LAM export (for T operations)

LAM export (for H operations)



* 1 **CYCLE** can take around 2 years to become oper

* each 6 months there is a new “R”, “T” and “H” cycle

* ~3,5 millions of code lines in FORTRAN and C++ (being refurbished) portable for a few platforms ...

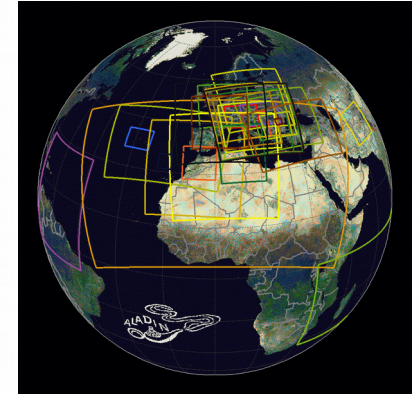
* with specific naming and modularity rules

* written and maintained by more than 250 “scientists”

* not always well documented !

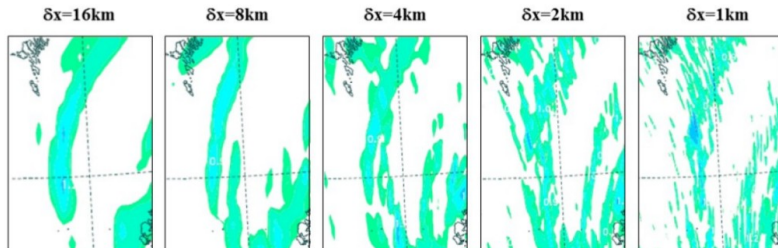
Courtesy by Fischer, C. (GMAP/CNRM, Météo-France)

The ALADIN System

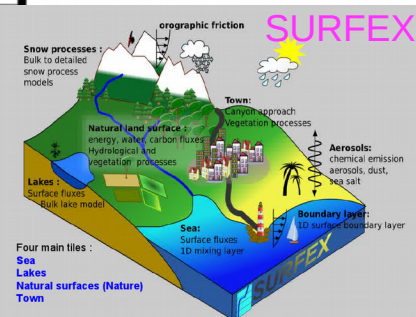
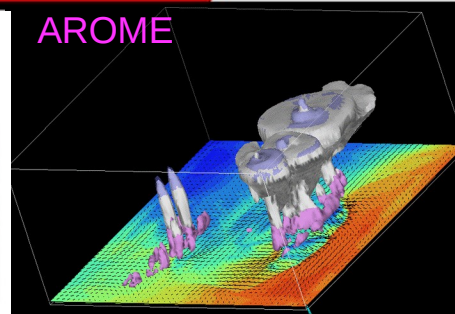


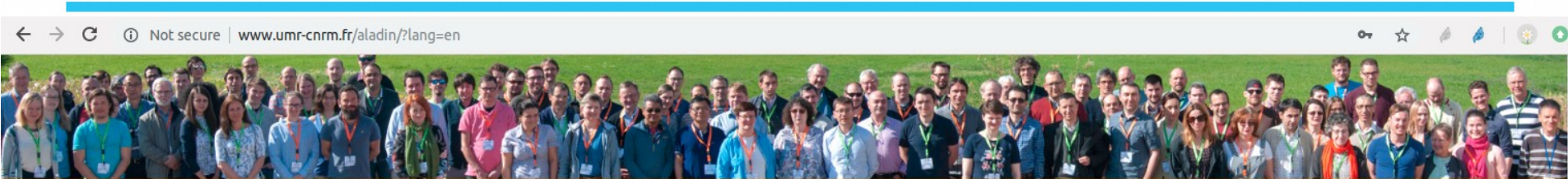
	Reanalysis	Numerical Weather Prediction	Climate
Global	ERA-40 ERA-Int, ...	IFS ARPEGE	ARPEGE-clim, CNRM CMIP runs
Meso scale	Downscaling	ALADIN System	ALADIN-climate
		ALADIN	ENSEMBLES, CORDEX, ...
Convection permitting		ALARO	ALARO-climate
		AROME	AROME-climate

ALARO



AROME





ALADIN

High Resolution Numerical
Weather Prediction Project

Website of the ALADIN Consortium

- Home
- Consortium
- Documents
- Scientific plans and reports
- Newsletters
- Meetings
- ALADIN People : who, where, how to contact
- Software and applications
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Direct Access

* ALADIN/HIRLAM Newsletter n° 11, published on August 21st, 2018

- ALADIN leaflets
- For an efficient



1/2 August 21st 2018 : new edition of the ALADIN-HIRLAM Newsletter

[Read more ...](#)

The ALADIN/HIRLAM Newsletter n° 11 was published on August 21st, 2018

- Last news
- Editorial
- The last articles
- Site map
- Remember!

News

Operational configurations

(updated on November 15, 2018)
Within ALADIN and HIRLAM Consortia, the 3 (...)

Licences

RMI (Be)	Ghent university (CORDEX runs)
CHMI (Cz)	ChechGlobe (climate): the licence expired at the end of 2015 – aligned with the validity of the MoU
OMSZ (Hu)	ALADIN/Chapeau at the Eötvös Loránd University, but discontinued due to lack of manpower
ARSO (Si)	CHAPEAU University of Ljubljana, Faculty of Mathematics and Physics, Meteorology group, for teaching some years ago
TSMS (Si)	plan to share it with Istanbul Technical University-Meteorological Engineering Dep

GA and

(Croatia)
the LACE
at ALADIN

site once
summary :



Some photos at random

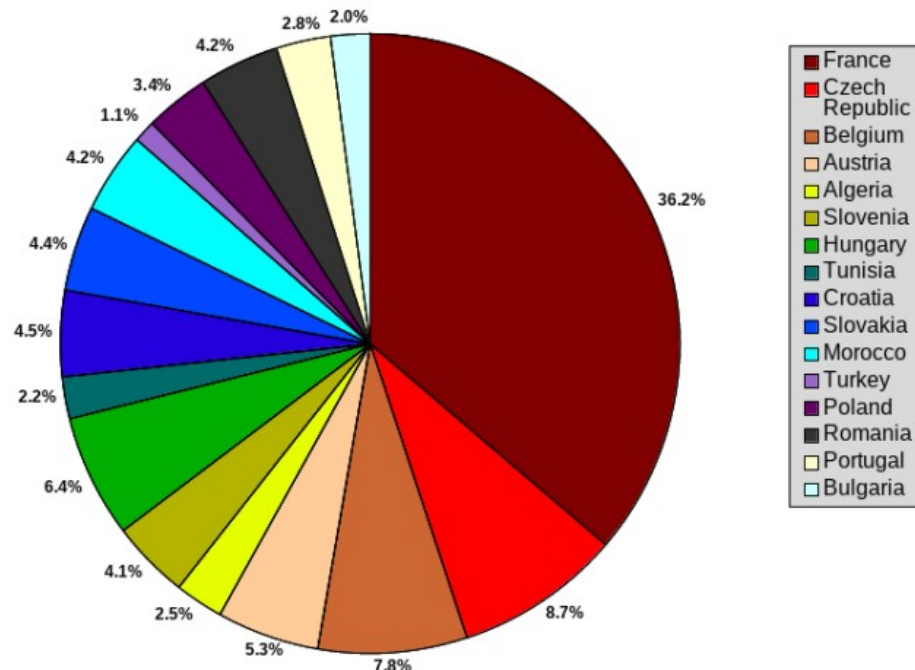


* Portugal is a member of the ALADIN project since April 1997

manpower

Participation in the ALADIN project since 1991

Breakdown of the manpower by Partner



* Number of contributors: ~15 (too few active)

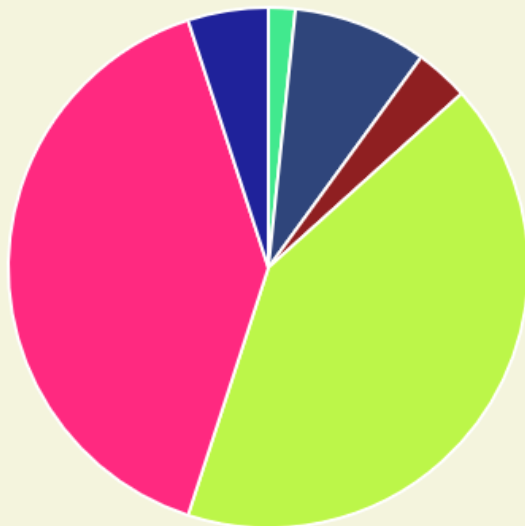
* Operational production: 8 cycles, starting in 2000

* Scientific production from the local team:

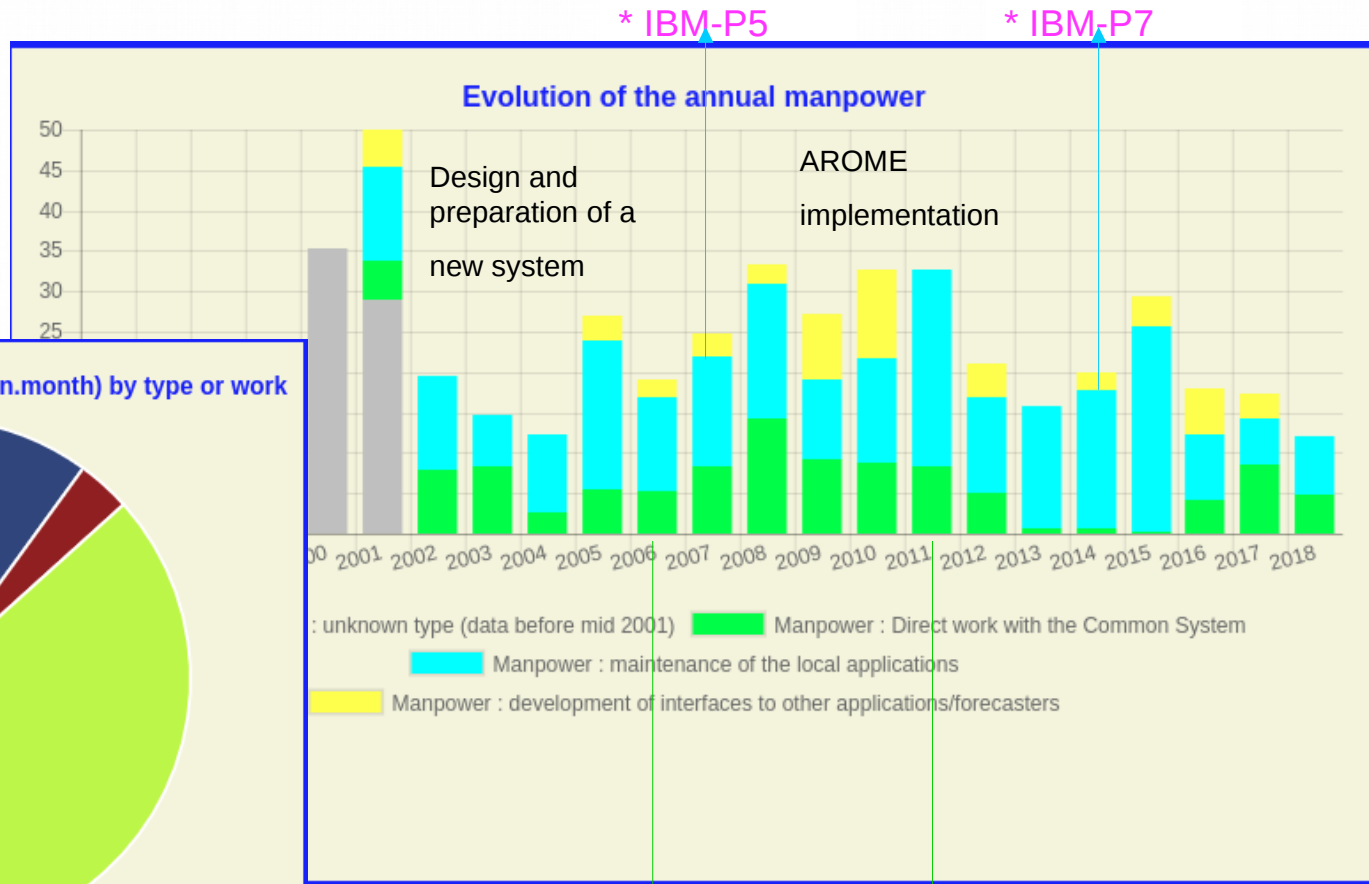
- 2 PhD dissertations in DA (global and regional)
- 2 Master degree thesis (or equivalent)
- 6 articles with referee

* Last year statistics

Breakdown of the effort (15.00 person.month) by type or work



- Training
- Tuition
- Development
- Operational
- Maintenance
- Validation
- Management
- Unknown



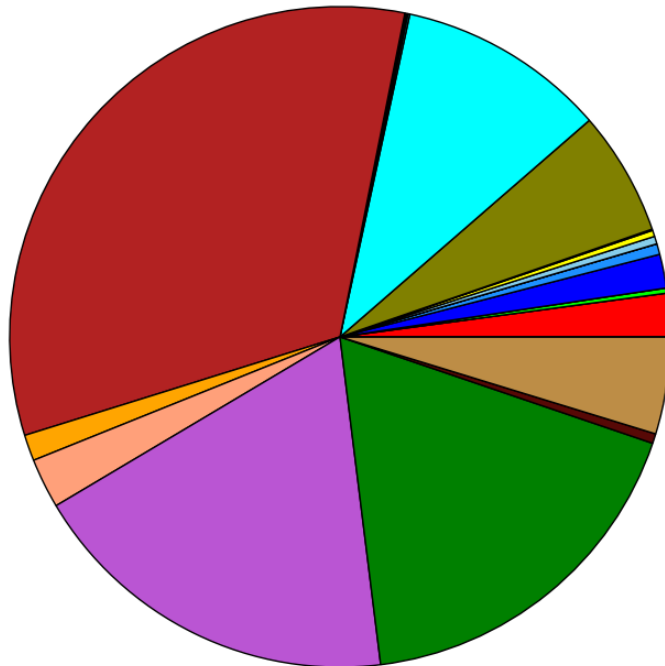
See poster: (2017) ALADIN – Portuguese Technical and Scientific Activities

Proportions des nombres d'observations utilisees par type d'obs
analyses cut-off AROME - AROME France dbl
observations conventionnelles et satellites

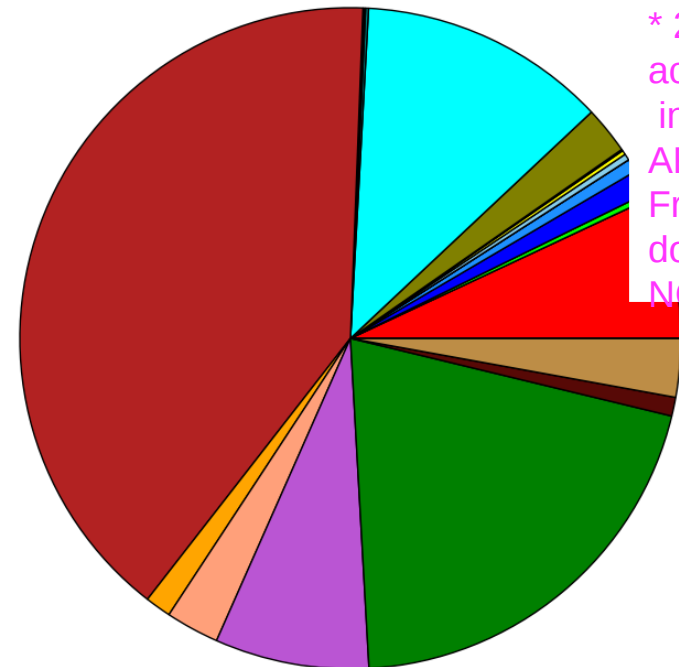
cumul du nombre d'observations utilisees sur la periode 2017102600 - 2017102623 : 508717

Part des DFS par type d'obs
analyses cut-off AROME - AROME France dbl
observations conventionnelles et satellites

cumul du DFS sur la periode 2017102600 - 2017102623 : 128193



GPS ground	2.12%	SSMIS	0.30%	SYNOP/SYNOR/RADOME	32.97%
GPS sat	0.00%	GMI	0.06%	SHIP	1.27%
SAT0B	0.25%	AIRS	0.00%	PILOT/PRF	2.44%
ATOVS HIRS	0.00%	IASI	6.09%	TEMP	18.43%
ATOVS AMSU-A	1.66%	CRIS	0.00%	AIRCRAFTS	17.81%
ATOVS AMSU-B	0.52%	GEORAD	10.22%	RADAR Vr	0.48%
SAPHIR	0.00%	SCATT	0.10%	RADAR Hur	4.74%
MWHS2	0.00%	BUOY	0.15%	BOGUS	0.00%
ATMS	0.38%				



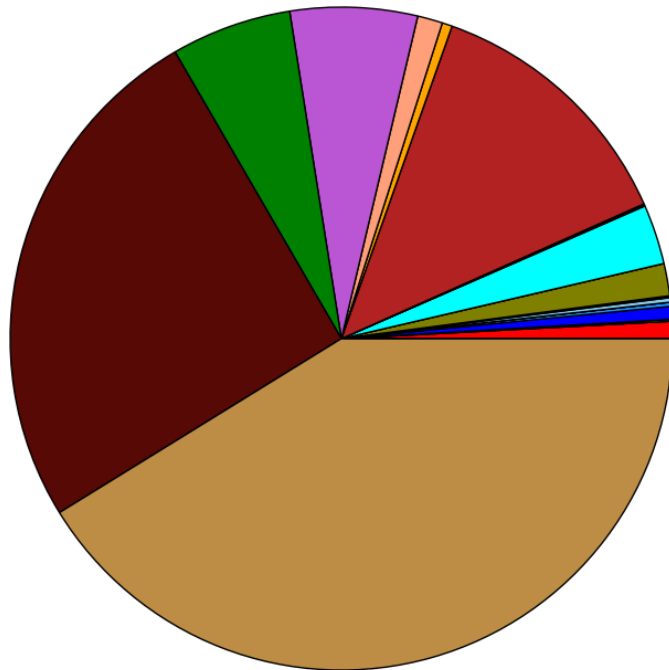
GPS ground	6.97%	SSMIS	0.21%	SYNOP/SYNOR/RADOME	40.08%
GPS sat	0.00%	GMI	0.08%	SHIP	1.27%
SAT0B	0.29%	AIRS	0.00%	PILOT/PRF	2.61%
ATOVS HIRS	0.00%	IASI	2.32%	TEMP	7.53%
ATOVS AMSU-A	1.18%	CRIS	0.00%	AIRCRAFTS	20.33%
ATOVS AMSU-B	0.64%	GEORAD	12.13%	RADAR Vr	0.92%
SAPHIR	0.00%	SCATT	0.15%	RADAR Hur	2.86%
MWHS2	0.00%	BUOY	0.13%	BOGUS	0.00%
ATMS	0.31%				

* 24-h accumulated info over AROME-France domain NO-RAIN

Courtesy by Benichon, H. (DirOP/COMPAS, Météo-France)

Proportions des nombres d'observations utilisees par type d'obs
analyses cut-off AROME - AROME France dbl
observations conventionnelles et satellites

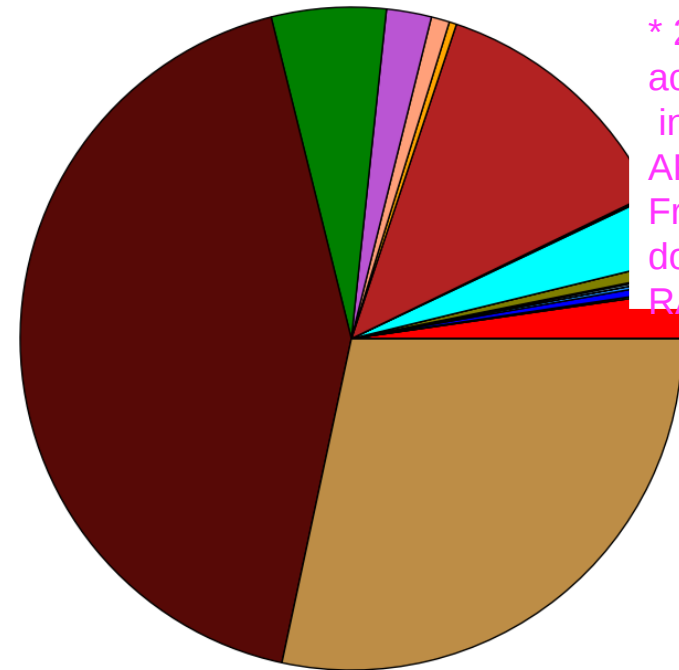
cumul du nombre d'observations utilisees sur la periode 2017110400 - 2017110423 : 129492



GPS ground	0.84%	SSMIS	0.07%	SYNOP/SYNOR/RADOME	12.91%
GPS sat	0.00%	GMI	0.02%	SHIP	0.49%
SATOB	0.09%	AIRS	0.00%	PILOT/PRF	1.22%
ATOVS HIRS	0.00%	IASI	1.57%	TEMP	6.20%
ATOVS AMSU-A	0.63%	CRIS	0.00%	AIRCRAFTS	5.88%
ATOVS AMSU-B	0.20%	GEORAD	2.91%	RADAR Vr	25.42%
SAPHIR	0.00%	SCATT	0.04%	RADAR Hur	41.21%
MWHS2	0.00%	BUOY	0.07%	BOGUS	0.00%
ATMS	0.22%				

Part des DFS par type d'obs
analyses cut-off AROME - AROME France dbl
observations conventionnelles et satellites

cumul du DFS sur la periode 2017110400 - 2017110423 : 394860



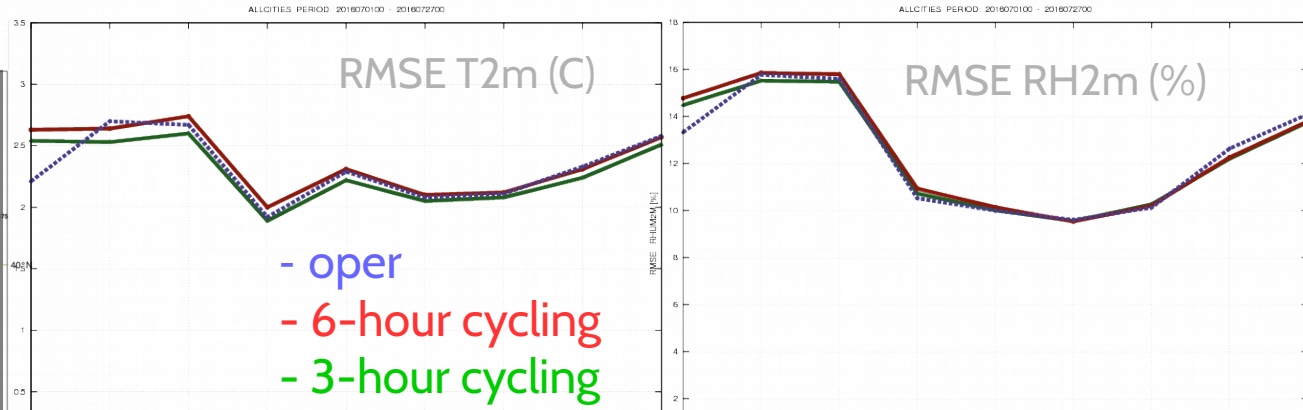
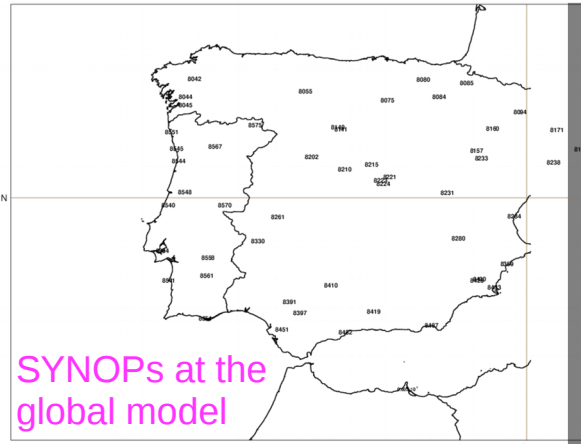
* 24-h accumulated info over AROME-France domain RAIN

GPS ground	2.27%	SSMIS	0.04%	SYNOP/SYNOR/RADOME	12.69%
GPS sat	0.00%	GMI	0.03%	SHIP	0.36%
SATOB	0.10%	AIRS	0.00%	PILOT/PRF	0.89%
ATOVS HIRS	0.00%	IASI	0.63%	TEMP	2.19%
ATOVS AMSU-A	0.40%	CRIS	0.00%	AIRCRAFTS	5.59%
ATOVS AMSU-B	0.19%	GEORAD	3.27%	RADAR Vr	42.74%
SAPHIR	0.00%	SCATT	0.08%	RADAR Hur	28.36%
MWHS2	0.00%	BUOY	0.04%	BOGUS	0.00%
ATMS	0.13%				

Courtesy by Benichon, H. (DirOP/COMPAS, Météo-France)

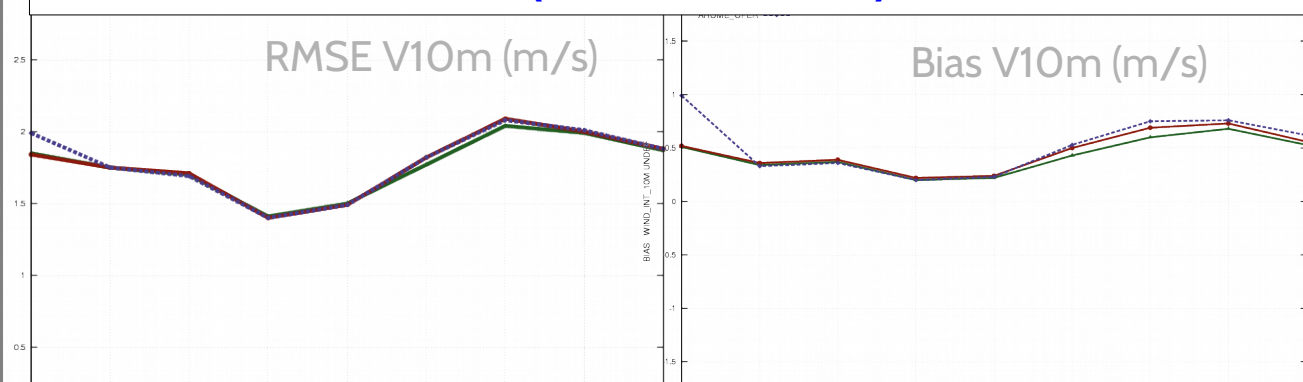
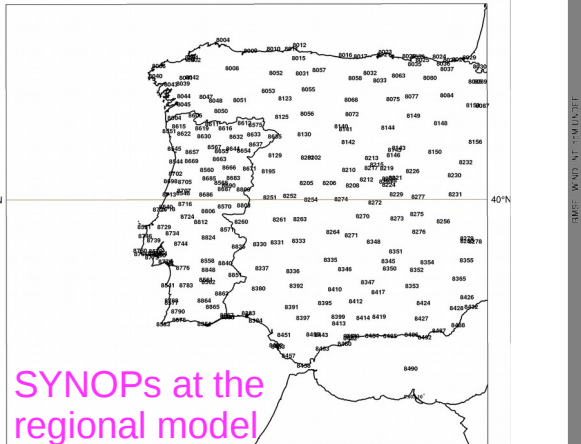
Surface Data Assimilation with screen-level parameters (Giard and Bazile, 2000)

Observação: 54 Estações
20150802 12 UTC



24-hour forecast OI_MAIN validation for a Summer period: 20160701 - 20160727 (OOUTC network)

Observação: 359 Estações
20170617 18 UTC



See poster: *An Iberian tailor-made operational high-resolution near-surface analysis using the ALADIN system*

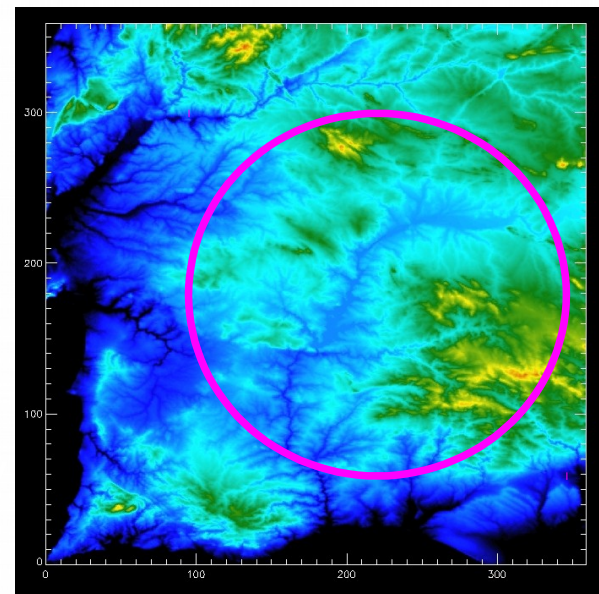
Next steps in the DAsKIT programme:

- inter-validation of local surface DA settings (CY40T1)
- setting up and implementing 3D-Var cyclings (CY40T1 or CY43T2)
- training in collaboration with LACE and HIRLAM

Locally:

- e-suite of surface DA cycling in CY40T1 (AROME-PT2, 60-levels) with the physiography of Alqueva Lake, validated by Assunção, S. in collaboration with Évora University (**See poster: *Impacto da introdução da Albufeira de Alqueva no modelo de previsão AROME***) and implemented in local climatologies by MJ Lopes

- setting up and implementing 3D-Var cyclings (CY40T1 or CY43T2)
- resuming local radar DA activities



FAST, Meteotsunamis (Rachid Omira, IPMA/IDL) – AROME
hindcasts to analyse the signal of atmospheric perturbations that trigger meteotsunamis conditions.

CLIMENA (Mariana Bernardino, CENTEC/IST) – to run ALARO-CLIMATE (at ECMWF) to produce wind scenarios by downscaling EC-EARTH

* Fellowship for 3 years (first at IPMA)

FIRESTORM (Ilda Novo, IPMA) – to assimilate extra surface observations in order to properly diagnose the BL height

Thank you very much for your attention !