

Summary

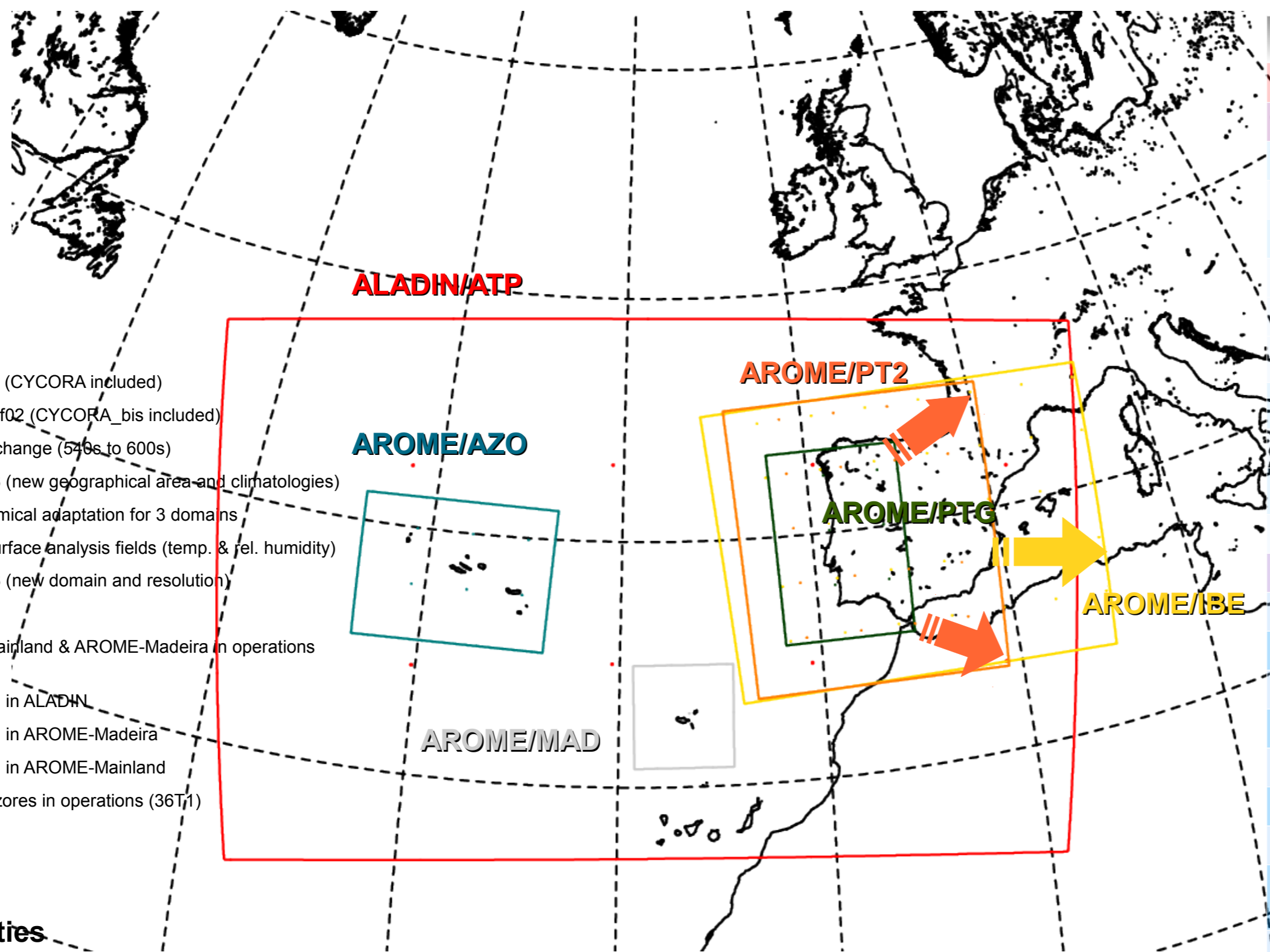
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During last year a new NWP system has been designed and is running in pre-operational mode on the new HPC platform of IPMA, the IBM p7⁺ (9 nodes). On this system the CY38T1 is used (main differences to the operational system are described in the section 2). Efforts are still devoted to a future upgrade of the new system configuration taking into account further ARPEGE dissemination facilities. To validate the new system, different experiments have been performed, whose results are illustrated in section 3. At the same time, several other tasks have taken place in order to support downstream services of the regional NWP system at 2,5 km: to compute a fire index in support of fire watch and prevention and to compute nowcasting products in support of weather forecasting. In parallel, the HARMONIE system (38H1.1) has been installed and tested for the actual operational system configuration. HARMONIE is the core system that is being used to bring visibility and attract funds from the Portuguese scientific community to the internal developments. In that sense, a R&D Project, the Regional Assimilation of Remote-sensing Observations (RARO), has been recently submitted to the Portuguese Foundation to Science and Technology (FCT).

The Portuguese NWP system versions

2

The Portuguese NWP system is based on a set of SMS/XCdp scripts submitted from a front-end cluster to an HPC IBM platform (see table). ALADIN-Portugal (domain "ALADIN/ATP") runs over a domain which covers the Portuguese mainland and the adjacent Atlantic Ocean including the Portuguese Islands, at 9km of horizontal resolution. The integration of the AROME forecasting model is done for three domains of Portuguese Mainland (AROME/PTG), Madeira (AROME/MAD) and Azores (AROME/AZO) Archipelagos. On the new system the ALADIN model does not provides initial and boundary conditions to model AROME. The re-design of the system is taking place.



OPER		PRE-OPER	IN PREPARATION
DELL cluster + IBM p575	computing platform	IBM blade + IBM p7 ⁺	
ALADIN (CY36T1 export)	model physics	ALADIN (CY38T1 export)	
9,0km	horizontal resolution	9,0km	
46	vertical levels	46	
ARPEGE	coupling model	ARPEGE	
DFI	initialisation method	DFI	
CY35T1	climatologies	CY38T1	
3h	coupling frequency	3h	
1h	output frequency	1h	
00UTC, 12UTC	integration hours	00UTC, 12UTC	
72,72	forecast range	72,72	
ATP	domains	ATP	
AROME (CY36T1 export)	model physics	AROME (CY38T1 export)	AROME (CY38T1 export)
2,5km	horizontal resolution	2,5km	2,5km
46	vertical levels	46	60
ALADIN/ATP (9,0km)	coupling model	ARPEGE (18,0km)	ARPEGE (10-13km)
No-DFI, no-DA	initialisation method	No-DFI, no-DA	No-DFI, no-DA
CY35T1	climatologies	CY38T1*	CY38T1
3h	coupling frequency	3h	3h
1h	output frequency	1h	1h
00UTC, 12UTC	integration hours	00UTC, 12UTC	00UTC, 06UTC, 12UTC, 18UTC
48, 48	forecast range	48, 48	tbd, 30, tbd, 30
PTG, MAD, AZO	domains	PT2, MAD, AZO	IBE
CANARI (CY32T3)	standalone surface analysis	CANARI (CY38T1)	SODA
ALADIN/ATP	background	ALADIN/ATP	AROME/PT2
SYNOP	observations	SYNOP	SYNOP, others

* not valid to AZO

Time Line

Apr 2000	Cycle 09
Jun 2000	Cycle 11T2 (CYCORA included)
Jul 2001	Cycle 12_bf02 (CYCORA_bis included)
Apr 2002	Time step change (576s to 600s)
Jun 2006	Cycle 28T3 (new geographical area and climatologies)
Jun 2007	Wind dynamical adaptation for 3 domains
Apr 2008	CANARI surface analysis fields (temp. & rel. humidity)
Dec 2008	Cycle 32T3 (new domain and resolution)
Out 2009	Cycle 35T1
Jan 2010	AROME-Mainland & AROME-Madeira in operations (35T1)
Dec 2010	Cycle 36T1 in ALADIN
Jun 2011	Cycle 36T1 in AROME-Madeira
Out 2011	Cycle 36T1 in AROME-Mainland
Dez 2011	AROME-Azores in operations (36T1)

Foreseen activities

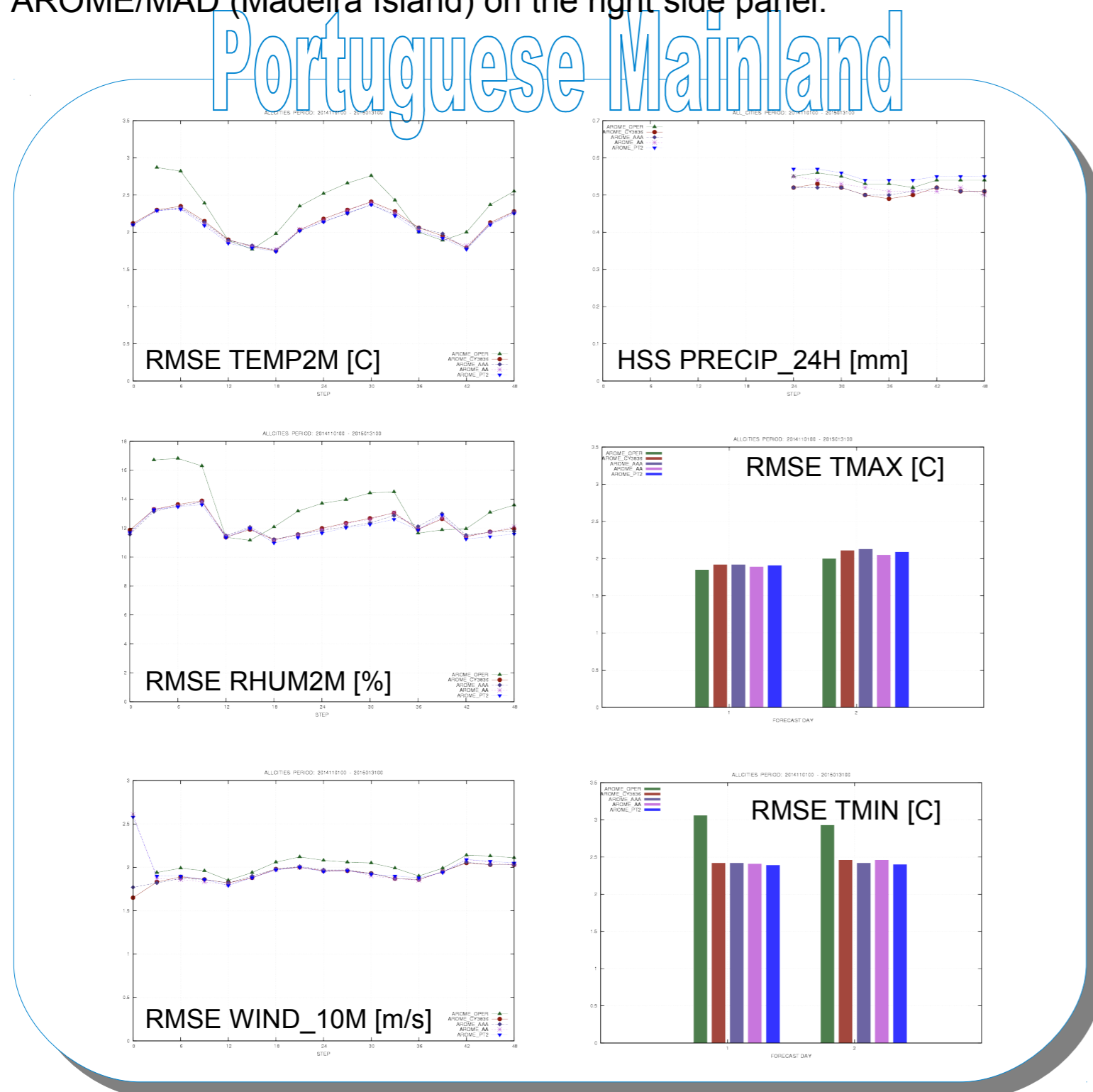
During 2015 an upgrade on the current pre-operational NWP system should take place taking advantage of the ARPEGE new dissemination facilities: the increase of the horizontal coupling fields' resolution; the increase of the model vertical resolution to 60 levels and the enlargement of the Portuguese Mainland domain Eastward. Besides, the integration frequency should be increased to 4 times a day.

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CY38T1 validation (new NWP system)

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In order to validate the new cycle and the changes on the system, a statistical study has been performed for each system configuration on recent summer and winter periods, over the screen level and accumulated precipitation fields. A summary of the winter period results is illustrated on the for AROME/PTG2 (Portuguese Mainland) on the left side panel and for AROME/MAD (Madeira Island) on the right side panel.

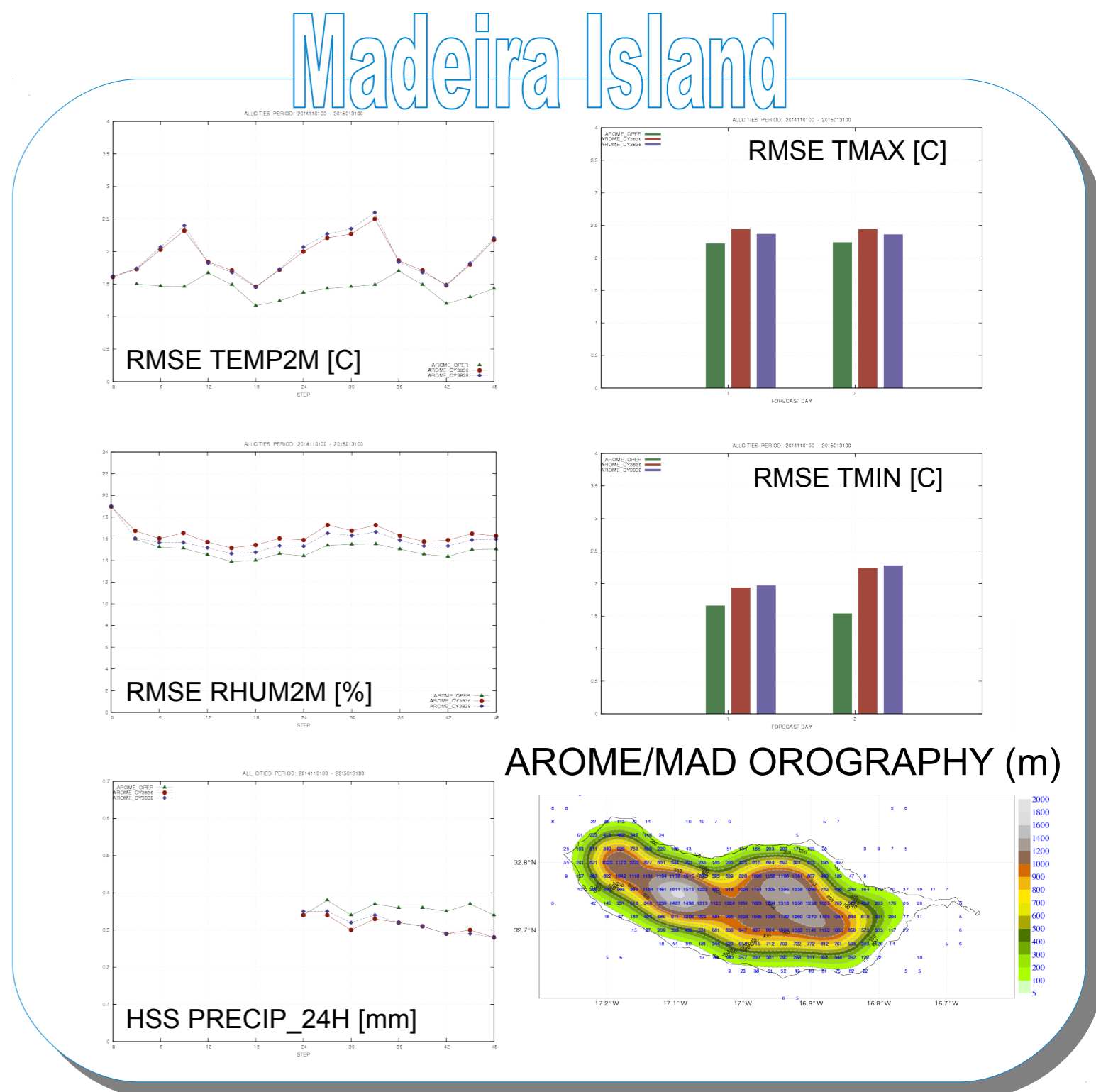


For the **Mainland (left panel)**, as a general conclusion, statistics against local SYNOP data have shown:

- a positive impact when moving from CY36 to CY38 to all the verified parameters. Results are noticeable for the night cooling which is now more realistic (with less BIAS);
- an increase of the model spin-up when passing the coupling from ALADIN (9,0km) to ARPEGE (18,0km);
- a neutral impact, when changing climatologies from CY35 to CY38.

For **Madeira (right panel)**, as a general conclusion, statistics against local SYNOP data have shown:

- a positive impact on the 10m wind when moving from CY36 to CY38;
- a degradation on the night cooling simulation, with a negative impact in the temperature and humidity;
- a neutral impact, when changing climatologies from CY35 to CY38.



Related R&D projects

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The project Spanish-Portuguese Meteorological Information System, for Transboundary Operation in Forest Fires (SPITFIRE) has the objective to improve the information exchange on meteorology and forest fire risk in the border area between Portugal and Spain to support the Civil Protection and Firefighters of both countries in the border zone. The Fire Risk Index, FWI, used at the strategy and combat of the forest fires will be computed using CANARI and AROME products.

FCT Fundação para a Ciência e a Tecnologia

MINISTÉRIO DA EDUCAÇÃO E CIÊNCIA

The project Regional Assimilation of Remote-sensing Observations (RARO) has been submitted to the Portuguese Foundation to Science and Technology (FCT) in order to bring funds and attention from the local scientific community to the local team developments. Its goal is to set an activity on the assimilation of high-resolution remote-sense observations (from the local weather radar and locally available satellite information) at convective scale models, in particular those integrated at IPMA, in the context of the HARMONIE system. The HARMONIE system is now installed on IPMA's HPC platform under testing mode.

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