

Summary

During 2018-2019 a few changes occurred on the local operational NWP systems (see Section 2): the scripting system re-written under ecflow (ECMWF) entered into operations on a new front-end machine in March. With these upgrade, the ALADIN model integration for operational purposes was discontinued. In this way, the hourly high-resolution (2,5km) Optimal Interpolation (OI) analysis of screen-level parameters – CANARI (Taillefer, 2002) - having as background a short-term forecast from AROME-PT2, initialized by a surface Data Assimilation (DA) cycling (Giard and Bazile, 2000), has entered into operations and replaced the old lower-resolution (9km) CANARI which was using ALADIN forecasts as background. At the beginning of 2018, Portugal assumed the coordination of the ALADIN core programme “DA basic KIT” (DASKIT) and the basic KIT assembled for the AROME surface DA is now being ported locally to CY40T1_bf07 in order to replace the original surface DA (CY38T1) just described. This work is being done in parallel with the porting of the operational dynamical adaptation model configuration. Due to the natural geographical proximity and in the last couple of years, IPMA keeps a communication channel with AEMET (Spanish Meteorological Service), and under this new framework a regional collaboration has been started on several NWP topics (see Section 3); DA (upper-air of ASCAT and surface of SYNOP data) is one of the main topics. At the same time and in the framework of a longer collaboration of IPMA with RC-LACE, KNMI and NWP-SAF in DA, new local DA topics work is in progress (see Section 4). Further local team efforts have been put to support other research projects, internal requests (post-processing) and also ALADIN/SRNWP activities.

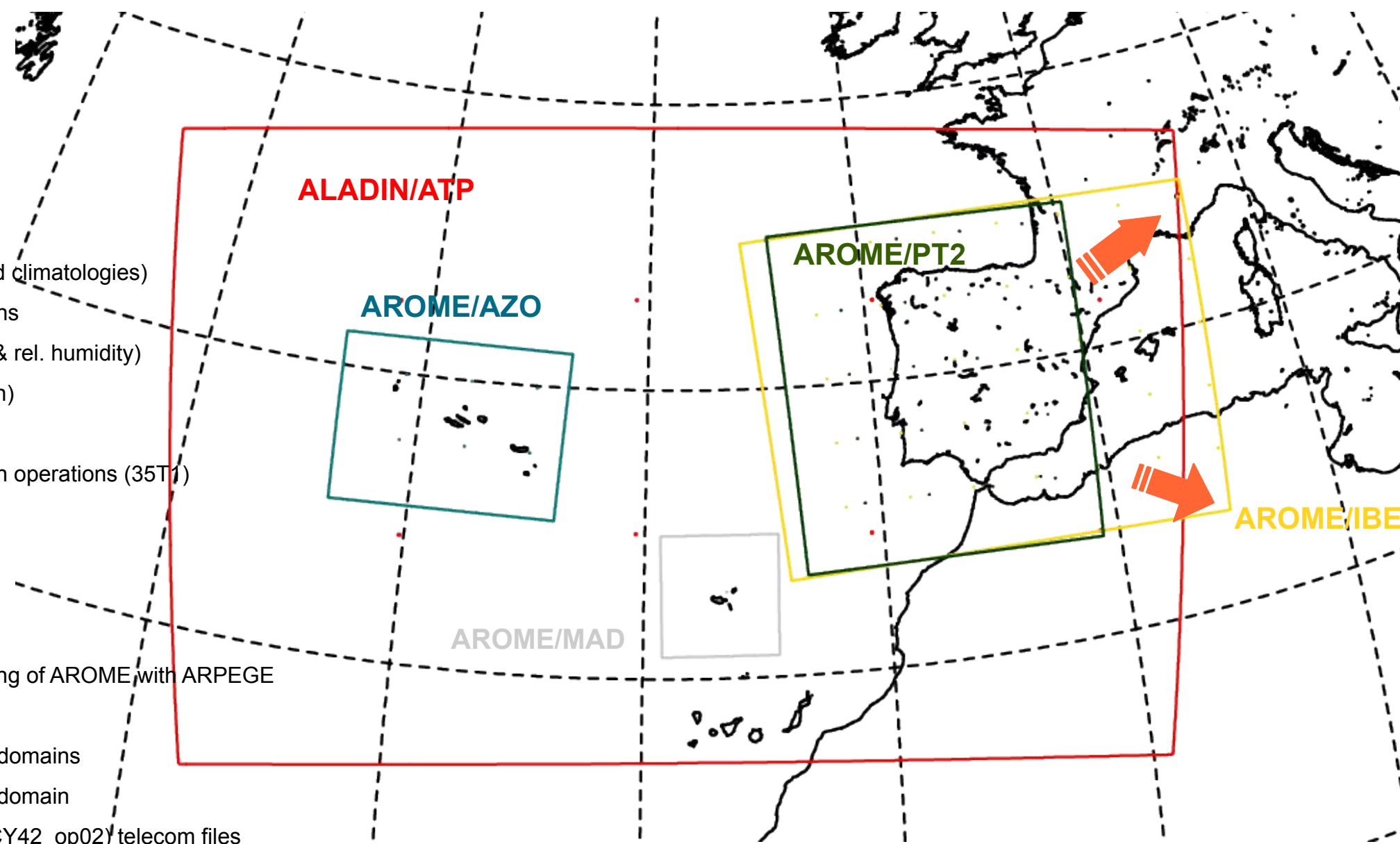
The Portuguese NWP system versions (vanda.costa@ipma.pt, manuel.lopes@ipma.pt, maria.monteiro@ipma.pt)

The Portuguese (SR)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 over a domain which covers the Portuguese Mainland and the adjacent Atlantic Ocean including the Portuguese Islands, at 9km of horizontal resolution (ATP) was discontinued. The integration of the AROME forecasting model is done for three domains: Portuguese Mainland (PT2), Madeira (MAD) and Azores (AZO) Archipelagos. The latest model takes direct ARPEGE fields for its initialization.

	OPER	DEVELOPMENT
IBM Blade + IBM-p7+	Computing platform	IBM Blade + IBM-p7+
ALADIN-ATP domain (CY38T1 export)	Model physics	To be locally discontinued
9.0km, 46 levels, DFI, ARPEGE 3-hour coupling, 00/12UTC runs up to 72 hours	Local version aspects	
AROME (CY38T1 export)	Model physics	AROME (CY40T1_bf07 export)
2.5km	Horizontal resolution	2.5km
60	Vertical levels	60
ARPEGE (10,0km)	Coupling model	ARPEGE (10,0km)
No-DFI, no-DA	Initialisation method	No-DFI, DA (3-hour OI_MAIN)
CY38T1 (PT2, MAD), CY35T2 (AZO), CY40 (ARP LBC)	climatologies	CY38T1 (PT2, MAD), CY35T2 (AZO), CY40 (ARP LBC)
3h	Coupling frequency	3h
00UTC, 06UTC, 12UTC, 18UTC	Integration hours	00UTC, 06UTC, 12UTC, 18UTC
48	Forecast range	48
PT2, MAD, AZO	domains	PT2, MAD, AZO
CANARI (CY38T1)	Standalone surface analysis	CANARI (CY38T1)
ALADIN	background	AROME-PT2
Regional WMO BUFR SYNOP	observations	Regional WMO BUFR SYNOP

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 (540s 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)
- Apr 2015 Cycle 38T1 in all domains; direct coupling of AROME with ARPEGE
- Jun 2015 10km resolution in ARPEGE coupling
- Jul 2017 Increase on the number of levels in all domains
- Jul 2017 Increase on the run frequency for PT2 domain
- Dec 2017 SURFEX replaced ISBA in ARPEGE (CY42_op02) telecom files
- Sep 2018 Hourly screen-level OI analysis from a surface DA for AROME-PT2



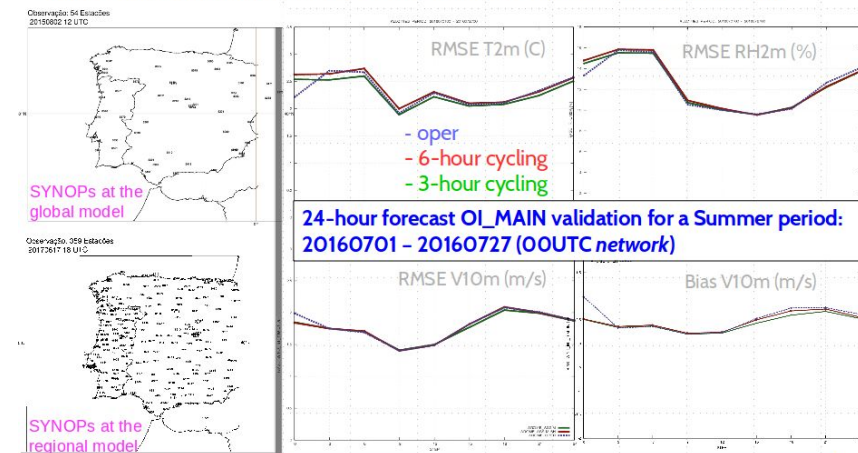
Foreseen operational activities will include: account with new ARPEGE coupling files with a new geographical domain (in cooperation with AEMET) - enlarged to East and shorten to West; porting and validation of AROME operational configurations to CY40T1_bf07 (export version); compilation of MASTERODB at CY43T2_bf10 with gFORTRAN in the IBM-P7+ in order to port the actual operational configurations and to adopt the step-by-step approach and plans of DASKIT framework.

Regional Cooperation (isabel.monteiro@ipma.pt, joao.rio@ipma.pt, nuno.moreira@ipma.pt, maria.monteiro@ipma.pt)

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Hourly analysis (& DA) with Iberian SYNOPs

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

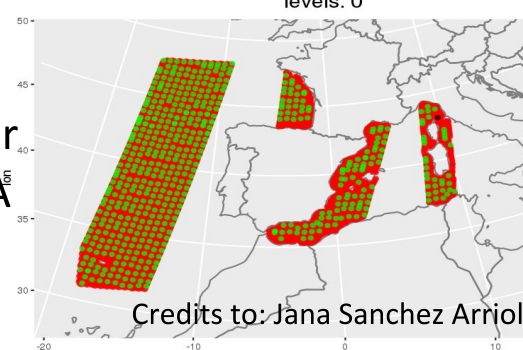


IPMA has been cooperating with AEMET; BUFR GTS SYNOP data is shared on a hourly basis under WMO BUFR format and assimilated both at IPMA and AEMET.

ASCAT Data Assimilation

(more info: J. CALVO, “AEMET NWP activities” poster)

AIBI_fras: Observation Usage scatt u10m 2019-03-18 09Z



IPMA has been cooperating with AEMET in incorporating ASCAT winds into AEMET data assimilation system .
A parallel suite is running at AEMET HPC

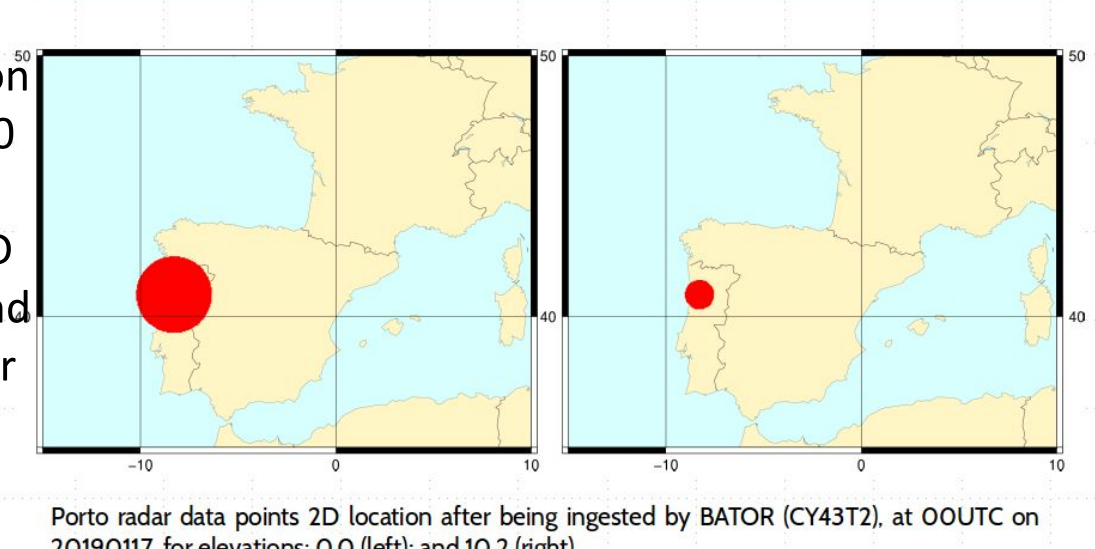
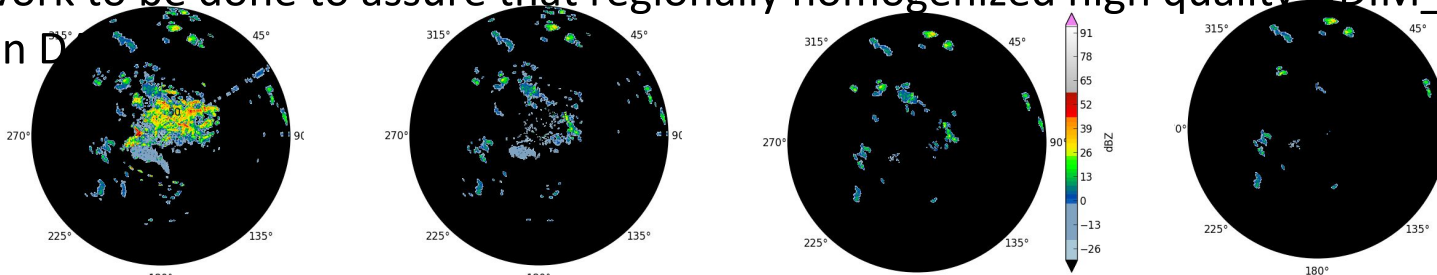
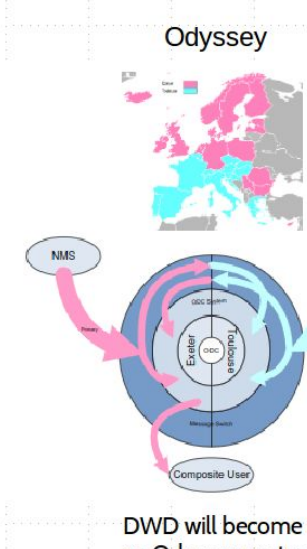
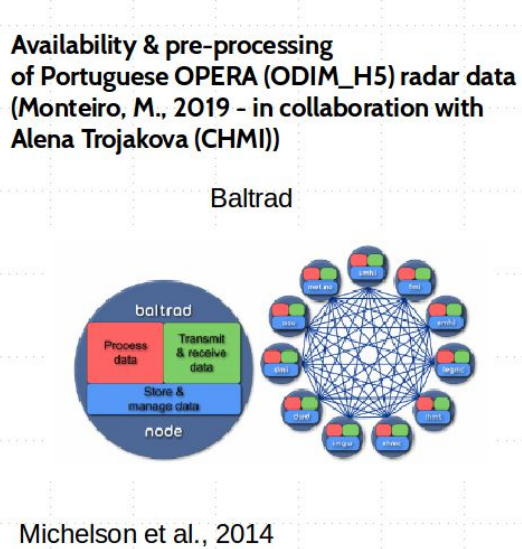
Data Assimilation activities

Framework of AROME (maria.monteiro@ipma.pt)

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Radar Data Assimilation

The two actual OPERA data flows, BALTRAD and ODYSSEY (see panel on the left), have been tackled. Portuguese OPERA Data Information Model data under HDF5 format (ODIM_H5) was examined and validated under BATOR (CY43T2), after being format-homogenized with the RC-LACE Homogenization Of OPERA Files (HOOF) tool (see panel on the right). The panels here below show the same data - 0.0 elevation angle of Lisbon’s radar reflectivity observation at 12UTC of 29 May 2018 - after different quality control filters have been applied (from left to right): raw data; IPMA pre-processed; BALTRAD pre-processed; ODYSSEY (exclusive) filter pre-processed. With this work it was possible to understand that there is still work to be done to assure that regionally homogenized high quality ODIM_H5 radar data can be used in D...

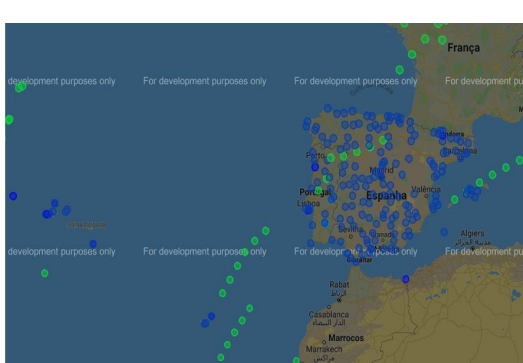


Framework of HARMONIE-AROME (isabel.monteiro@ipma.pt, vanda.costa@ipma.pt, manuel.mendes@ipma.pt)

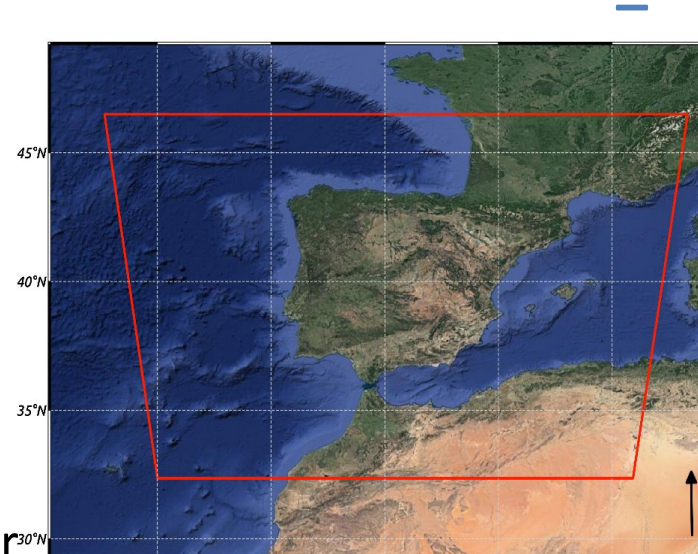
SAPP

Preliminary evaluation:

- VM is easy to install.
- Quite stable.
- Suitable to handle conventional observations used in HARMONIE and provided by GTS, (format adaptations)
- Most of the work at IPMA was (and will be) on the customization of large conventional data streams, at IPMA these data streams were never tested.



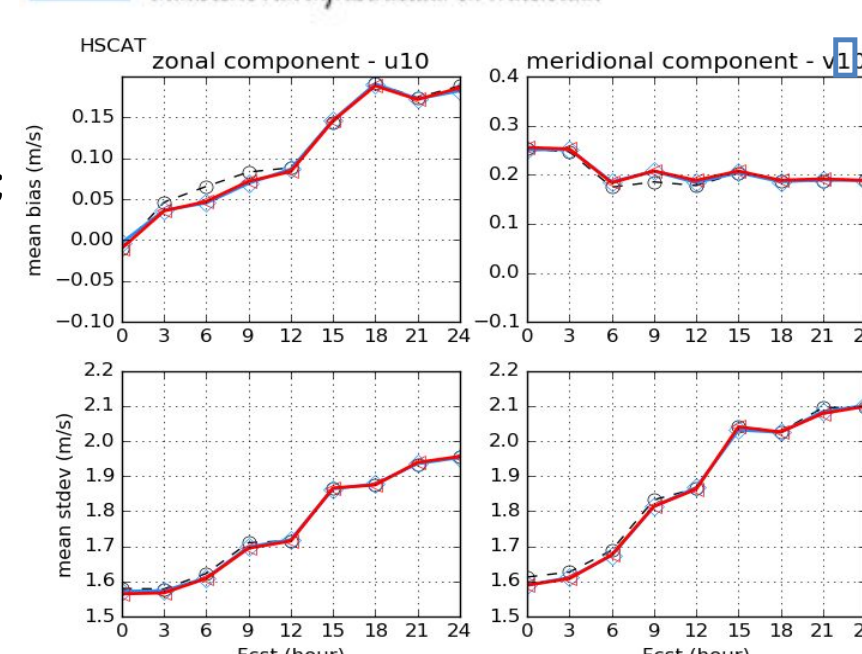
Tested Configuration at IBM—P8 Domain IBERIAxm_2.5



- 800 x 648 grid;
- 65 levels;
- 2.5 km grid size;
- 3D-Var, 8 times/day;
- 24-hour forecasts;
- ECMWF boundaries;
- Conventional obs;
- ASCAT-A, -B, -C were also used.

Optimization of scatterometer winds DA

Koninklijk Nederlands Meteorologisch Instituut
Ministerie van Infrastructuur en Waterstaat



ASCAT DA => reduced (o-f) bias and stddev against HSCAT and OSCAT observations. 45 days experiments show impact up to fc+09!

To Do: (1) investigate best observation sampling: Tests on Supperobbing Thinning procedure & observation error. (2) Accounting for ASCAT footprint size in first-guess departure (Mate Mile, Met No). (3) Focus on 4D-Var to overcome time mismatch. (4) Assess the impact of gain on coverage: Use of HY-2B OSCAT-2/3 and CFOSAT too