

# Status report on implementation of ALADIN Data Assimilation systems at IPMA (Portugal)

2017

Maria Monteiro  
with contributions from João Rio, Isabel Monteiro

In collaboration with  
Alena Trojakova, Benedikt Strajnar, Pierre Brousseau, Yann Seity, common  
ALADIN-HIRLAM DA training & DAsKIT colleagues

2020 Joint LACE Data Assimilation Working Days & ALADIN Data Assimilation basic kit Working Days  
Visio-meeting, Vienna, 14-16 September 2020

1/11

1. **Systems & Tools (actual) status**
2. **Status on Dynamical Adaptation (CY43T2\_bf10)**
3. **Status on Surface DA (CY43T2\_bf10)**
4. **Status on (combined) Surface+3D-var DA (CY43T2\_bf10)**
5. **Conclusions & future outlook**

## Operations (IBM\_p7+ (9 nodes)):

**September 2018**

SurfDA CY38T2\_L46 (export version)

AROME/PT2 (used for hourly diagnostics)

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

**February 2020**

DynAD CY40T1\_L60 (export version)

AROME/PT2 (by switching off CANOPY and LNOTS)

+ AROME/MAD + AROME/AZO (used for 48-h prognostics)

outlook: @ECMWF

## Ported & NEW Developments:

**AROME CY43T2\_bf10**

DynAD: AROME/PT2\_L60/2.5km

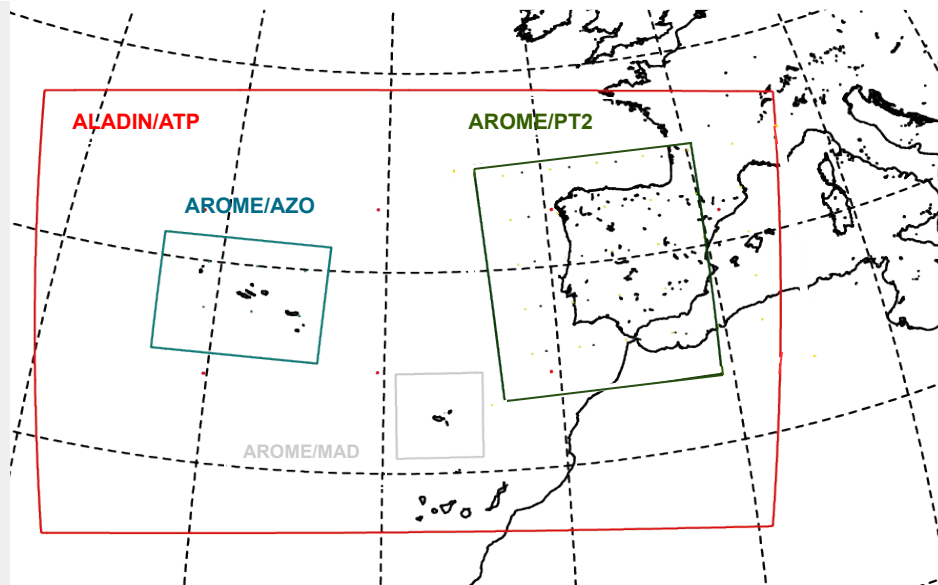
SurfDA: AROME/PT2\_L60/2.5km

CombDA: AROME/PT2\_L60/2.5km

Local ARPEGE couplings

Local observations under GTS WMO BUFR

Local OIFS HDF5 radar observations



## Local Development ([isabel.monteiro@ipma.pt](mailto:isabel.monteiro@ipma.pt)):

**SAPP**

Acquisition Mature and tested for GTS

Processing Tested but tailoring needed

Extraction Under development (suitable for HARMONIE-AROME)

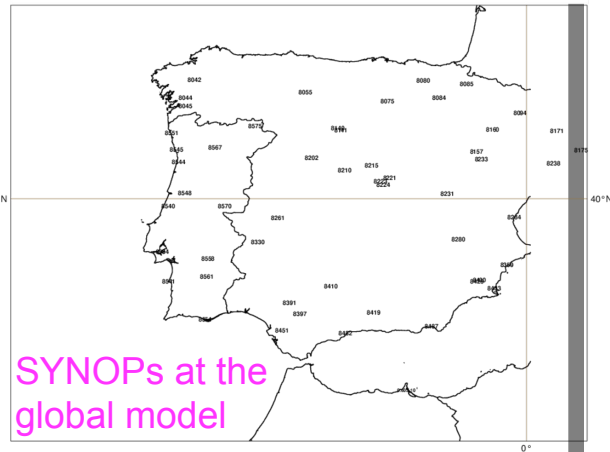
Outlook upgrade vsapp021.1 (ECMWF, May 2020)

**OBSMON**

v3.3.2 off-line (Shiny part) used regularly with ODB provided by HARMONIE-AROME

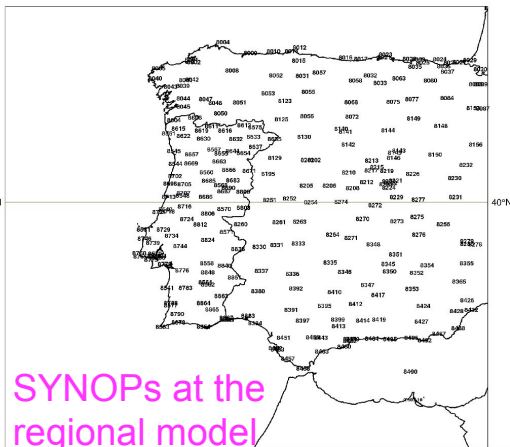
## Under validation@ECMWF !

Observação: 54 Estações  
20150802 12 UTC



SYNOPS at the  
global model

Observação: 359 Estações  
20170617 18 UTC



SYNOPS at the  
regional model

**REF** = Operational (AROME physics, CY38T1 & CY40T1\_bf07, L60, 2.5km), dynamical ADaptation from ARPEGE at 10km, Iberian Peninsula domain (PT2)

### 3 AROME\_PT2 experiment settings are being assembly from scratch:

- **dynAD\_cy43\_l60** – to validate the porting of dynamical adaptation
- **sfxDA\_cy43\_l60** – to validate the 2018 surface DA KIT (10-day cycling period before sampling...)
- **sfx+3DvarDA\_cy43\_l60** - to validate a combined surface+3D-var DA solution

**Observations: Local, GTS WMO BUFR: SYNOP, TEMP, AIREP  
OIFS HDF5 radar**

### 2 target weather period (as preliminary trial with CY38T1):

**Winter:** 11dez2018 - 10fev2019 (cold/rainy) -> 60 days

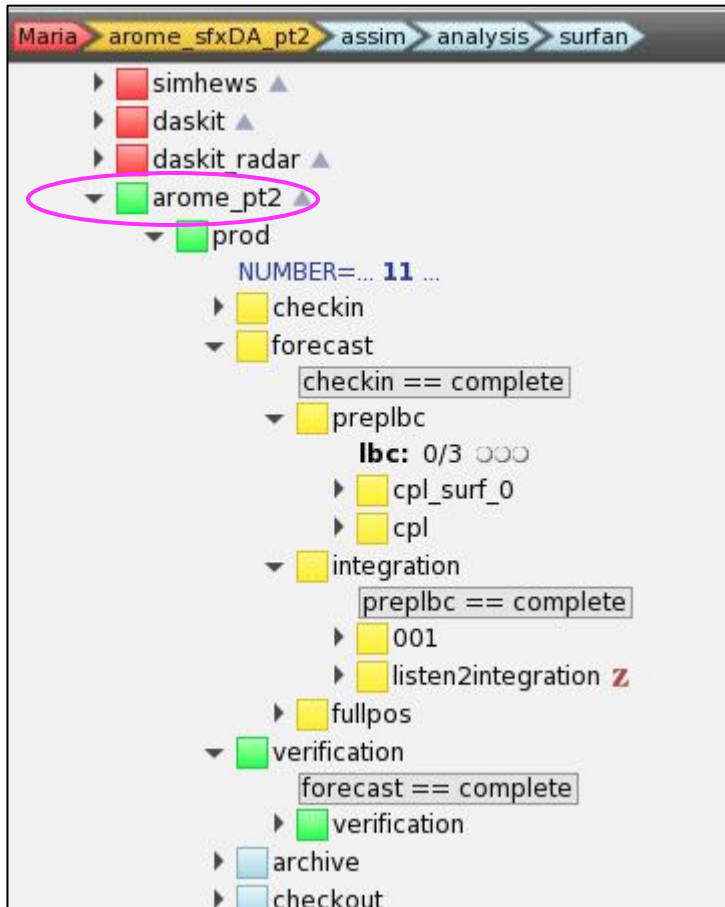
**Summer:** 01ago2018 - 09set2018 (extreme temperatures) -> 40 days

### 3 target screen level fields (preliminary trial):

**T2M** - 2-metre Temperature

**H2M** - 2-metre Relative Humidity

**W10M** - 10-metre Wind speed



**Adaptation of Slovenian tools @ECMWF**  
(from seemhews project):

**createsuites**  
**python (OO) interface for ecflow**

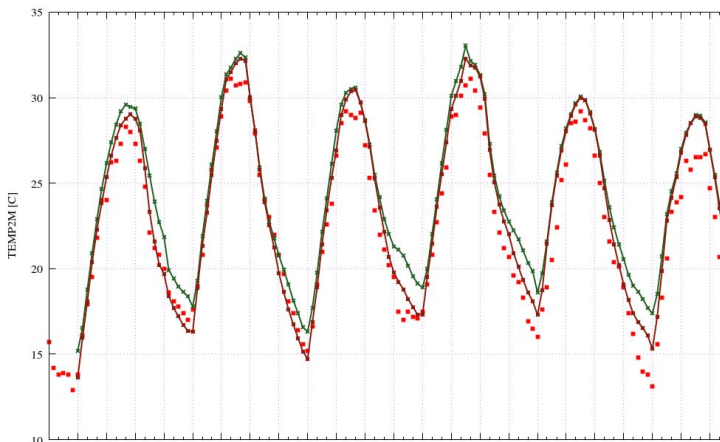
**ecflow scripts**  
**Korn shell scripts for ecflow**  
being adapted or created for surfex and AROME

**namelists**  
**adapted from reference environment**  
experiment done in Météo-France at CY42T2

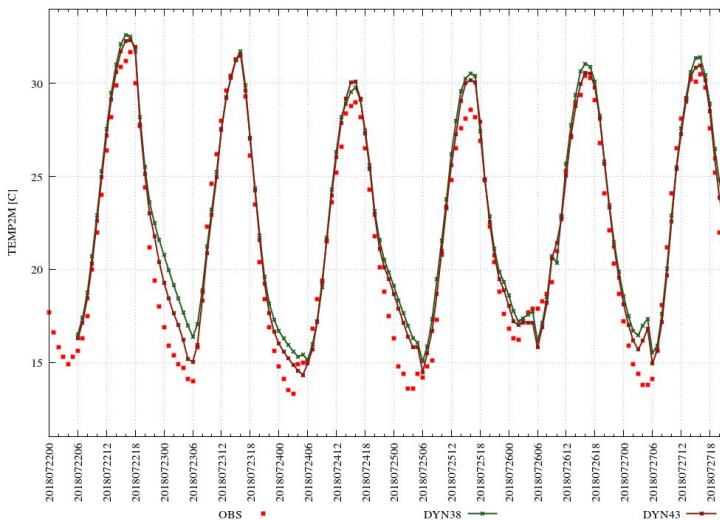
**status:**  
workflow tested, but post-processing to be reviewed (number of fields/GRIB 2/PROGRID compilation)  
validation over Summer/Winter periods for tuning purposes

**outlook:**  
final tune the namelists if needed  
repeat the procedure for the Portuguese Islands

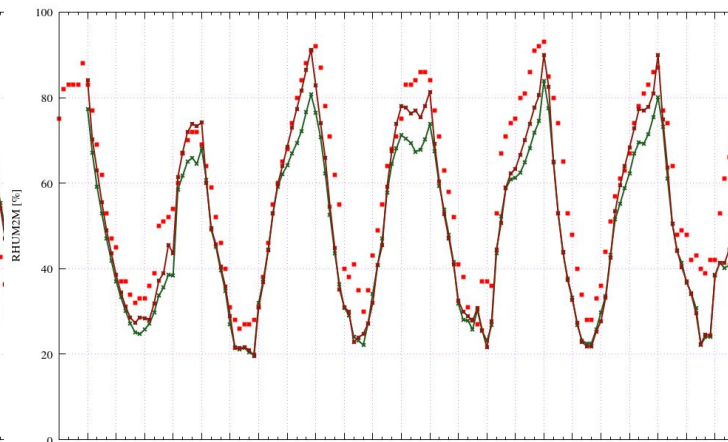
**T2M time series** STATION: BRAGANCA PERIOD: 2018072200-2018072800



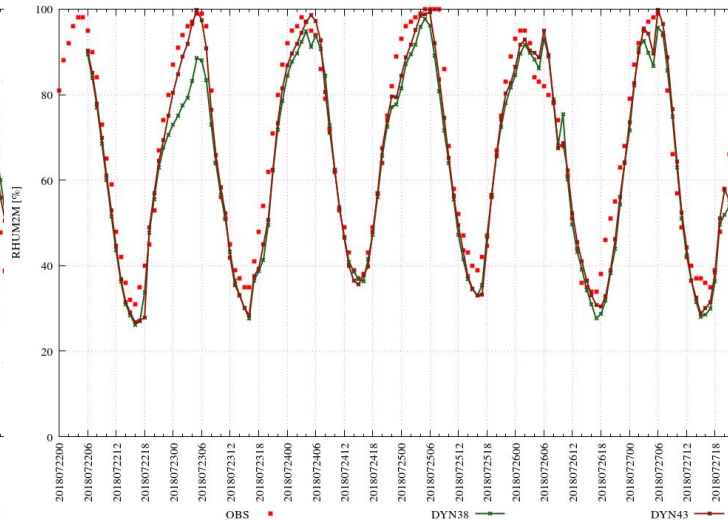
STATION: BEJA-CIDADE PERIOD: 2018072200-2018072800



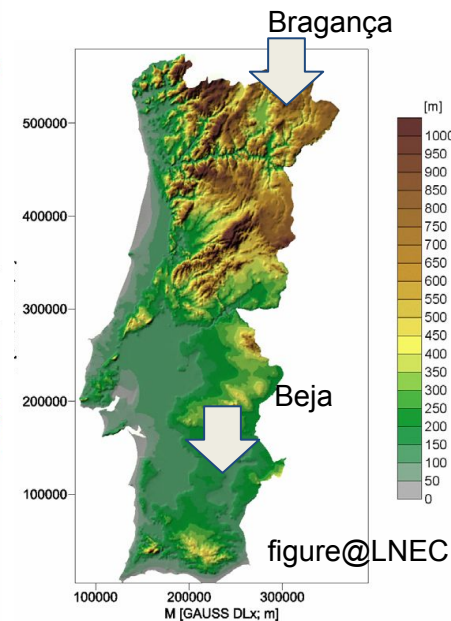
**R2M time series** STATION: BRAGANCA PERIOD: 2018072200-2018072800



STATION: BEJA-CIDADE PERIOD: 2018072200-2018072800

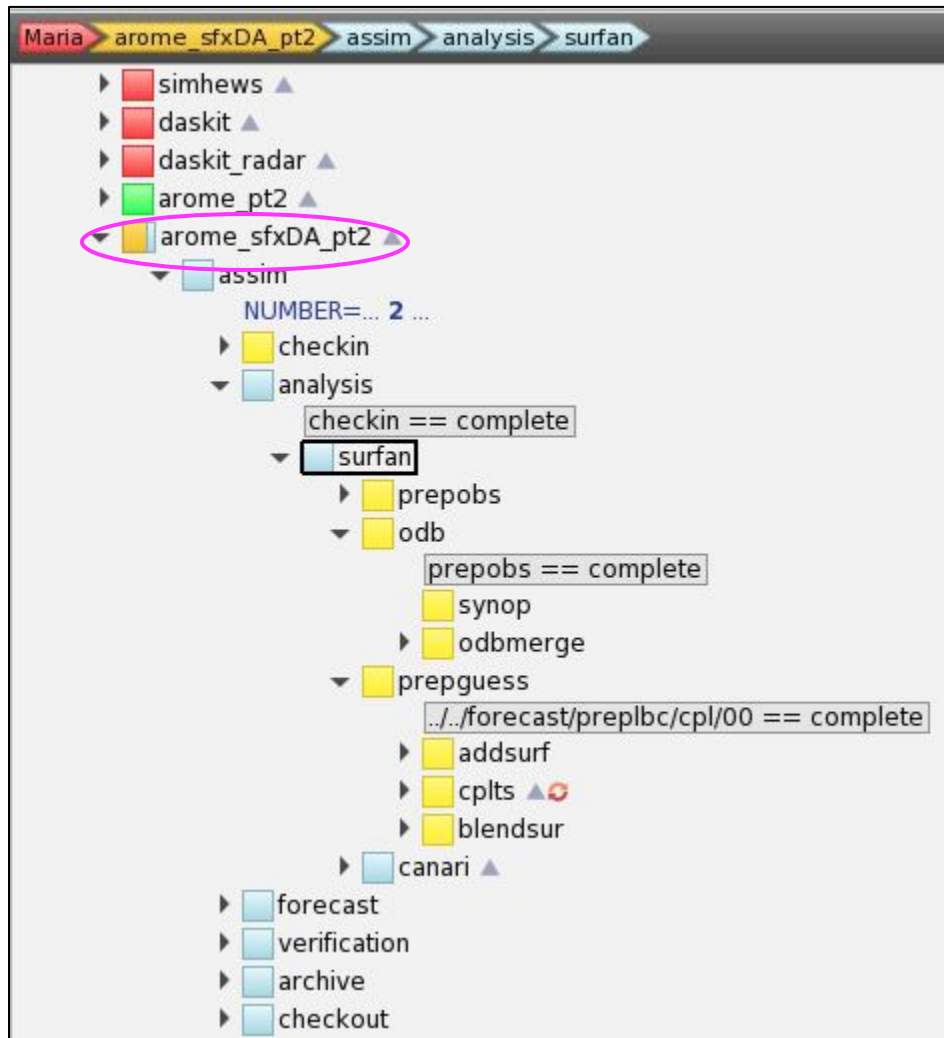


verification plots by  
joao.rio@ipma.pt



-- observations  
-- oper (CY38)  
-- dynAD (CY43)





Adaptation of Slovenian tools @ECMWF  
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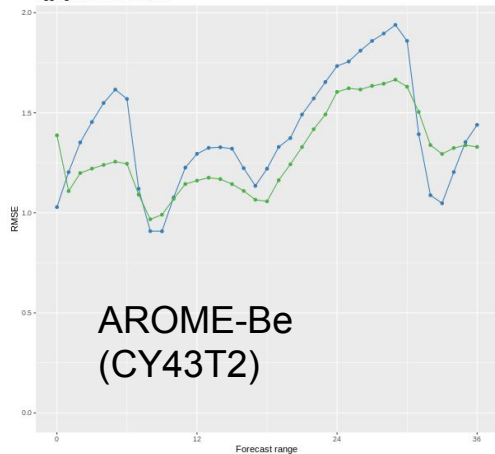
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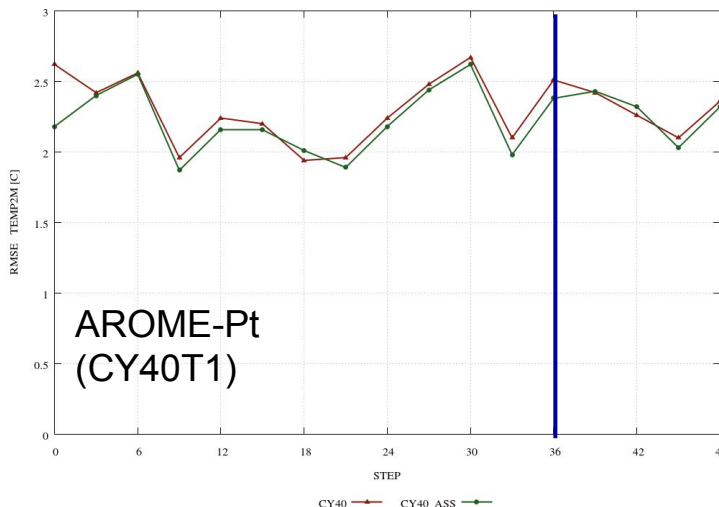
**status (next slide):**  
tested for one day (20190210)  
start of workflow diagnosis

**outlook (next slide):**  
tune the namelists according to Jean-François Mahfouf  
(next slide)  
start of cycling over Summer/Winter periods for  
validation/tuning purposes

RMSE T2m  
20190901 - 20191031 00h  
Aggregated over all stations



ALLCITIES : 2018080100 - 2018090900

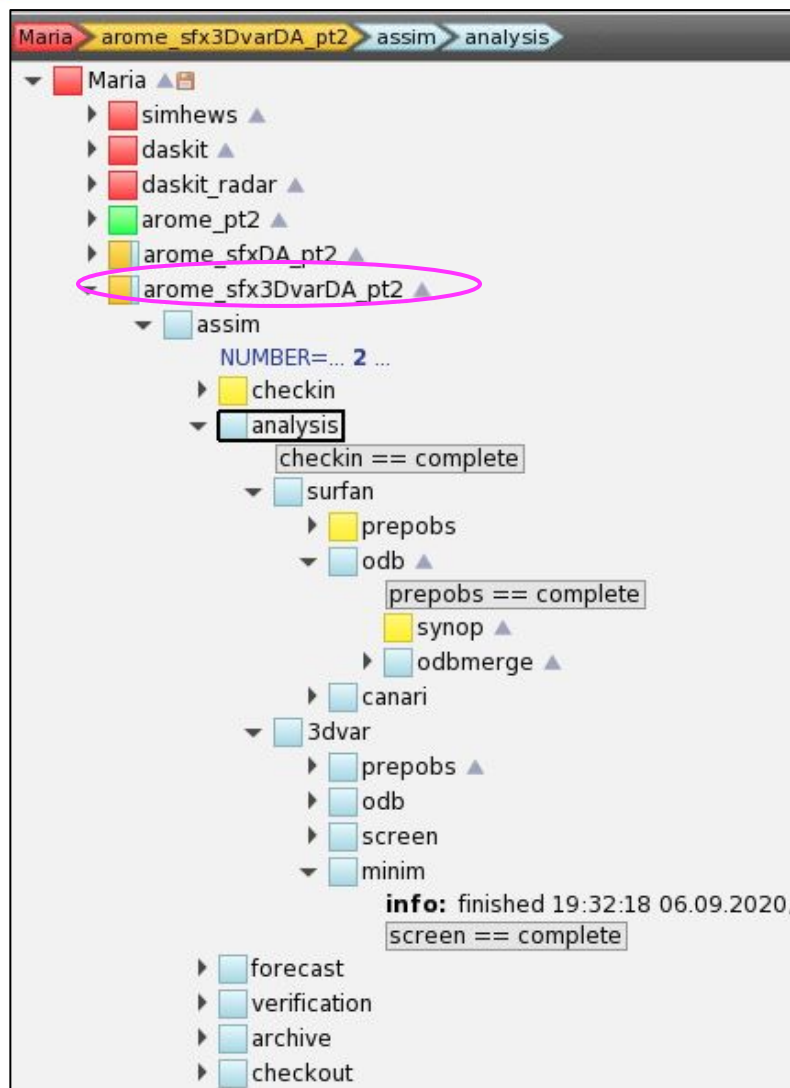


Consistency  
between two  
different  
implementations  
(with different  
horizontal  
resolutions) of  
DAsKIT (OI\_MAIN)  
during a Summer  
period

Preliminary validation over AROME/PT2 48-h forecast	SUMMER	WINTER
<b>T2M</b>	positive (specially at H+00)	positive up to H+12; negative afterwards
<b>H2M</b>	positive during day (H+00); negative during night(not shown)	positive (specially at H+00)

**Outlook:** porting to CY43T2 and tuning after Jean-François Mahfouf, 25 jun 2020  
- changes of CANARI namelist (NACVEG/NALORI/NAM\_CANAPE/LAECHK)





Adaptation of Slovenian tools @ECMWF  
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python (OO) interface for ecflow

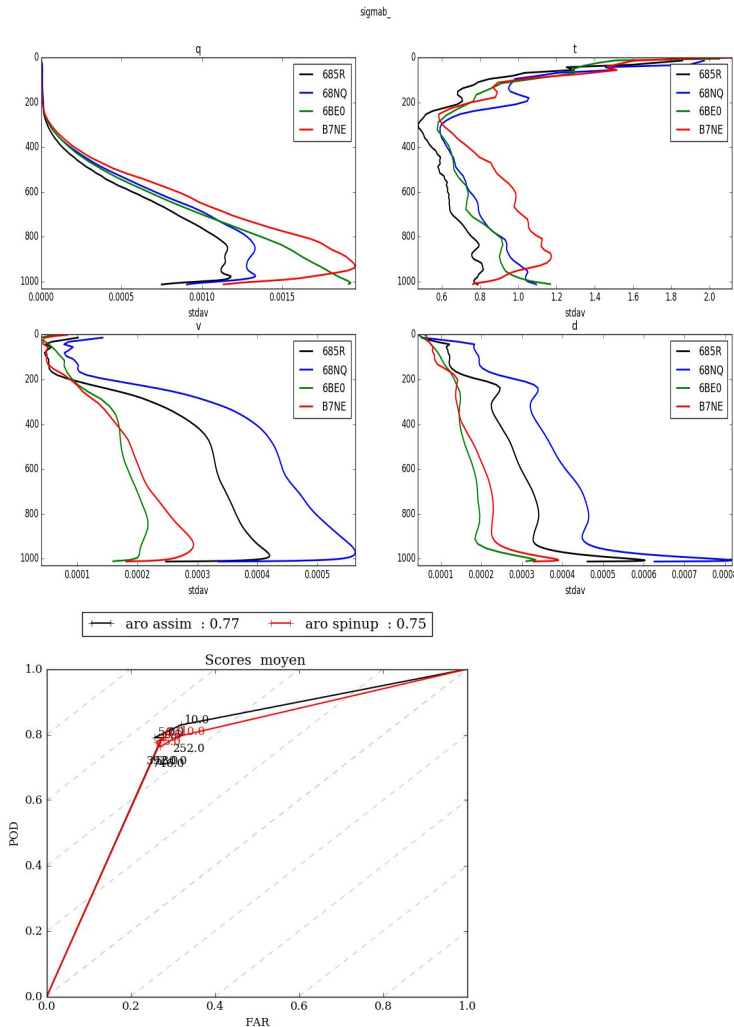
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**observations pre-processing at ECMWF**  
HOOF

**status (next slide):**  
tested for one day  
start of workflow diagnosis

**outlook:**  
start of cycling over Summer/Winter periods for  
validation/tuning purposes



B-matrix computed in Météo-France by downscaling from AEARP

**Diagnostics:** Vertical profiles background error standard deviations, for the different geographical domains of AROME-Al (green line), AROME-Pt (red line) and AROME-Fr (blue and black lines), for different control variables: specific humidity (top left panel); temperature (top right panel); vorticity (bottom left panel); and divergence (bottom right panel)

Validation of B-matrix over 20 day rainy period in a surface+3D-var DA solution (CY42T2), using conventional + radar OIFS HDF5 (not HOOFF yet) data

**Scores:** Averaged Probability of Detection vs. False Alarm Rate of 24-hour accumulated precipitation of AROME-Pt, over the period 20190122(03UTC) - 20190210(03UTC), initialized by dynamical adaptation (red line) and assimilation (black line)

- 1- progress is on-going for Portugal
- 2- CY43T2\_bf10 is installed at ECMWF and the basic ALADIN system configurations have been successfully tested at ECMWF platforms
- 3- 3 different ALADIN system configurations are being tested for a Portuguese domain: dynAD, surfDA and combDA and are now being diagnosed and validated
- 4- preliminary validation of dynAD shows a positive impact on representing night cooling
- 5- 'createsuites' seems to be an optimal tool to deal with ALADIN systems as objects and set up a good ecflow experiments environment
- 6- Portuguese and Spanish OIFS HDF5 radar data (reflectivity) have been ingested by ALADIN systems at an hybrid CY42/43T2 (on a reference environment) and there was a small positive impact on forecasting over the Iberian Peninsula on a 20-day period of cycling

Thank you for the attention !