Portuguese DA progress report

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2021 LACE DAWD & DAsKIT WD

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IPMA

2017

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Topics

1. Status of Portuguese implementations
2. Diagnostics on the implemented solutions
3. Preliminary scores
4. Outlook

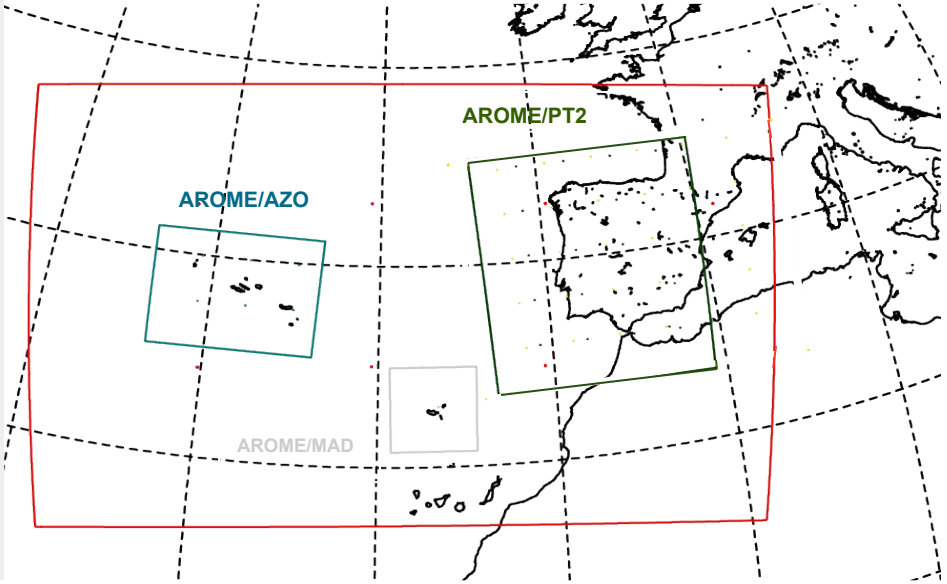
Status of Portuguese implementations

Local operations (IBM_p7+ (9 nodes)):

September 2018
SurfDA CY38T2_L46 for AROME/PT2 (used for hourly diagnostics) -> DAsKIT set

February 2020
DynAD CY40T1_L60,2.5km,ARPEGE coupling (export version)
AROME/PT2 + AROME/MAD + AROME/AZO (48-hour prognostics)

outlook: new local HPC in 2022



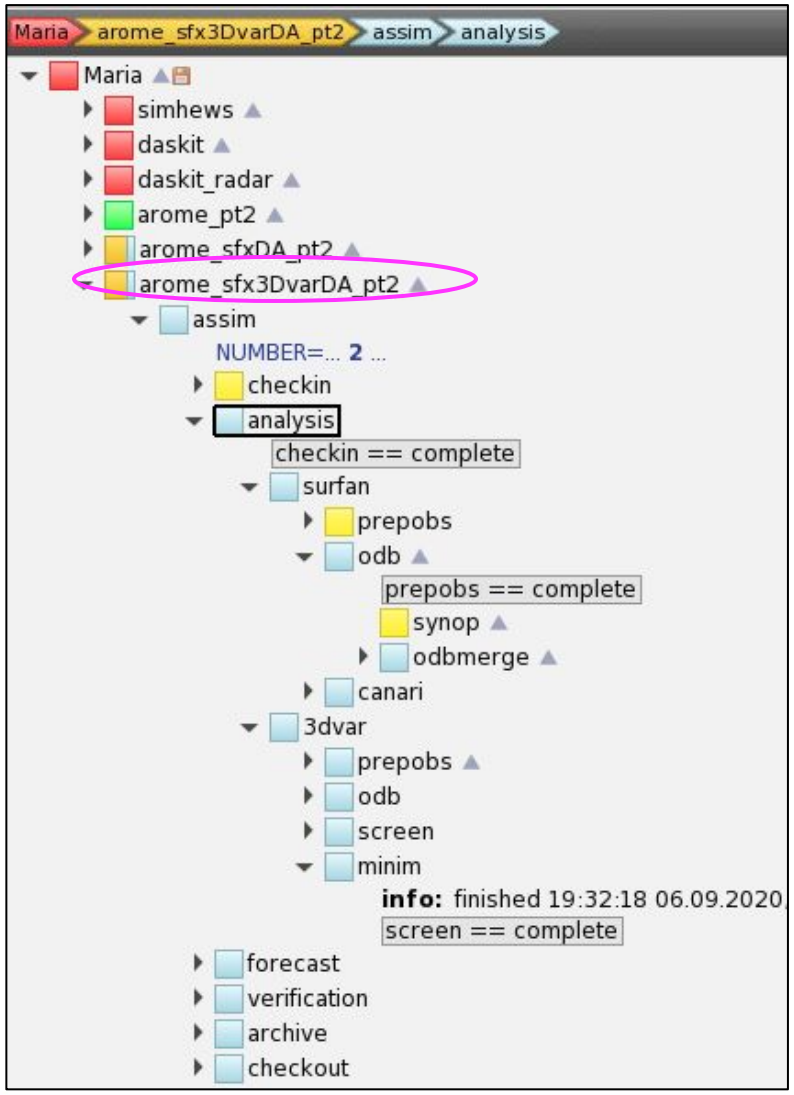
Ported @ ECMWF & NEW developments:

Daily archiving
Local ARPEGE couplings
GTS & local observations under GTS WMO BUFR format
Local OIFS HDF5 radar observations

Missing the DA implementation over Azores !

AROME CY43T2_bf10 (3-hour cycling since 19 July 2021)
DynAD: AROME/**PT2_L60,2.5km**.....AROME/**MAD_L60,2.5km**.....AROME/**AZO_L60,2.5km**
SurfDA: AROME/**PT2_L60,2.5km**.....AROME/**MAD_L60,2.5km**.....**Issues during integration**
CombDA: AROME/**PT2_L60,2.5km**.....AROME/**MAD_L60,2.5km**.....**None**

Status of Portuguese implementations



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

observations pre-processing at ECMWF
HOOF (not working at the moment...)

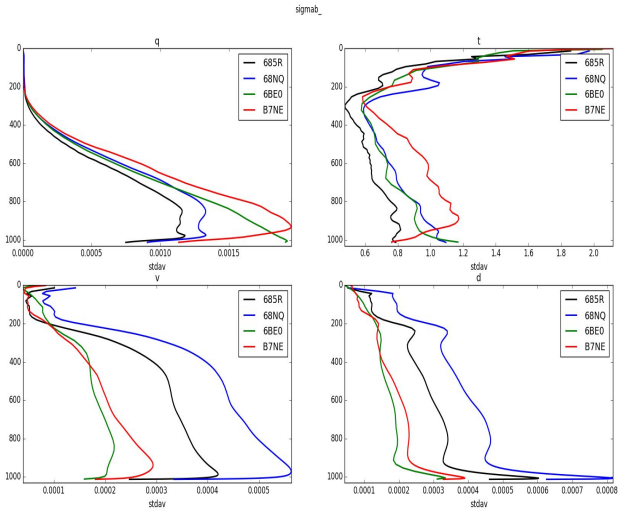
status (next slide):
tested for experiments settings and daily cycling
workflow diagnosis and cleaning on-going

outlook:
working for the time being
???? depends on NodeRunner and the community decisions...

Status of Portuguese implementations

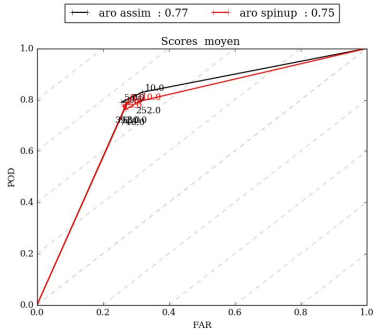
Iberia B-matrix computed in Météo-France by downscaling from AEARP

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 Iberia B-matrix over 20 day rainy period in a surface+3D-var DA solution (CY42T2), using conventional + radar OIFS HDF5 (not HOOF 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)

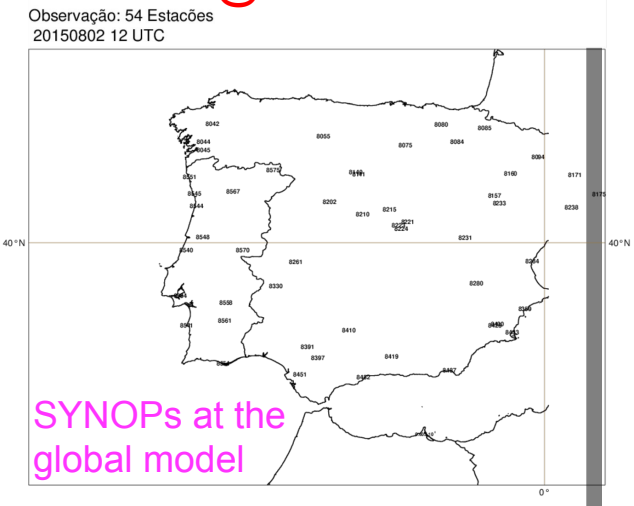


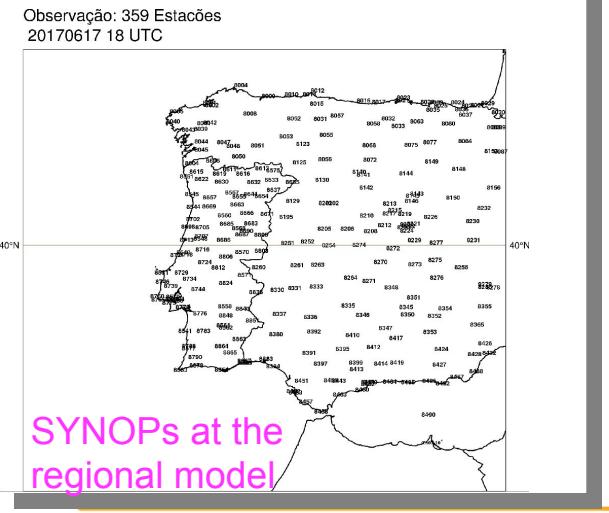
First B-matrix

Iberia: computation & validation done
Madeira: computation done & validation missing
Azores: not computed or validated

Diagnostics on the implemented solutions

Still under validation@ECMWF !





REF = Operational (AROME physics, CY38T1, CY40T1_bf07, L60, 2.5km), dynamical ADaptation from ARPEGE at 10km, Iberian Peninsula domain (PT2)

3 AROME_PT2, MAD, AZO experiments

- dynAD_cy43_l60
- sfxDA_cy43_l60
- sfx+3DvarDA_cy43_l60

Observations

Local, GTS WMO BUFR: SYNOP, TEMP, AIREP

OIFS HDF5 radar (tested; not fully used yet)

2 target weather period

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

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

3 target screen level fields (home-made validation tool)

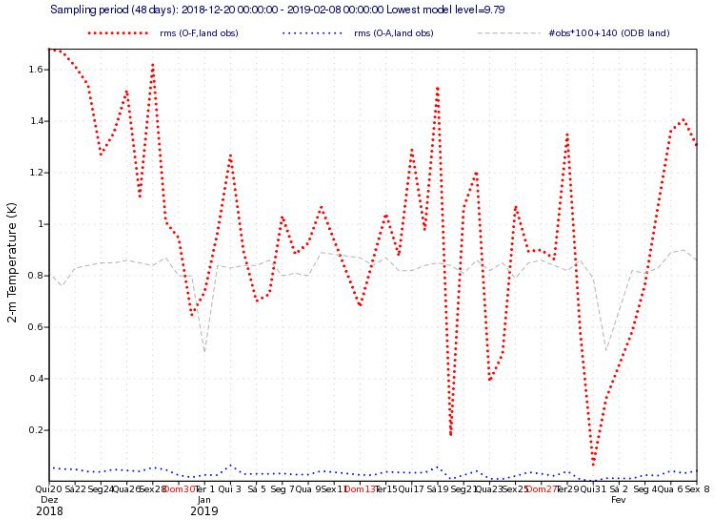
T2M - 2-metre Temperature

H2M - 2-metre Relative Humidity

W10M - 10-metre Wind speed

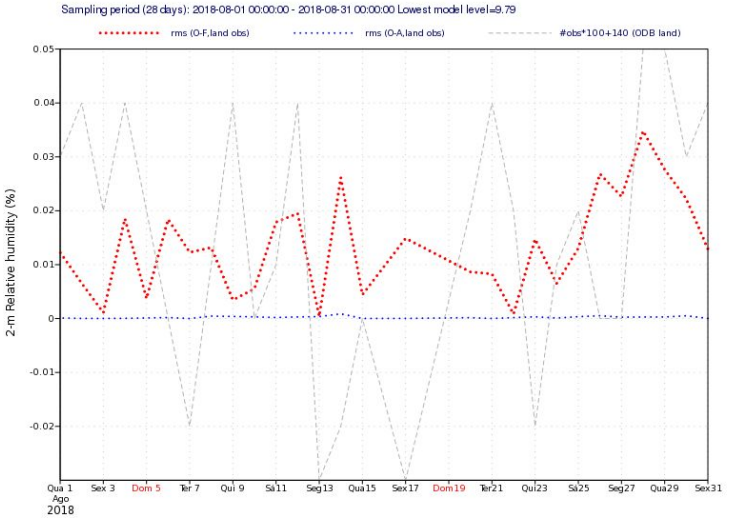
Diagnostics on the implemented solutions

RMS: O-F vs O-A surfAD (T2m)



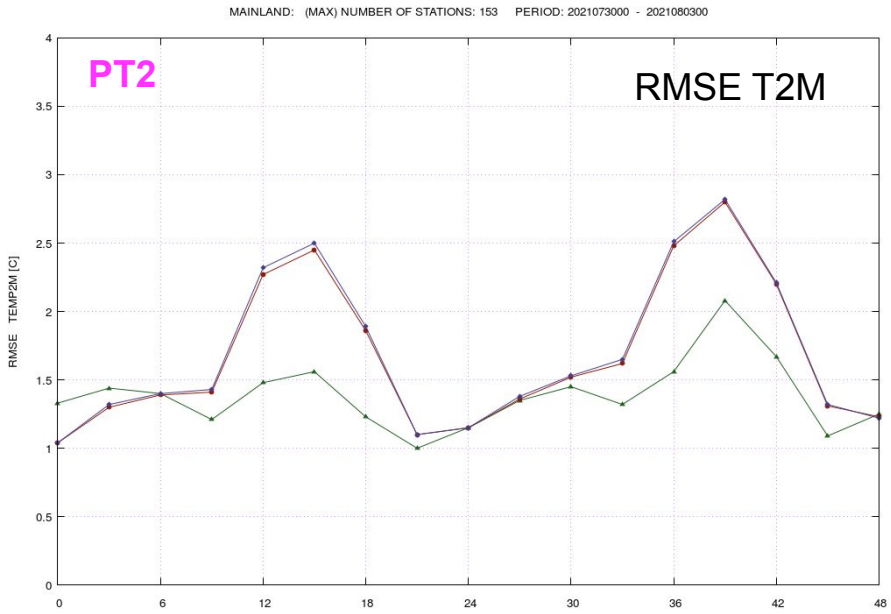
Winter: departures O-A at stations are smaller than innovations

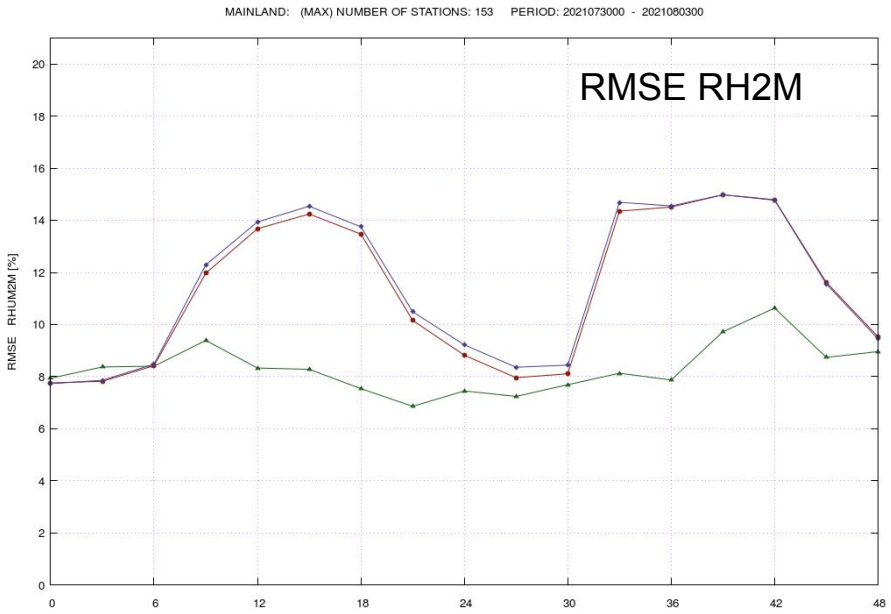
RMS: O-F vs O-A combDA (H2m)

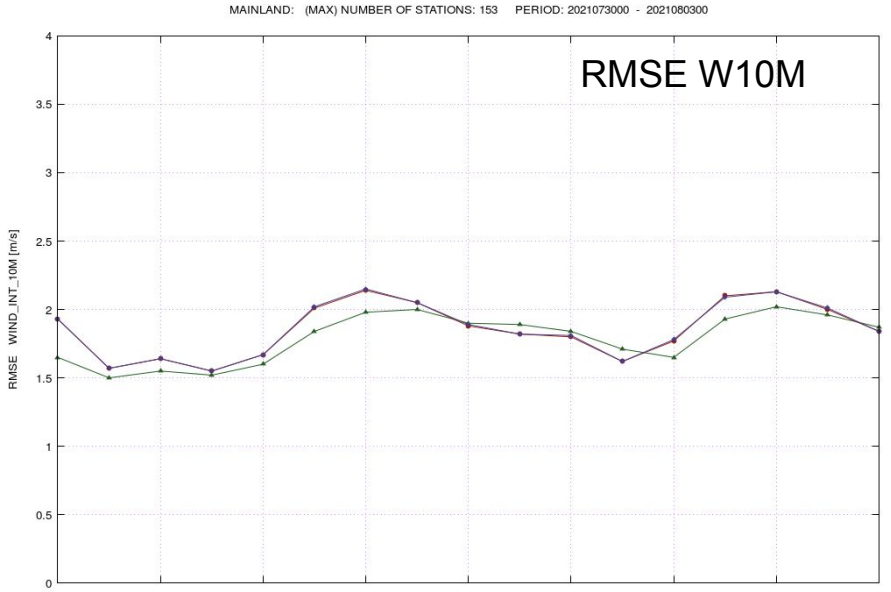


Summer:departures O-A at stations are smaller than innovations

Preliminary scores





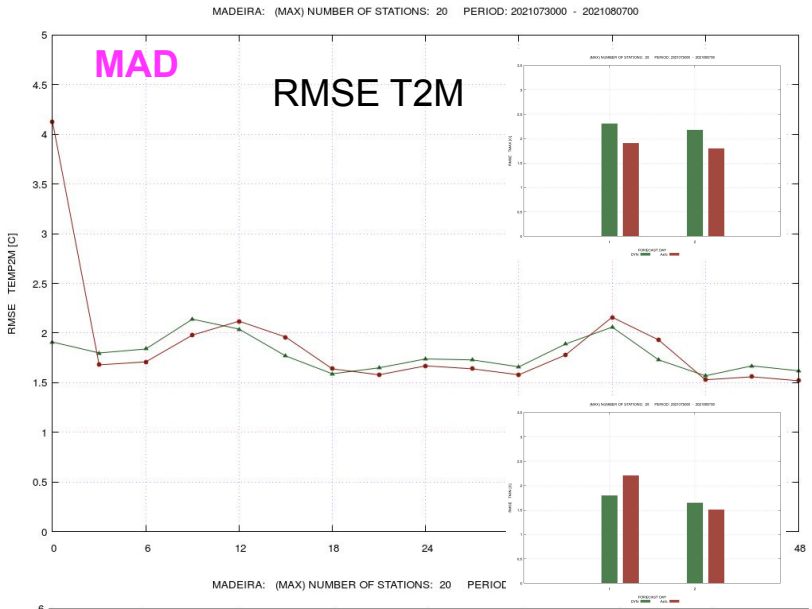


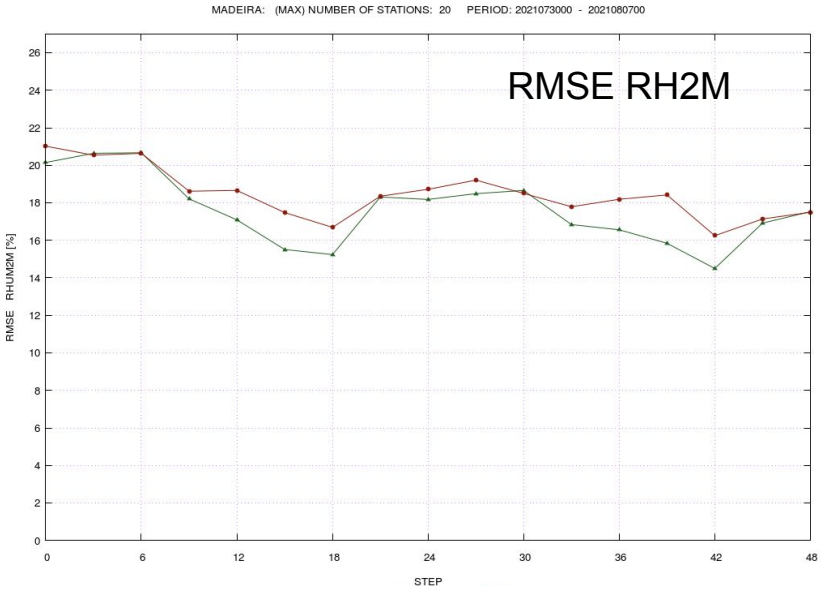
- DYNAD
- Surface DA
- Combined DA

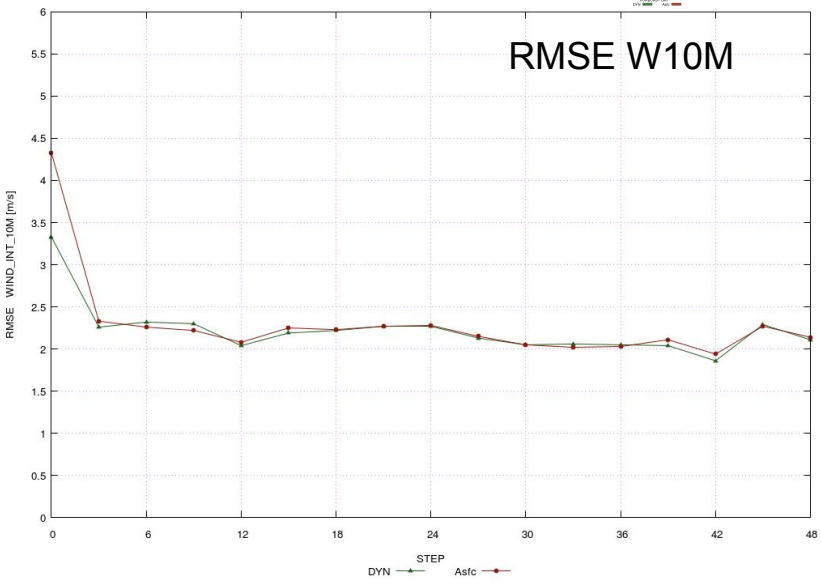
Just **5 summer days** (!) of **screen-level scores** (after 10-day cycling):

1. generally speaking, the combined solution seems slightly better than the surface solution, but also suggests that it is driven by the surface solution
2. but the improvement is only seen for the first time steps (6-hour)
3. the forecast error is a clear function of the diurnal cycle, for all the parameters, when compared with dynamical adaptation; and this degradation is seen in

Preliminary scores







- DYNAD
- Surface DA

Just **9 summer days** (!) of **screen-level scores** (after 10-day cycling):

1. generally speaking, the surface DA solution seems add value to the T2M forecast, but not to the RH2M
2. however, a degradation is visible in the initial time step, which suggests a setting or post-processing problem (already seen once)
3. the function of the forecast error with the diurnal cycle is only slightly visible for T2M (seen before)

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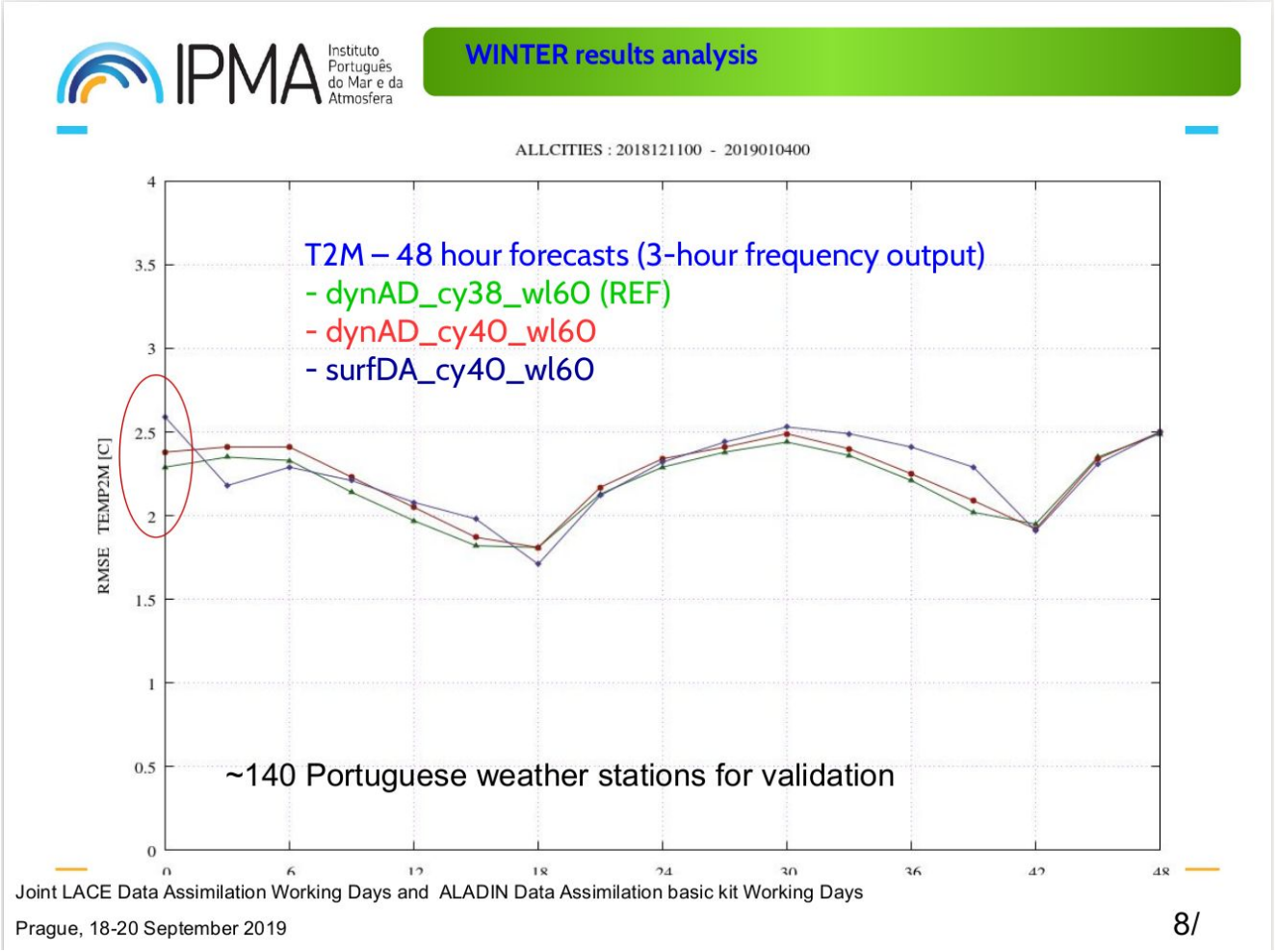
Conclusions and (near future) outlook

- The actual cycling of the surface and combined DA solutions is expected to continue in order to provide info on the way to the progress; however parallel investigation will continue to solve issues
- More studies, as diagnostics and tuning, are expected to occur when required
- More conventional observations will start to be assimilated. And, special will be given to OIFS radar
- The Azores domain is lacking some attention too, but that will be for later...
- In the meantime, a new HPC machine will be locally implemented ... and a decision on a new cycle and/or or new geographical domain and/or new CSC will possibly be taken …

Thank you for your attention !

LNOTS_T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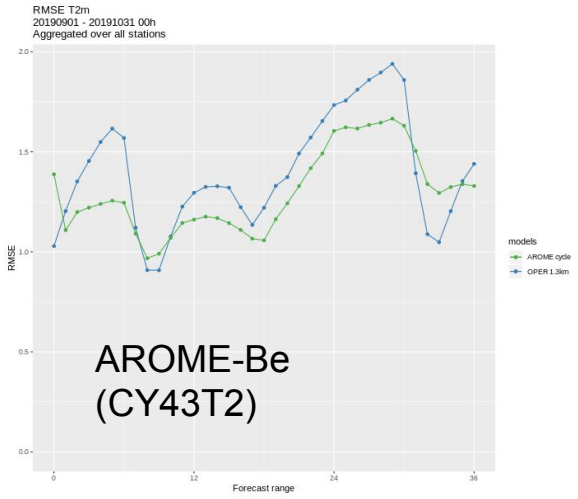
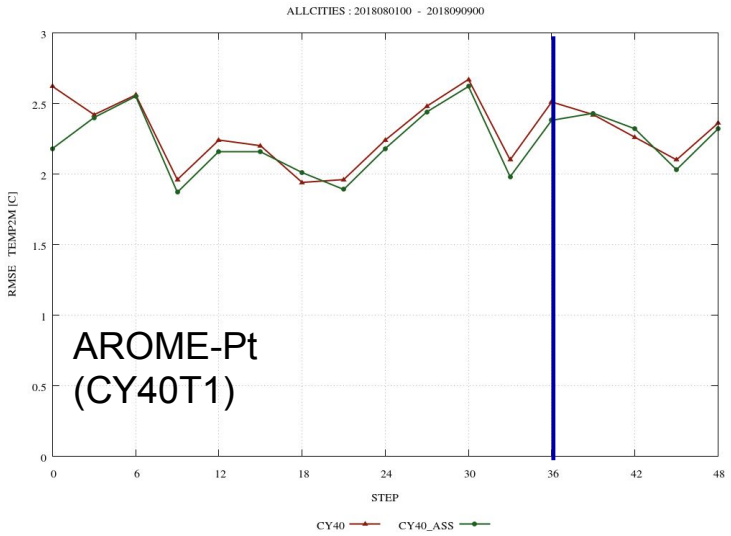
WINTER results analysis
ALLCITIES : 2018121100 - 2019010400
T2M – 48 hour forecasts (3-hour frequency output)
- dynAD_cy38_wl60 (REF)
- dynAD_cy40_wl60
- surfDA_cy40_wl60
RMSE TEMP2M [C]
~140 Portuguese weather stations for validation
Joint LACE Data Assimilation Working Days and ALADIN Data Assimilation basic kit Working Days
Prague, 18-20 September 2019
8/

Status on Surface DA (CY40T1_bf07)





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**
T2M	positive (specially at H+00)	positive up to H+12; negative afterwards
H2M	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)