IPMA Instituto Português do Mar e da Atmosfera

2017

Status report on implementation of ALADIN Data Assimilation systems at IPMA

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With collaboration of
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IPMA

Joint LACE Data Assimilation Working Days and ALADIN Data Assimilation basic kit Working Days

Prague, 18-20 September 2019

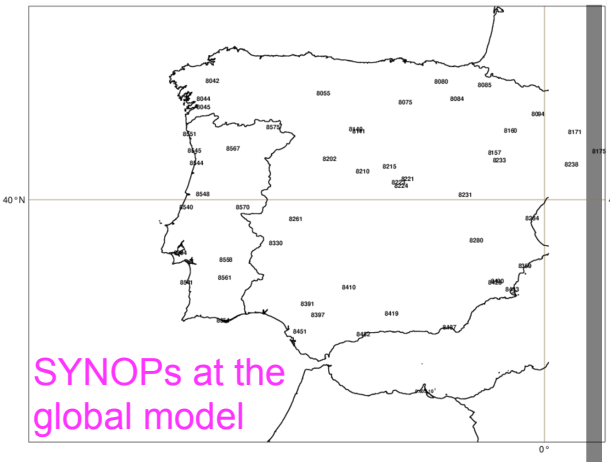
Topics

1. Motivation & goals
2. Impact/validation of local Surface DA (CY40) *vs*. REF (CY38)
3. WINTER results analysis
4. SUMMER results analysis
5. Conclusions & future outlook

Motivation & goals

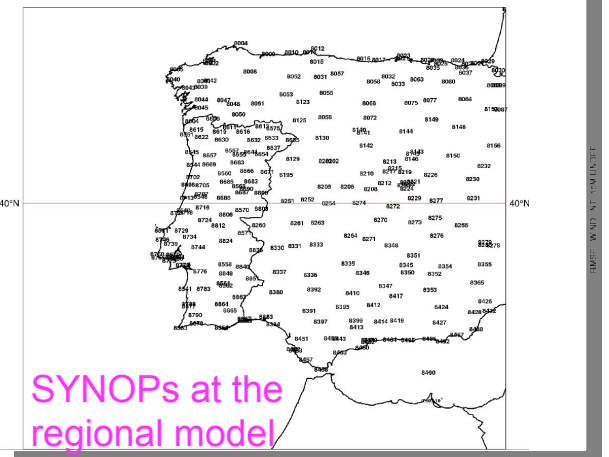
Surface Data Assimilation with screen-level parameters (Giard and Bazile, 2000)
September 2018: operational at CY38T2_L46 (export version)

Observação: 54 Estações
20150802 12 UTC

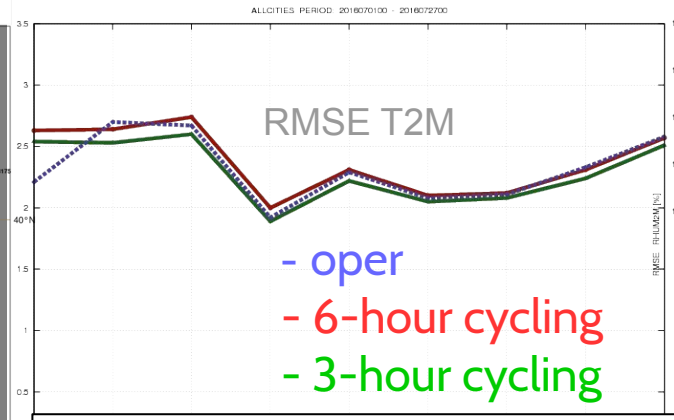


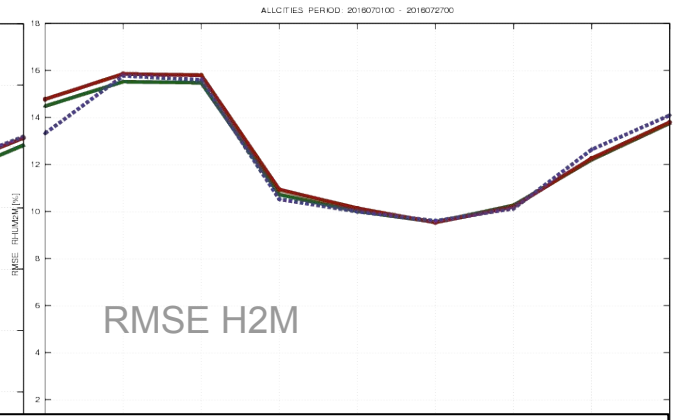
SYNOPs at the global model

Observação: 359 Estações
20170617 18 UTC

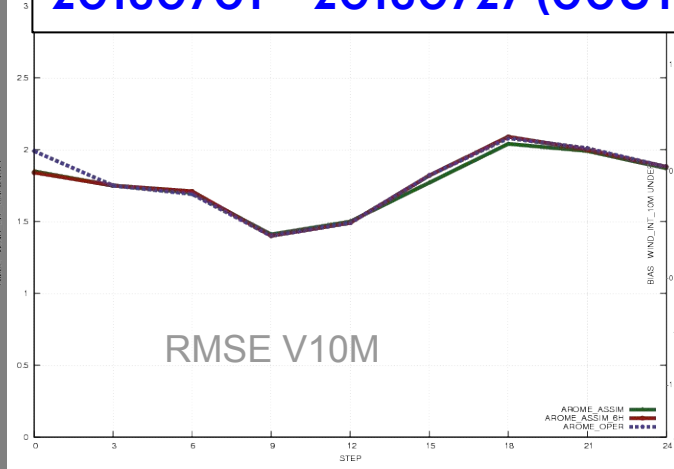


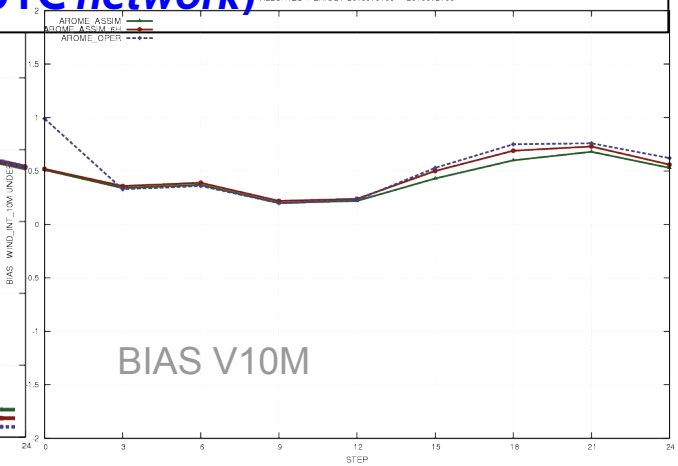
SYNOPs at the regional model





24-hour forecast OI_MAIN validation for a Summer period: 20160701 – 20160727 (00UTC *network*)





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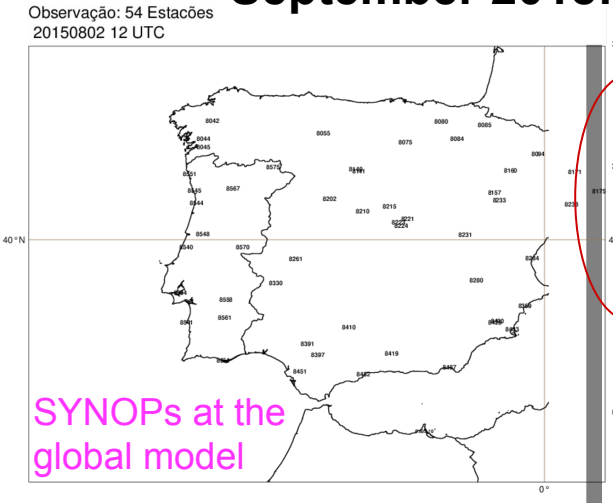

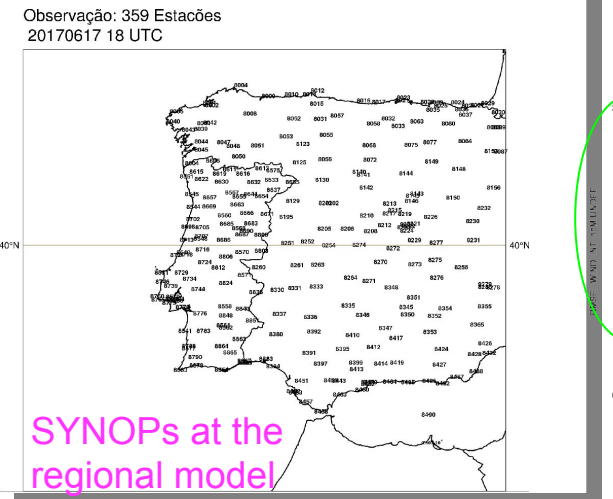

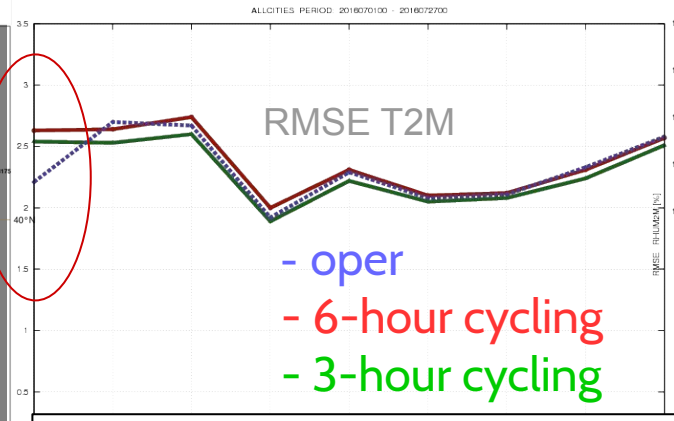

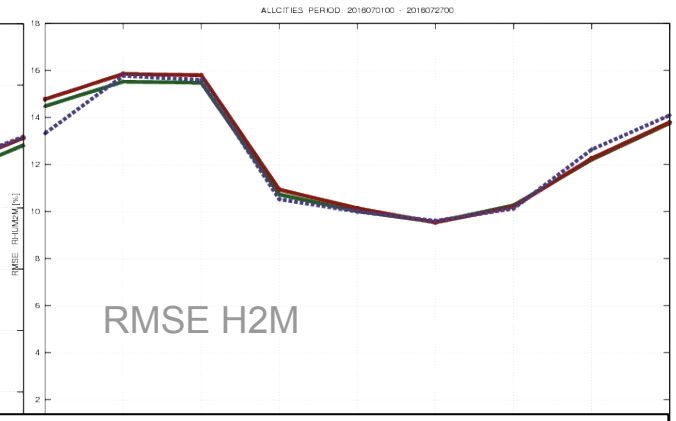

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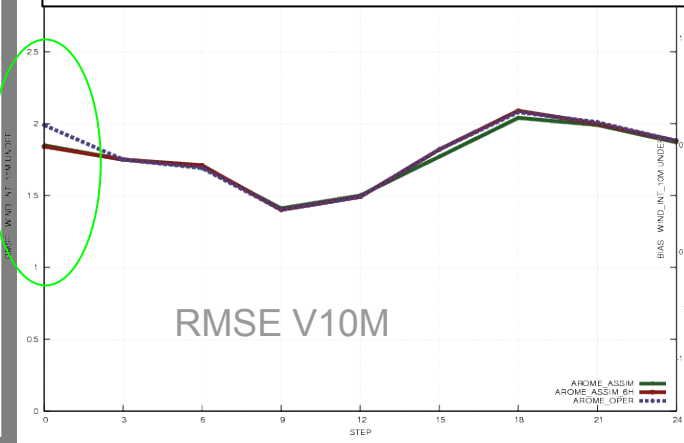
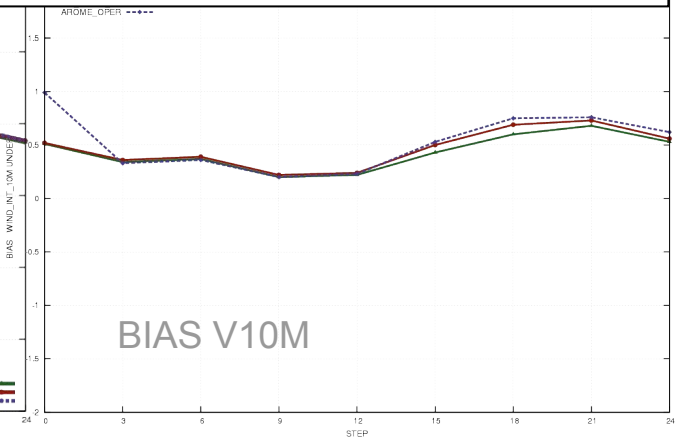




Impact/validation of local Surface DA (CY40) *vs.* REF (CY38)

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

4 AROME_PT2 experiment settings were prepared:

- dynAD_cy40_wl60 – to validate the porting of dynamical adaptation
- surfDA_cy40_wl60 – to validate the 2018 surface DA KIT (10-day cycling period before sampling...)
- surfDA_cy40_wl46
- surfDA_cy38_wl46 (original cycling without cpl_ts)

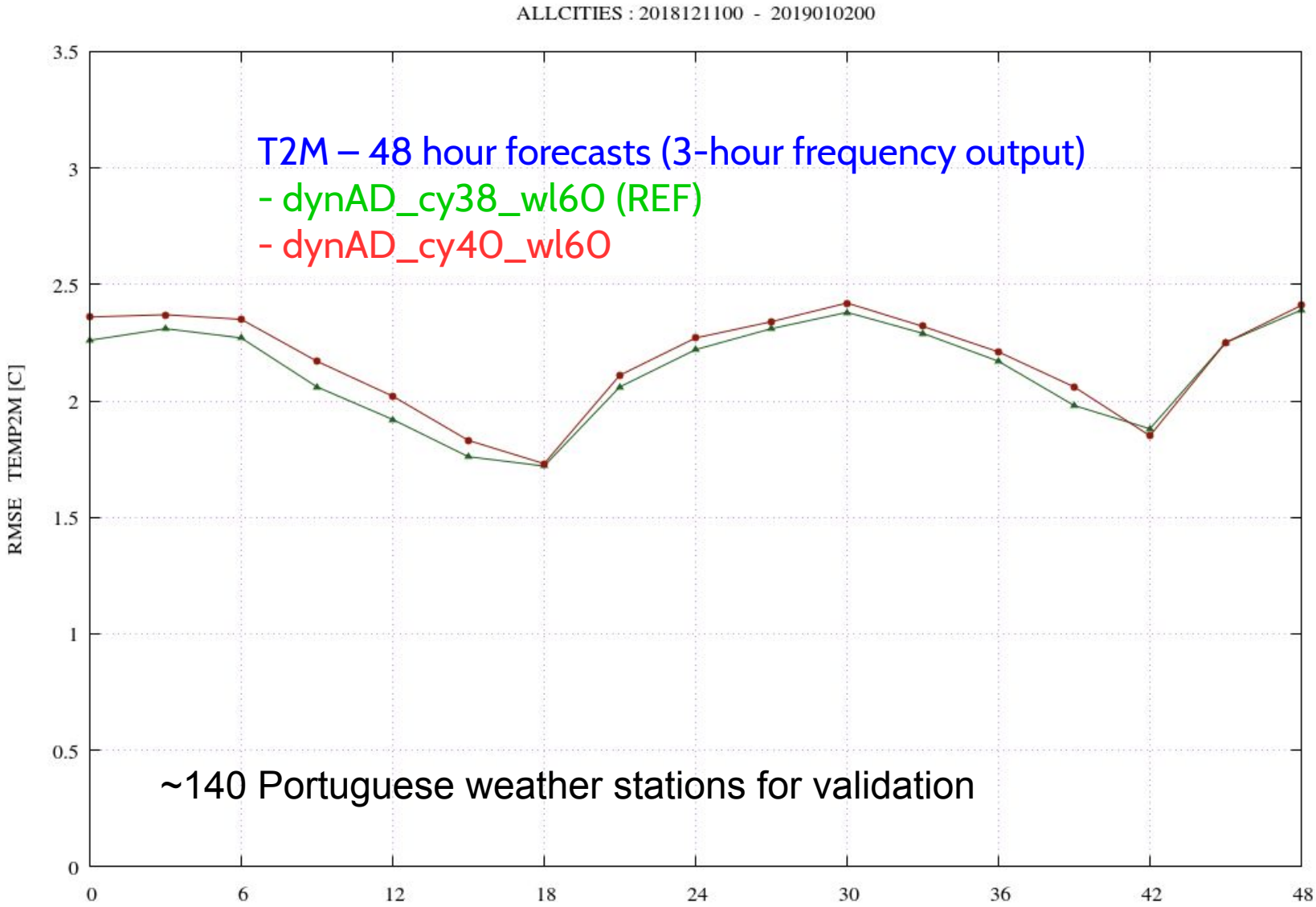
2 target weather periods:

Winter: 11dez2018 - 10fev2019 (cold/rainy) -> 60 days
Summer: 01ago2018 - 09set2018 (extreme temperatures) -> 40 days

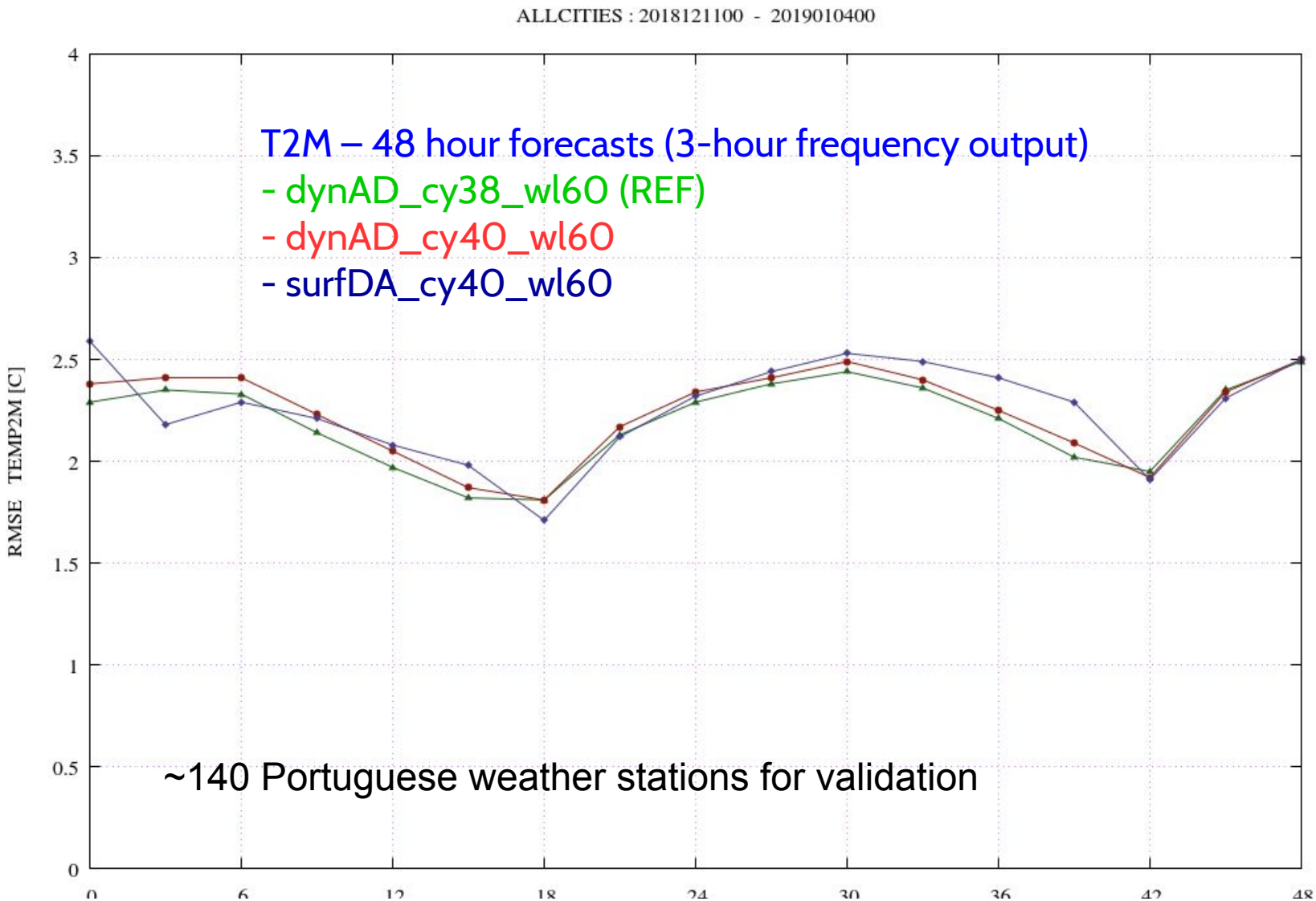
3 target screen level fields:

T2M - 2-metre Temperature
H2M - 2-metre Relative Humidity
W10M - 10-metre Wind speed

WINTER results analysis



WINTER results analysis



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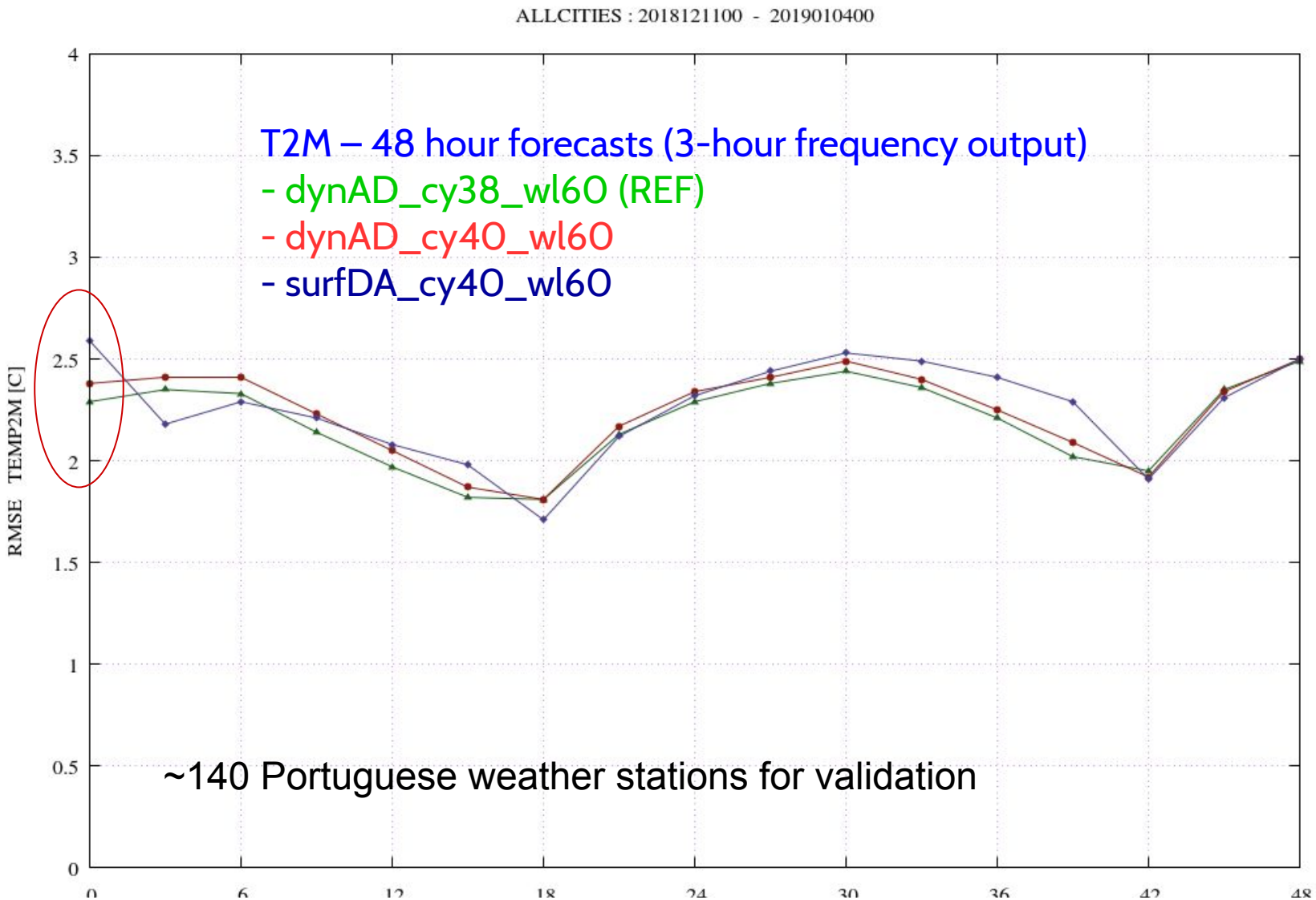

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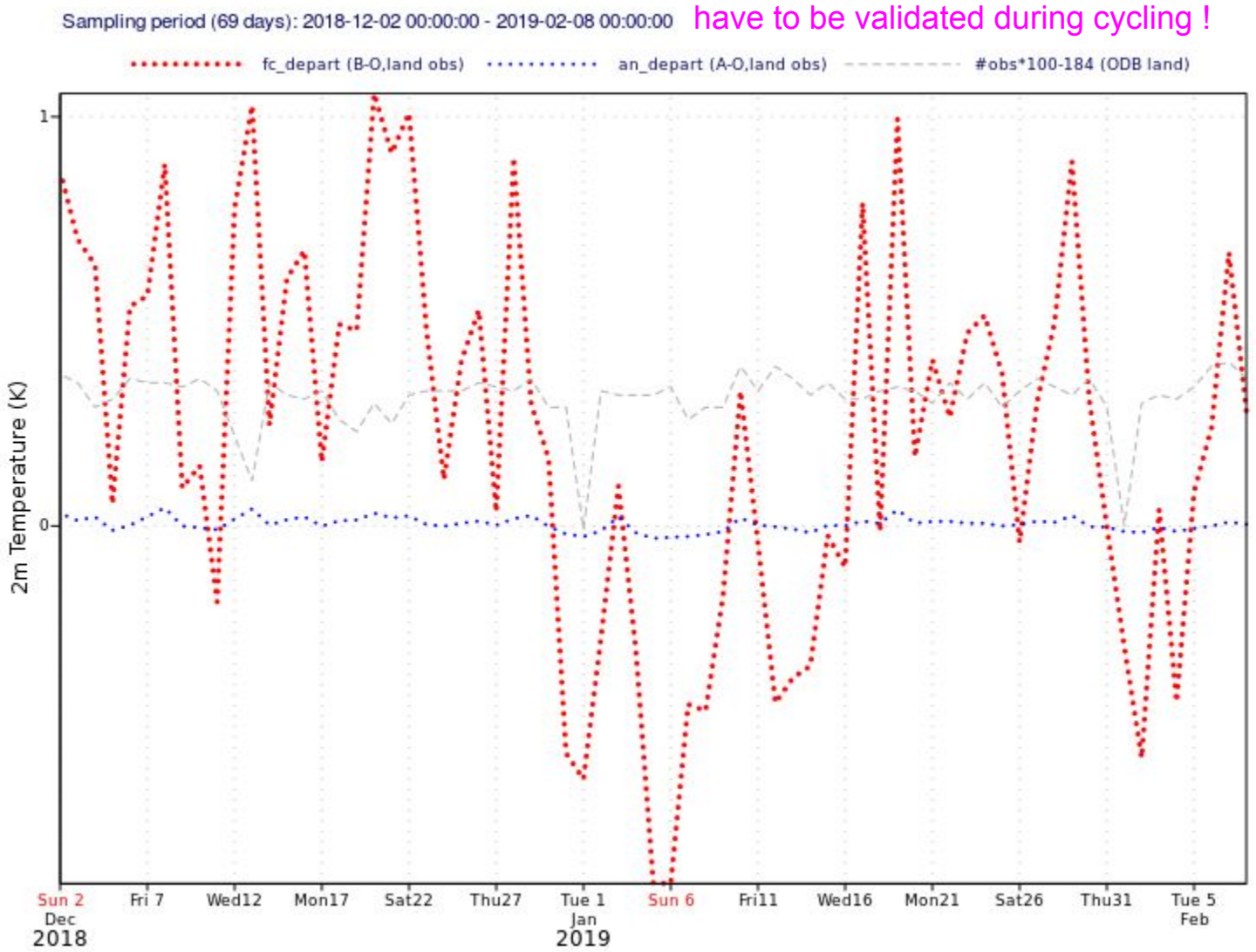
WINTER results analysis

DA diagnostics seem to show that the horizontal mapping is O; vertical interpolation of increments have to be validated during cycling !



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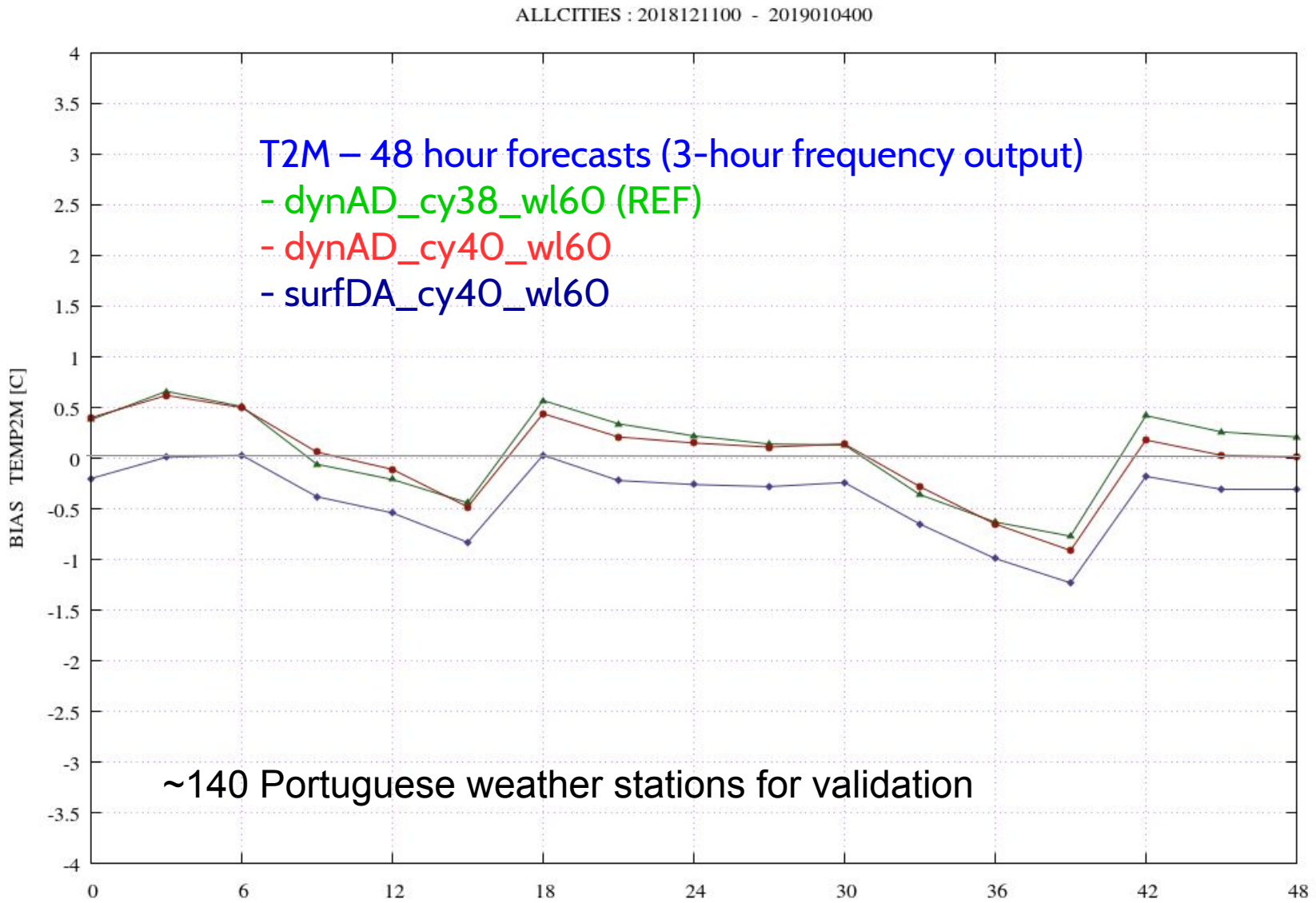
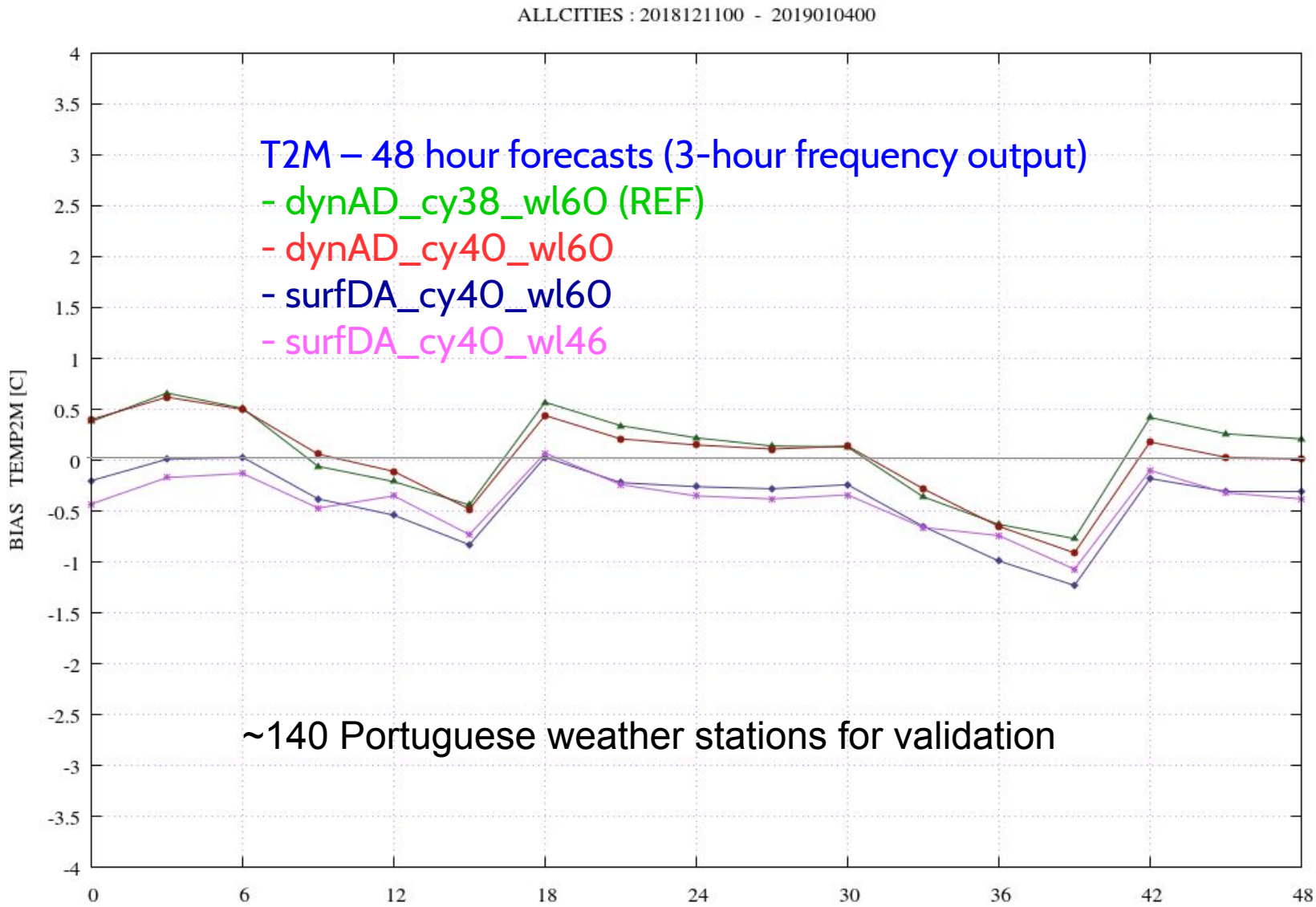
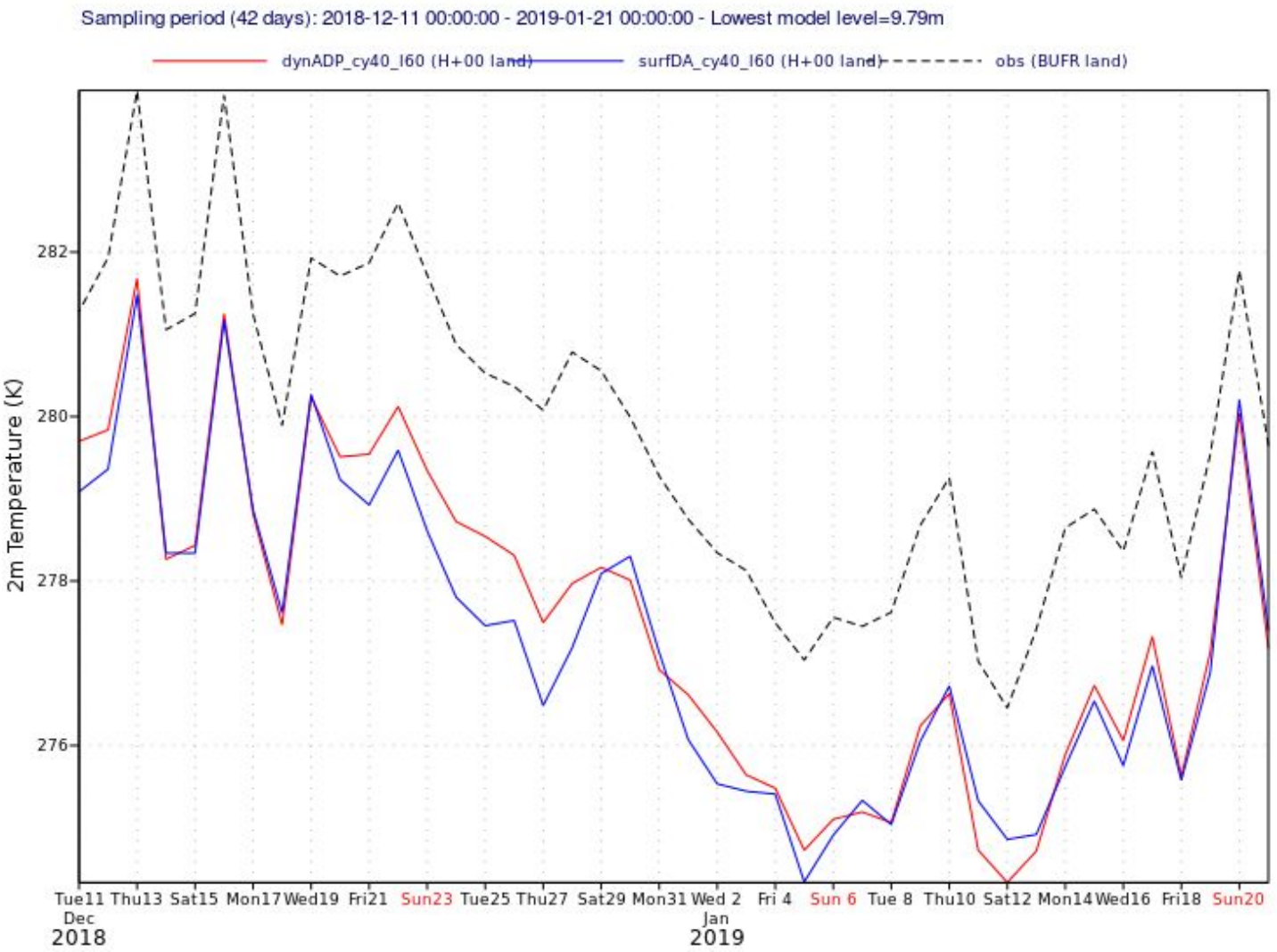


WINTER results analysis



WINTER results analysis



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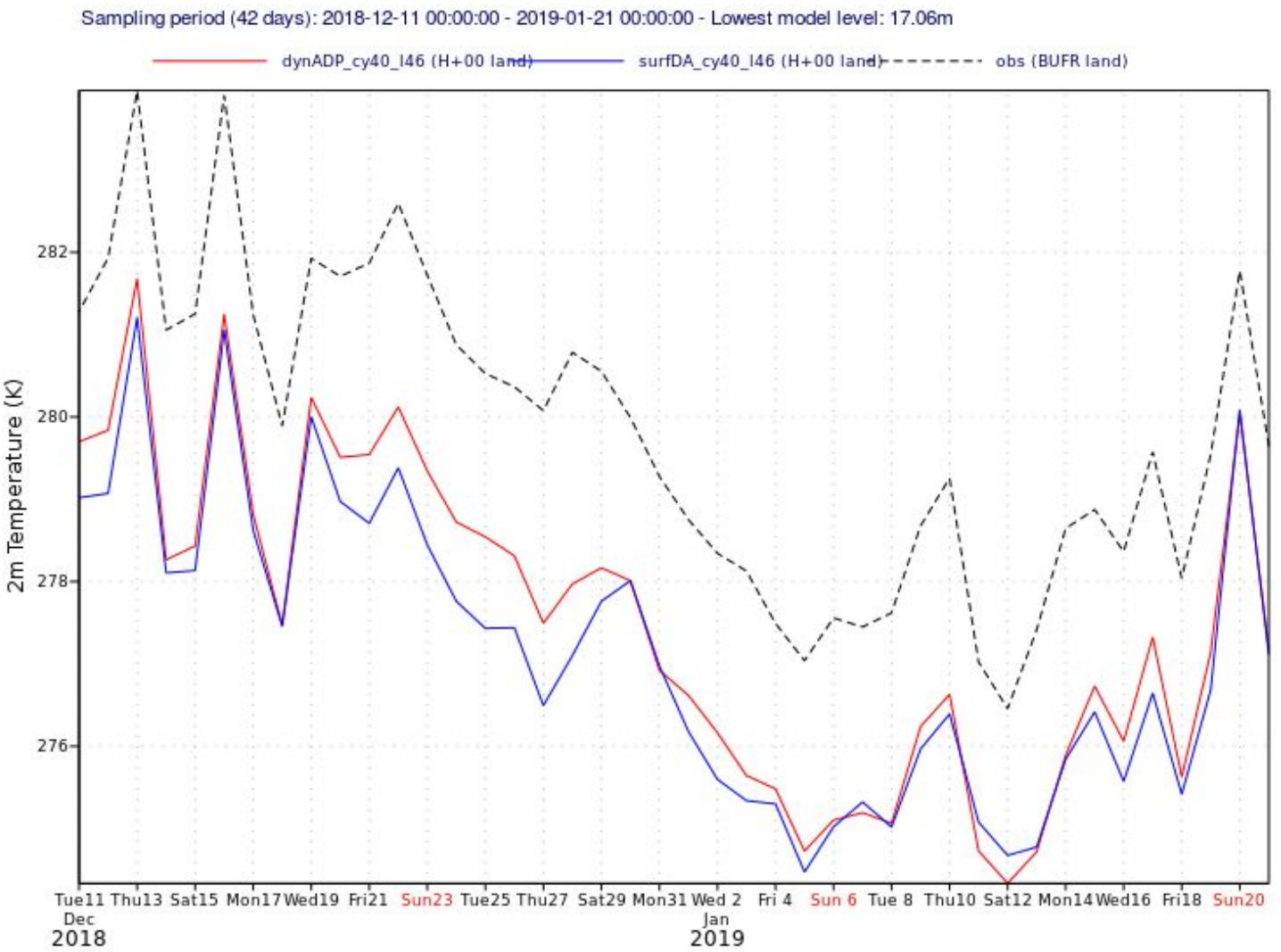

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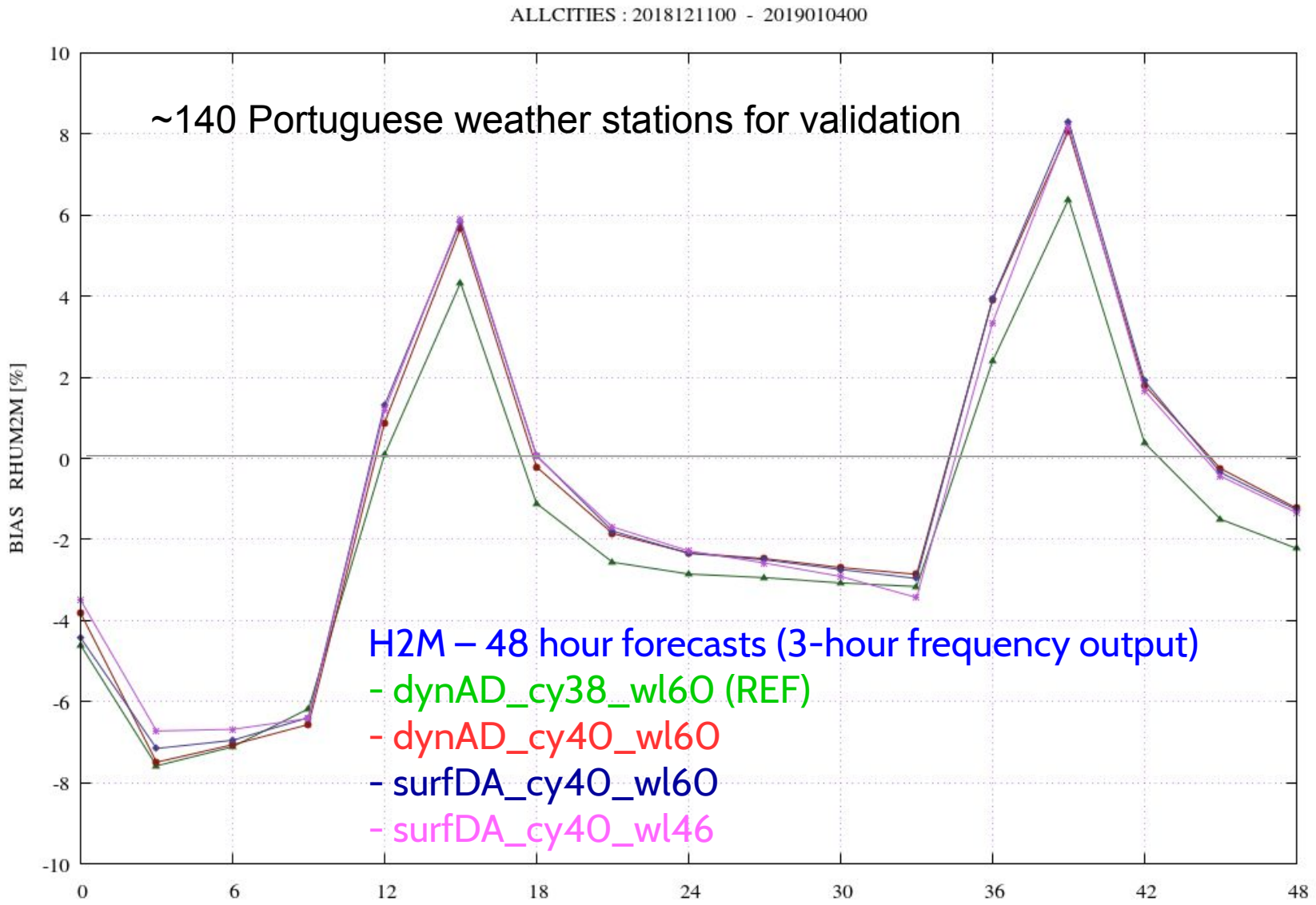
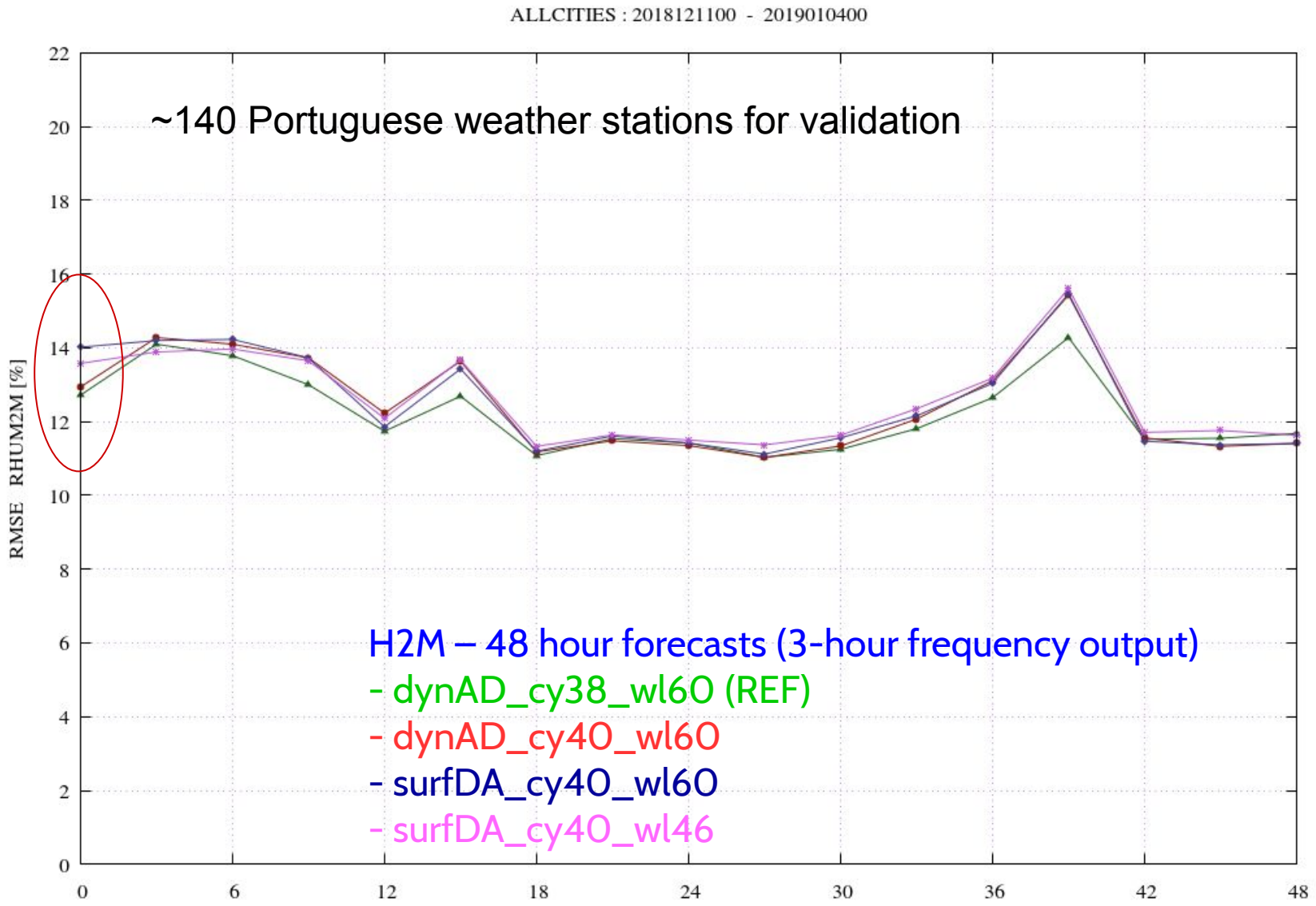
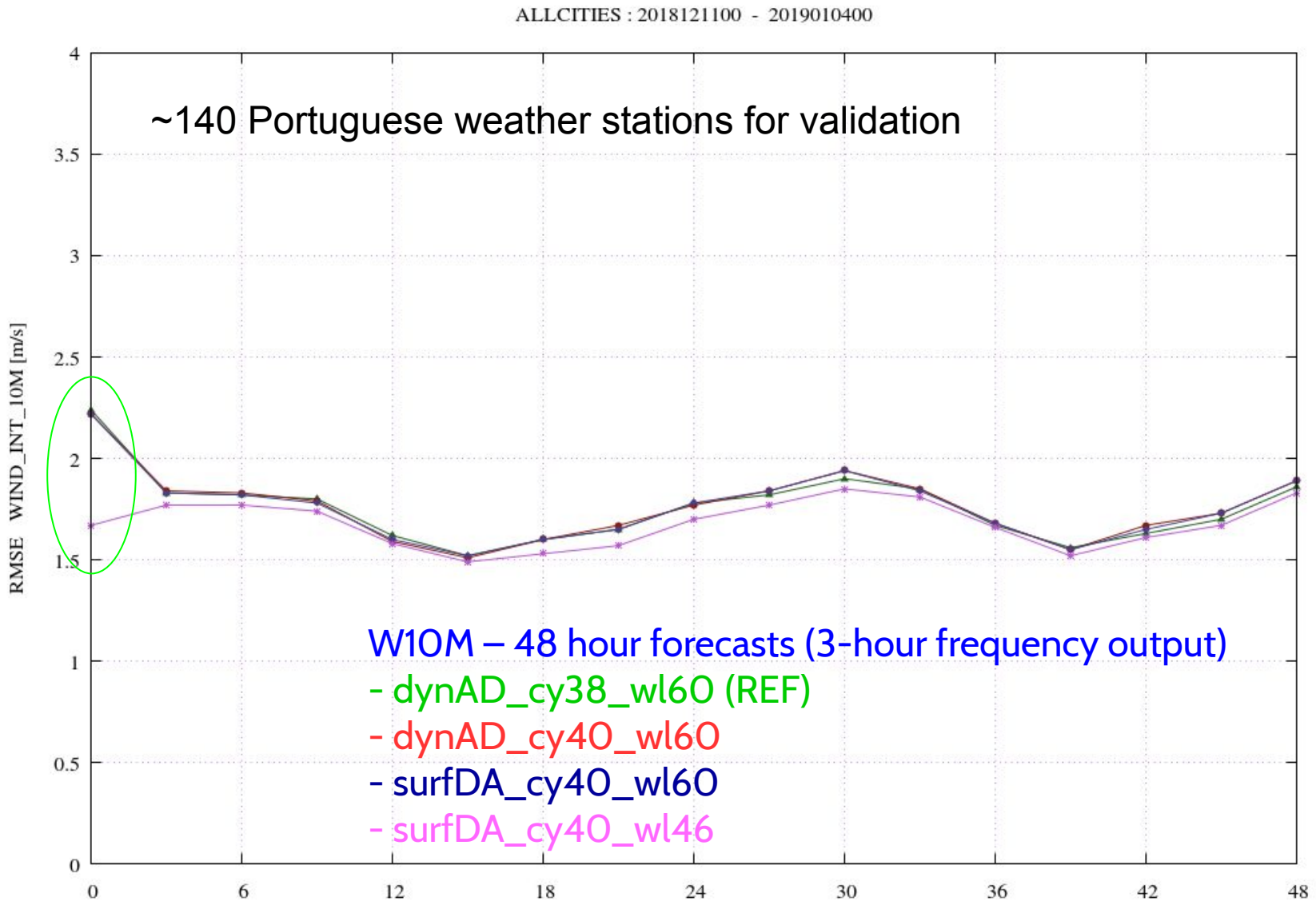


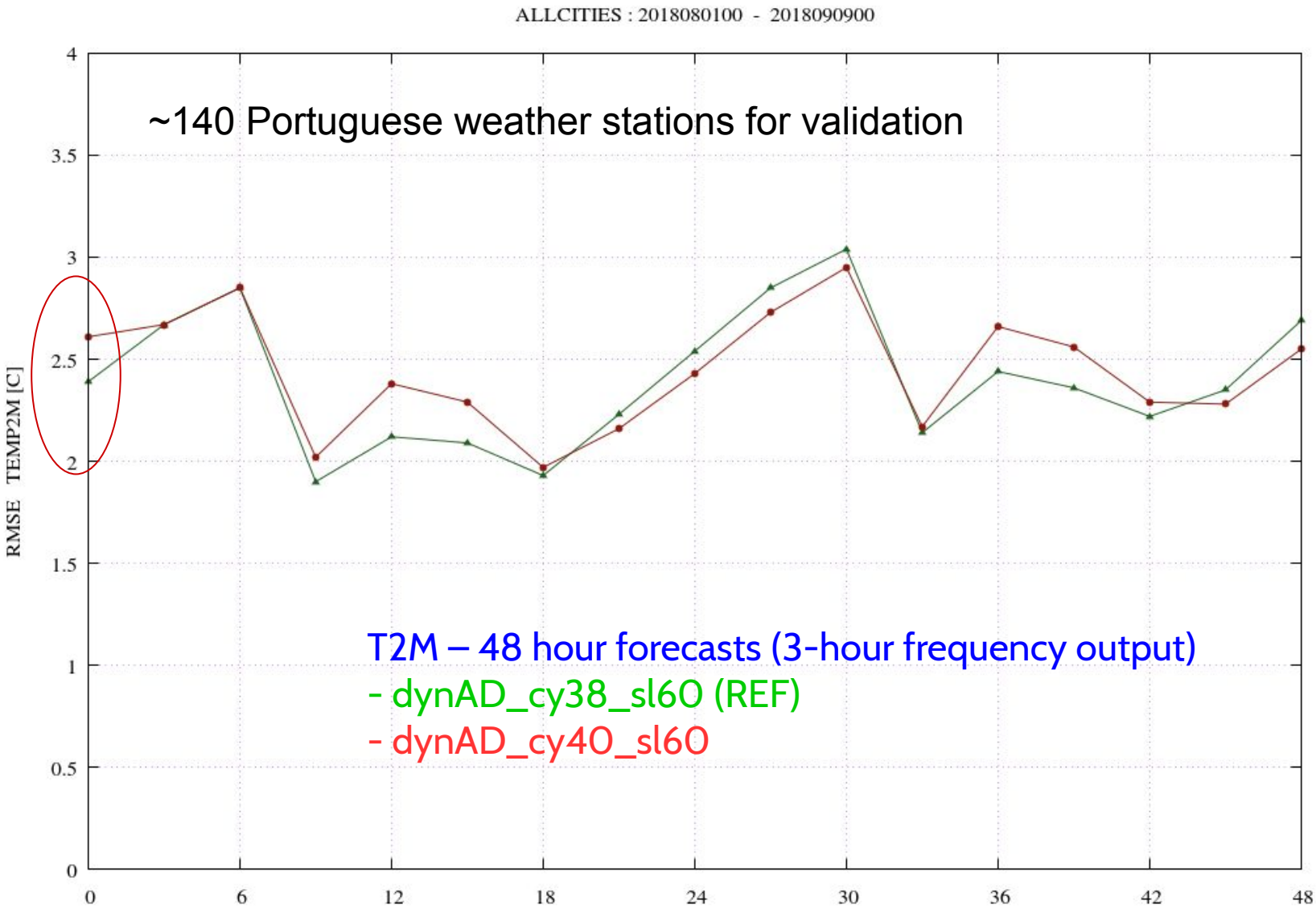
WINTER results analysis



WINTER results analysis



SUMMER results analysis



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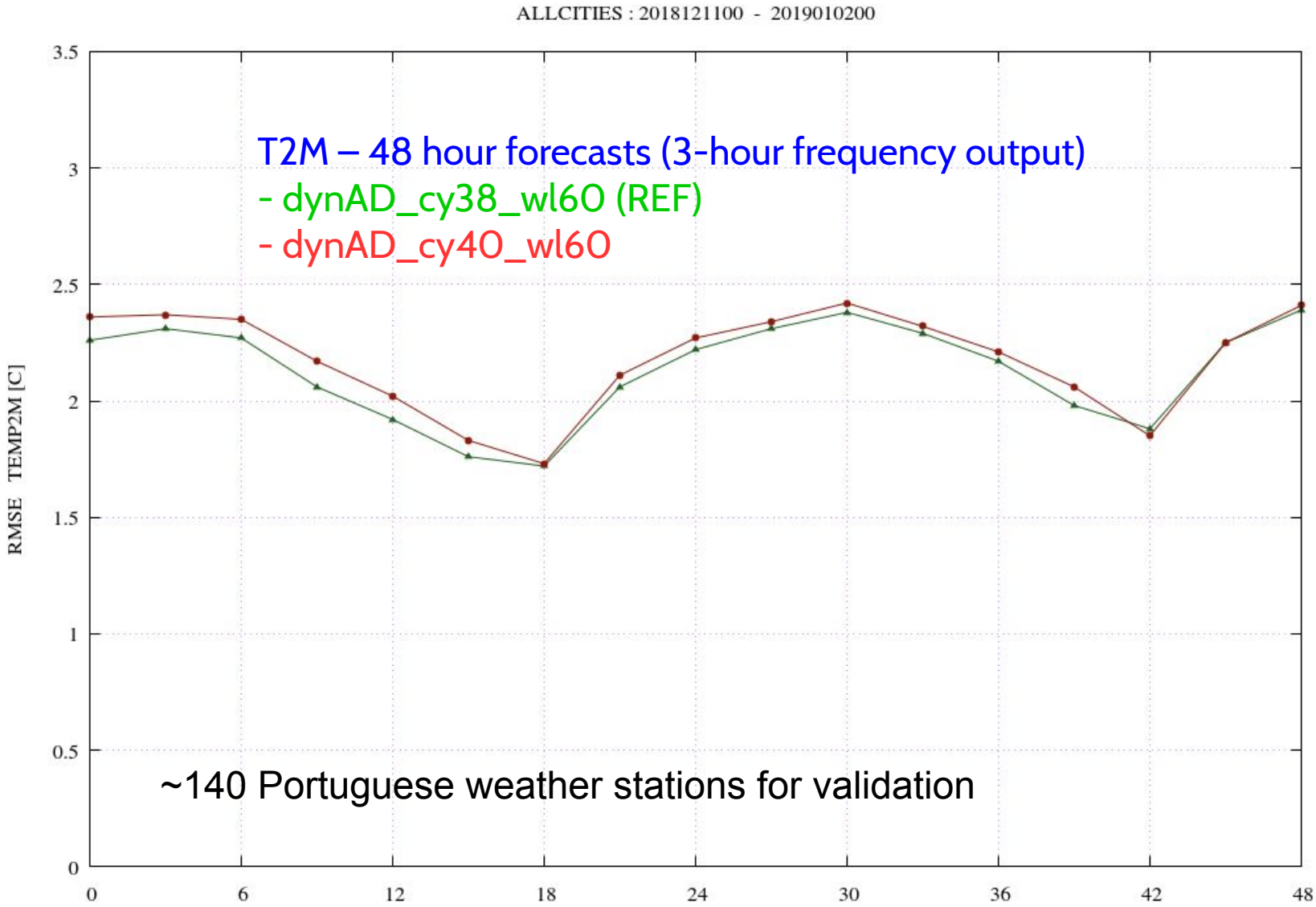

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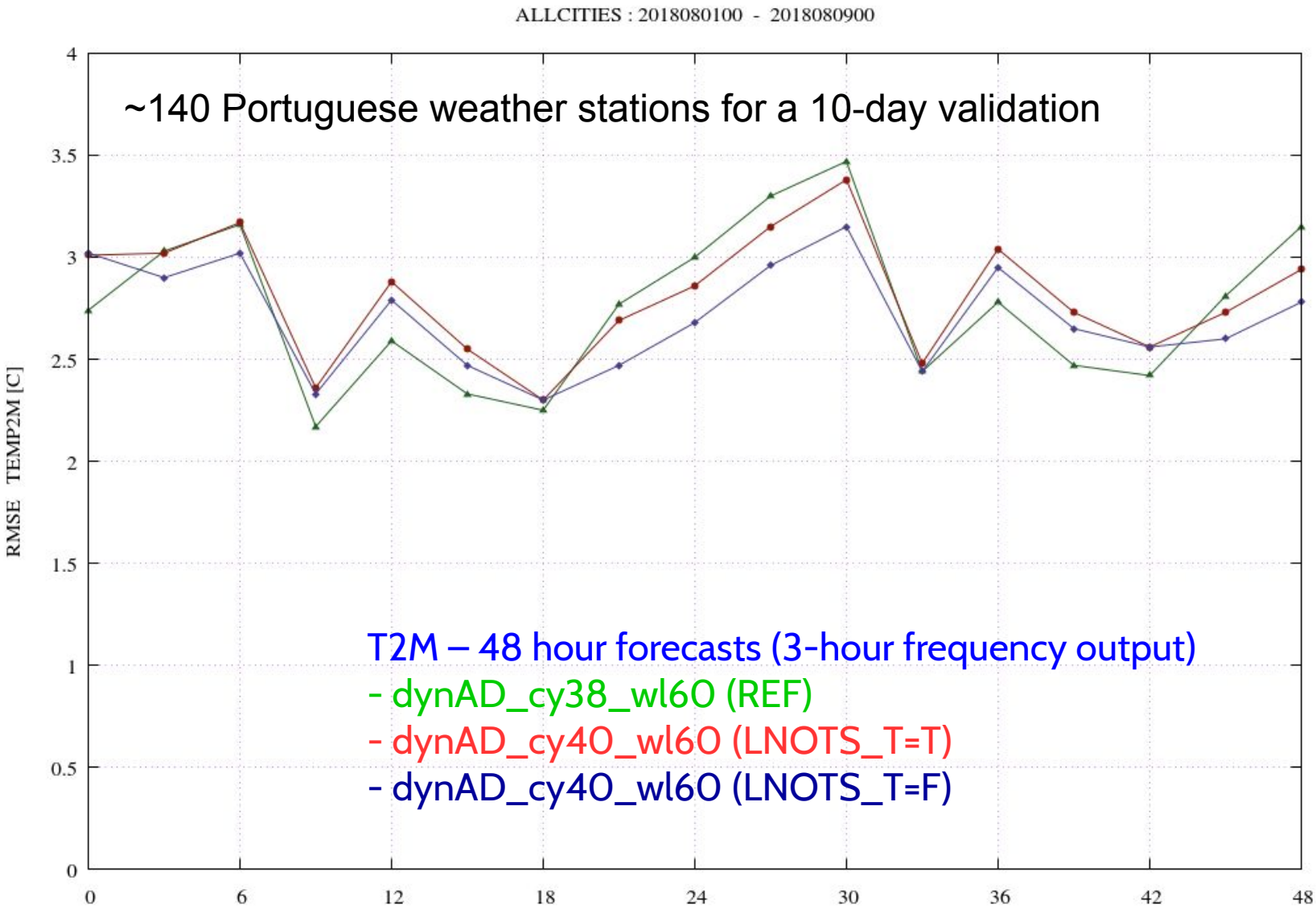

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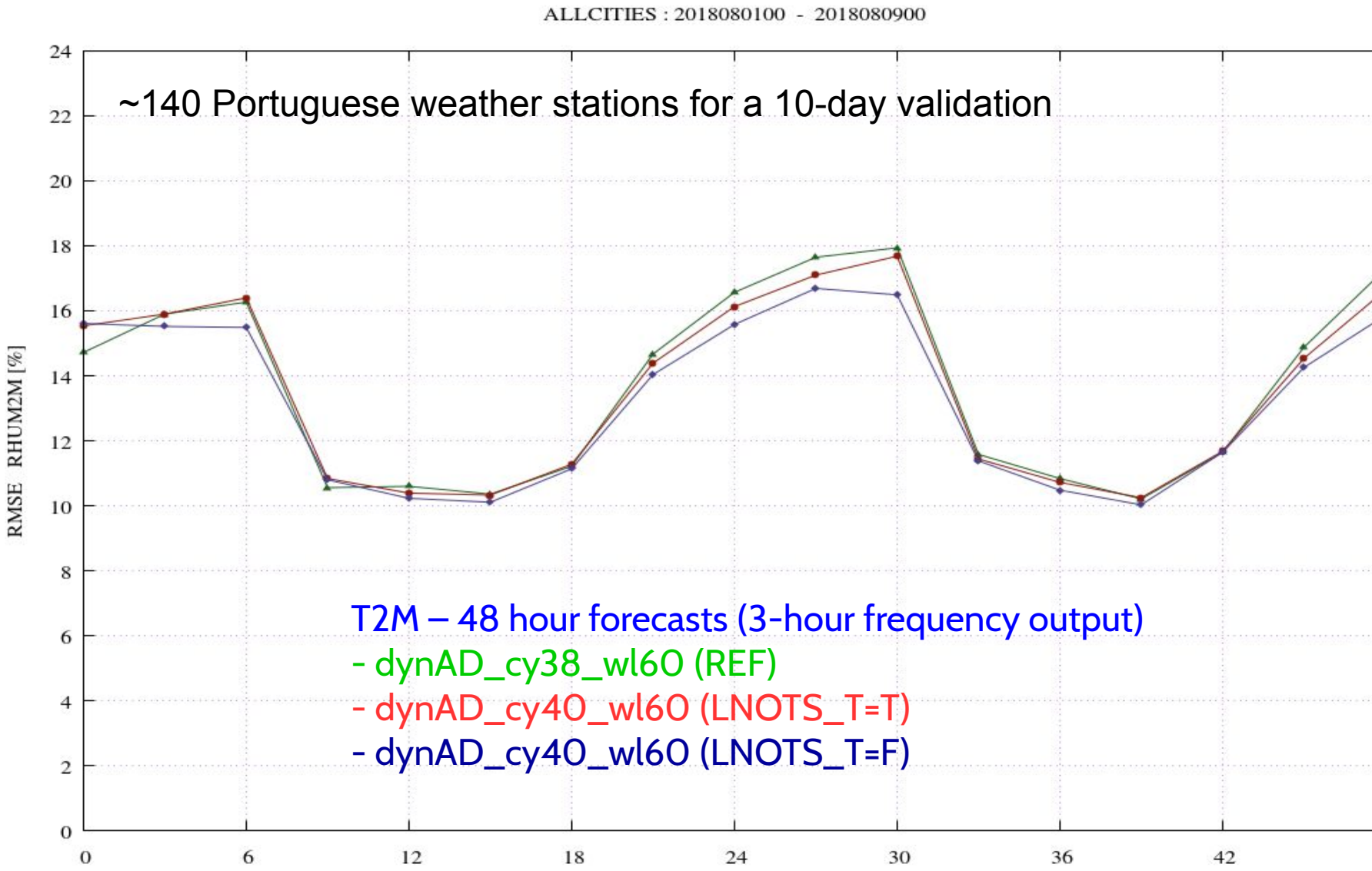


Conclusions & future outlook

Porting dyn_AD:

1- the impact of CY40T1 seems to be neutral for WINTER conditions but negative during daytime for SUMMER (T2M); on the other hand

2- LNOTS_T=F has a neutral impact during WINTER but added value on CY40 during SUMMER

Cycling surface DA basic kit (WINTER) :

1- A-O << B-O which means horizontal mapping (CANARI) seems to be working well; and the same conclusions is given by A-B (at the observations points, not shown here)

2- the setting for wind is properly done

3- the added value of surfaceDA seems to depends on the lowest atmospheric model level and on the stability conditions (for comprehension see, for instance, Masson and Seity, 2009)

4- T2M forecast is the screen level parameter which gets the worse impact from surfDA

5- H2M tend to show better scores than T2M, but it is still below expectations

6- W10M neutral with 60 levels; excellent with 46 levels

Outlook:

1- conclusions on LNOTS_T have to lead to a new operational model setting

2- validation of 2018DA basic KIT for SUMMER (and still for WINTER) has to be finished

3- implementation of a full surface(OI_MAIN)+upper-air(3D-VAR) DA cycling (CY43T2 ?) with SYNOP, AMDAR, TEMP (?) and radar

Conclusions & future outlook

Thanks for your attention !

Motivation & Goals

1. Moving to a **"full" DA system** was an ambition to Portugal

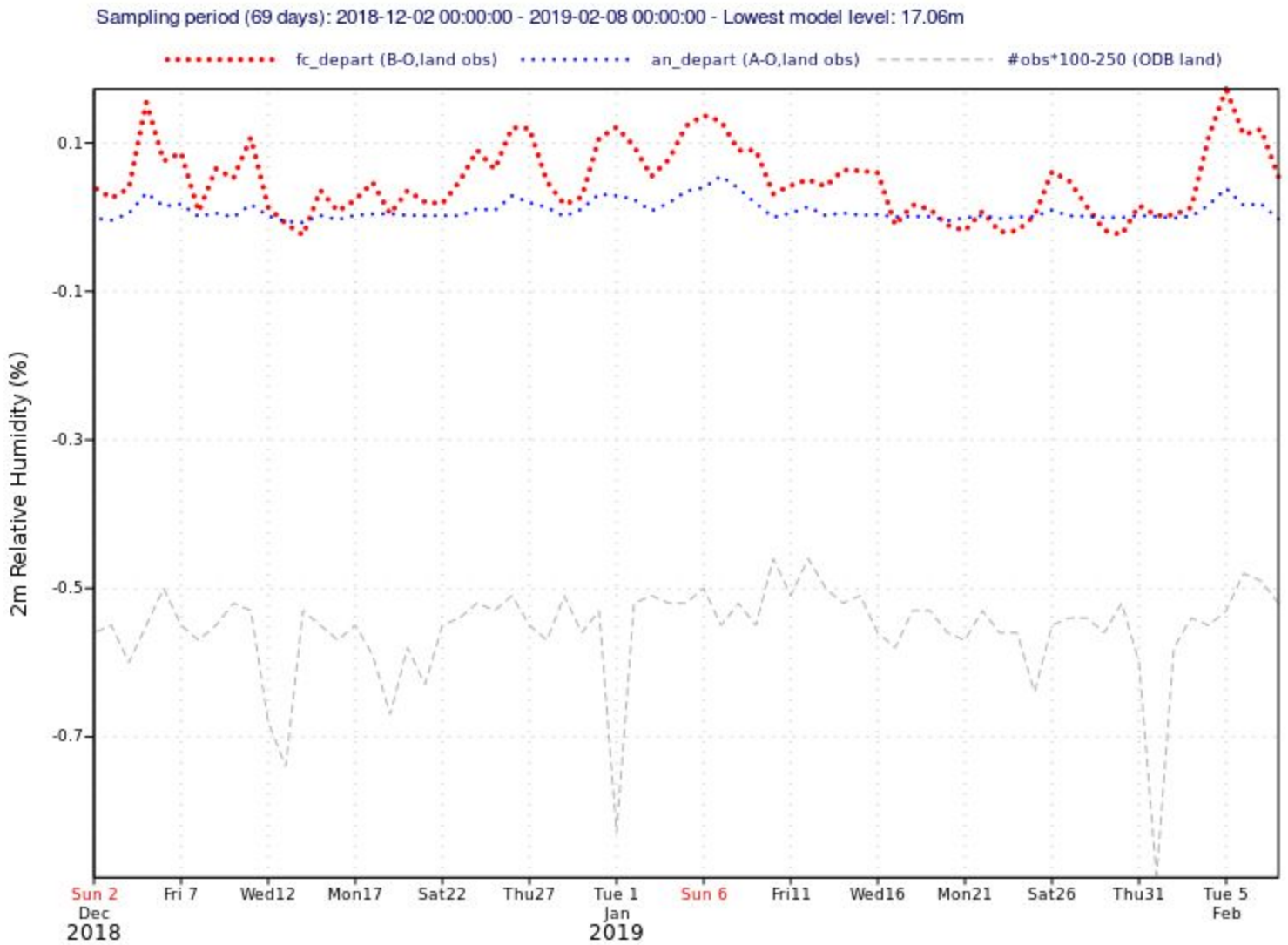
2. **ALADIN SPDA Goal !** develop a cross-consortia coordination to set-up a basic 3D-Var data assimilation cycle with a limited set of observations suitable for operational implementation

3. **CY40T1_bf07** looked like the best candidate to allow this achievement …

4. **SurfDAexer** the surface DA settings were ported to CY40T1 (export version) and cycled each 3 hours with the Iberian WMO BUFR SYNOP for the 2018DAsKIT, where the tasks were reviewed and updated with the support of Météo-France

5. Results should be reproducible

WINTER results analysis



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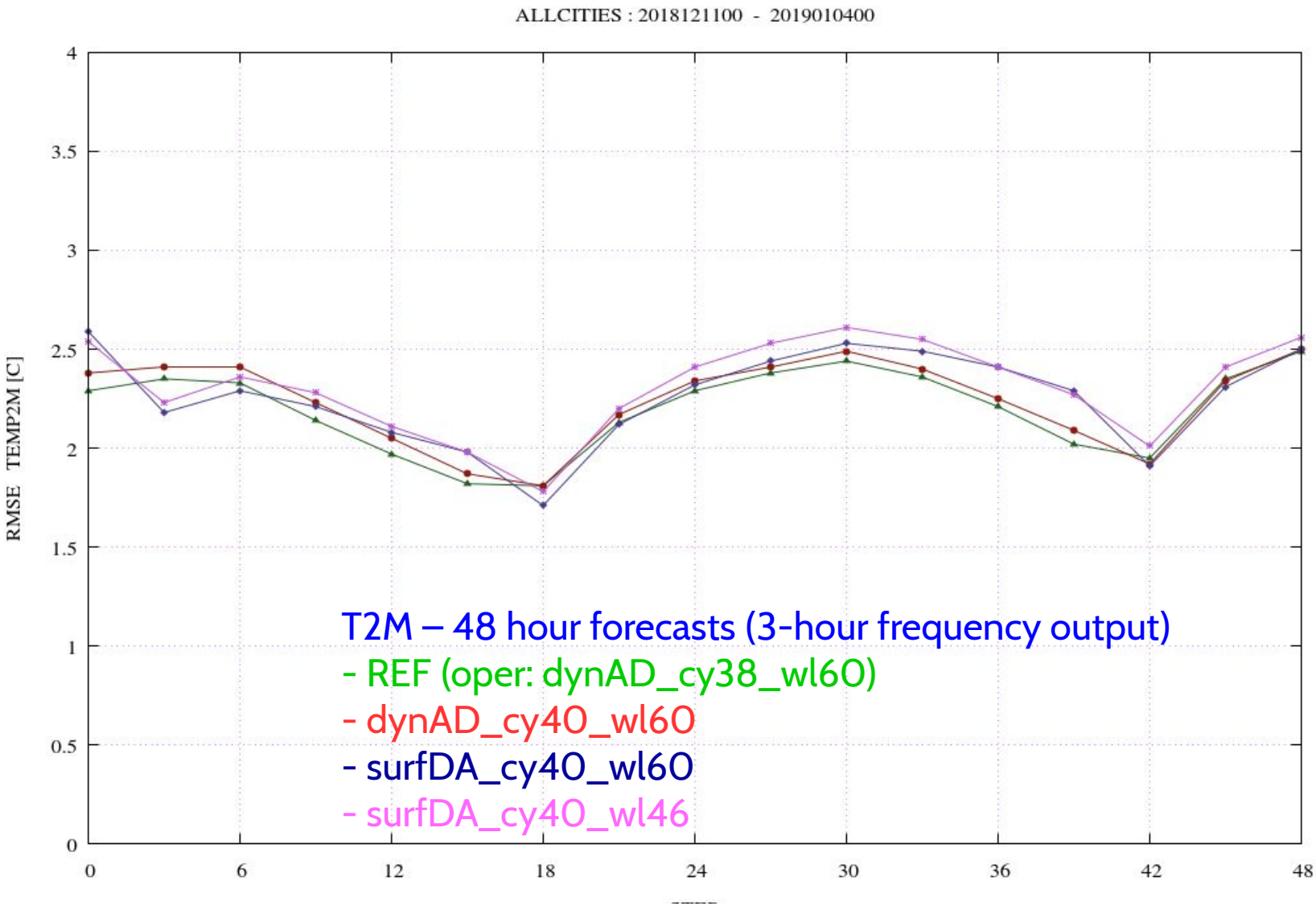
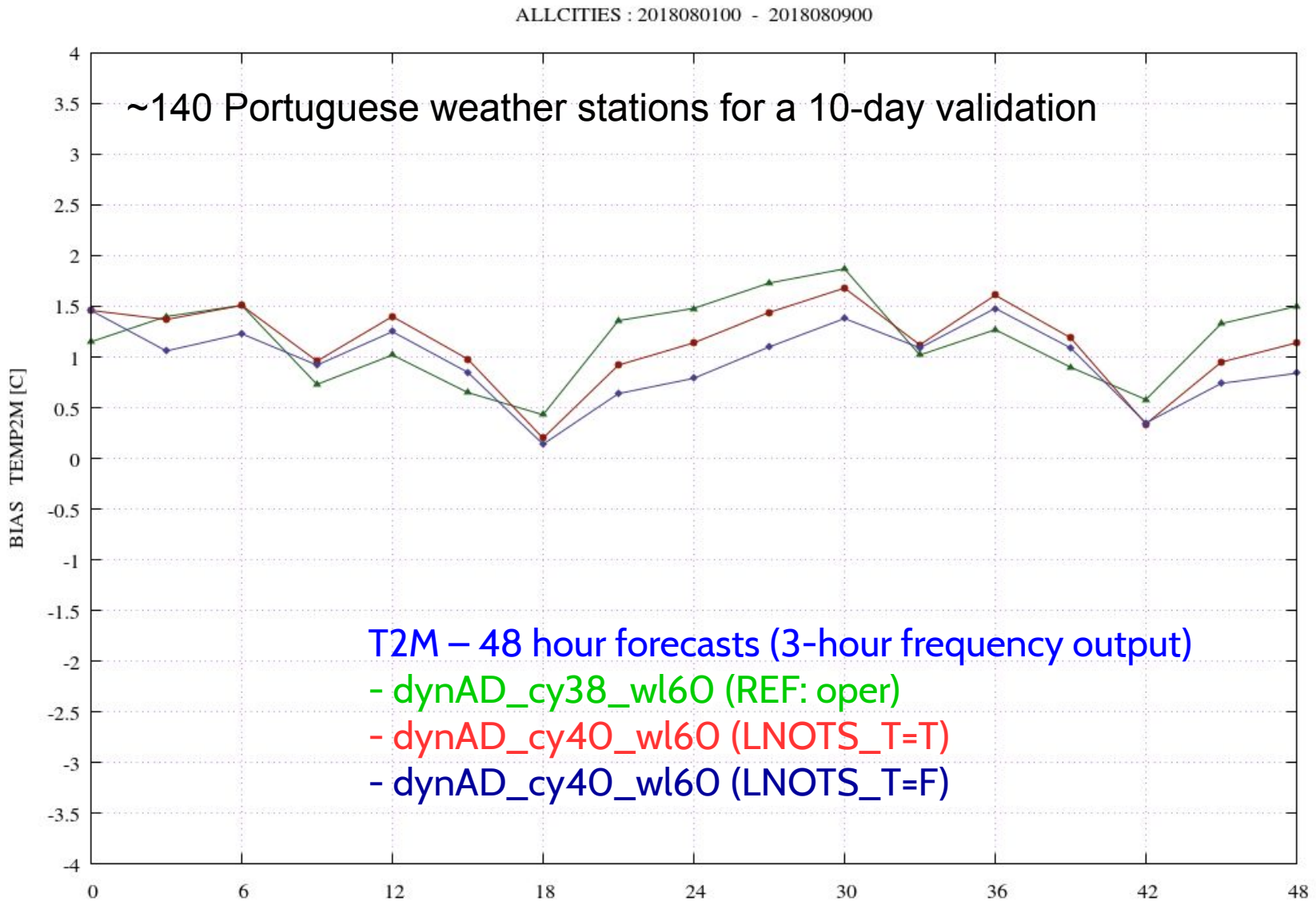
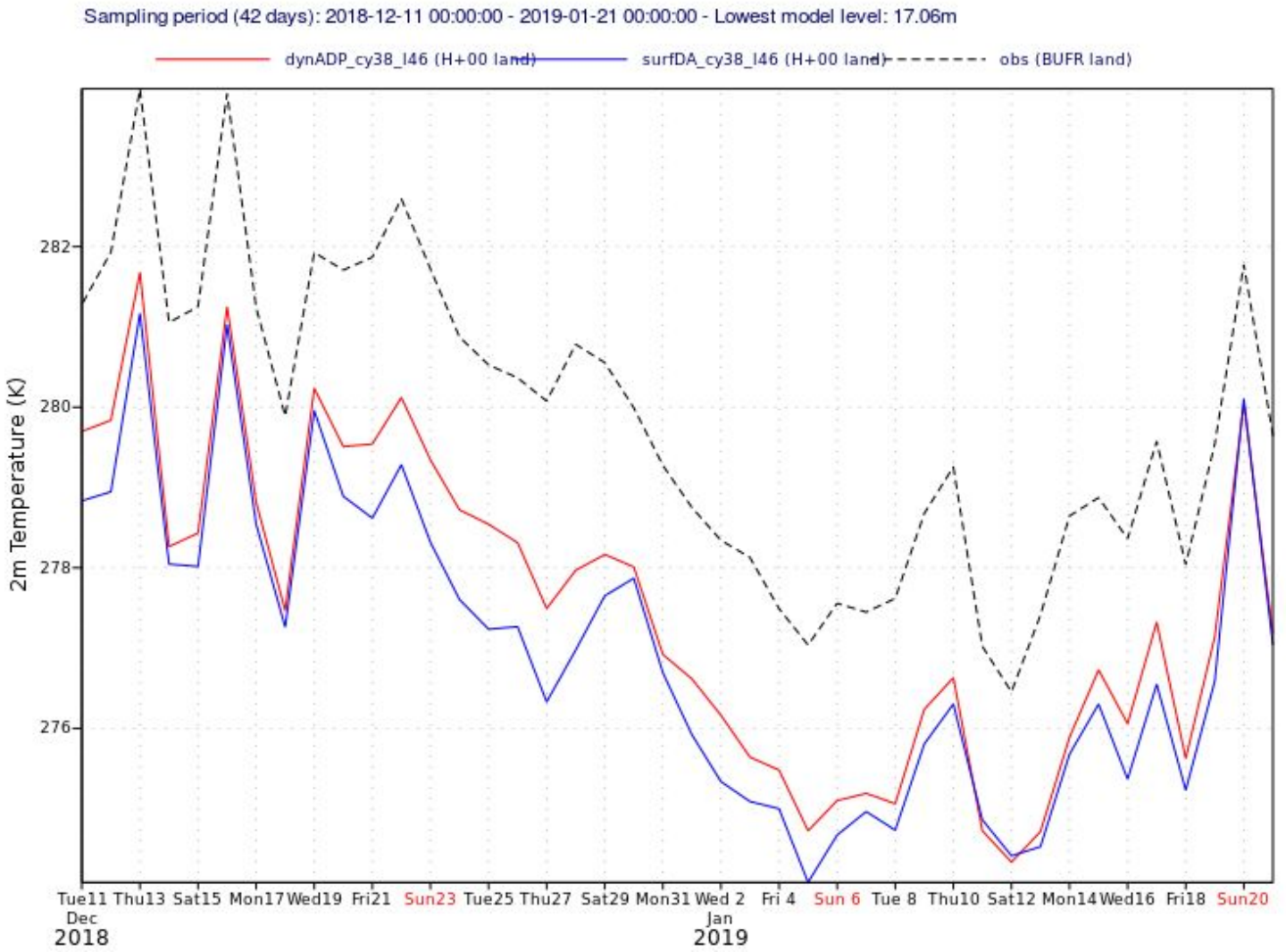


SUMMER results analysis




Sampling period (42 days): 2018-12-11 00:00:00 - 2019-01-21 00:00:00 - Lowest model level: 17.06m
dynADP_cy38_l46 (H+00 land)
surfDA_cy38_l46 (H+00 land)
obs (BUFR land)
2m Temperature (K)
282
280
278
276
Tue11 Dec 2018
Thu13
Sat15
Mon17
Wed19
Fri21
Sun23
Tue25
Thu27
Sat29
Mon31
Wed 2 Jan 2019
Fri 4
Sun 6
Tue 8
Thu10
Sat12
Mon14
Wed16
Fri18
Sun20