



Data assimilation activities at ONM (Algeria)

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Operational setup at ONM

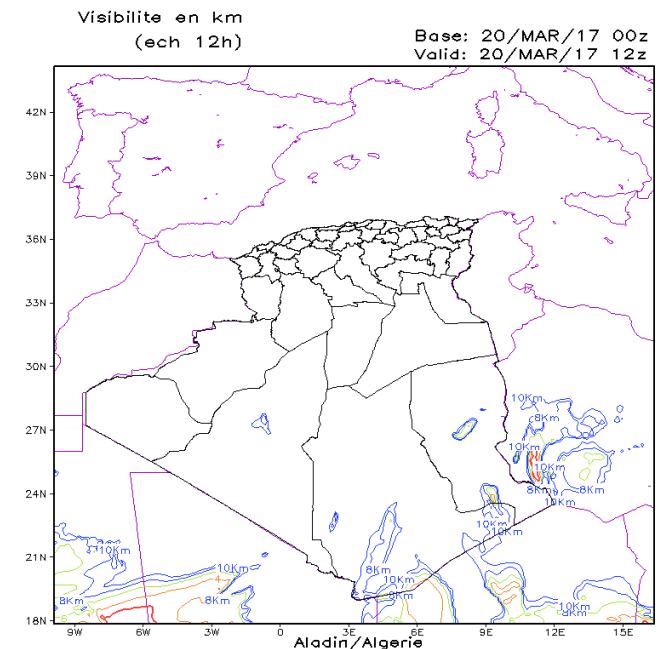
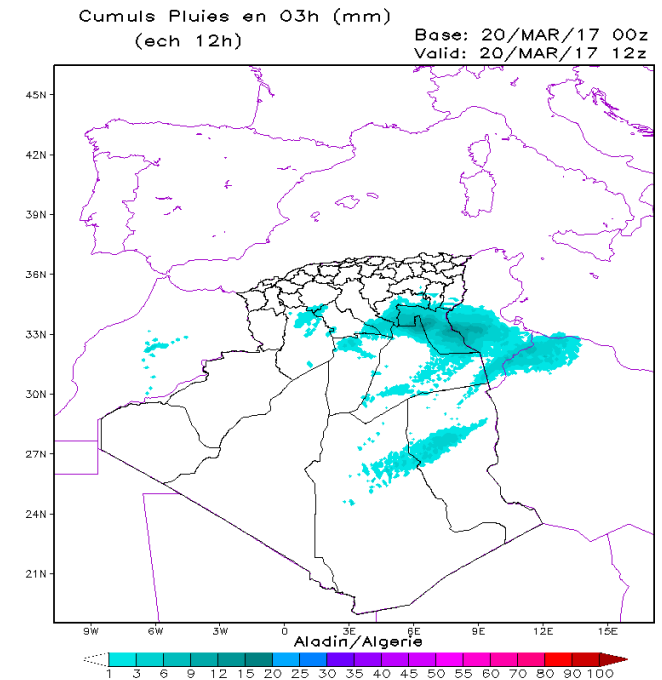
Operational forecast models

ALADIN cy43t2

Resolution = 8 km , 450x450 grid points
Number of levels = 70
Time step integration = 514 s
Coupling model : ARPEGE
Coupling frequency : Every 3 hours
Forecast range : 72h at 00h , 12h
Type of initialisation : First ARPEGE coupling file.

ALADIN_DUST cy43t2

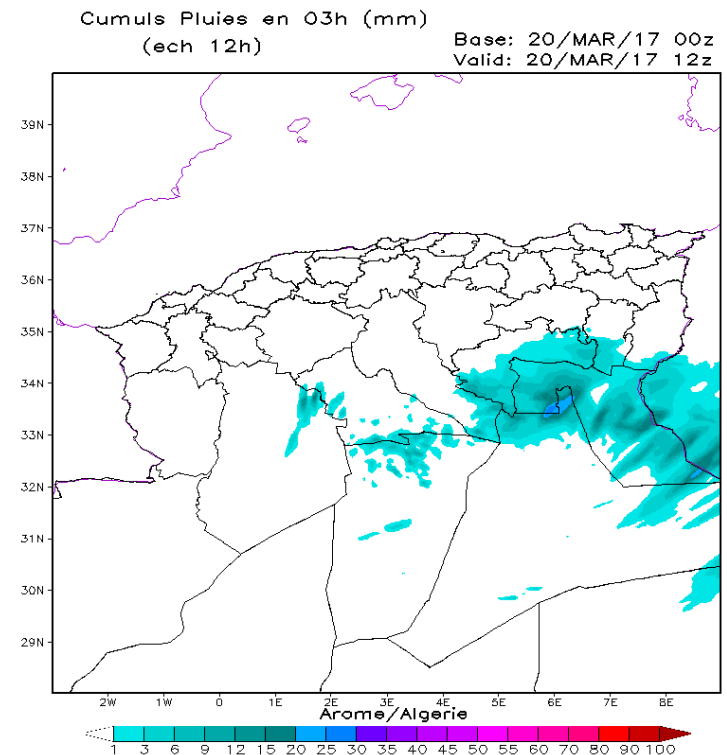
Resolution = 14 km , 250x250 grid points
Number of levels = 70
Time step = 514 s
Coupling model : ARPEGE
Coupling frequency : every 3 hours
Forecast range : 72h at 00h , 12h
Type of initialisation : First ARPEGE coupling file.



Operational setup at ONM

AROME cy43t2

Resolution = 3 km , 500x500 grid points
Number of levels = 41
Time step = 60 s
Coupling model : ALADIN
Coupling frequency : every 1 hour.
Forecast range : 48h at 00h , 12h
Type of initialisation : First ALADIN coupling file.



Pre-operational setup with DA

Upper air analysis (ALADIN and AROME) (**NEW**)

3DVAR analysis for ALADIN and AROME (pre-operational setup)

Observations used : Synop

Cycling frequency : 6 hours

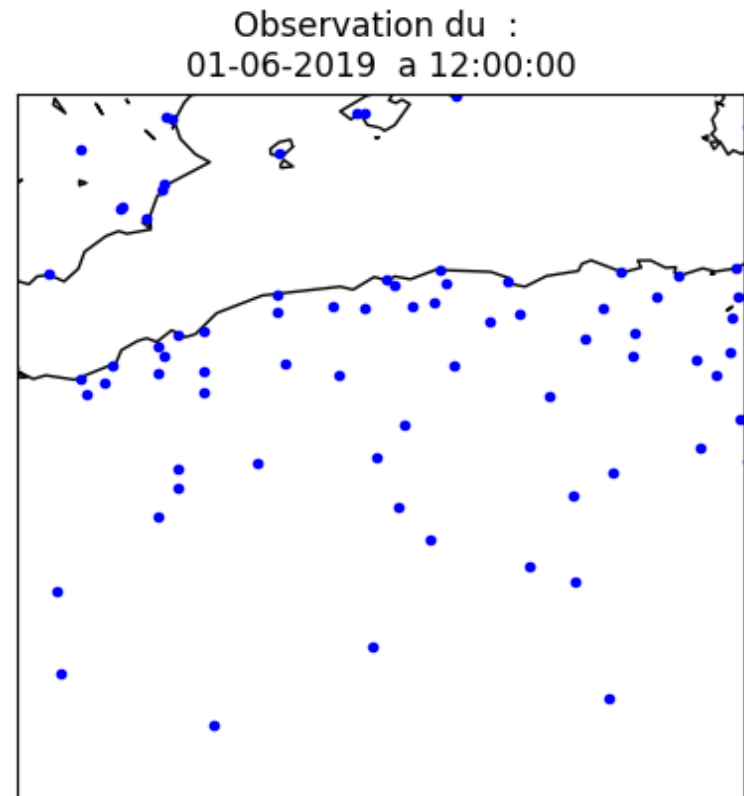
Configuration in under testing

Surface analysis (AROME) (**NEW**)

CANARI+OIMAIN for AROME (under testing)

Observation used : synop

Cycle frequency : 6 hours



Progress and DA activities (Since Lisbon DAsKit working days)

2017

- Computation of the background matrix error covariances for ALADIN using NMC method (at ONM)
- Computation of background matrix error covariances for AROME model using AEARP method (at Météo France)
- Configuration of the 3DVAR assimilation setup for ALADIN and AROME using synop data

2018

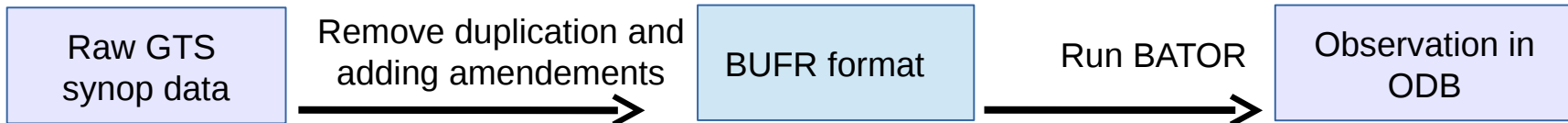
- First setup of a 3DVAR assimilation cycle for ALADIN (pre-operational version).
- Installation of the back-phased BATOR cy40t1 (M.Monteiro ,F. Guillaum , A. Trojakova) for the assimilation of AMDAR data (template 31 10 10) and testing assimilation of the GTS AMDAR.
- Installation of MANDALAY utility in order to read ECMA and CCMA databases.

2019

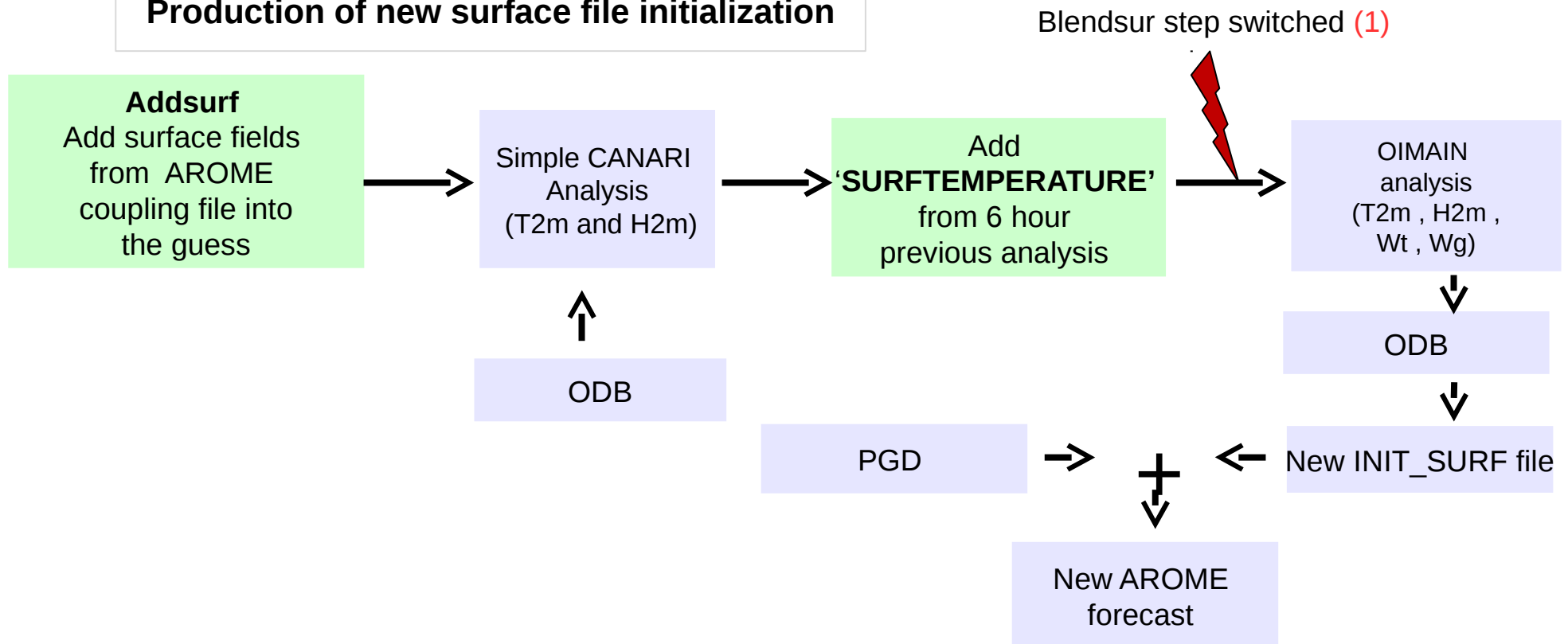
- Testing of upper-air observations : AMDAR , Temp in 3DVAR ALADIN cycle.
- Canari-Oimain surface analysis for AROME.
- Building of a first stable 3DVAR data assimilation cycle for ALADIN and AROME (Waiting for final validation)

Testing of CANARI-OIMAIN surface analysis with AROME

Observation pre-processing and ODB generation



Production of new surface file initialization

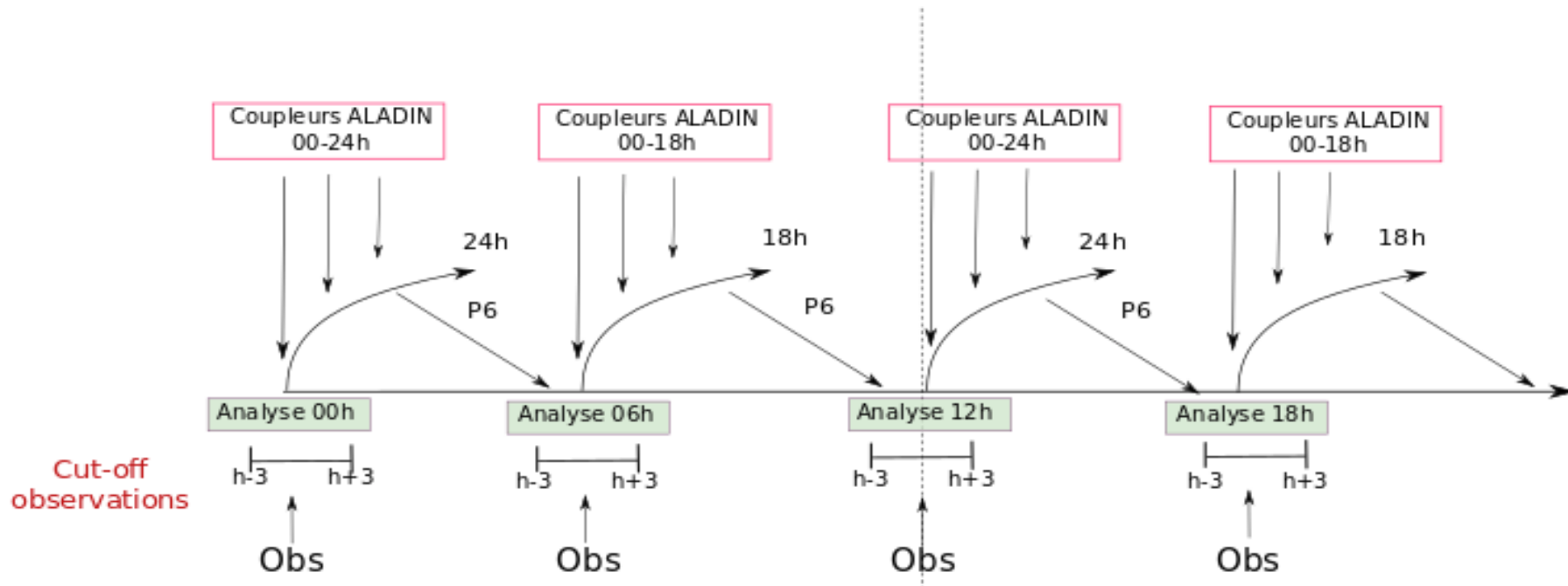


(1) A segmentation fault during the forecast is encountered when the **BLENDSUR** step is added to the process.

Testing of CANARI-OIMAIN surface analysis with AROME

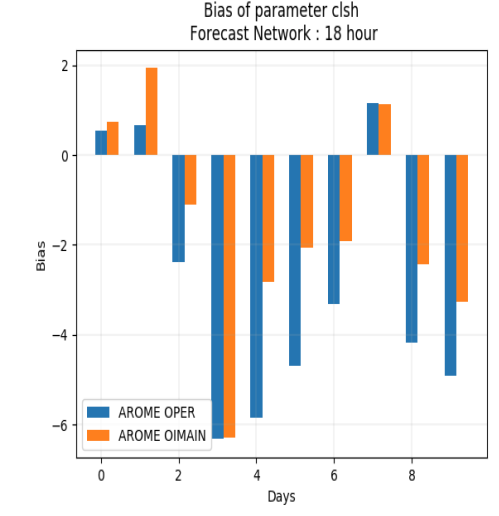
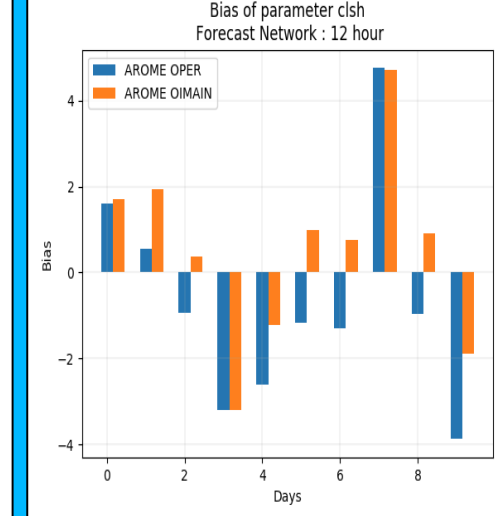
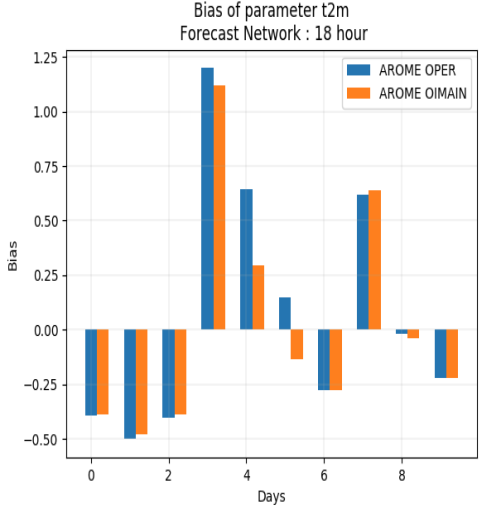
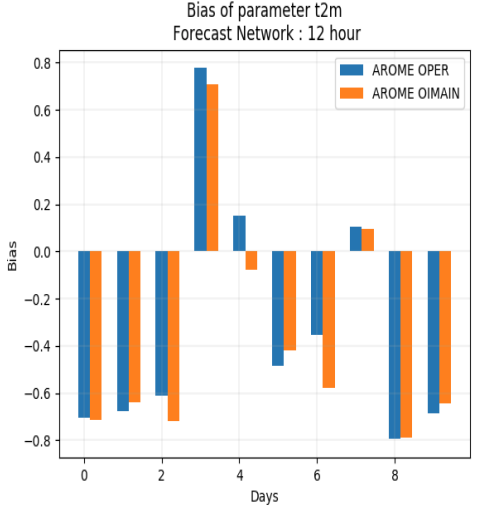
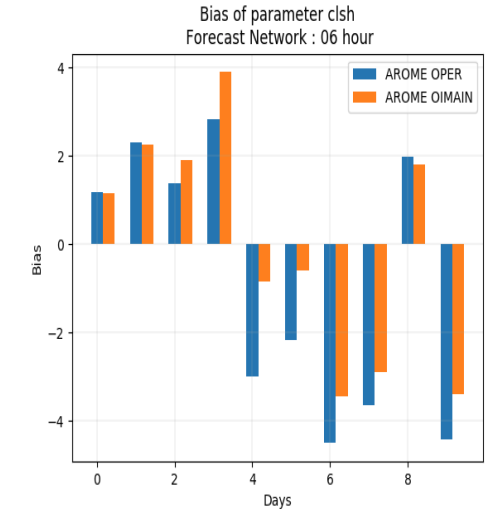
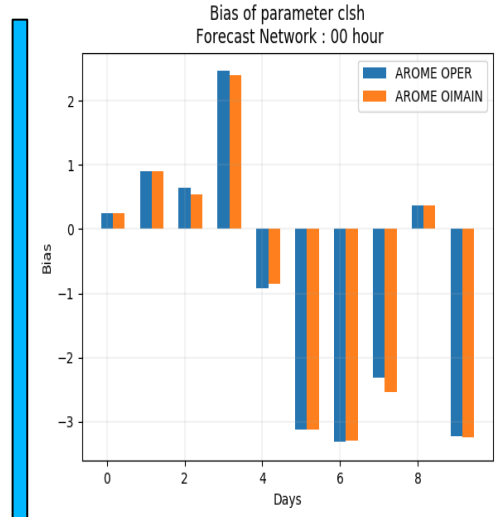
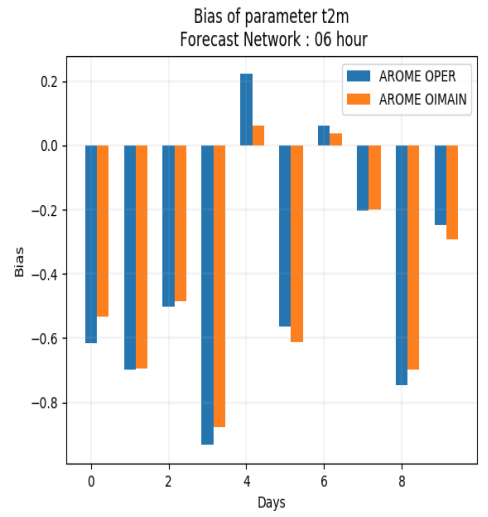
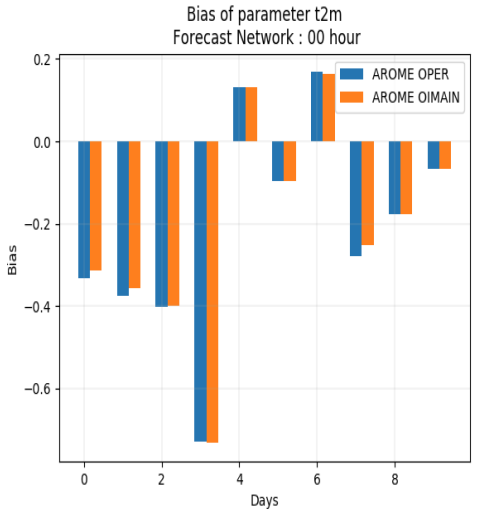
The experiment setup:

- 6 hours assimilation cycling
- 3 hours observations cut-off
- Period : from 01-06-2019 until 10-06-2019
- 24 h forecast for 00 and 12 networks and 18 h forecast for 06 and 18.



Preliminary results (Verification using observation)

(Comparison between AROME-OPER and CANARI-OIMAIN)



T2m scores for AROME Oper and CANARI-OIMAIN for the four Networks : 00 , 06 , 12 and 18h

H2m scores for AROME Oper and CANARI-OIMAIN for the four Networks : 00 , 06 , 12 and 18h

Comments:

- The scores computation is done using only the synop stations in the north (AROME domaine)
- The biases are computed by taking the daily average.
- In general, the plots show a slight improvement in t2m forecast especially for both 06 and 18 forecast networks
- The impact of surface analysis is more important in the case of h2m forecast , where we can see a diminution of the bias from 2 % to 4 % for 06 ,12 and 18 forecast networks.

Issues

1- AMDAR template not recognised by the program BATOR

The GTS system merges some EGRR AMDAR messages **31 10 10** template with those having templates not recognised by the BATOR program (it causes sometimes crashes).

BUFR template (not recognised)	GTS Header	Emission Center (CCCC)
30 10 11	IUAG	VHHH
31 10 01	IUAX	NZKL
31 10 08	IUPC	RJTD

Solution :

The ECMWF utility bufr_filter is used in order to split BUFR messages and select only the AMDAR EGRR with the template 31 10 10 and the messages contained within the Algerian ALADIN domain.

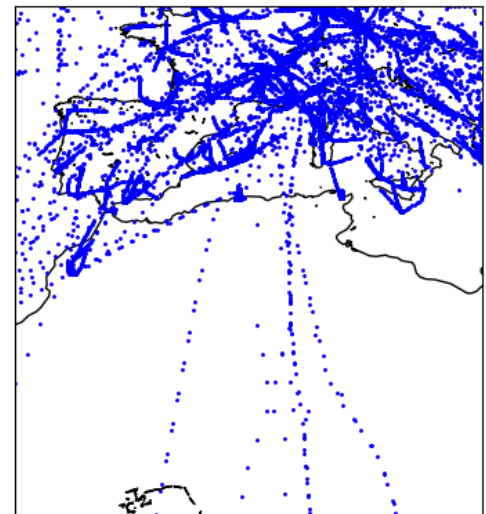
Command :

```
bufr_filter rule_file IUA*_EGRR_mmddmn_ddmn_XXXXXXX
```

Rule file instructions :

```
set unpack=1;
switch (unexpandedDescriptors) {
  case 311010:
    if ( latitude < 46.6 && latitude > 17.0 && longitude < 17.2 && longitude > -11.0) {
      write "amdar_[typicalDate].bufr" ;
    }
}
```

Observation du :
08-09-2019 a 11:11:00



Issues

2- CANARI-OIMAIN

- Segmentation fault in AROME forecast with new INIT_SURF file when the Blendsur step is added

3- 3DVAR configuration

- Crash of Screening or minimisation step in 3DVAR configuration when a large amount of observation points is used (ASCAT + Temp +AMDAR)

Fatal error in MPI_Recv: Message truncated, error stack:

MPI_Recv(201).....: MPI_Recv(buf=0x2b39b180, count=62949, dtype=0x4c000829, src=0, tag=23001, comm=0x84000000, status=0x7fff5fb0ad00) failed

4- Migration to cy43t2

- Bug in [bator_decodhdf5_mod.F90](#) routine in cy43t2.
- The model was compiled using hdf5 1.8.15 , 1.8.16 and 1.8.20
- mpiifort ,mpicpc , mpiicc compilers 2015 and 2017

Main perspectives

- Final validation of 3DVAR cycle for ALADIN
- Combination of 3DVAR minimisation with CANARI-OIMAIN surface analysis for AROME
- Building of AROME nowcasting version based on 1 hour cycle analysis

Other

- Handling and assimilation of GPS data (collected from National Institut of cartography and Teledetection in format RINEX)
- Assimilation of SEVIRI satellite radiances.

Thank you
for your attention