Data Assimilation progress and plans in Tunisia

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Slide I

Haythem Belghrissi : recently named direct supervisor of Numerical prediction short and medium range service (team NWP).

- Engineer in the National Institute of Meteorology

- Since 2008 in the NIM

- Climate Change study team

Previous work:

- Dynamical and statistical downscaling

- Climate Monitoring

- National and international projects related with Climate Change Impact vulnerability and adaptation.

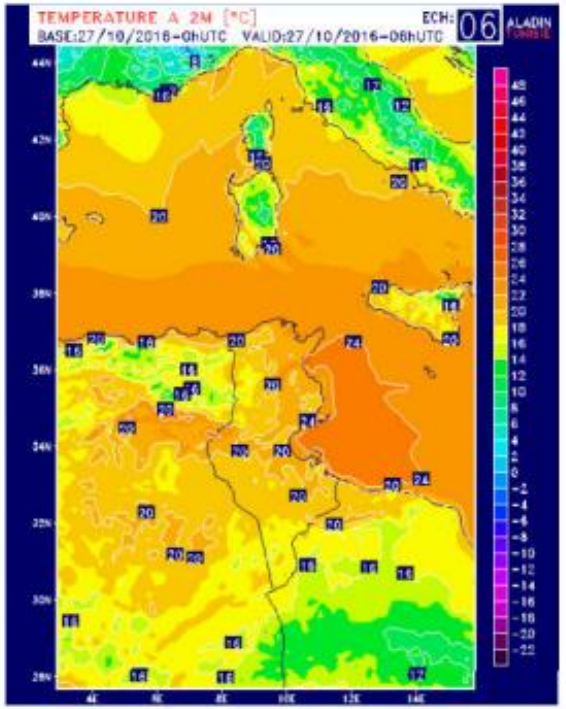
Models Installed on the HP Server

Operational & Parallel Suites

- Models implemented on Ashtarte Server

	ALADIN operational	AROME	HARMONIE
Model version	CYCLE 40	CYCLE 40	CYCLE 40
Spatial Resolution	7.5 km	2.5 km	2.5 km
Vertical Levels	70	60	65
Boundaries	ARPEGE 10km	ARPEGE 10km	ALADIN 7.5km
Time step	450 s	60 s	60 s

- Configuration of AROME-Tunisia 1.3 km
(CY42, Coupled to ARPEGE 10Km, Time step 45s,90 vertical levels



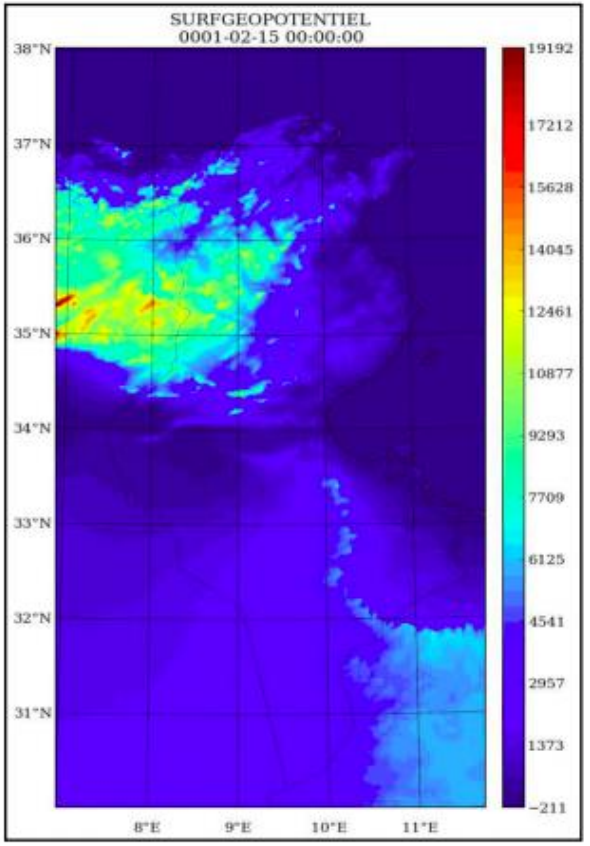
- HPC Project: Enhancement of the computing capacity:

On going project: 2sd call of tender

Model used in the Benchmark

AROME-TUNISIE Configuration

	AROME-TUNISIE 1.3 km
Version	CYCLE 42
Resolution	1.3 km
Number of Points NLON*NLAT	384 X 720
Vertical Level	90
Coupling Model	ARPEGE 10km
Time step	45 s



AROME-Tunisie Domain

- HPC Project: Enhancement of the computing capacity:

Type and source of data

Locally : 25 synop station, 2 TEMP, 1 wind profiler

RADAR project

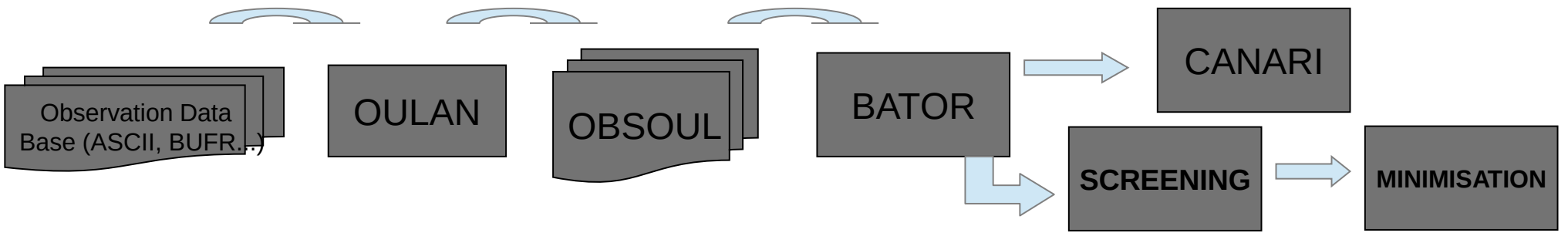
OPLACE data

Observations for CANARI

SYNOP and TEMP

Observations for 3DVAR

SYNOP / Aircraft / AMV / TEMP / Wind Profiler / Satellite ATOVS / Satellite SEVIRI



Canari and Minimisation chain

Obsprep - odb – canari

Obsprep – odb – screening – minimisation

Obsprep : prepares all needed observations for 3DVAR Atmospheric analysis.

Odb : Builds ODB (program BATOR) by subbases and merges the sub-bases at the end to one common ECMA database. The database is dumped at the end with MANADALAY.

Screening : Performs observational SCREENING and take first guess from CANARI analysis.

Minimisation : Performs 3DVAR analysis and take first guess from CANARI analysis.

B matrice used

- B matrices are the average of 3 B matrices calculated over 3 periods: winter (rainy season) , summer (Hot & humid) and Fall (convective systems) → take on consideration all the Regimes that influence Tunisian Weather

- In order to have a positive definite B matrix , we must have the number N of differences equal to or greater than the number of vertical levels of the model (60 for Arome 2.5 km et 90 for Arome 1.3 km) :

Winter-Time 07-16 February:

6 members ensemble * 10 days at 00H → **60**

Fall-Time ''Off season'' 25September – 04October 2015:

6 members ensemble * 10 days at 00H → **60**

Summer-Time 16-20 August 2016:

6 members ensemble * 5 days * 2 runs 00H & 12H (to integrate convective phenomena) → **60**

- Same periods for B matrix - EDA and B matrix Spin-up → compare the matrices

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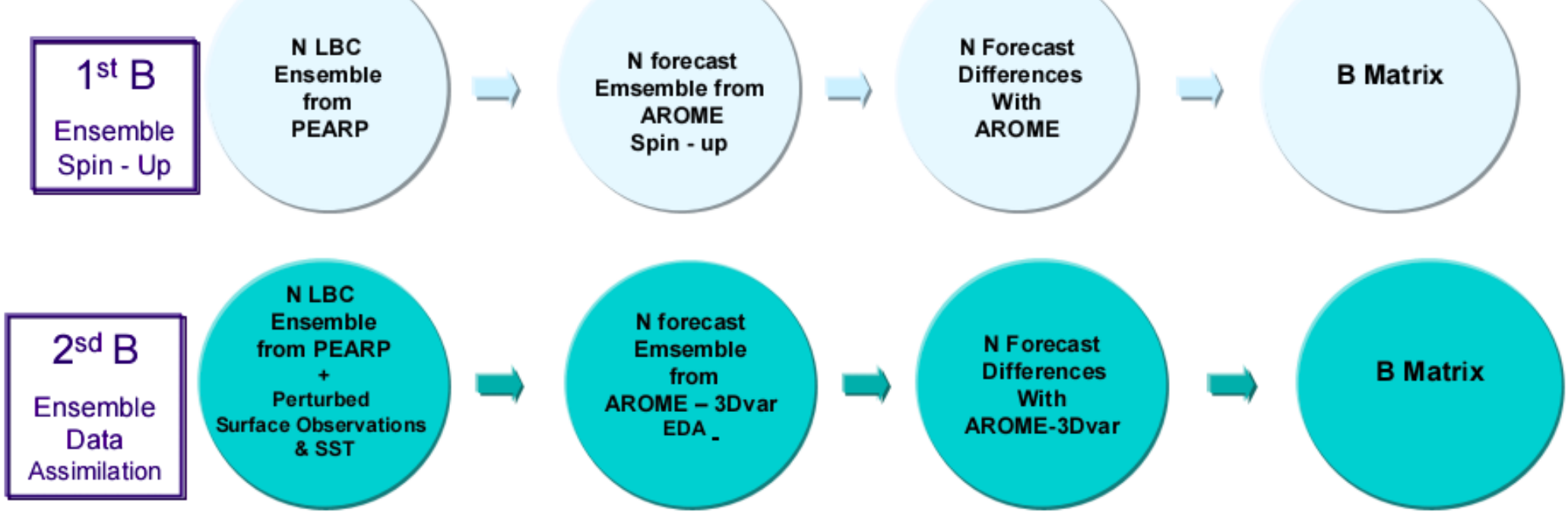

Perturbed Surface Observations & SST

Perturbed SST: (following Y. Michel's works)

- OSTIA files
- As the Sea ~ 1/6 of Tunisian domain -> fixed perturbation

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Screening & Minimisation

When I run screening with ARPEGE VARBC file I get the following error :

- ABORT! 1 VarBC_setup (load_table): Increase JPMXNPRED.

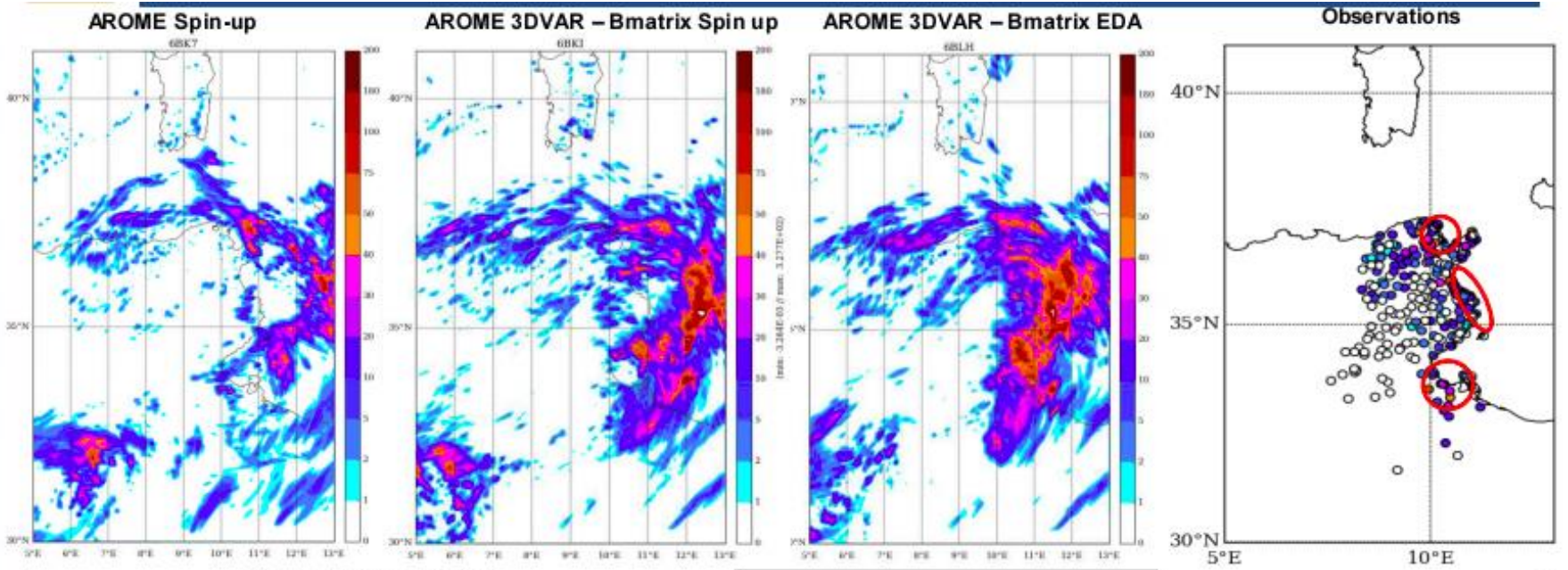
it occurs in the following chain :

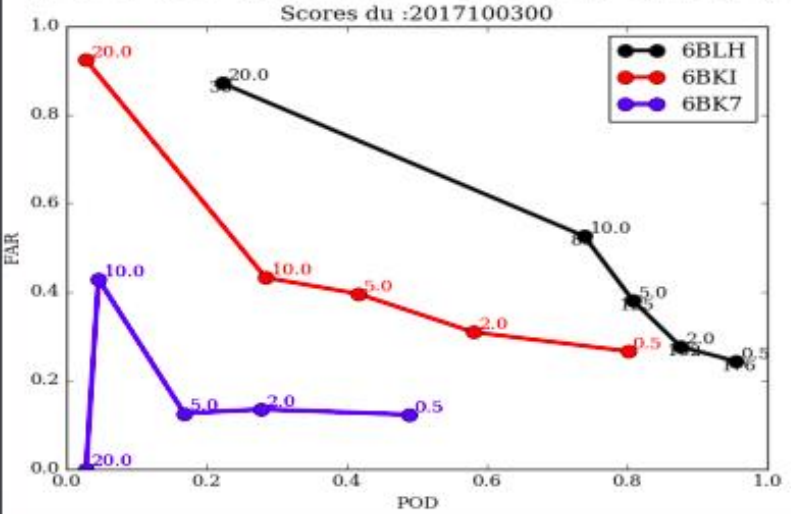
- #4 0x20D640F in __sdl_mod_MOD_sdl_srlabort at sdl_mod.F90:100
- #5 0x20F1DF9 in abor1_ at abor1.F90:38

First guess generated

- We succeded to solve the issues related with the minimisation and we proceeded to produce the first guess.

- Run a forecast with DA using the first guess.



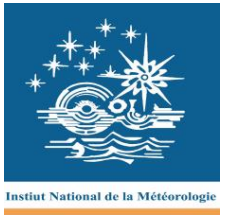


Case Study - 03 October 2017

Better Prediction for the cell localization and intensity

- 3 typical systems: North-East, East Cost, South-East Cells
- Better Prediction for the cell localization and intensity for Arome 3DVAR compared to Spin up
- Better scores for Arome 3DVAR EDA Bmatrix compared to Bmatrix Spin up

Convective Situation causing heavy rain & flood



Thank you