

3DVAR DATA ASSIMILATION IN MORROCO : STATE OF ART

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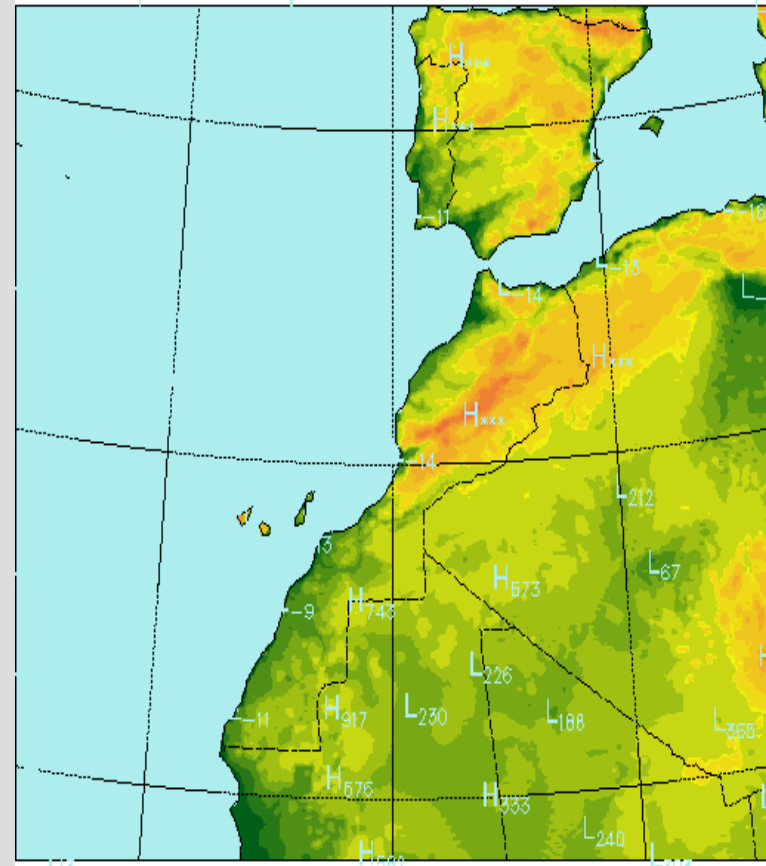


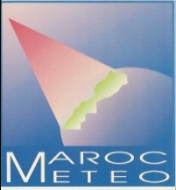
OUTLINE

- Description of ALADIN MOROCCO model
- 3DVAR suite
 - Cycling
 - Observations
 - Background error covariances assessment
 - Variational bias correction
- Validation of 3DVAR suite
 - Suite scores
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Description of ALADIN MOROCCO model

- New supercomputer (2010) : IBM HPC (112 quad-core nodes/ 8.3TFlops)
- Cycle: cy36t1
- Horizontal resolution : 10km
- Vertical resolution : 60 levels
- Coupling frequency : 3 hours
- 2 run per day (00 and 12 UTC) / Forecast range : 72H

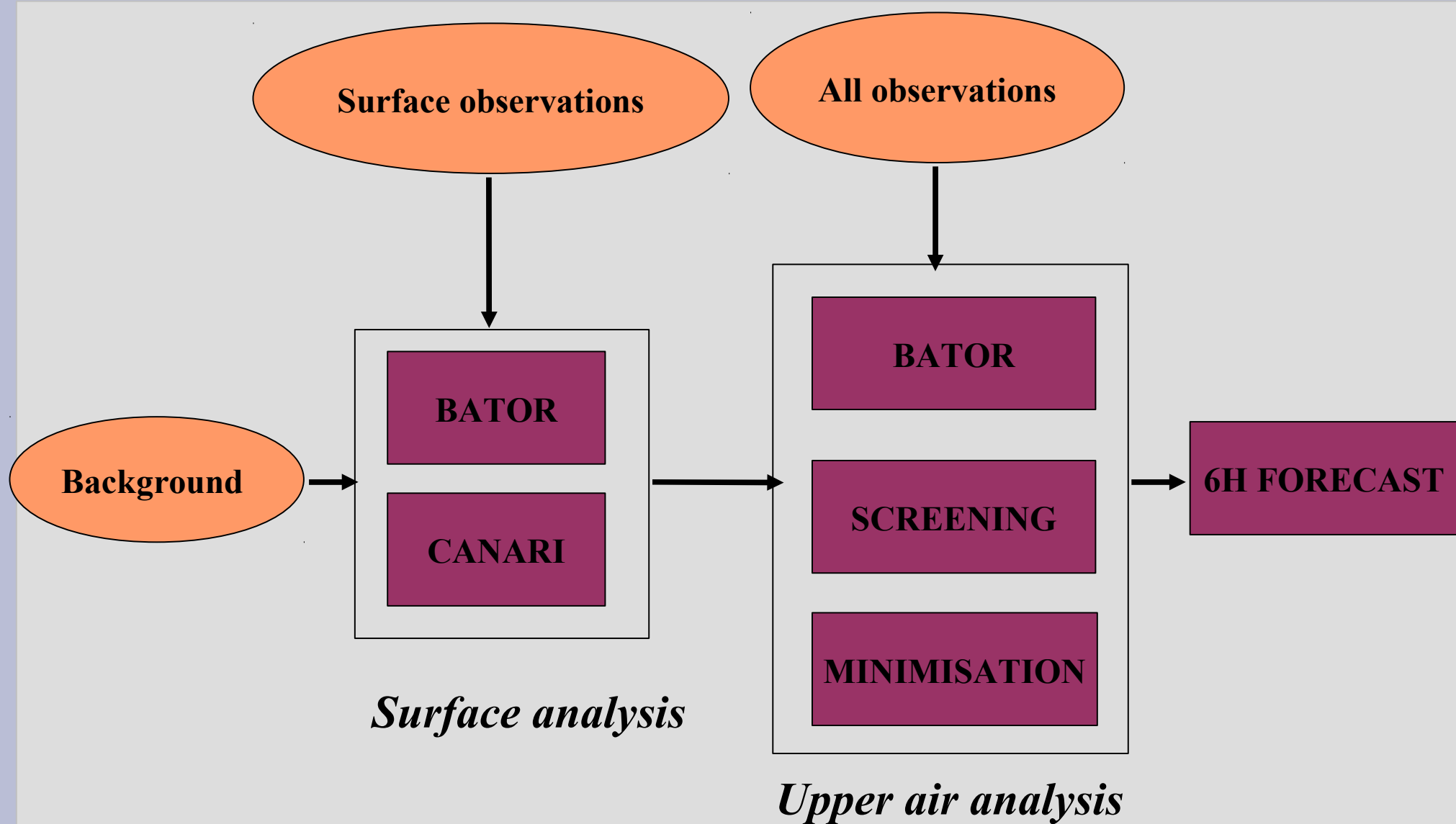




Description of 3DVAR suite

- Cycle: cy36t1
- Horizontal resolution : 10km
- Vertical resolution : 60 levels
- Coupling frequency : 3 hours
- 4 runs per day (00, 06, 12 and 18UTC): long cut-off (+/- 3hours) + Forecast 6h (background)
- 2 runs per day (00 and 12 UTC) : short cut-off (-3h,+1,5h) + Forecast 72h

3DVAR cycling





Observations

Observations	Assimilated parameters	Thinning
SYNOP	U10m, H2m, Z, T2m	
AIREP	U, U10m, T	25 Km
DRIBU	U, U10m, Z	
RADIOSONDES	U, U10m, H, T, Z, Q	
ATOVS *	Tb	80 Km
MSG/SEVIRI	Tb	70 Km

* ATOVS : AMSUA-AMSUB/MHS and HIRS From NOAA 16, 18, 19 and metop-A



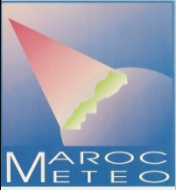
Statistics of observations before/after screening

08/02/2012 at 00UTC

TYPE	ALL	ACTIVE
SYNOP	302	157
AIREP	245	151
DRIBU	21	4
TEMP	12	12
SATEM	19774	3340

08/02/2012 at 12UTC

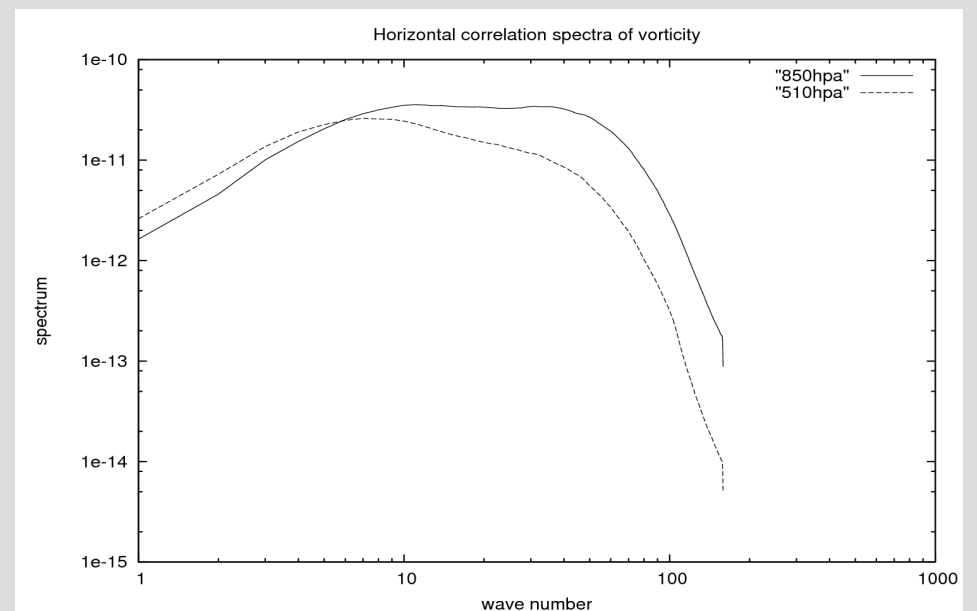
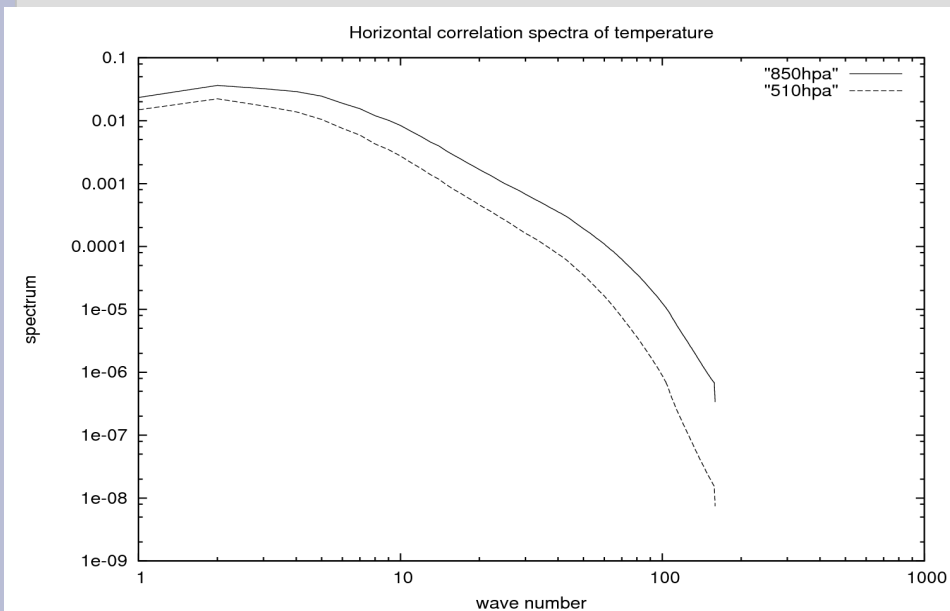
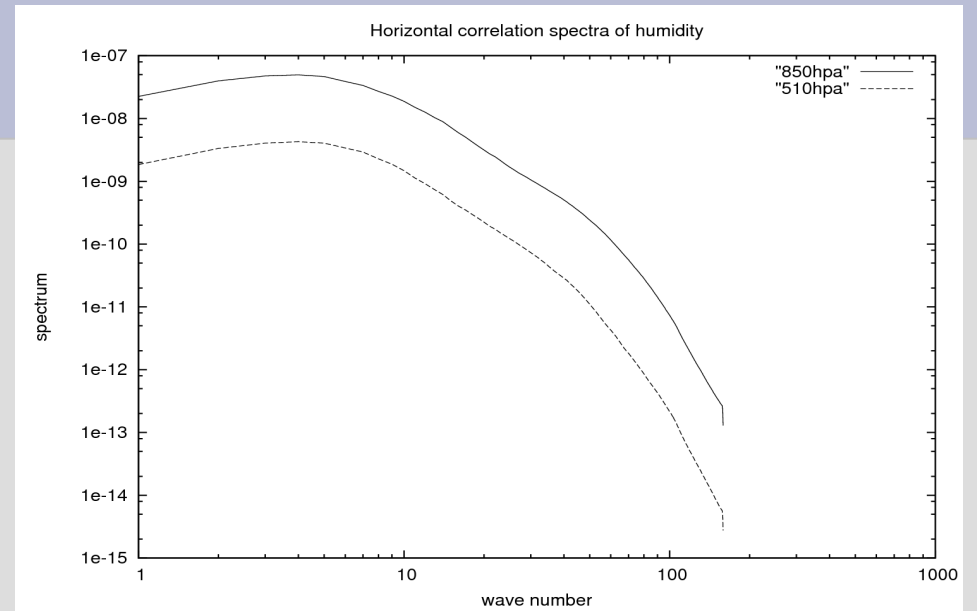
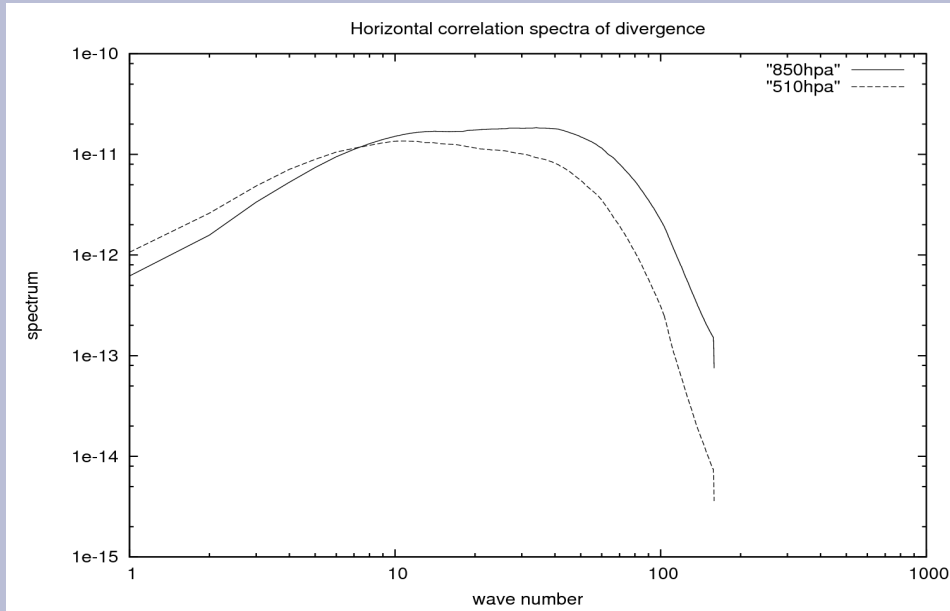
TYPE	ALL	ACTIVE
SYNOP	400	218
AIREP	678	512
DRIBU	20	4
TEMP	17	17
SATEM	26084	3473



B matrix

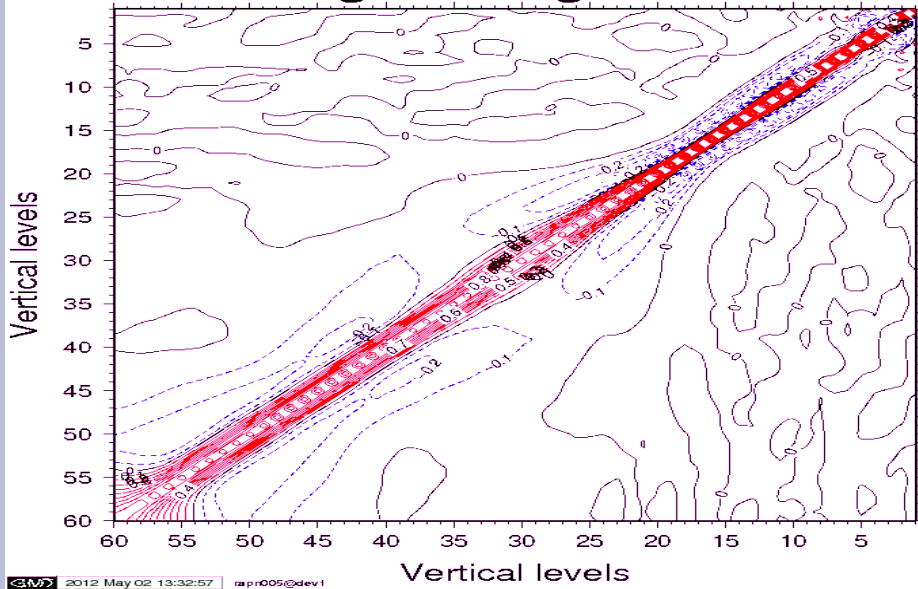
- Ensemble method for the B-matrix : 6 hours ALADIN forecast with initial and lateral conditions provided by an ensemble of perturbed ARPEGE assimilation cycles for the period 1/10/2010 to 3/11/2010.
- 2 files `stabal.bal` and `stabal.cv` :
- `stabal.cv` : description of the covariances for each predictor inside the control variable (divergence, vorticity, temperature + surface pressure, humidity).
- `stabal.bal` : description of the correlations between each predictor.

B matrix

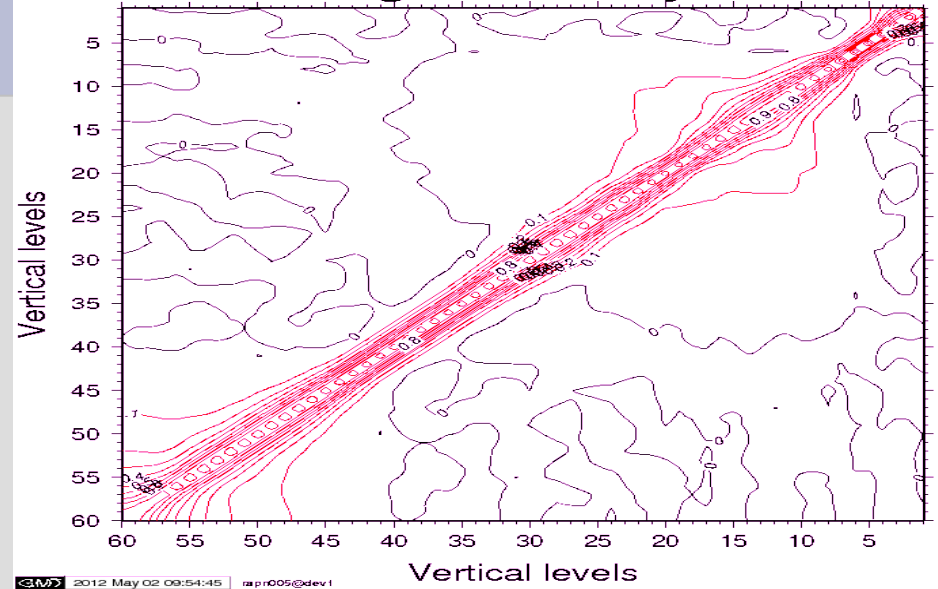


B matrix

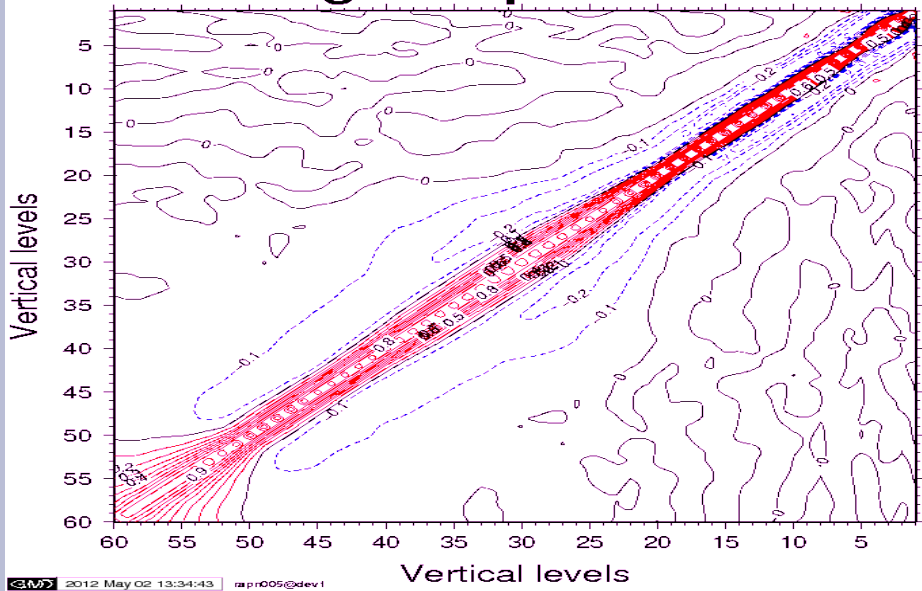
Average divergence cors



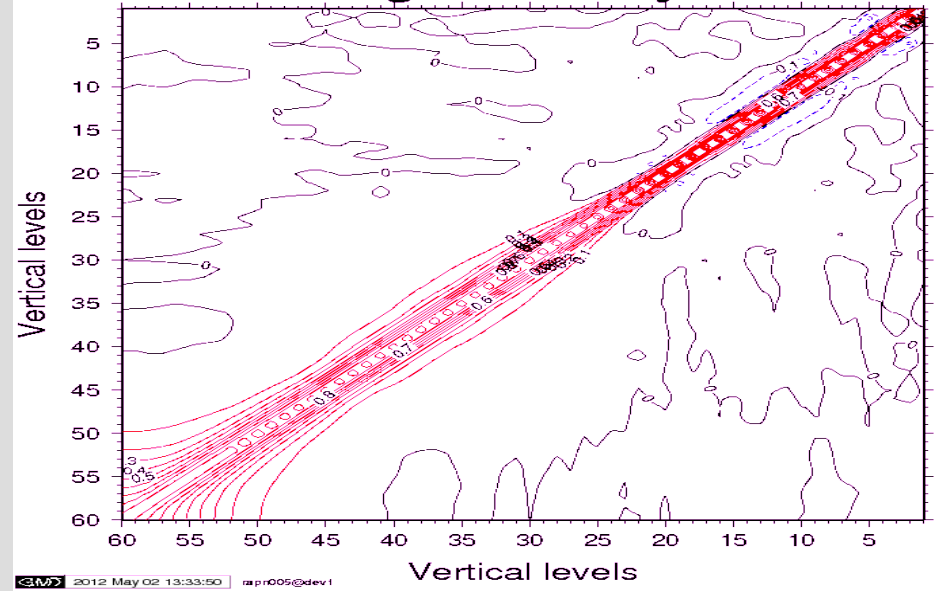
Average humidity cors



Average temperature cors



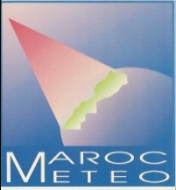
Average vorticity cors





Variational Bias Correction

- Simplify the bias correction of satellite data by :
 - estimating bias corrections in real time during the assimilation
 - and taking into account all available information
- Start with warmed up varbc file : varbc.merge from ARPEGE/ALADIN France suite
- Use of new satellite data (noaa 19, metop A)



Validation of 3DVAR suite

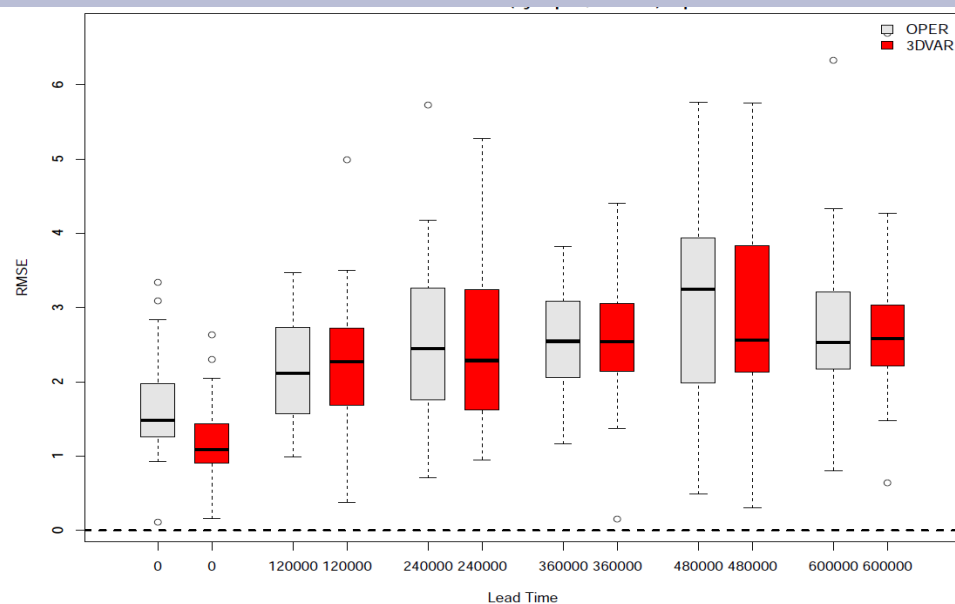
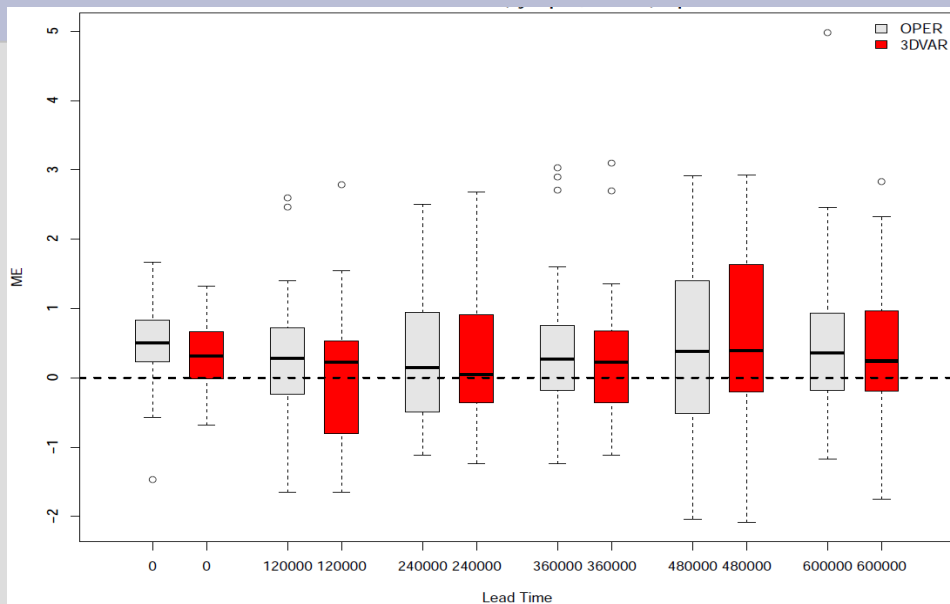
- Scores 3DVAR vs Dynamic Adaptation (OPER).
- Scores over february 2012.
- Use of MET package (Driss BARI's Poster).
- Surface parameters (T2m, U10m, V10m, HU2M) against synoptic observations.
- Upper air parameters (T, U, V, HU) against radiosondes.

Validation of 3DVAR suite

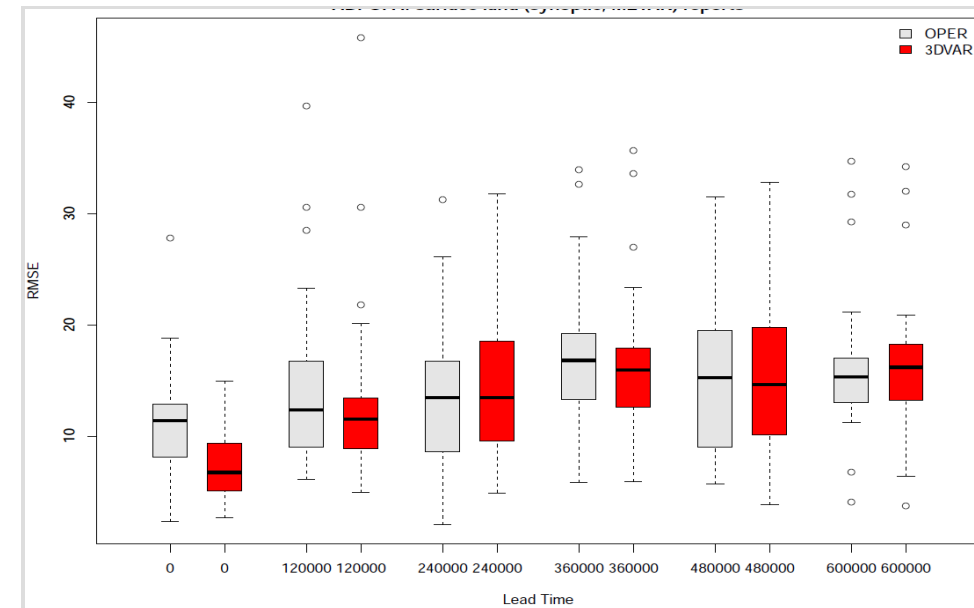
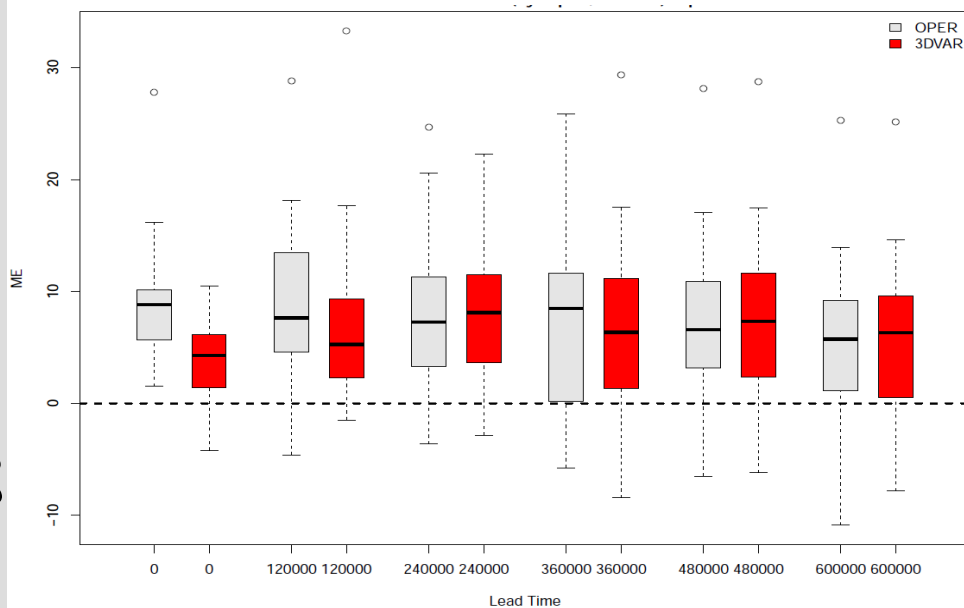
BIAS

RMSE

058 V



005 u H

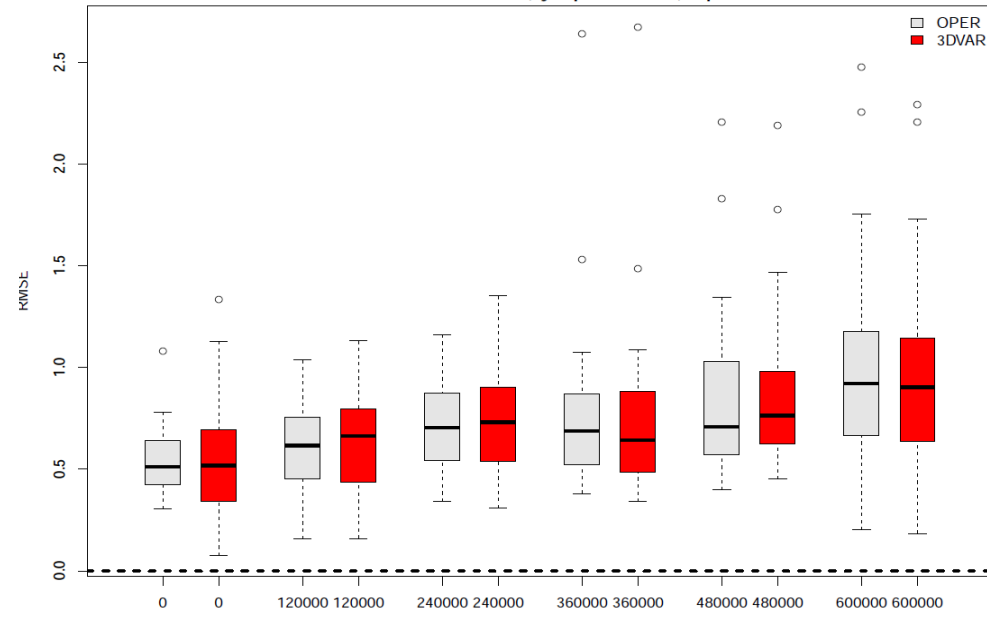
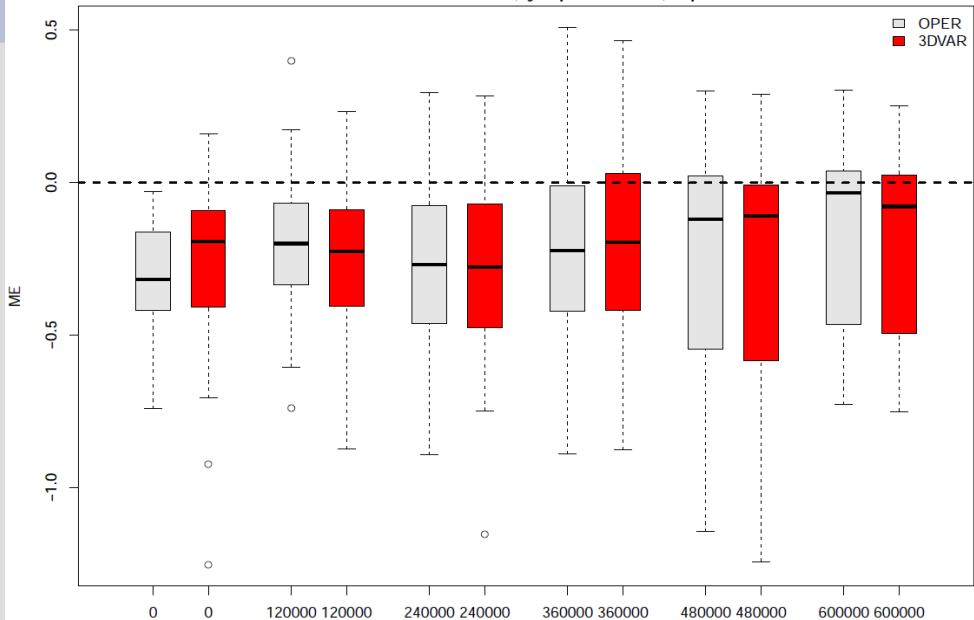


Validation of 3DVAR suite

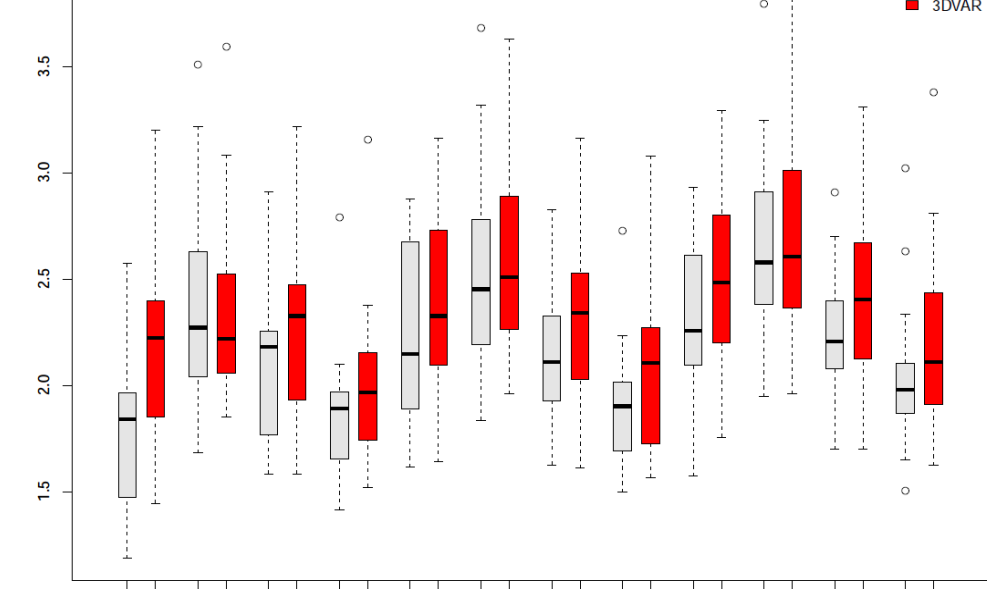
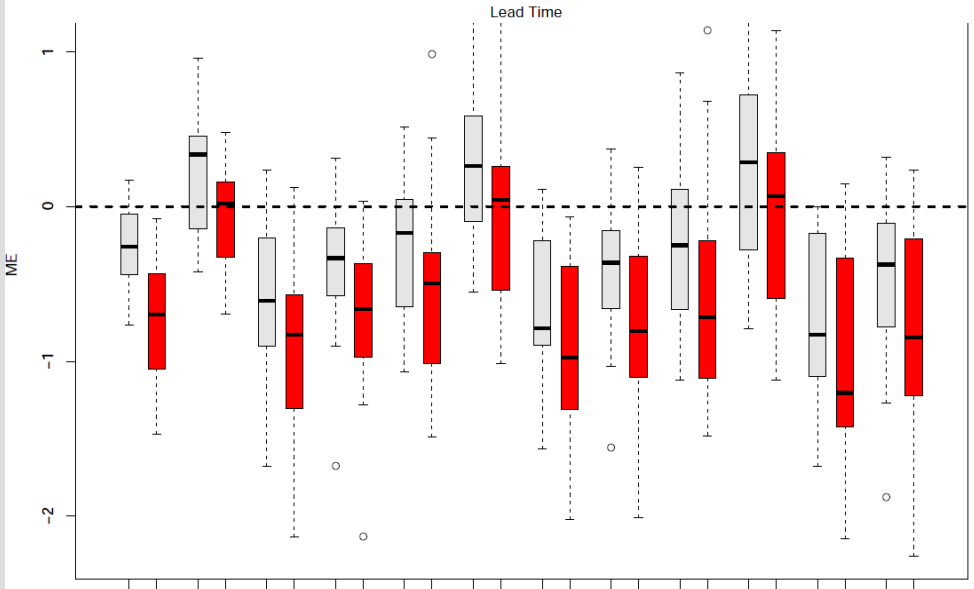
BIAS

RMSE

005 T



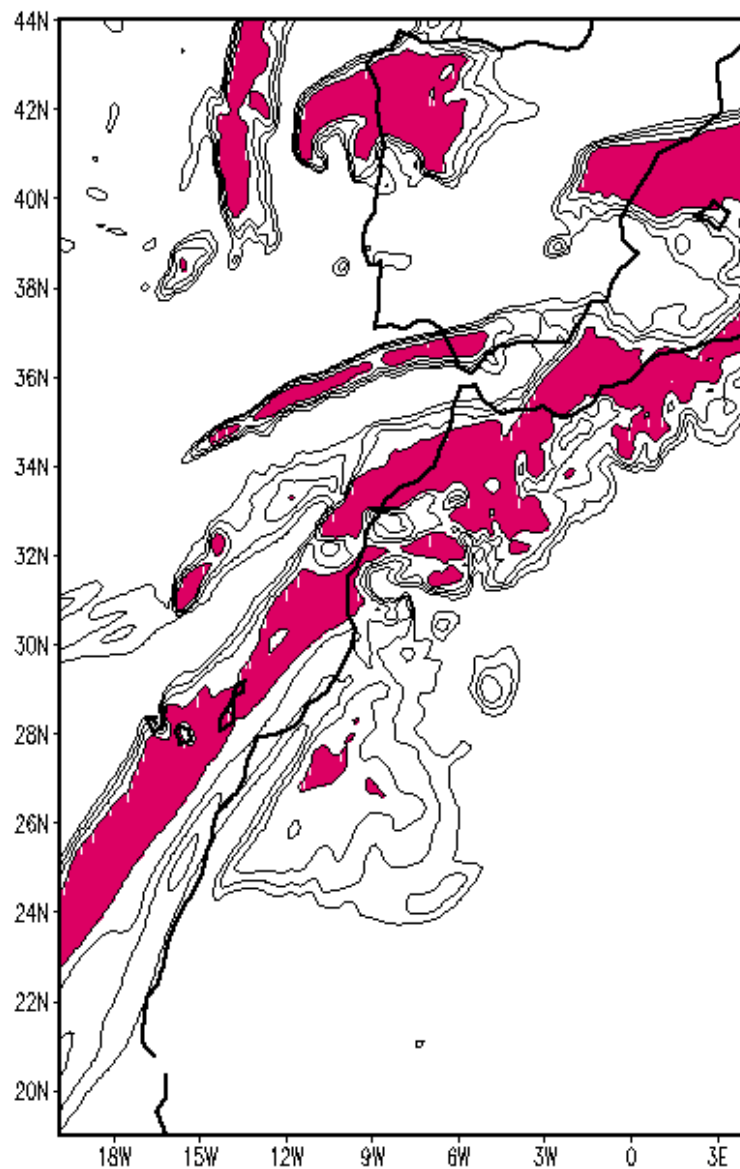
m2 T



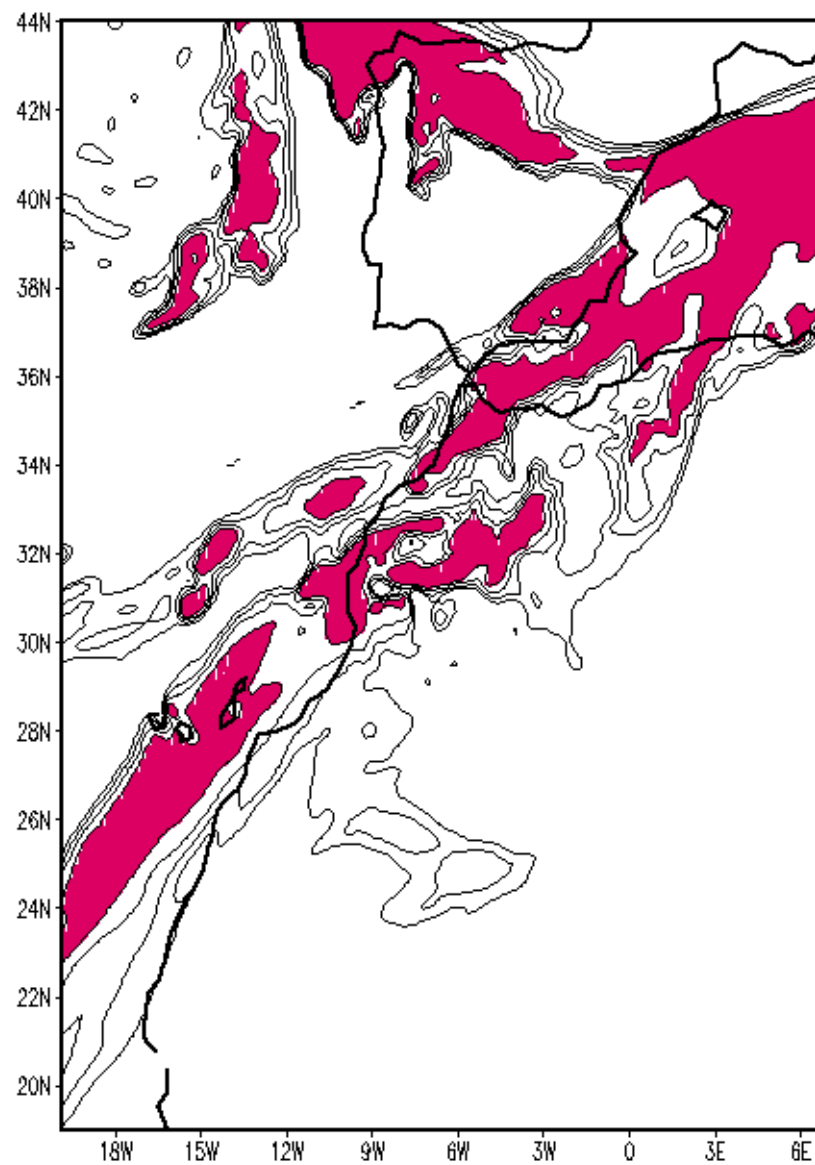
Case study 29 NOV 2010



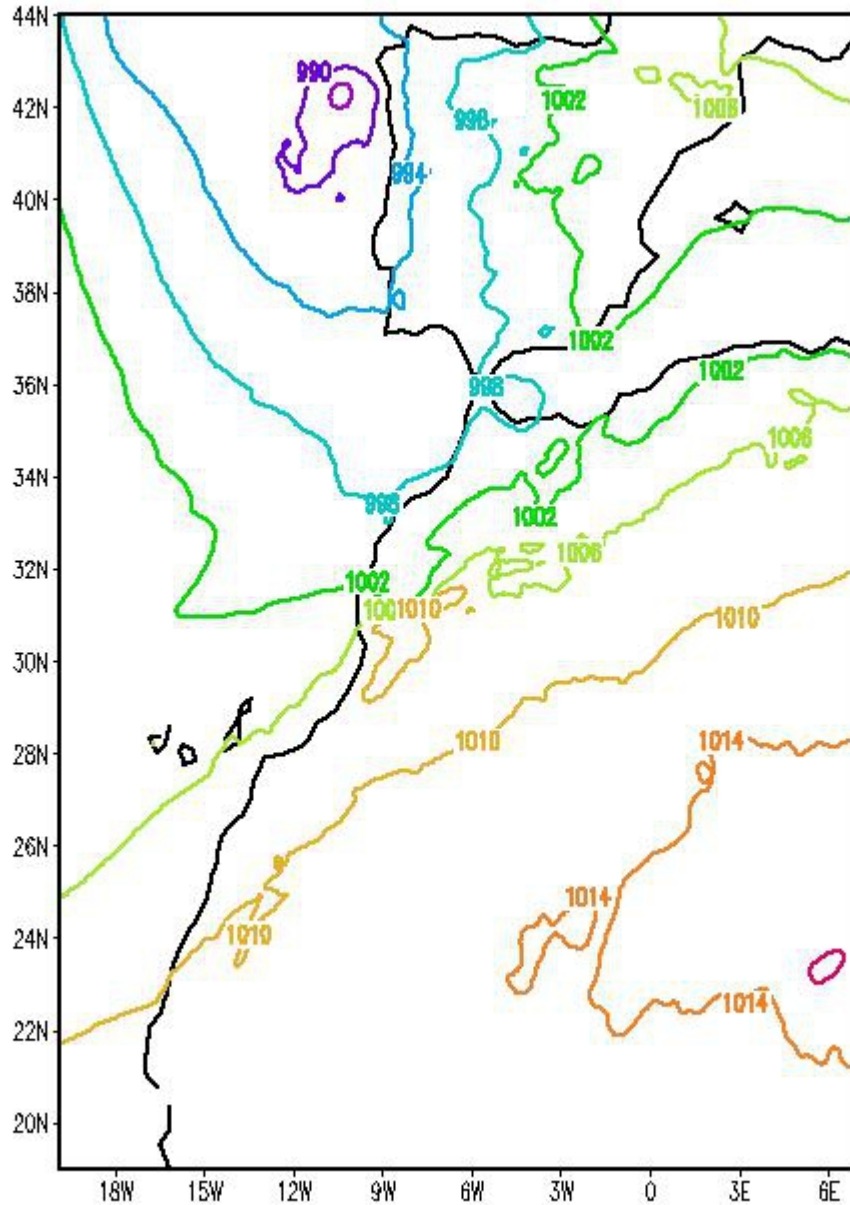
RELATIVE HUMIDITY AT 600hPa – 29Nov at 18UTC : 3DVAR



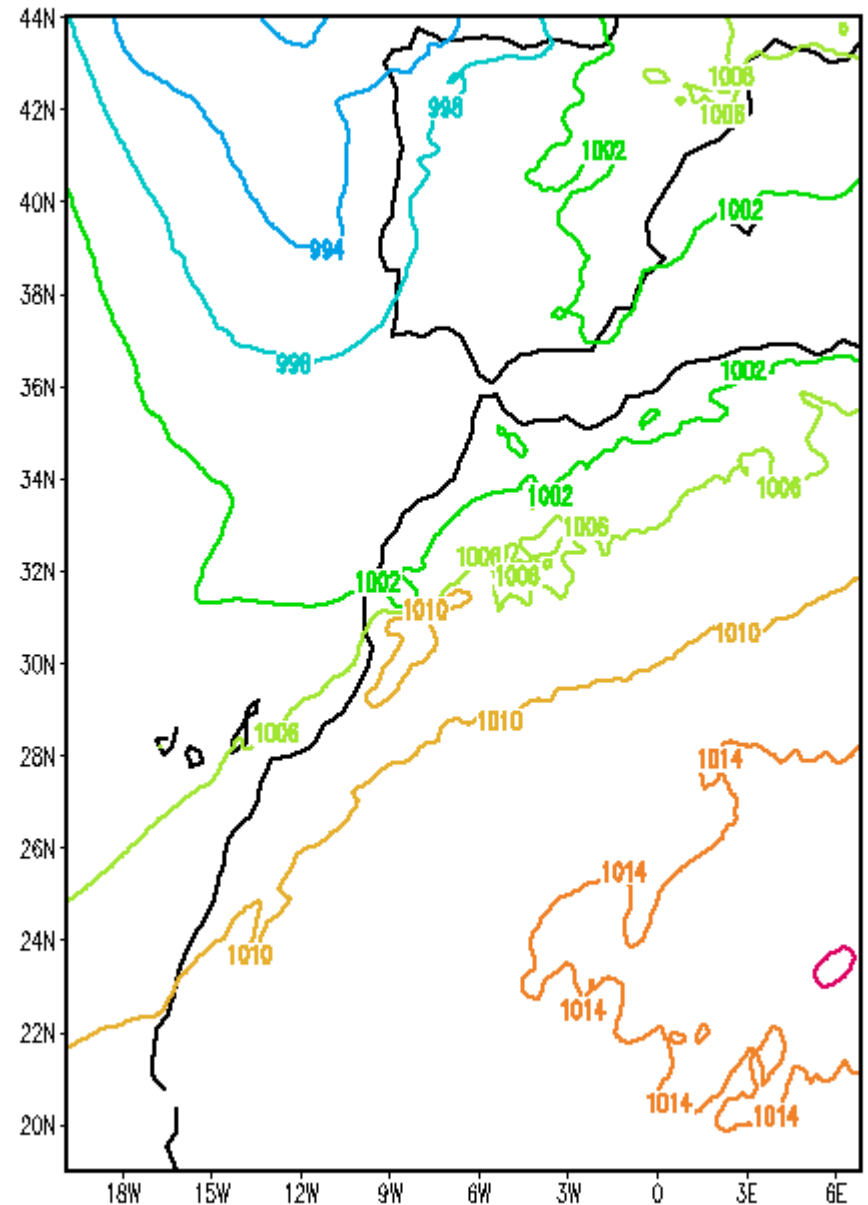
RELATIVE HUMIDITY AT 600hPa – 29Nov at 18UTC : ADN



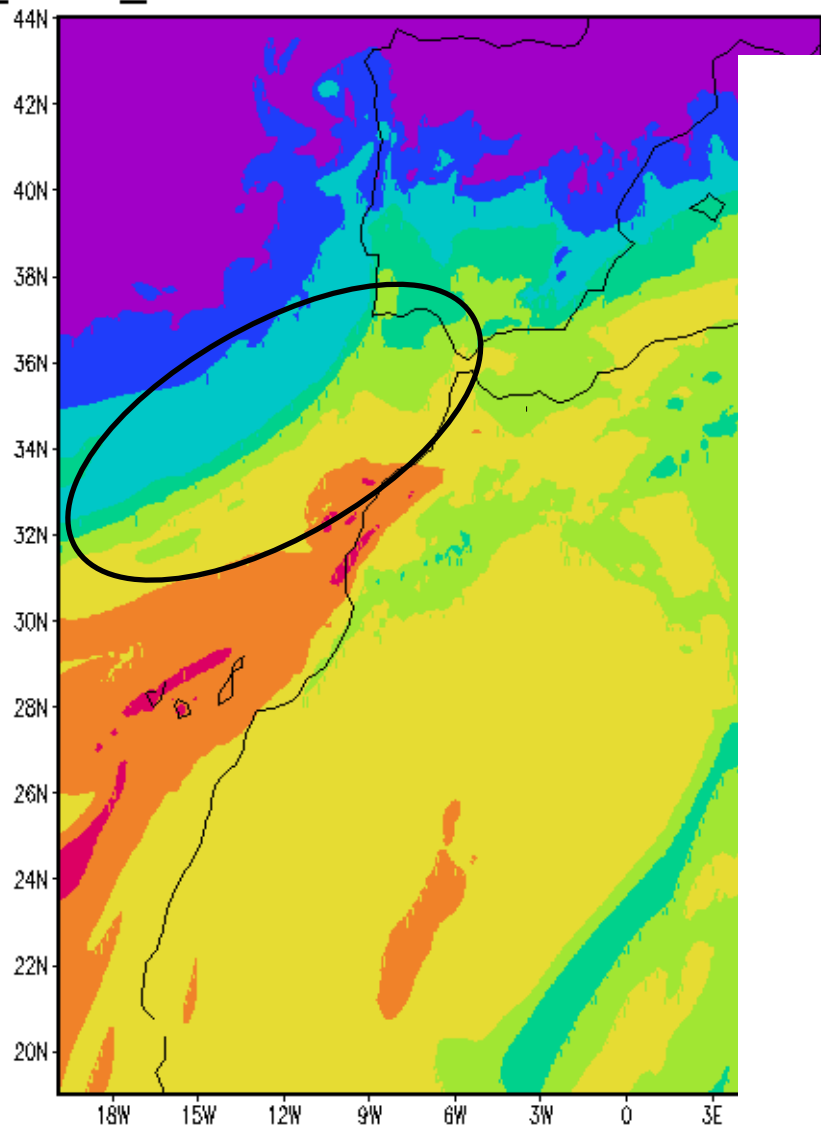
Mean Sea Level Pressure – 30Nov at 00UTC : 3DVAR



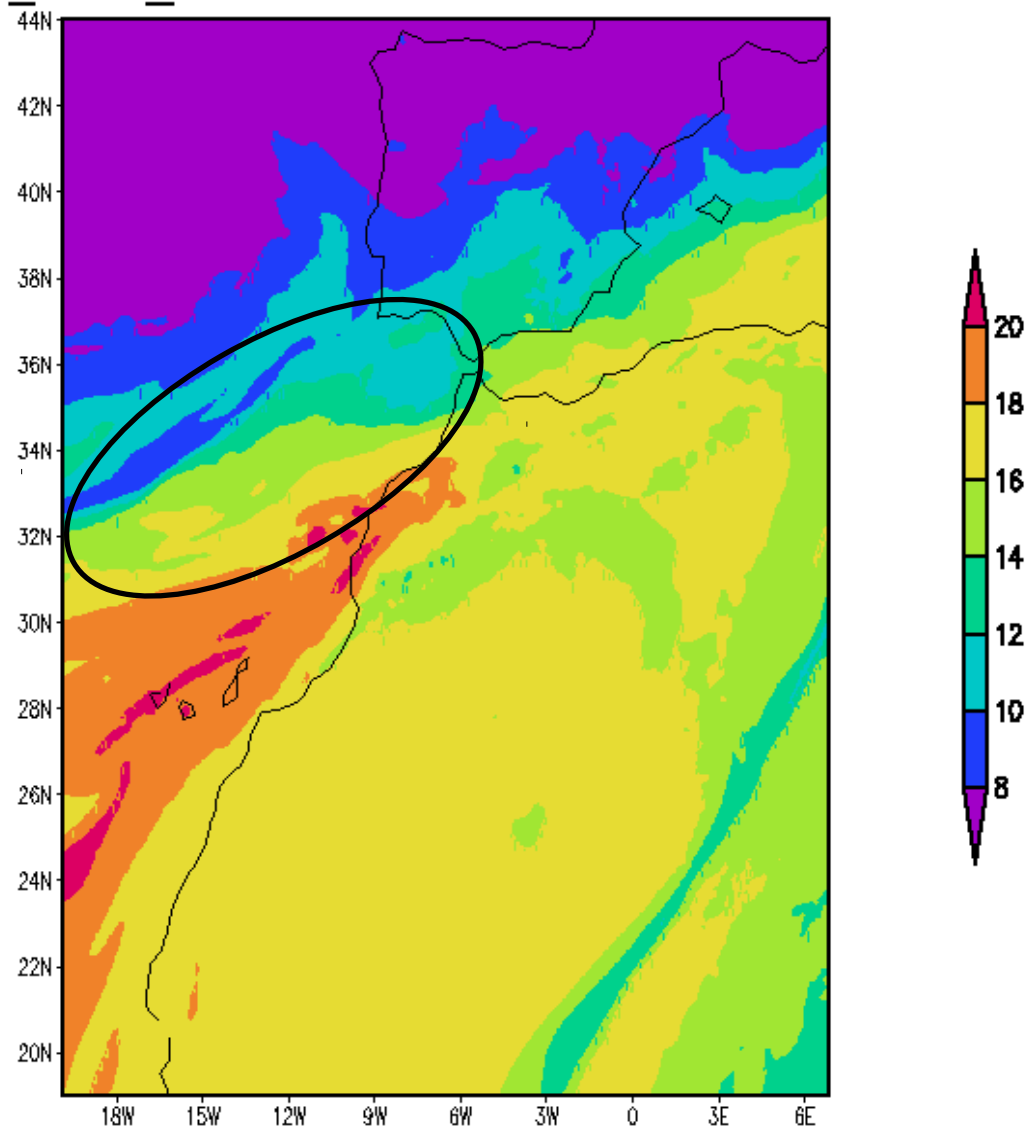
Mean Sea Level Pressure – 30Nov at 00UTC : ADN

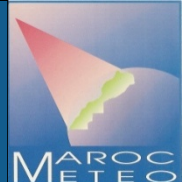


TETA_PRIME_W AT 850hPa - 30Nov at 00UTC : 3DVAR



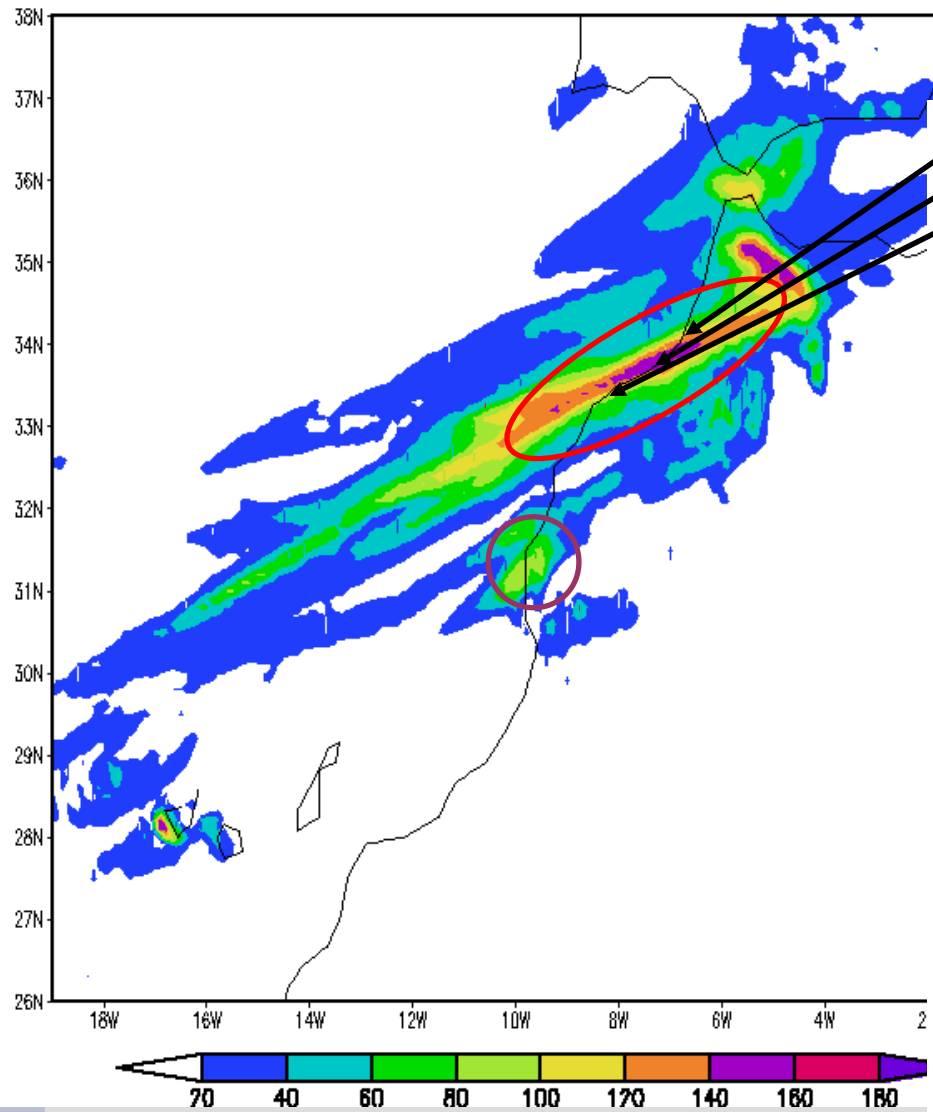
TETA_PRIME_W AT 850hPa - 30Nov at 00UTC : ADN



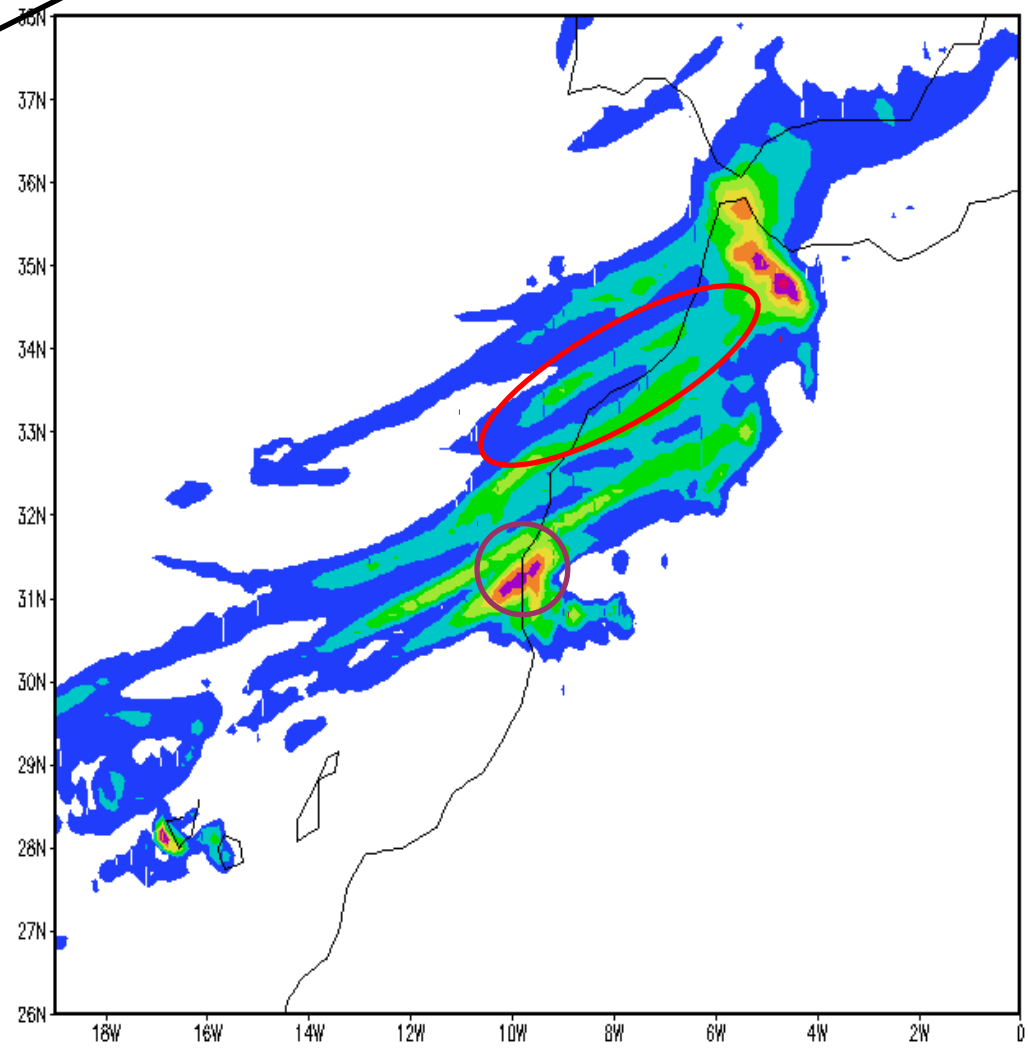


- Rabat: 97mm
- Casablanca: 178mm
- ElJadida: 150mm

RAIN CUMUL FROM 29Nov at 06UTC to 30Nov at 06UTC : 3DVAR



RAIN CUMUL FROM 29Nov at 06UTC to 30Nov at 06UTC : ADN





Perspectives

- New observations :
 - GPS, automatic stations, geowind, new radiometers
 - AMSU over land
- Assimilation method : BlendVar
- Surface analysis