Status of Numerical Weather Prediction in Morocco

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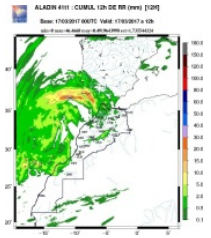
ALADIN/AROME Configurations without Data Assimilation

ALADIN :

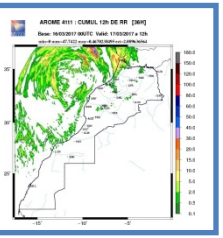
Coupling model : Arpège
Coupling frequency : 3h
Time step : 450s
Forecast range : 72h
Horizontal resolution:10km
Number of points : 320x320
Vertical Levels : 60
Cycle : 36t1, 38t1 (with Surfex)

For cy41t1 :
Horizontal Resolution : 7.5km
Number of points : 400x400
Vertical levels : 70
Time step : 300s



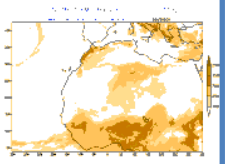
AROME :

Coupling model : ALADIN
Coupling frequency : 1h
Time step : 60s
Forecast range : 48h
Horizontal resolution : 2.5km
Number of points : 800x800
Vertical Levels : 60 (90 for cy41t1)
Cycle : 38t1 and cy41t1



ALADIN NORAF :

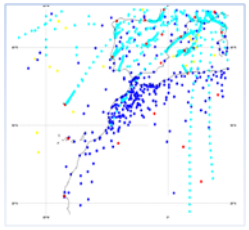
Coupling model : ARPEGE
Coupling frequency : 6h
Time step : 600s
Forecast range : 72h
Horizontal resolution : 18km
Number of points : 324x540
Vertical Levels : 60 (70 for cy41t1)
Cycle : 36t1, 38t1 and cy41t1



Configurations with data assimilation

Local Database

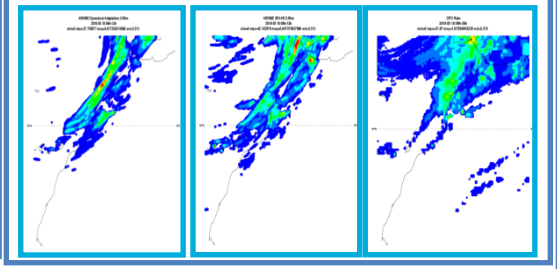
Local visualization data base programs
+ routines for extraction
+ Oulan
4 files per day with a 6hours observation window
BUT only for conventional data



Data Assimilation suite in ALADIN and experiments in AROME

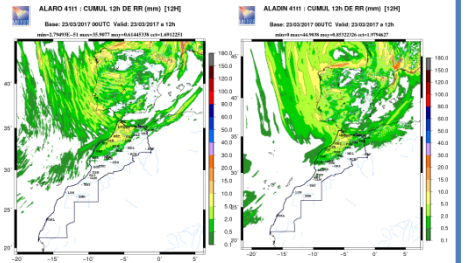
3DVAR for upper air analysis
CANARI for surface analysis
Ensemble B matrix
Cycle 36t1 for ALADIN (10km)
Cycle 40t1 for AROME (2.5km)
Assimilation of conventional, SEVIRI and ATOVS data

Observation type	Assimilated variables
Synop	Z,T2m,U,T,Hu,Hu2m
Dribu	Z,U,T,Hu
Airep	T,U
Temp	T,U,Q
Satem	T_z



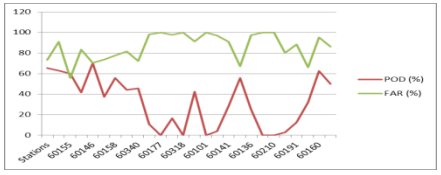
First experiments of ALARO-MOROCCO

Cycles 40t1 and 41t1
Coupling model : ARPEGE
Coupling frequency : 3h
Time step : 120
Forecast range : 72h
Horizontal resolution : 5km
Number of points : 600x600
Vertical Levels : 70



Predicting Fog with AROME

The evaluation of the capability of predicting fog in Morocco using AROME-Morocco (CY38t1, 2.5 km)
The study covered the period from March 2015 to December 2015
Results show that LWC at 10m, as used to detect fog, present high rate of FAR associated to good quality of POD.
The model underestimates the temperature at 2 m and overestimates the relative humidity at 2 m with good reproduction of the wind evolution at 10 m.



First experiments with Open IFS

- Installation of uni-column version of the OpenIFS model
- Installation of 3D version of OpenIFS on IBM but with problems in CPU
- Sensitivity tests of a highly convective situation to the different ways of approaching the diurnal cycle of convection combined with a CAPE closure

Ongoing works related to High performance computing :

•A tender procedure for a new machine
•Preparing all benchmark tests

Ongoing works related to IFS/ARPEGE/ALADIN/ALARO/AROME

•Testing Cy41t1 with Data Assimilation in AROME-Morocco
•Porting the last available cycle in Dynamical Adaptation configuration
•Investigating new ways to better forecast fog with AROME 1.3km
•Introducing local GPS ground base data in initial conditions
•Investigating the possibility to introduce Radar precipitation (already adjusted by rain gauges) in initial conditions
•Cases studies with ALARO 5km
•Convection studies with OpenIFS/ALARO
•LBC files from ARPEGE+SURFEX were tested, results are ambiguous.

Coupling AROME-MAROC directly from ARPEGE :

The Bais and RMSE scores calculated for the months of January and July 2016 showed that the coupling of Arome with Arpège allowed a slight improvement in the prediction of the temperature and humidity fields at 2 meters.
In addition, the wind strength at 10 meters improved considerably during the first three hours.
For precipitation, the results obtained show that the coupling of Arome with Arpège generally reduces false alarms and a slight improvement in detection of low rainfall, but for the detection of strong rains, the coupling with Aladin remains significantly better.