



# Forecasters feedback about AROME model



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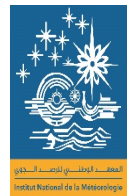
# I. Models & Tools

## Models :

- AROME 1.3 km
- ARPEGE 0.1 (10 km)
- ARPEGE 0.5 (50 km)
- ALADAIN 7.5 km
- GFS , ECMWF,....

## Satellite Data ( MSG, EUMETSAT Products, NWC Saf)

## RADAR DATA ( X band)



## II. Arome assessment

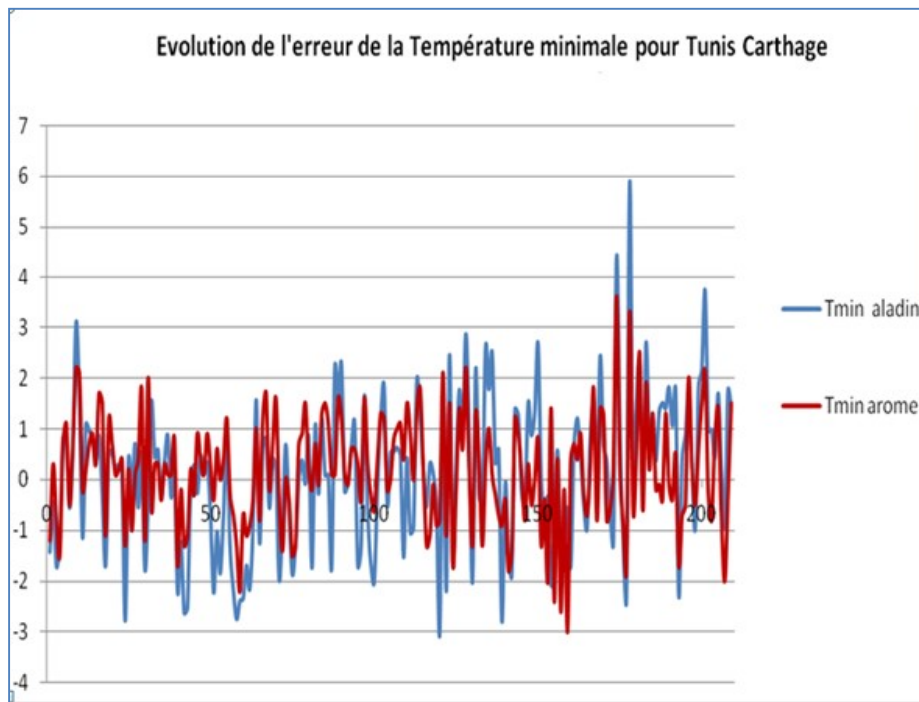
Temperature ( max , min ) - wind ( Gust)



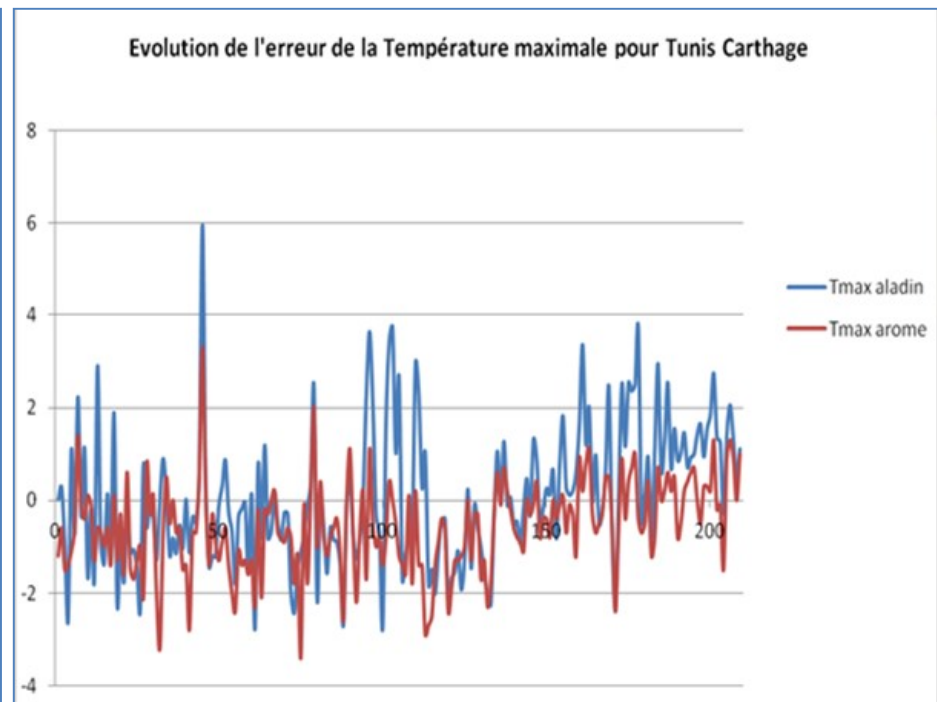
- 4 Stations
- comparison : Arome, Aladin , recorded Temp & wind
- Periode from June to December 2021

## II. Arome assessment

### Temperature ( max , min )



AROME Tmin error < ALADIN Tmin error

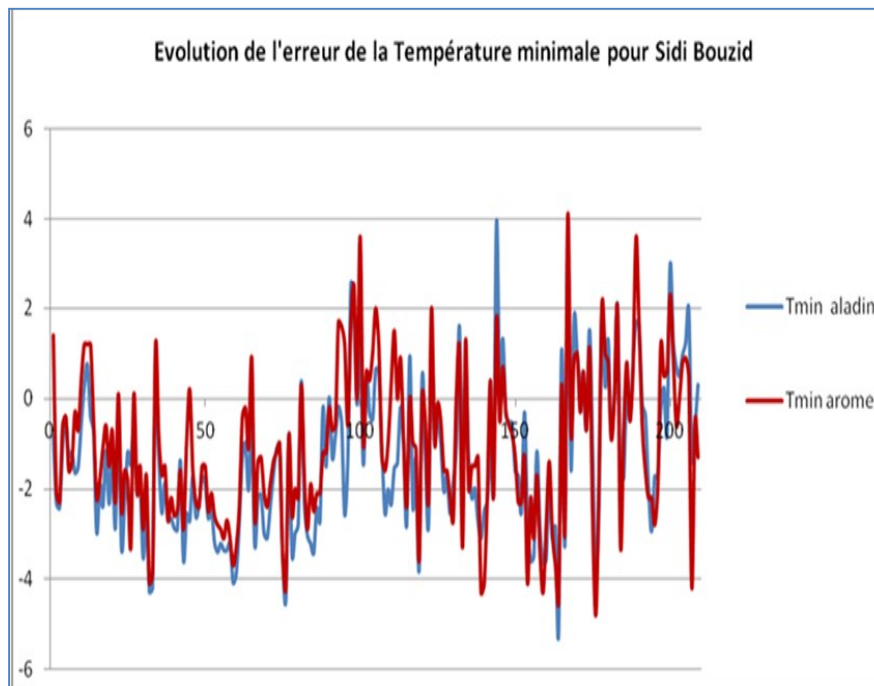


AROME Tmax error < ALADIN Tmax error

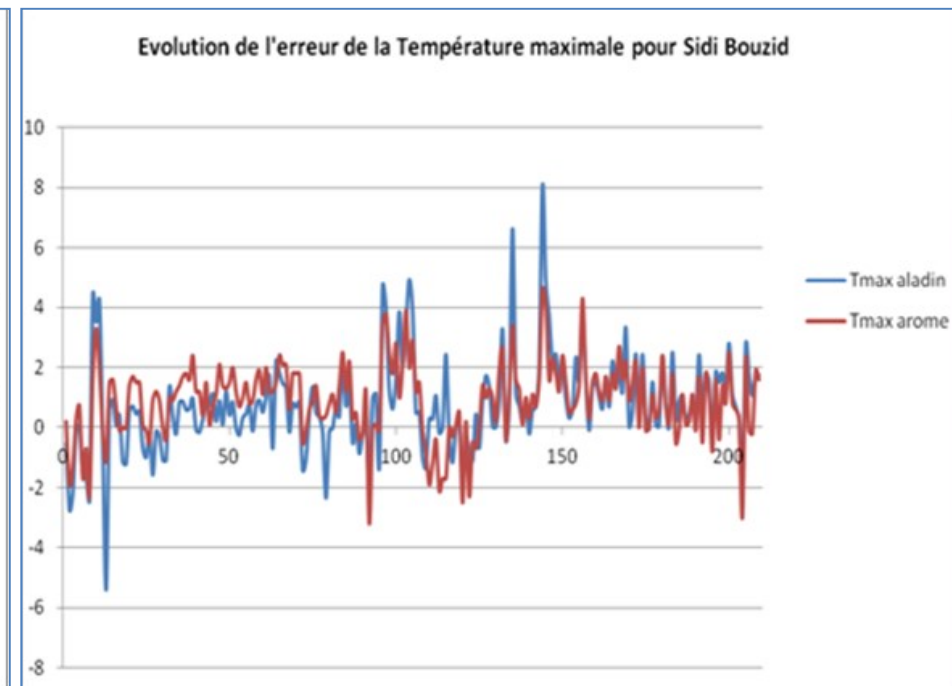
→ We noticed that Arome had the lowest error rate for Tunis station

## II. Arome assessment

### Temperature ( max , min )



AROME Tmin error < ALADIN Tmin error

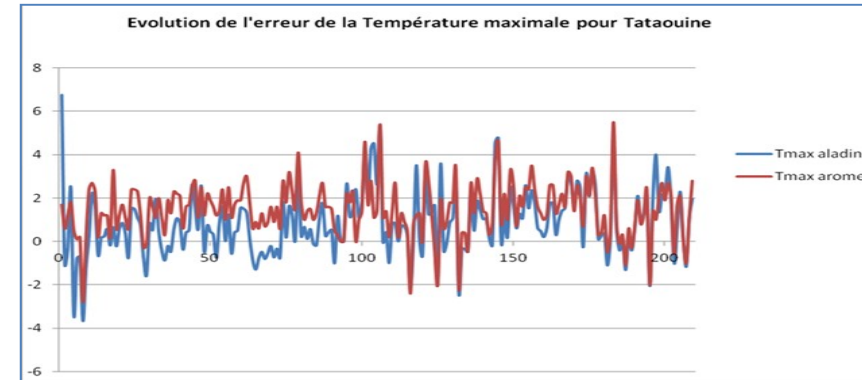
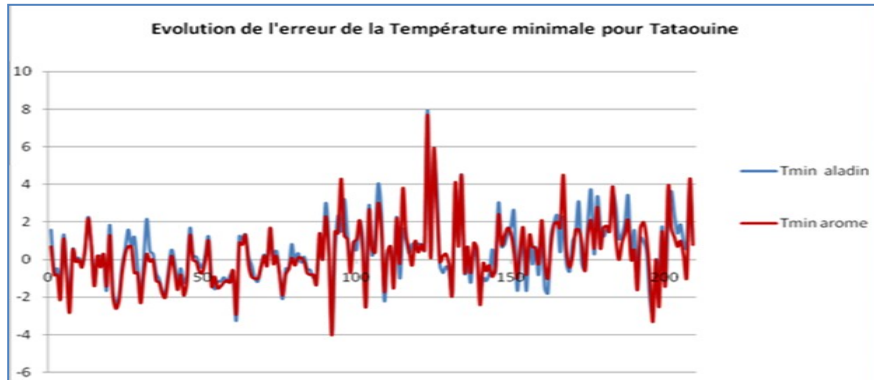
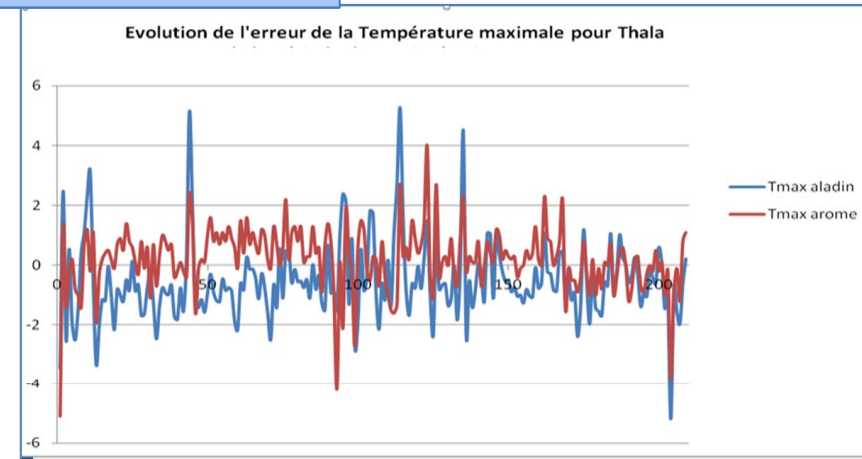
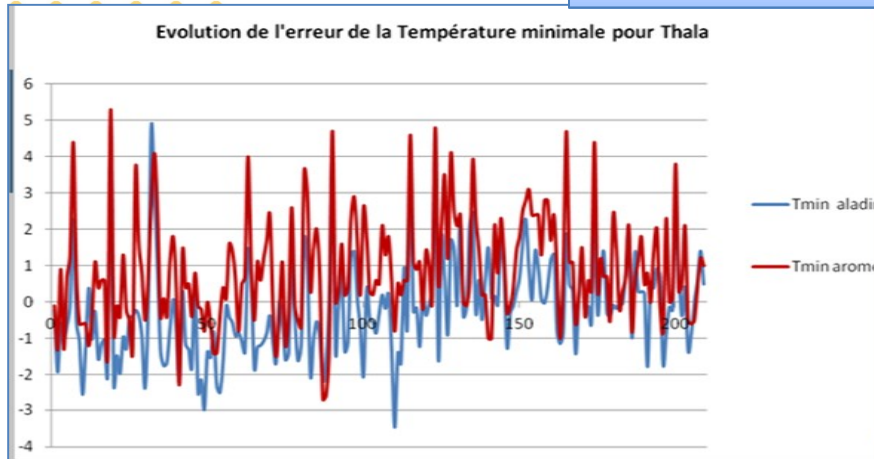


AROME Tmax error < ALADIN Tmax error

→ Arome had the lowest error rate for Sidi Bouzid Station

# II. Arome assessment

## Temperature ( max , min )



AROME Tmin error > ALADIN Tmin error

AROME Tmax error > ALADIN Tmax error

→ Arome error rate was increased and Aladin provided a better forecast of temperature

## II. Arome assessment

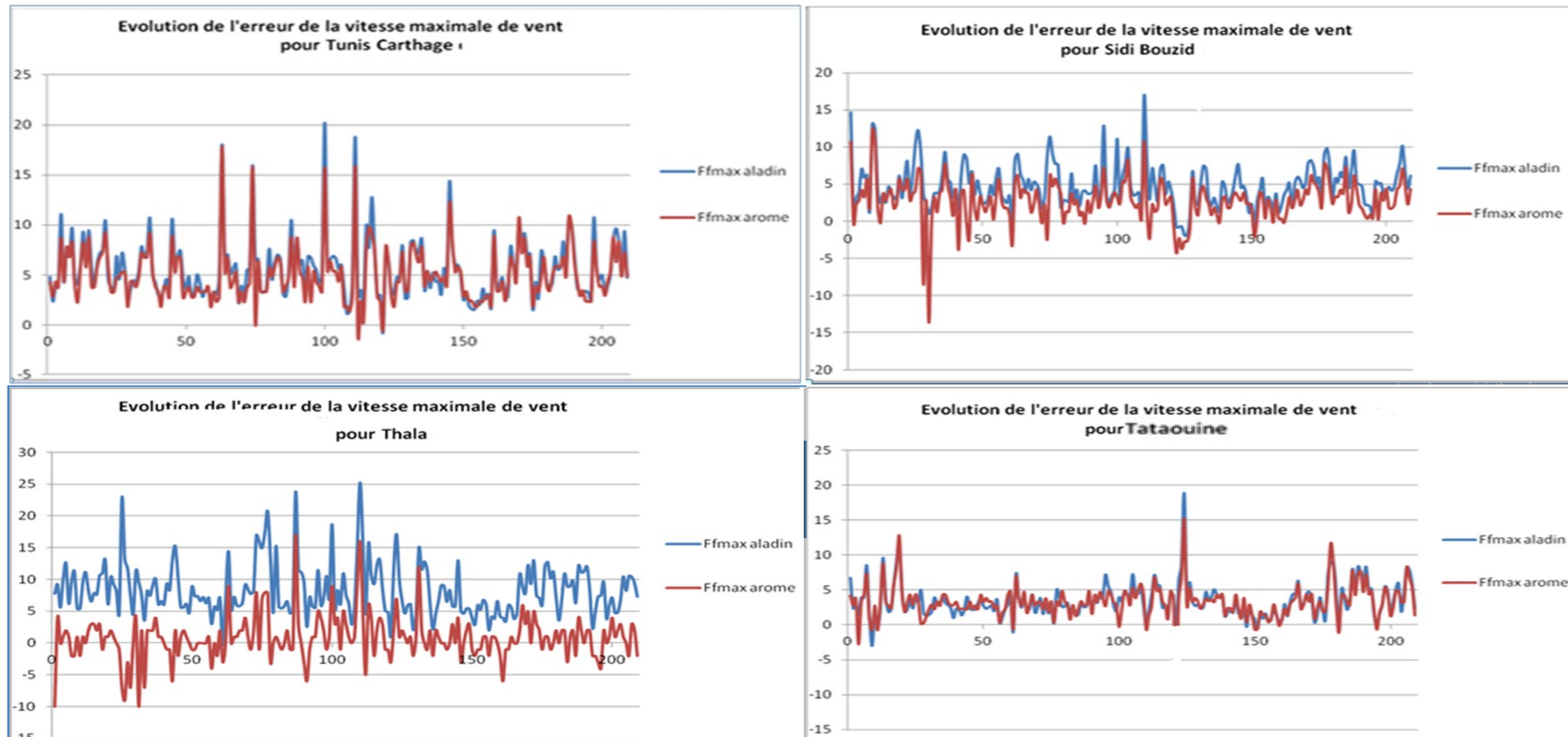


**weaknesses among min and max  
temperature forecasts for mountainous and  
Saharan regions**



## II. Arome assessment

### Wind<sub>max</sub>



AROME **Wind<sub>max</sub>** Error < ALADIN **Wind<sub>max</sub>** Error

➔ For the wind, Arome provided a better and more reliable forecasts and had the lower error rate than Aladin over all stations.

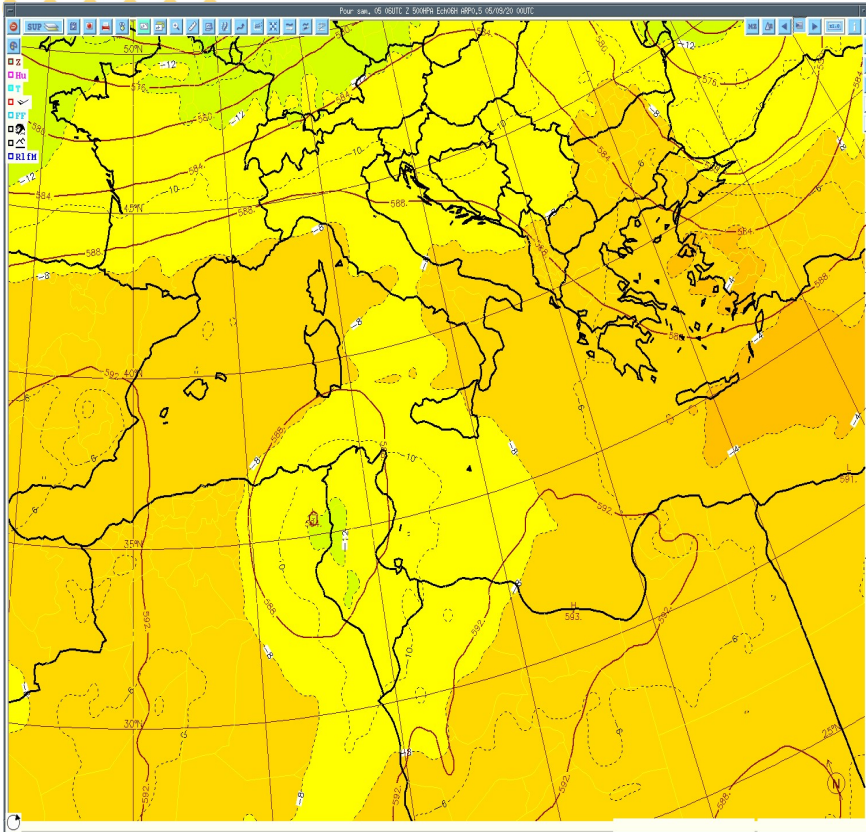


## II. Arome assessment

Rainfall & Precipitation

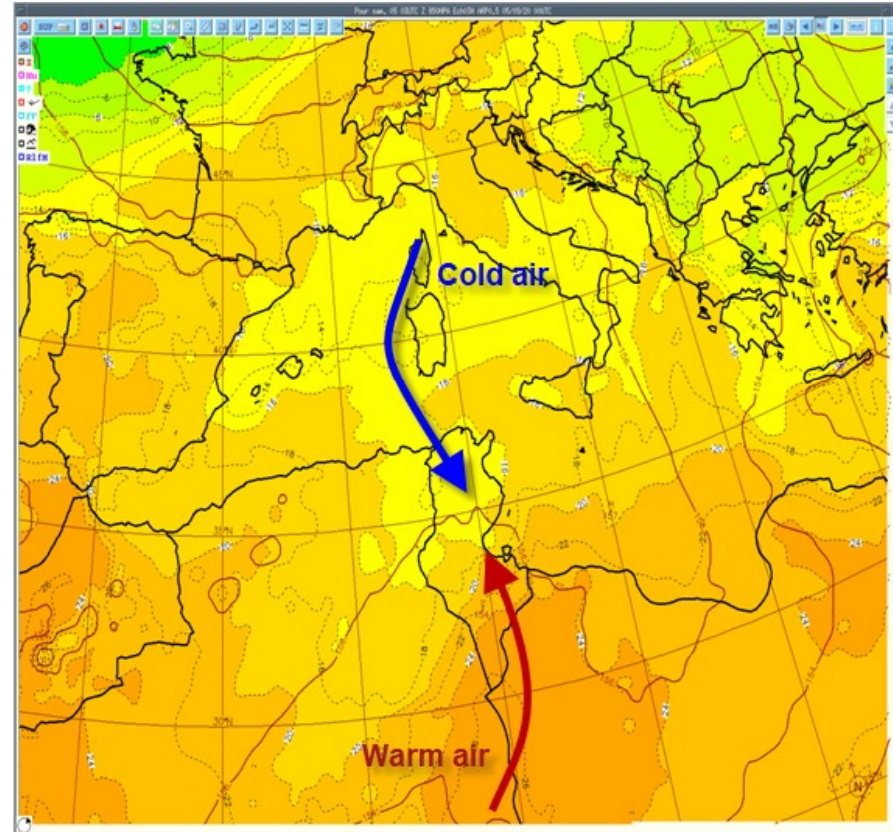
Case of September 05, 2020

## II. Arome assessment



Z+T - 500 hpa

- Low geopotential
- Cold-air drops

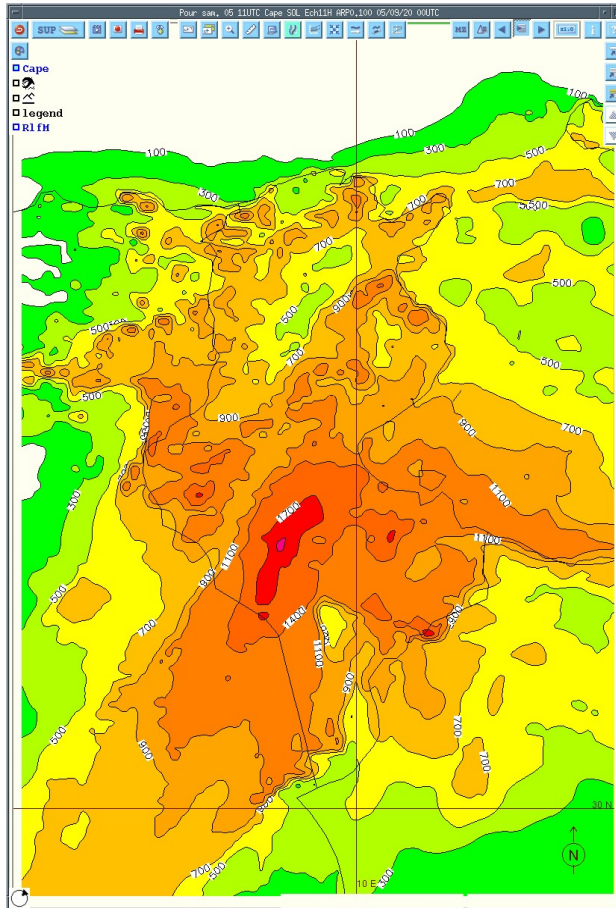


Z+T - 850 hpa

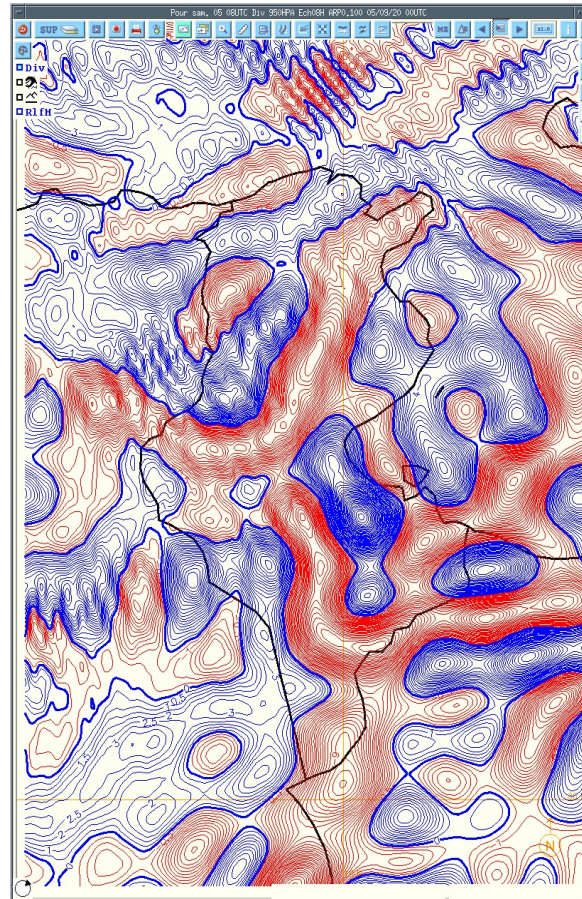
- Cold air infiltration
- warm air advection
- ➔ conflict area of air masses



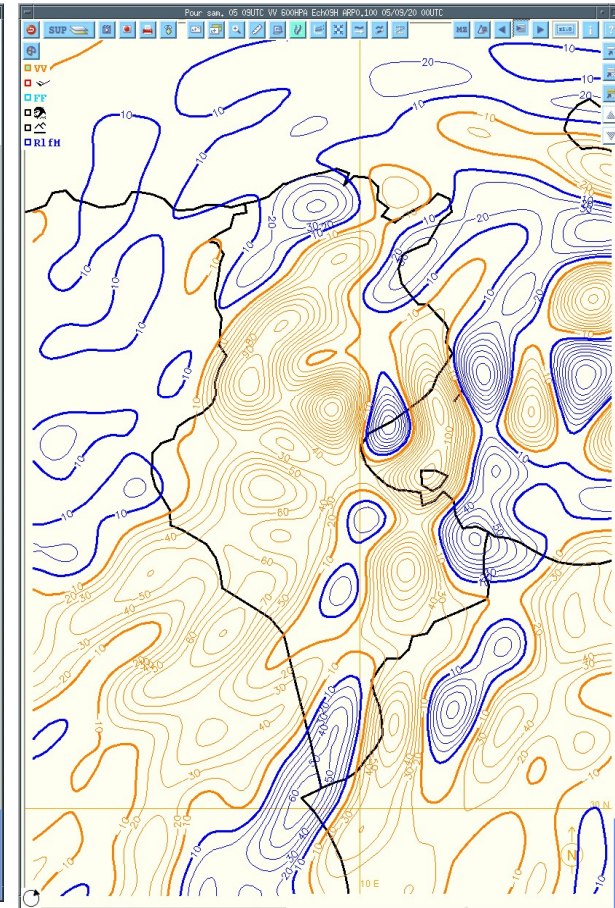
## II. Arome assessment



Convective Available Potential Energy



convergence -950 hpa



Vertical Velocity -900 hpa

## II. Arome assessment

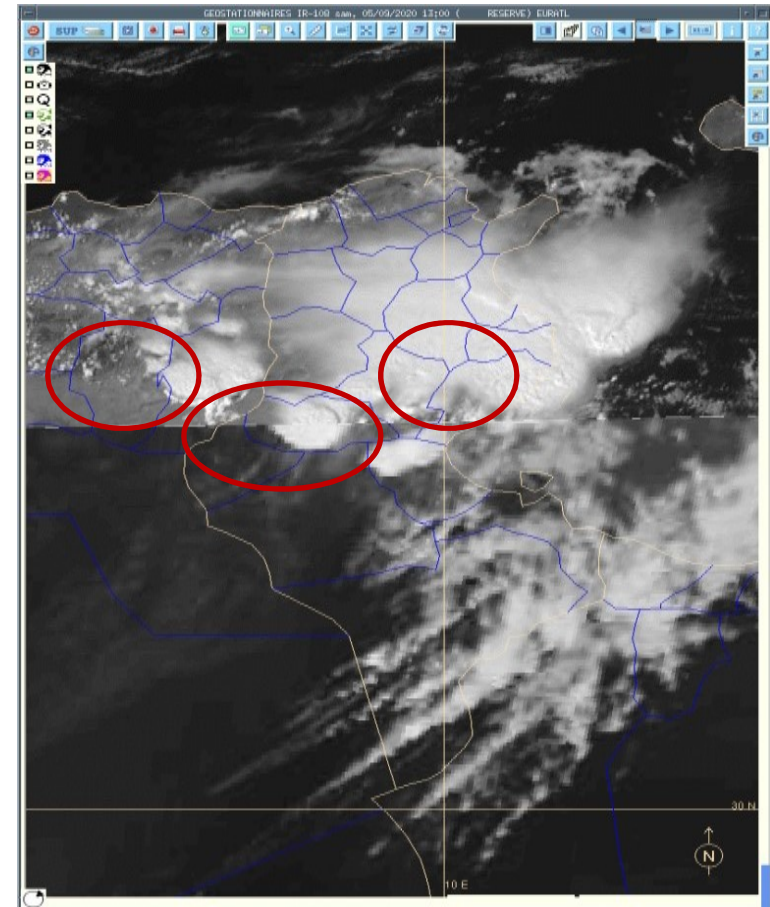
Dynamic forcing in the upper  
layers of the atmosphere

+

Convection

+

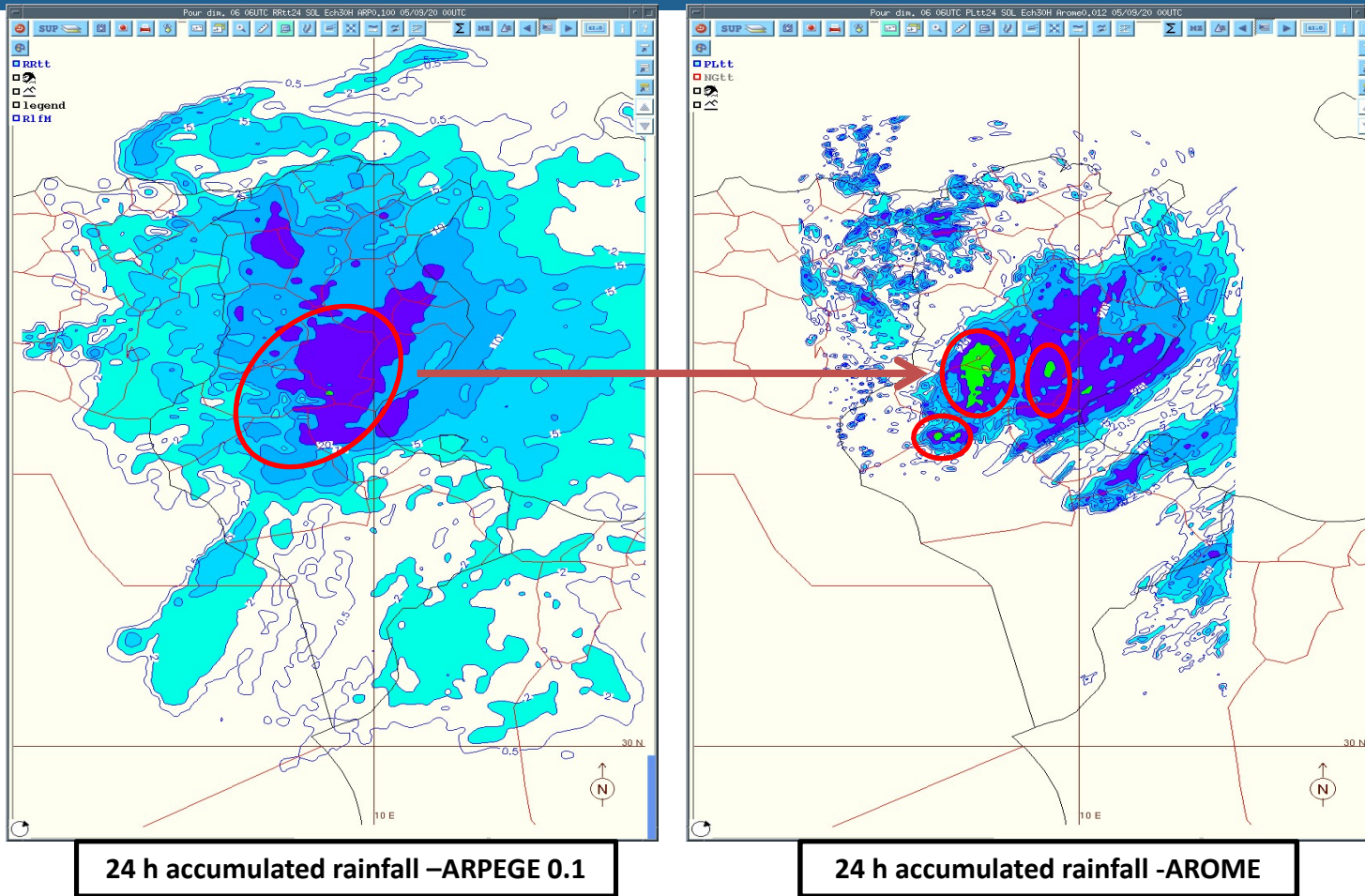
instability at Lower layer



Triggering of thunderstorms  
September 05, 2020

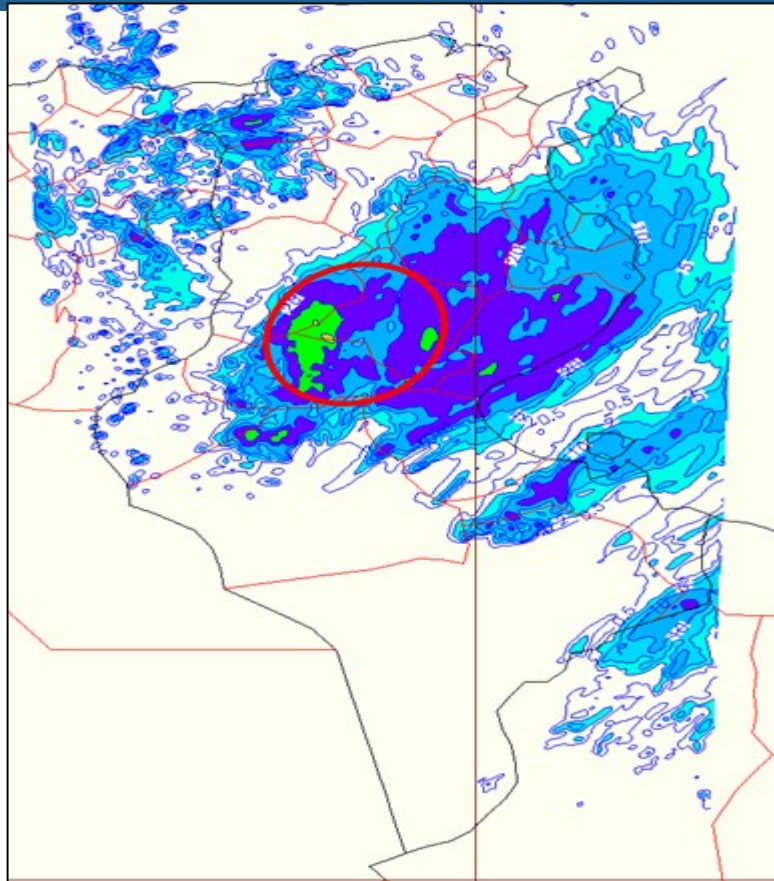


## II. Arome assessment

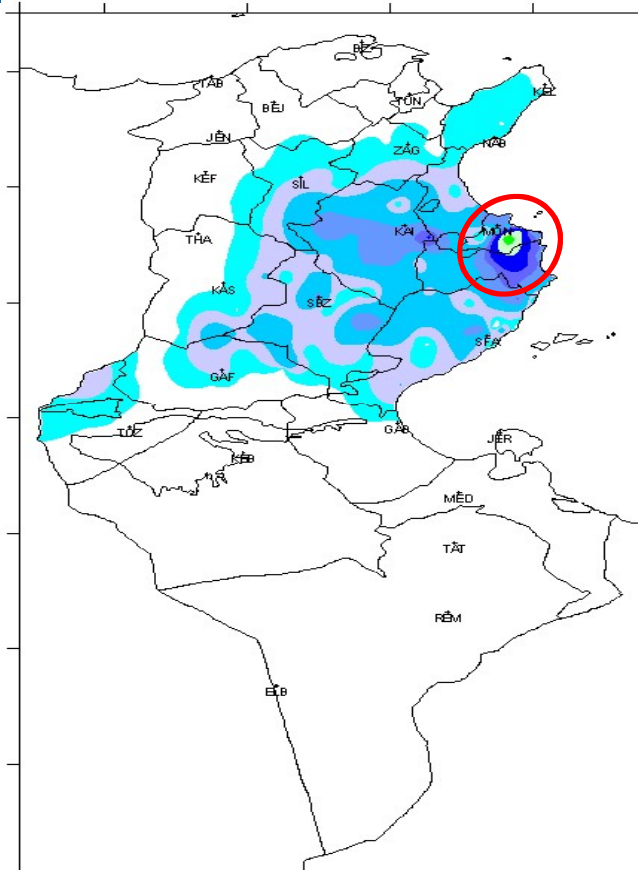


➔ Arome provided higher resolution and finer forecasts than Aladain .  
It showed significant rainfall quantities ( 50 - 150 mm )

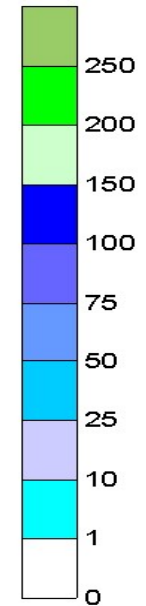
## II. Arome assessment



24 h accumulated rainfall -AROME



24 h recorded rainfall



Detection of the heavy rainfall amounts / spatial shift → 230 mm recorded in the eastern coastal regions.

## II. Arome assessment

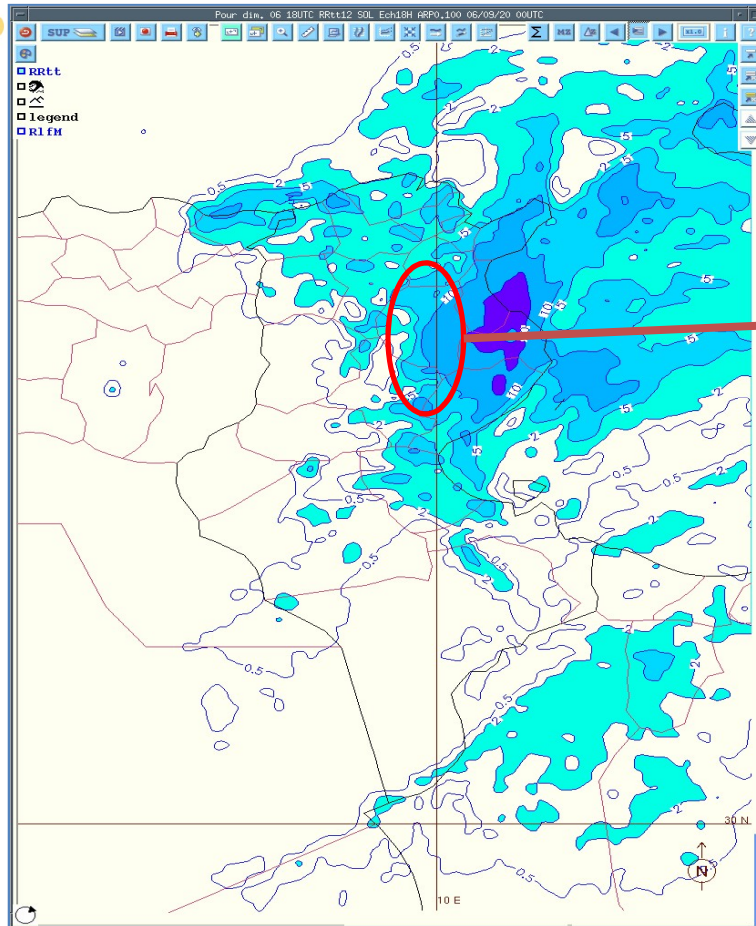
Rain & Precipitation

Case of September 06, 2020

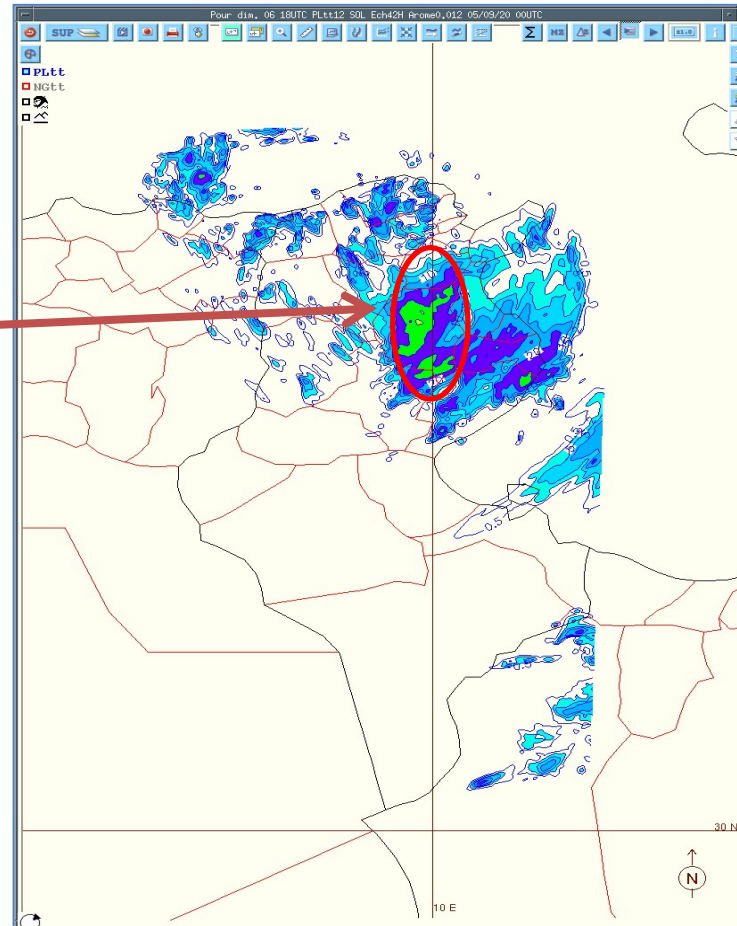
Dynamic forcing  
+  
Convection and instability at  
Lower layer



## II. Arome assessment



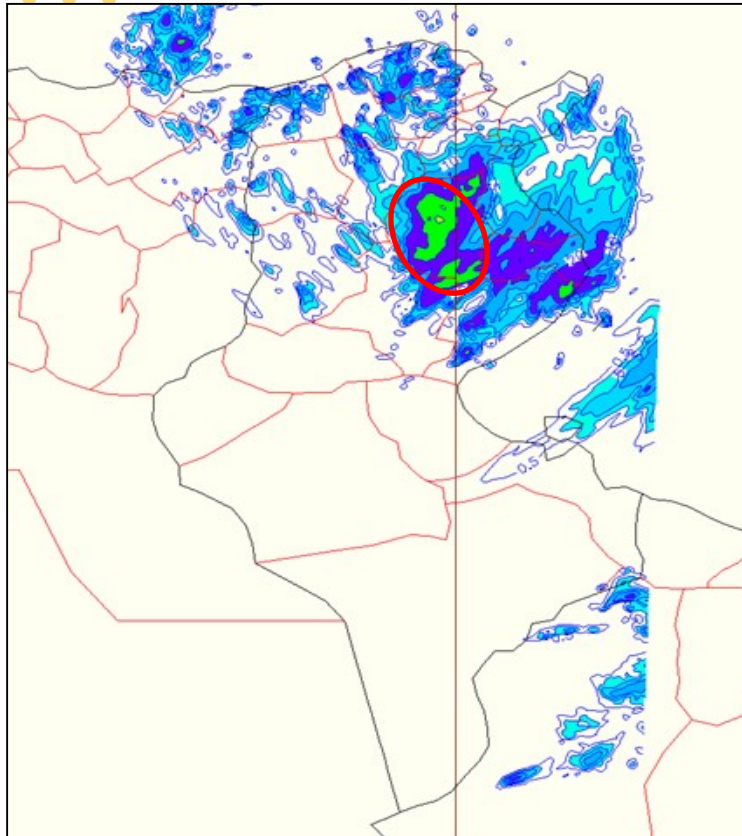
24 h accumulated rainfall –ARPEGE 0.1



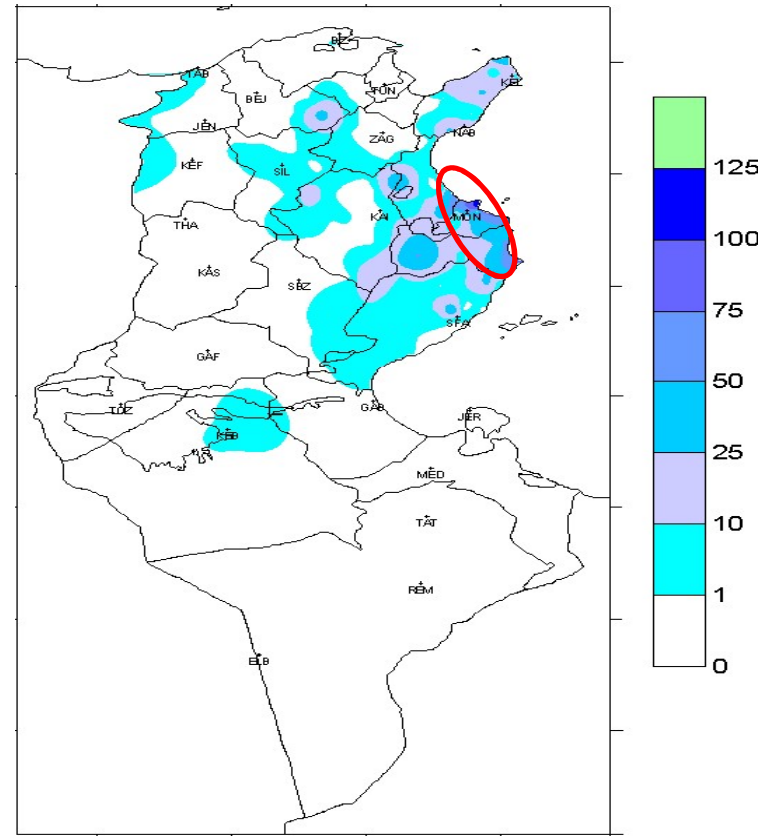
24 h accumulated rainfall -AROME

Arome provided higher resolution and more details of rainfall quantities

## II. Arome assessment



24 h accumulated rainfall -AROME

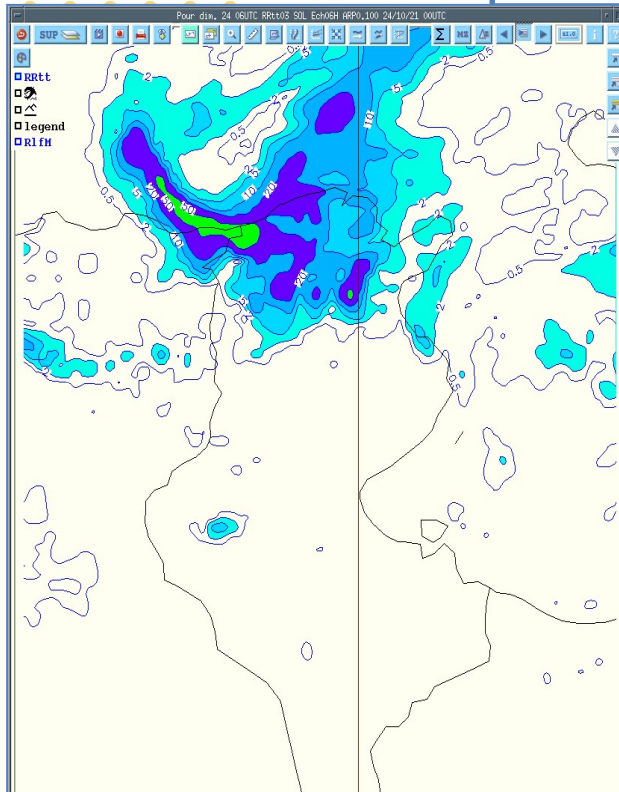


24 h recorded rainfall

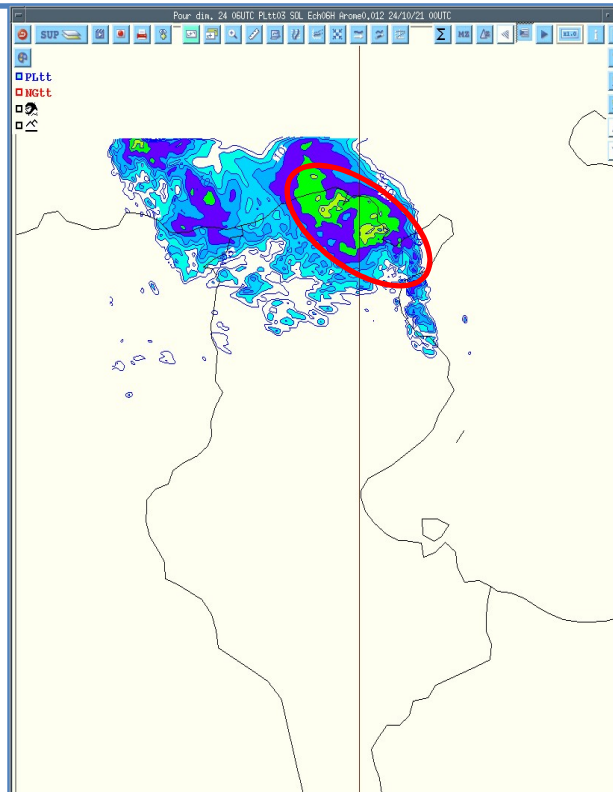
Detection of heavy rainfall quantities / spatial shift → 110 mm was recorded in the eastern coastal regions.

# II. Arome assessment

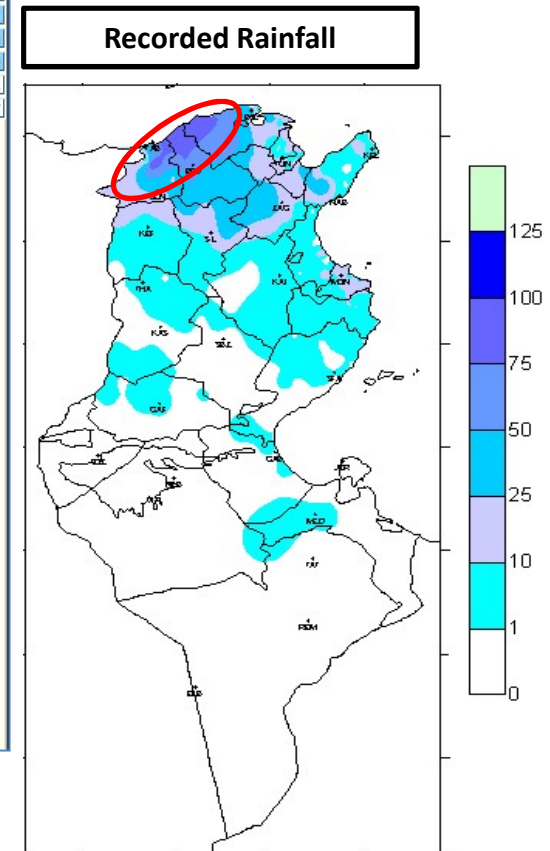
Case of October 24 , 2021 → Convective situation



24 h accumulated rainfall -ARPEGE



24 h accumulated rainfall -AROME



A spatial shift is noticed, the heavy rainfall forecasted in the North East were recorded in the North West



## II. Arome assessment

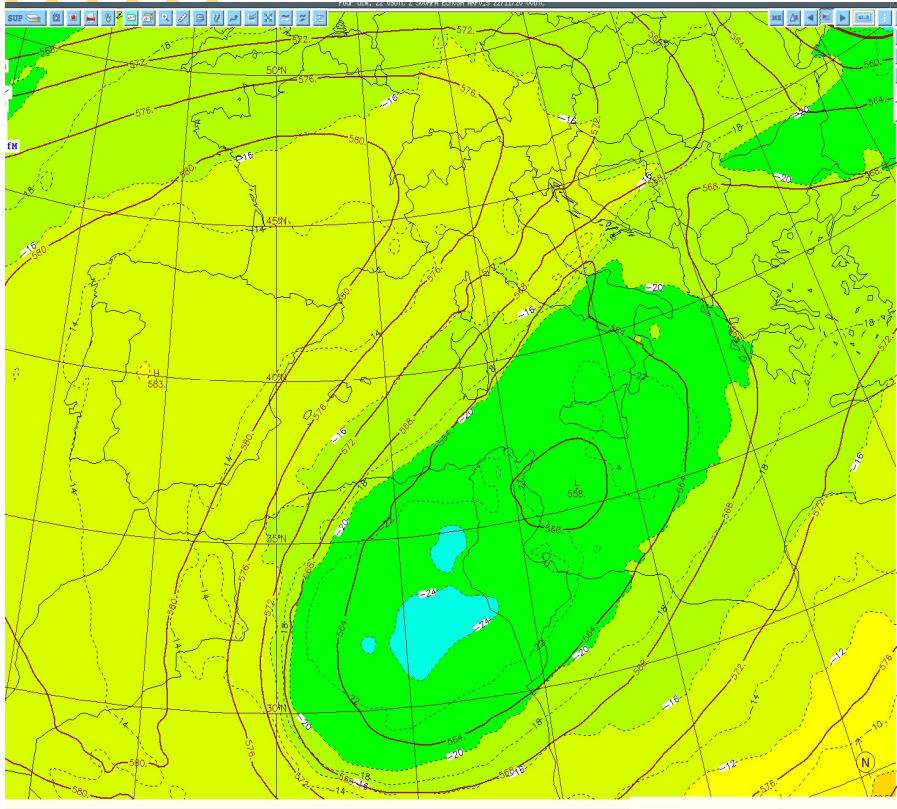
Rain & Precipitation

Case of October 22, 2020

Case of dynamic situation

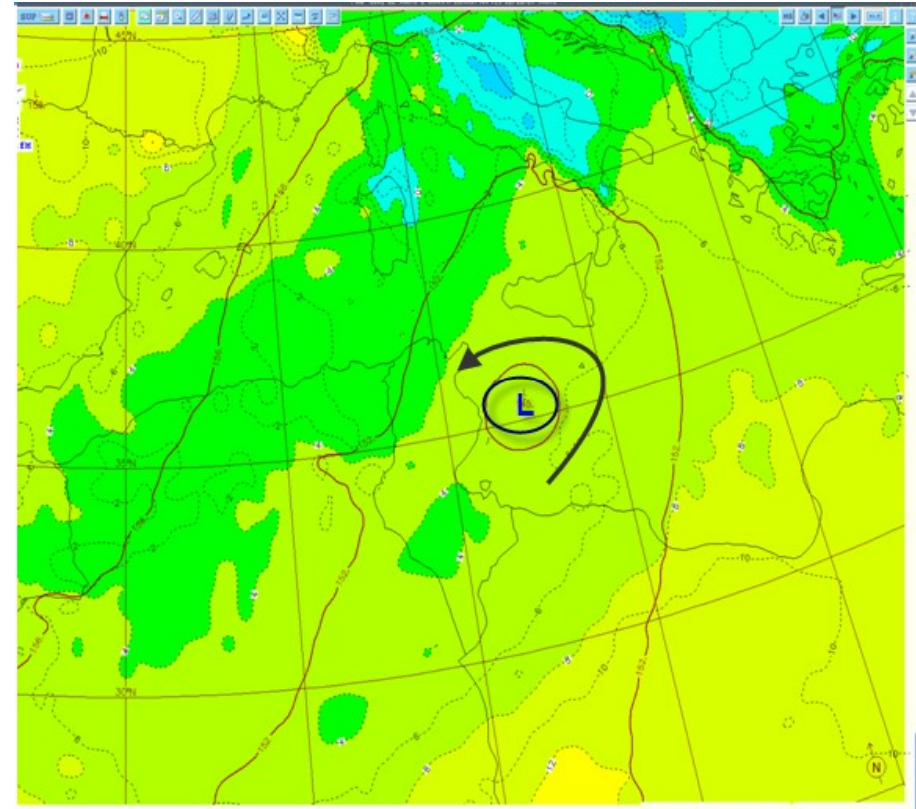


## II. Arome assessment



Z+T - 500 hpa

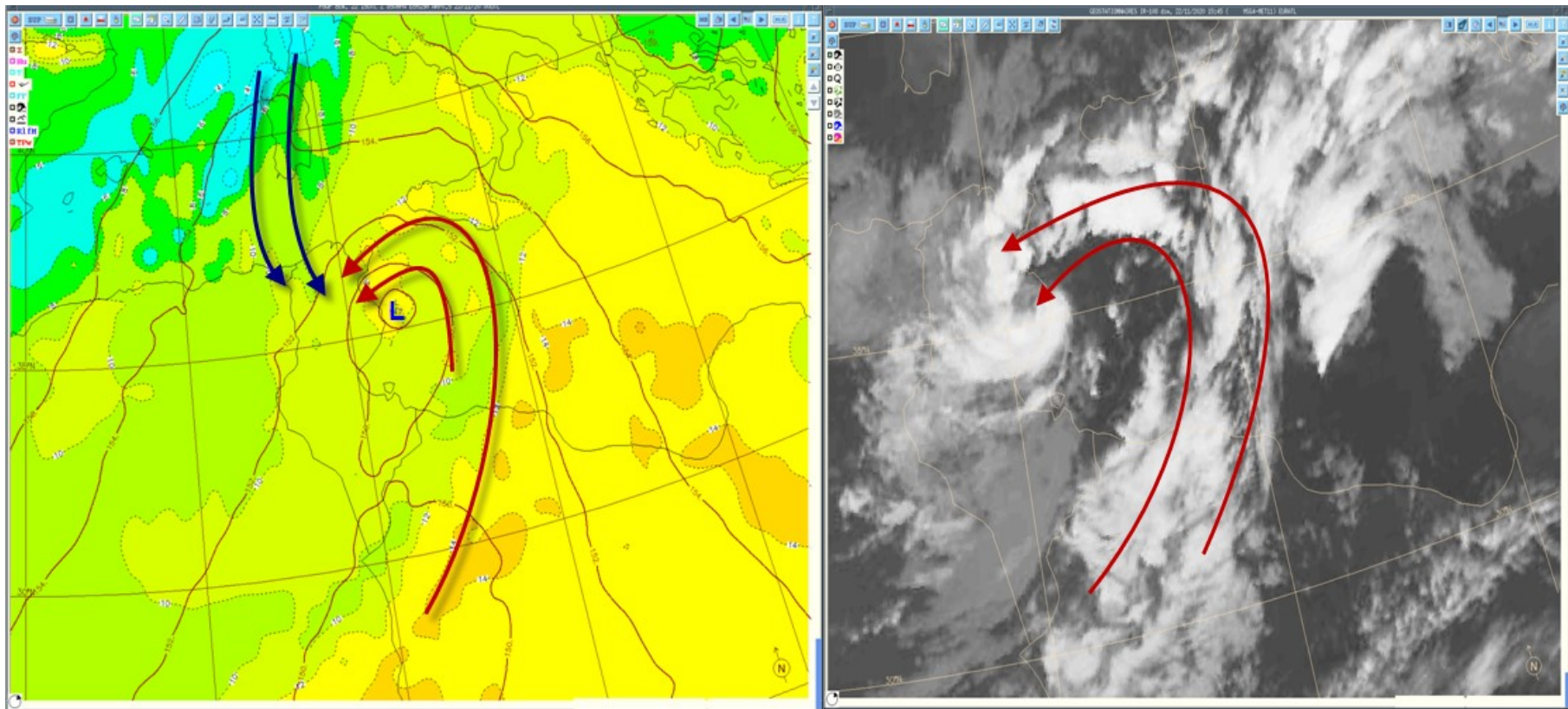
Low geopotential over entire area + cold air



Z+T - 850 hpa

Marine Low pressure + air masses movement from the east.

## II. Arome assessment

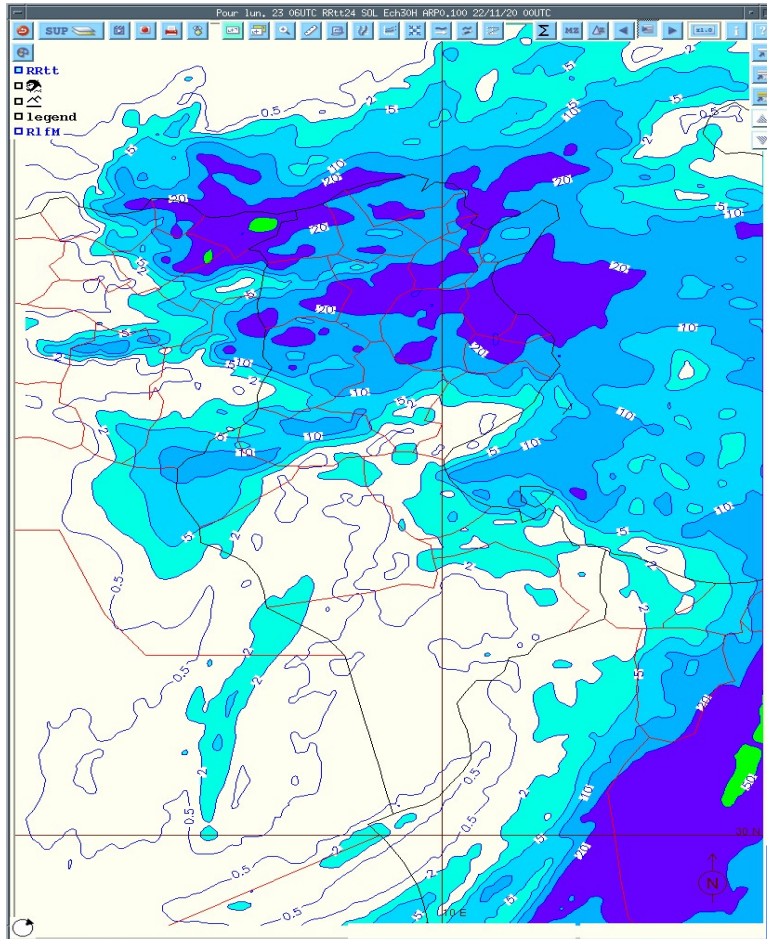


$Z+Tw' - 850 \text{ hpa}$

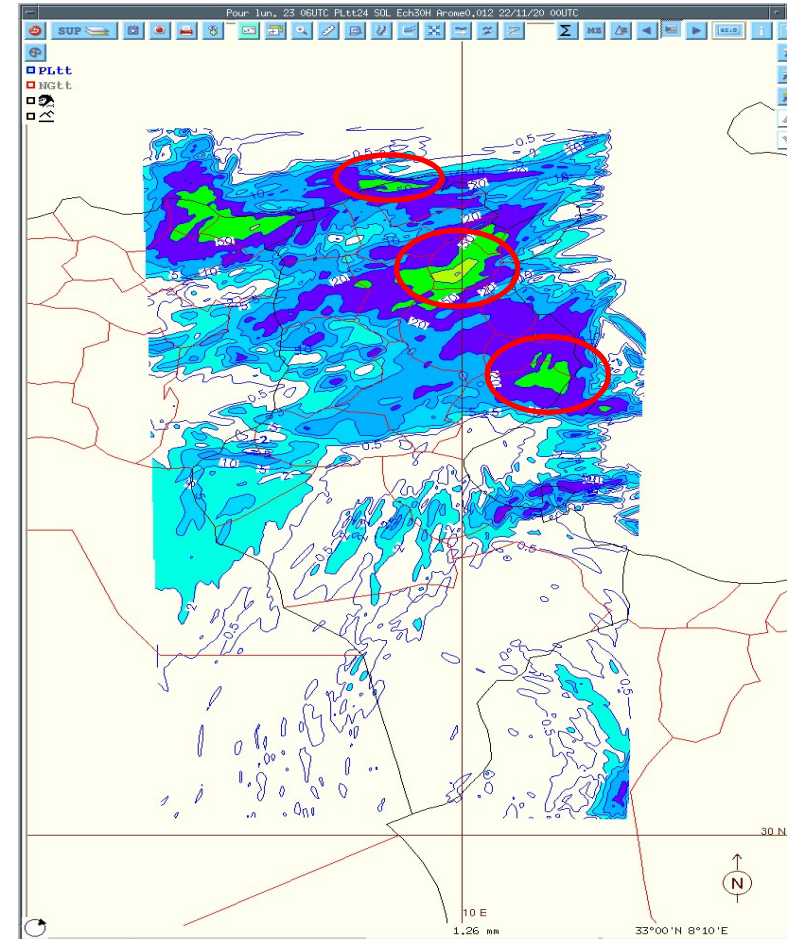
The lower part of the troposphere



## II. Arome assessment



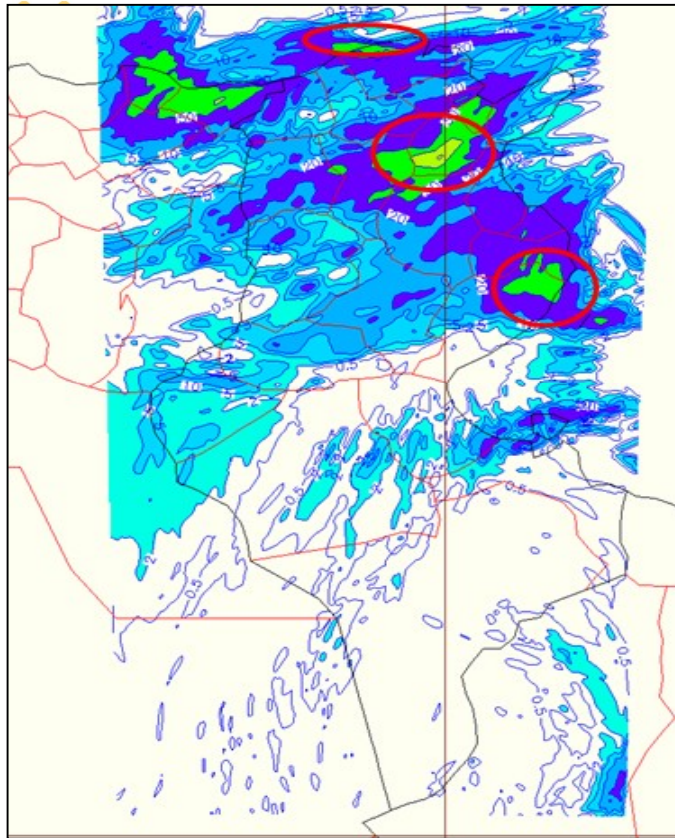
24 h accumulated rainfall -ARPEGE



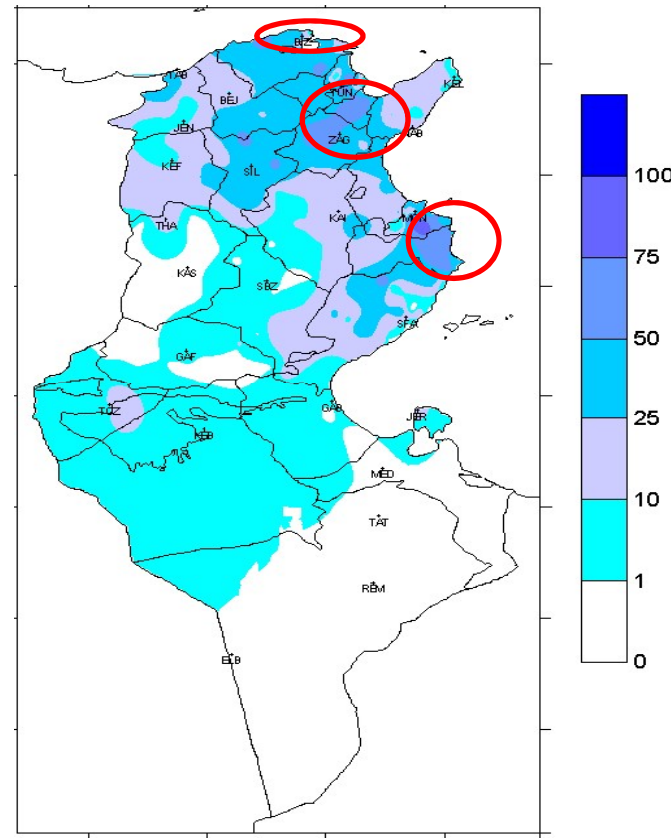
24 h accumulated rainfall -AROME

Arome has better predicted the significant rainfall than Aladin

## II. Arome assessment



24 h accumulated rainfall -AROME



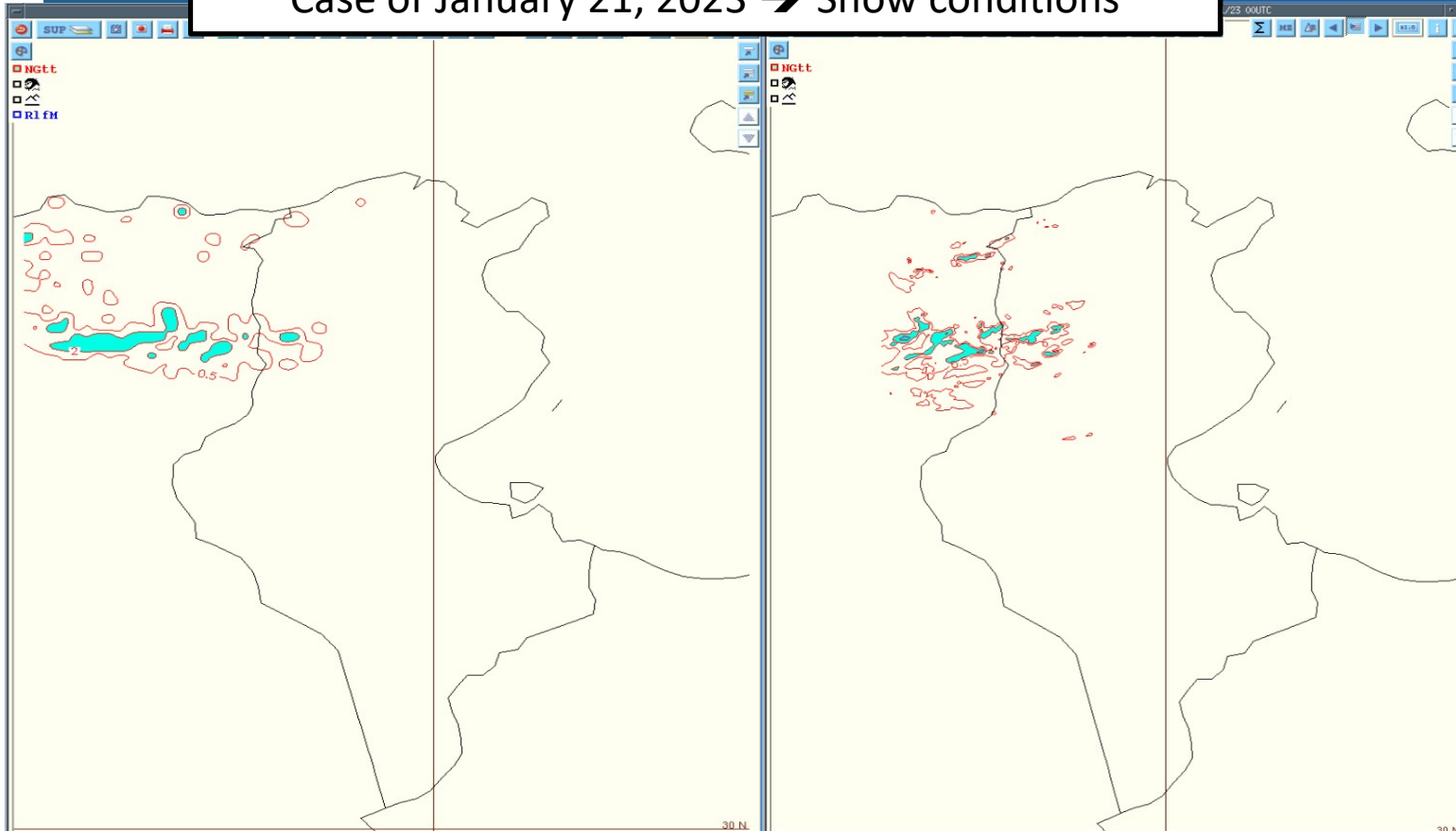
24 h recorded rainfall

Arome has well located the heavy Rainfall amounts



## II. Arome assessment

Case of January 21, 2023 → Snow conditions



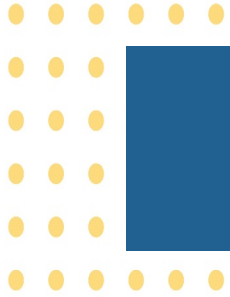
Snow forecast -ARPEGE

Snow forecast -AROME

- Arome and Arpege have almost the same snow forecasts.
- Both models underestimate the snow depth.

### III : Suggested improvement

- Further investigation about the reasons of the spatial shift especially in convective weather situations.
- Further investigation about the reasons of the time lag (Triggering of thunderstorms detected before the starting time predicted by the model).
- Develop icing and fog/visibility index.
- Improve the 'graupel' index.
- Develop simulated satellite image.



*Thank you*

