



Synoptic analysis of some Lokal Modell quantitative precipitation forecasting cases over Romania

I.V.PESCARU, Rodica DUMITRACHE, Liliana VELEA, Florinela POPA, Cosmin BARBU
National Meteorological Administration, Bucharest, Romania

LM Integration characteristics

Horizontal resolution:

14km (81x73, grid points)

Vertical resolution:

35 levels

Time step:

80s

IC & LBC:

GME 00, every 3h

Grid-scale pp:

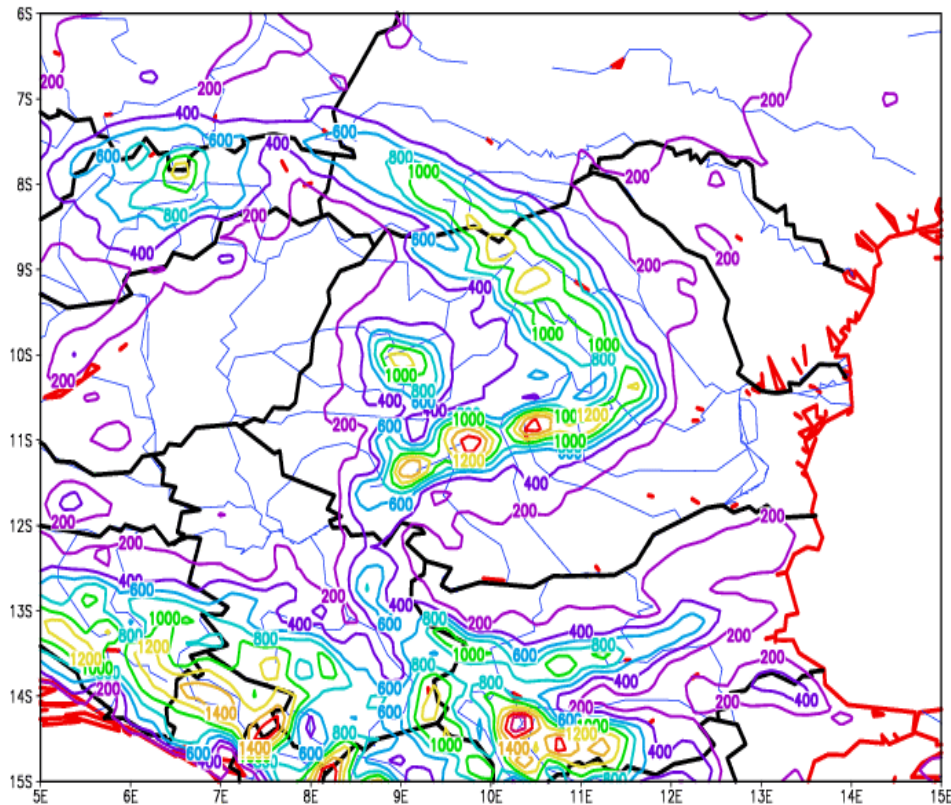
**2-ice category scheme,
prognostic**

Convection scheme:

Tiedtke

Data Assimilation: No

Time of integration: 54 h



In order to identify the characteristics of cases with very poor performance of **LM model** on **Romanian territory** with respect to precipitation, the results of pre-operational runs of the model in the period **February-September 2005** were compared with the observed fields of precipitation.

Presented cases

- 19 July 2005
- 19 september 2005

Methods and Criteria

Period of analysis: **March-September 2005**

Method: **subjective comparison** (Simulated/Observed fields) with respect to:

- **location** of areas with significant amounts
- **over/under-estimation** of observed amounts (at least twice larger/smaller than observed)

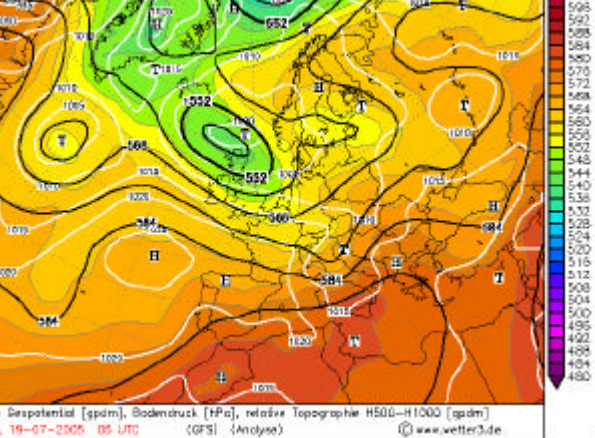
Comparison restricted to Romanian territory

Comparison of 48h and 24h anticipation for the same day

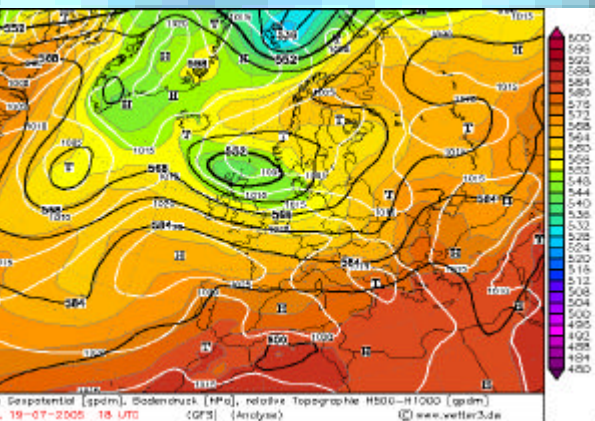
'**24 h anticipation**' is used for the interval (30h-06h) of the "**today**" forecast and observation

'**48 h anticipation**' denotes the interval between (54-30) of "**yesterday**" forecast

19 July 2005

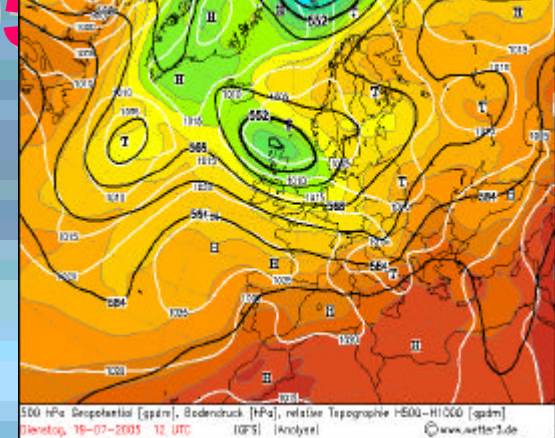


06 UTC

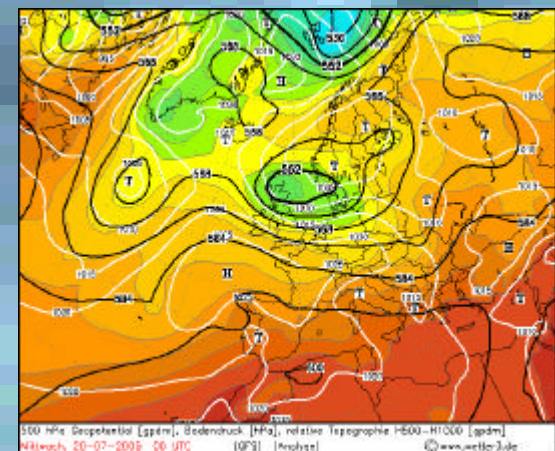


18 UTC

1. The warm weather in this interval suggests the existence of a tropical air mass in the **SE** of the continent, characterized by a relatively low pressure at surface and high values of geopotential in middle troposphere and of 1000-500 hPa layer thickness.



12 UTC



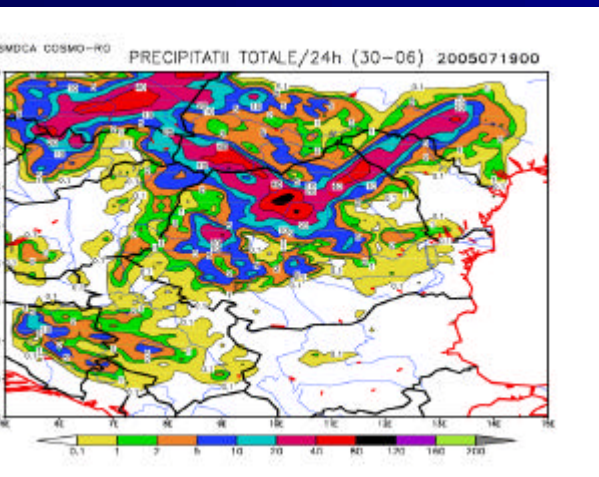
24 UTC

3. The altitude structure, with the ascending part of the trough over **Romania**, explains the most important precipitation in this interval, in the **mountainous regions**.

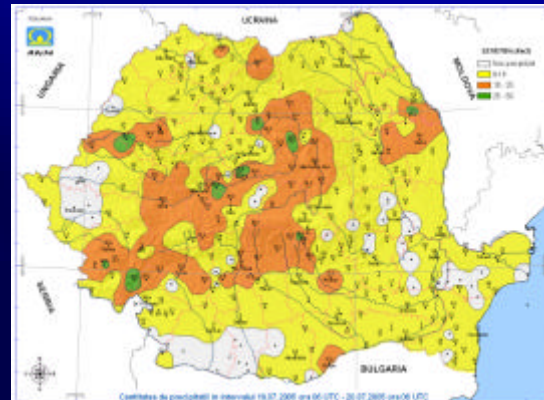
2. The instability was determined by the advance, to the east, of the trough of Icelandic Low. This trough had a correspondent in the middle troposphere.

The results of a model for 19.07.2005 - 24h anticipation and for 18.07.2005 - 48h anticipation

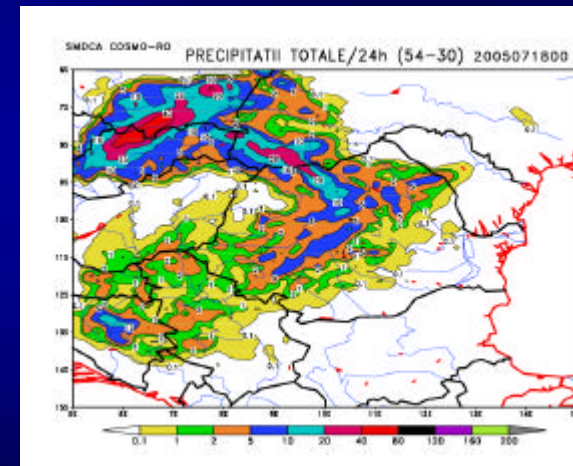
19.07.2005 + 24h



observed precipitation



18.07.2005 + 48h

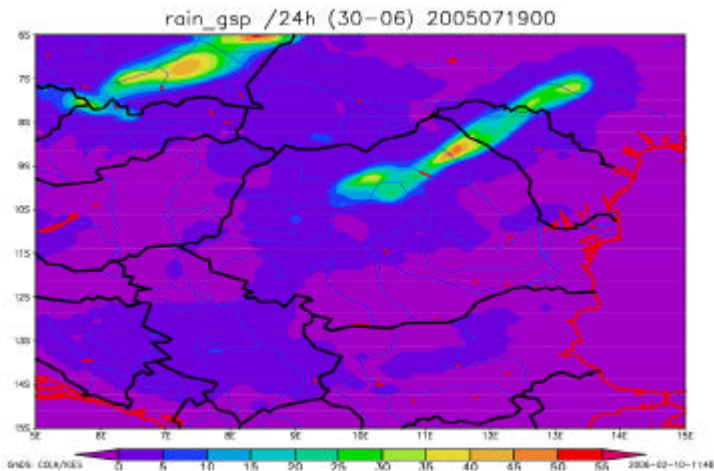


For the 24 h anticipation there are some mismatches errors in in the simulated field of precipitation comparison with recorded one:

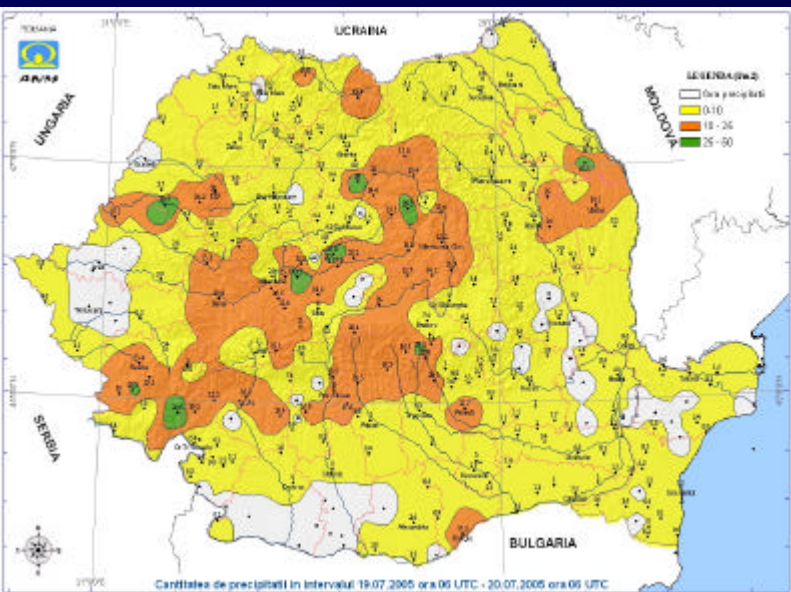
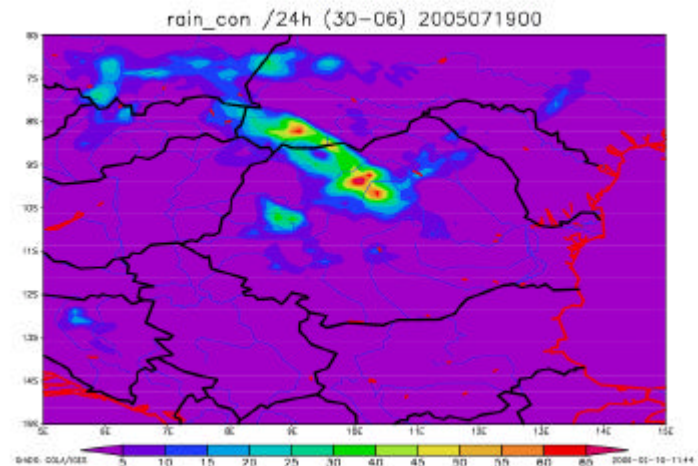
- ❑ in the **East part of the country** the area with moderate precipitations is **overestimated**
- ❑ in **N-NW part of the country** the precipitation amount are **overestimated** too
- ❑ the center of maximum in the **W of Eastern Carpathians** (Transilvania region) (values over 80 l/m²) present in the observations field, but is **overestimated**; this center seems to be the consequence strong convection
- ❑ in **SW of Romanian territory** the model estimation are closed to observations.
- ❑ in the **S-SE** light precipitation observed are not well estimated in the model

For the anticipation of 48h, the spatial distribution of precipitation is **well estimated**. The intensity of precipitations is **slightly underestimated**, and in **S-SE part of the country**, light precipitation observed are not present in the model.

GRID SCALE PRECIPITATION

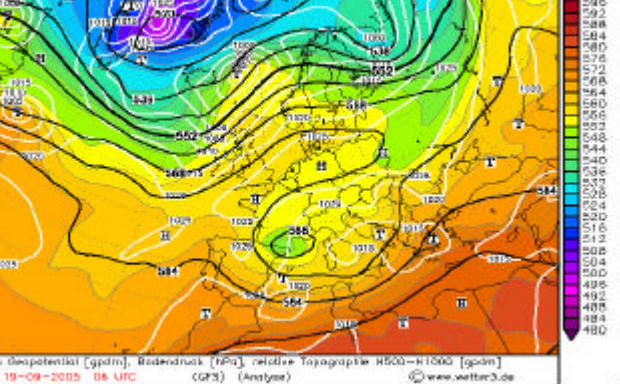


CONVECTIVE PRECIPITATION

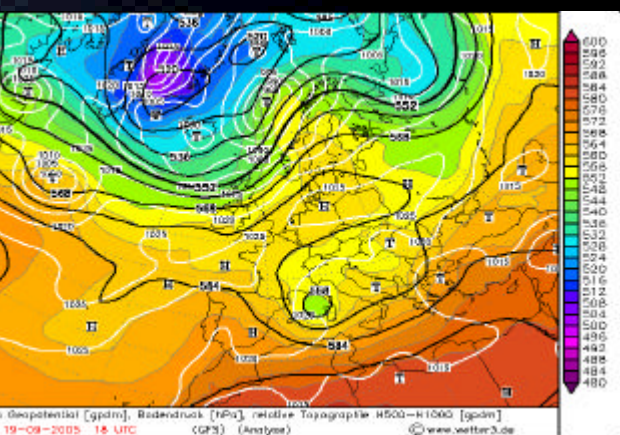


Precipitation in **Eastern Carpathians** are explained by the additional instability caused by the moist **tropical air mass**, which was suddenly dislocated in the afternoon, when the **convective activity** had a maximum of intensity.

SEPTEMBER

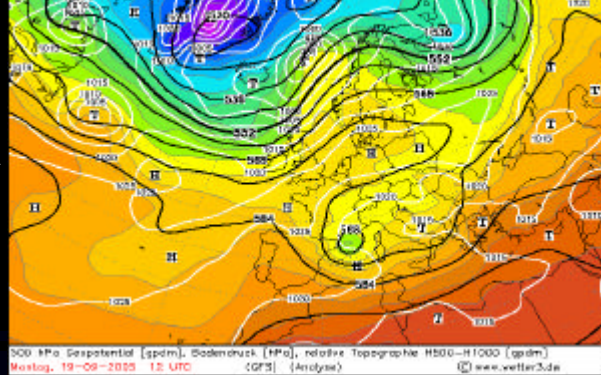


06 UTC

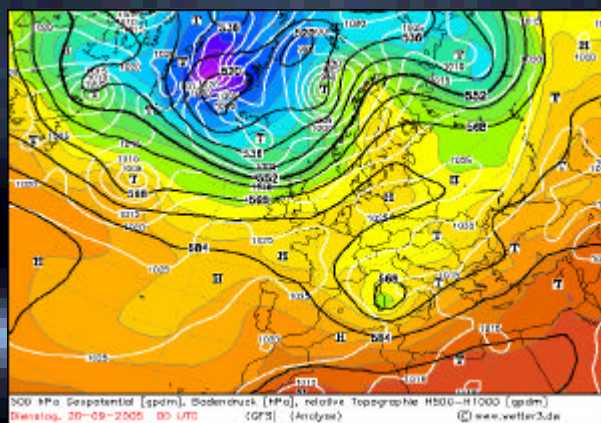


18 UTC

1. In the middle troposphere, the geopotential field displays a large trough structure, with a NE-SW axis and the region of maximum ascendance in the Western part of Romania



12 UTC



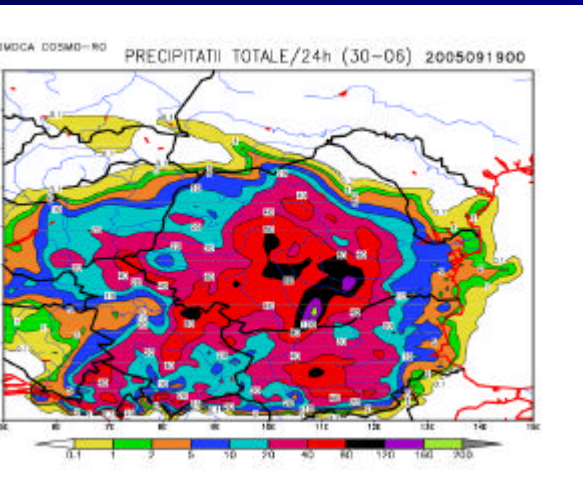
24 UTC

3. The precipitation in the Romanian region were generated at the contact area between a cyclone formed in the Adriatic Sea and the ridge of Azores High, very much extended to the east.

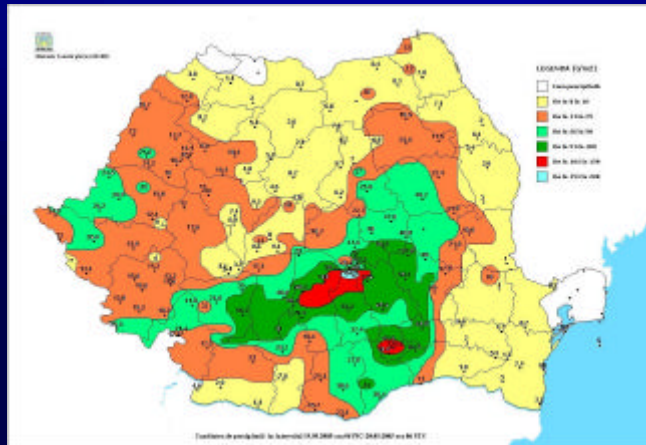
2. Over the eastern part there still persists the ridge associated to the warm and dry air mass from Asia

The results of the model for 19.09.2005 - 24h anticipation and for 18.09.2005 - 48h anticipation

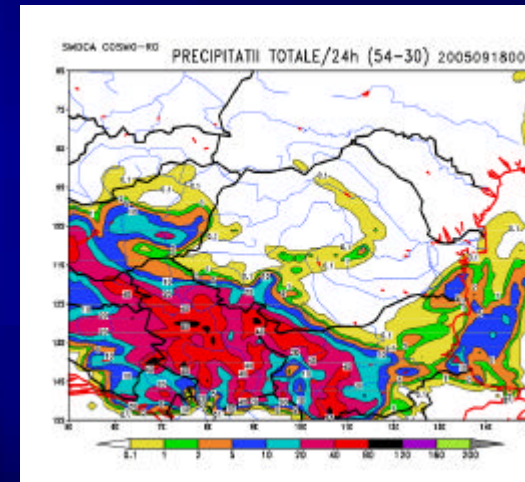
19.09.2005 + 24h



observed precipitation



18.09.2005 + 48h



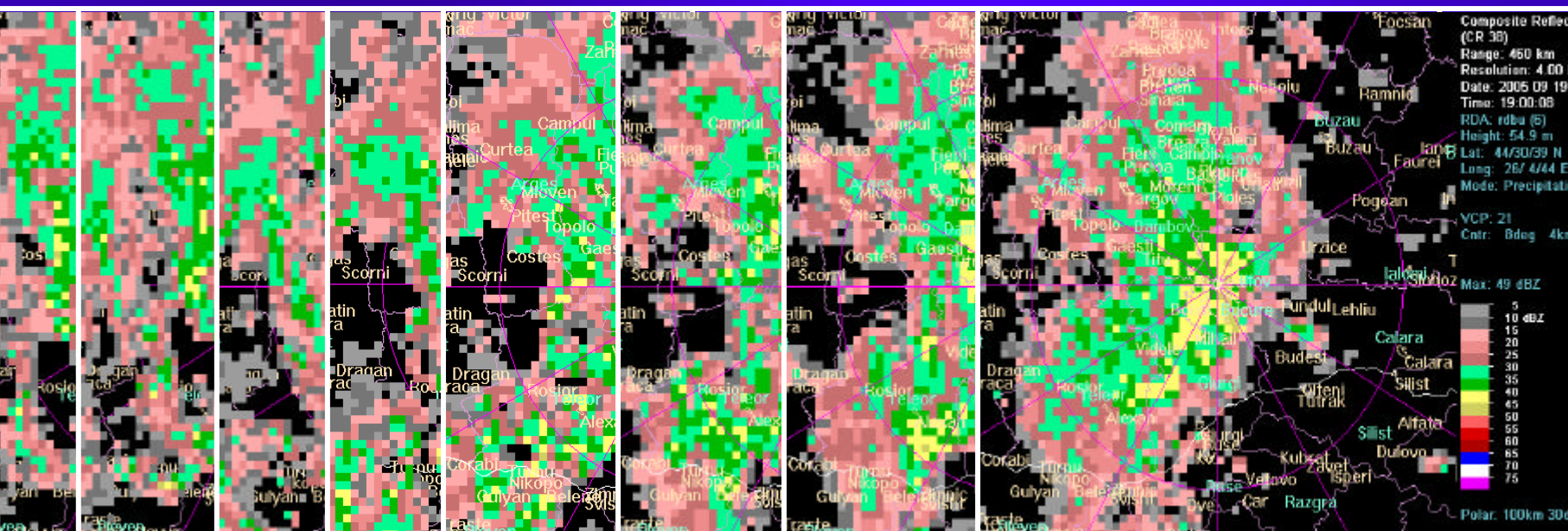
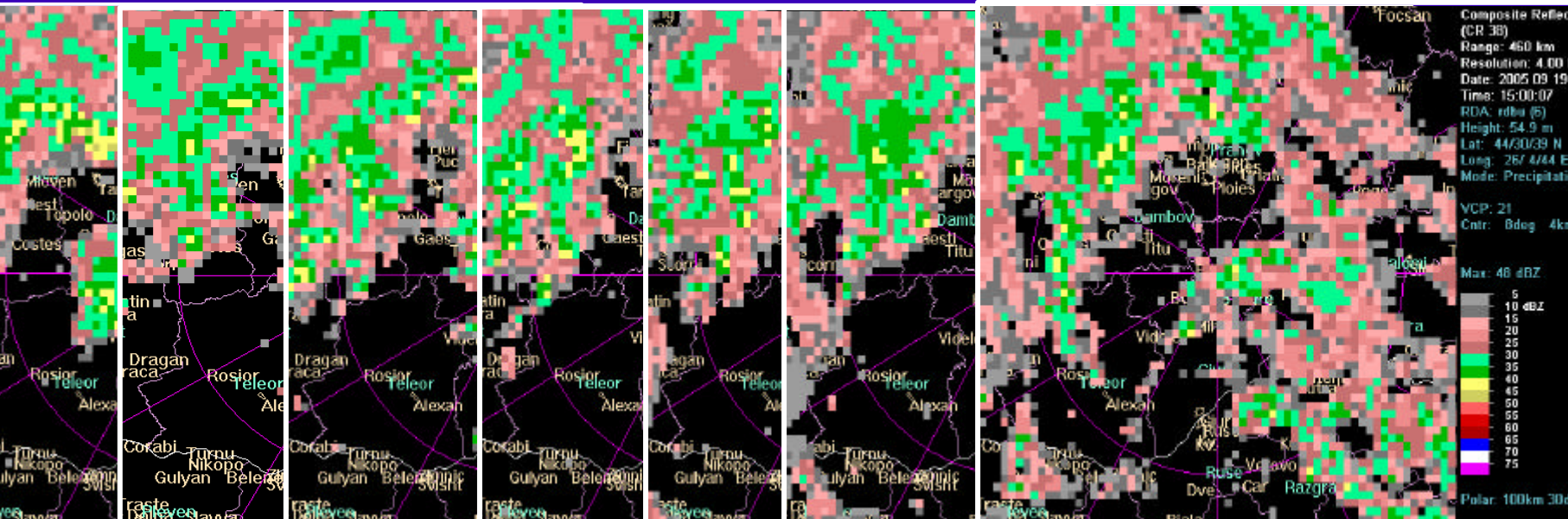
1. For the anticipation of **24h**, the spatial distribution field is **very realistically simulated** and also the values forecasted are in good agreement with the observations.

The maximum in the **S** (more than 100l/m²) corresponds to **Bucharest area**.

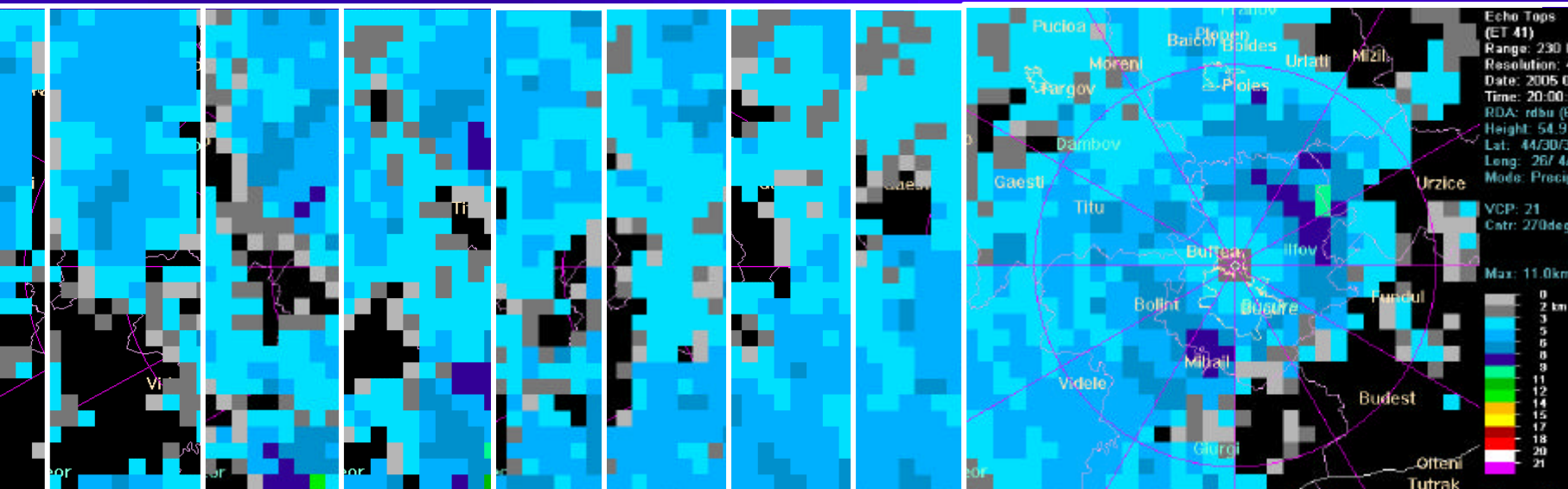
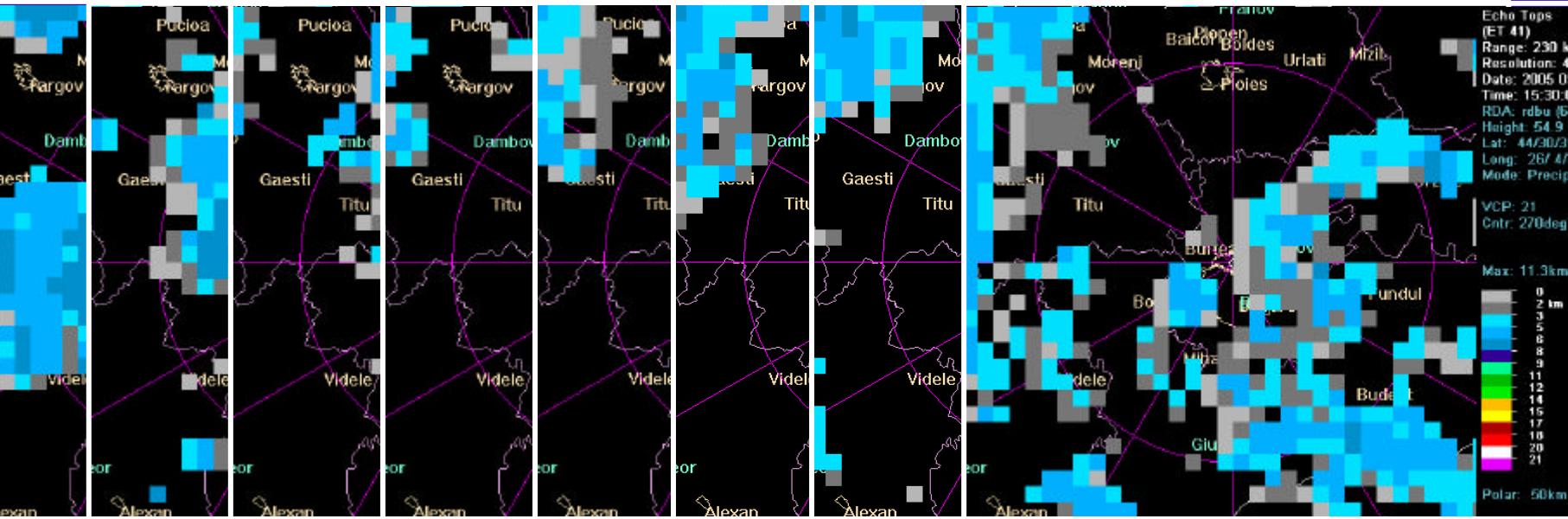
2. On the contrary, at **48h** anticipation, the model **doesn't 'see anything** – there are almost no precipitation over Romania.

The spatial pattern of precipitation, compared with the anticipation of 24h, suggests a faster movement of the front toward **W-SW**.

COMPOSITE REFLECTIVITY



ECHO TOPS



Cumulated precipitation –24 h examples

ARGES
127 l/m²



PRAHOVA
165 l/m²

DAMBOVITA
124 l/m²

BUCHAREST
115 l/m²

SUMMARY I

A subjective comparison of observed and simulated precipitation field for the period **February – September 2005**, pointed out a number of **cases** with poor QPF forecast of **LM model** over Romanian territory.

Criteria used for this analysis

errors in location of important amounts of precipitation and with regard to the extension of the area with intense precipitation.

significant over/underestimation, especially of the heavy precipitation

Also, a subjective comparison was done between the model forecast with 24 h and 48 h anticipation, for the same day.

SUMMARY



In the cases presented here precipitation over Romania were mainly of frontal nature, accentuated locally by convective instability

- ❑ For 19 July 2005 we observed errors both in location and quantities (overestimation)
- ❑ This may be caused by improper estimation of specific humidity in the area.
- ❑ For 19 September 2005 the amounts and location of heavy precipitation were well simulated for 24 hours anticipation
- ❑ At 48 hours anticipation there are almost no precipitation over Romania; possible cause – a simulated movement of the front (toward W-SW) faster than in reality.



THANK

YOU