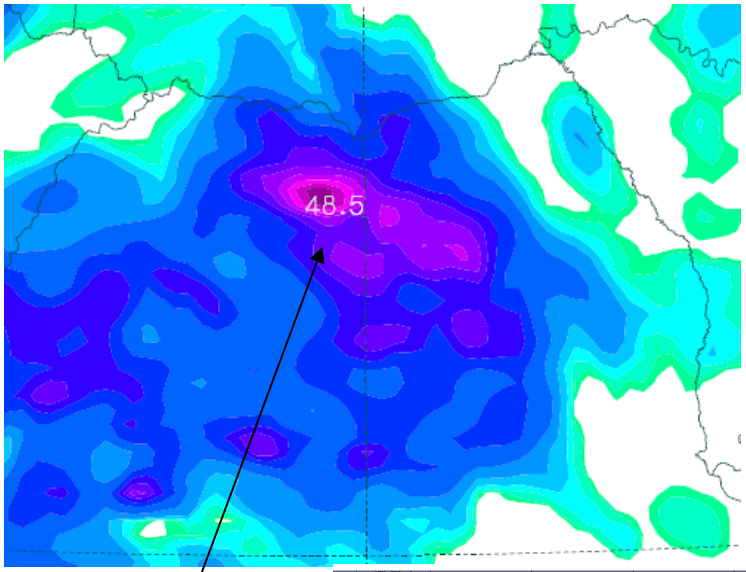
3MT

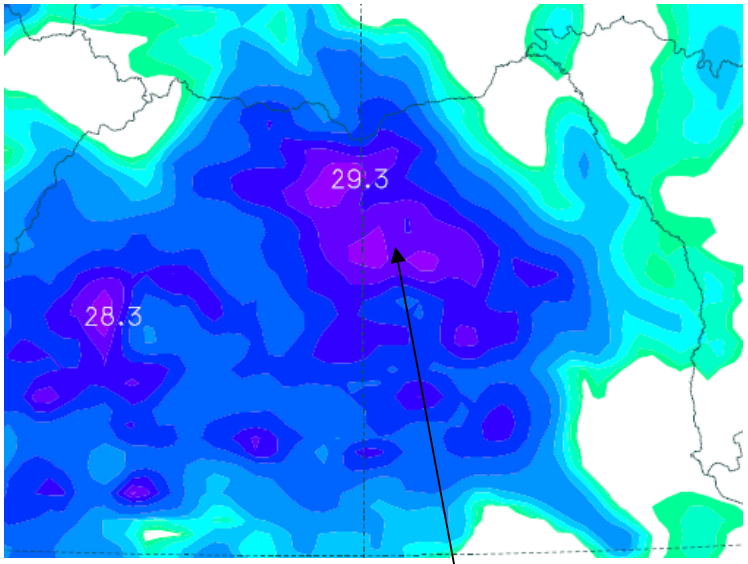
sub-grid aspects, interactions

Adjustment and existing convective clouds (1)

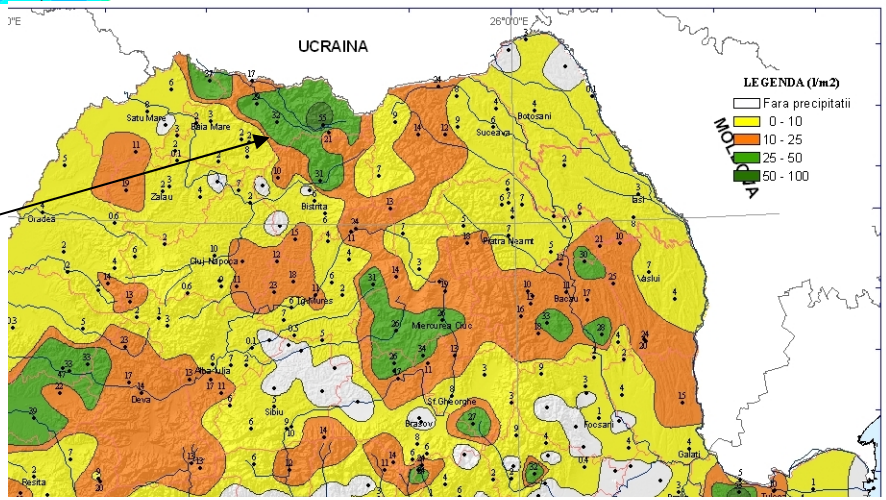
- When sub-grid scale convection is fully prognostic (case of 3MT), associated condensates are not all converted to falling species within the same time-step.
- If nothing is done, adjustment process at the beginning of the next time-step will treat them as mean box values and they will evaporate in surrounding dry air. This has a feed-back on the convective activity.
- Cure: to introduce option into the adjustment computation taking into account the existing convective cloudiness.
- At the moment it is done in case of Xu-Randall type of adjustment but this option should be introduced to other options/schemes.

Adjustment and existing convective clouds (2)





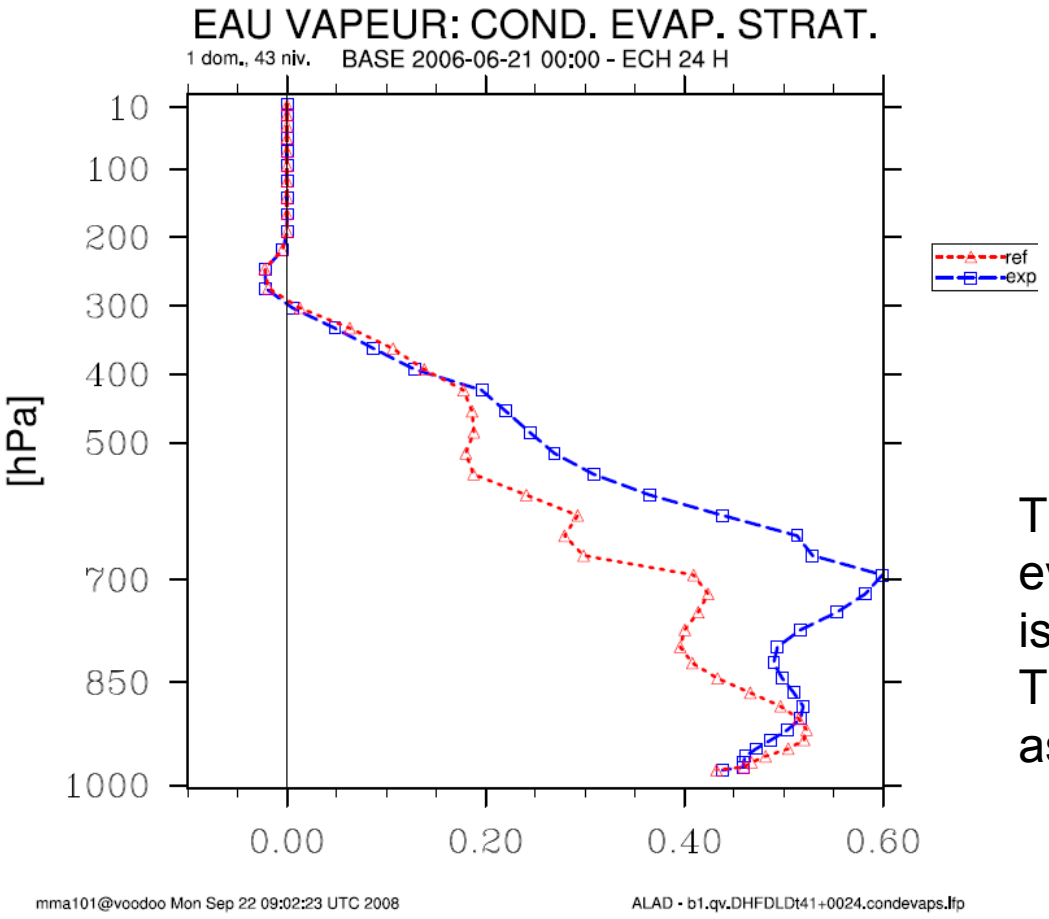
3MT std



24h precipitation sum
Courtesy of INMH

3MT but existing convective condensates are treated as resolved in the new time-step: squall line structure is smoothed out.

Sub-grid scale geometry in microphysics



Two options are coded:

- Maximum overlap of clouds (more realistic) – reference;
-Random overlap of clouds – exp 1

The impact (here shown for evaporation of falling species) is not negligible.
The problem cannot be treated as linear.

What about interaction of 3MT with other parameterizations

- Lesson from our experiences:
  - Think prognostic (time-step organization etc.);
  - Think about the necessity of sub-grid scale geometry;
  - Anticipate feed-backs in the design when possible rather then to run after solutions once things are put side by side and not really together.
- Clue: modularity.
  - Example: thanks to modular microphysics it was possible to treat rapidly the double detrainment problem we had in prognostic convection.