3D academic cases

warm bubbles

« KLEMP » profil

General model configuration

- LMAP=F (cartesian)
- physics : only microphysics (cloud scheme + precipitation)

Initial conditions

- **Uniform** T and qv profils from KLEMP, no wind
- **Except** an initial perturbations : +2K at the first 3 levels for n*n columns (the perturbation is included only at time t=0, the 'artificial' warming does not continue during the simulation)

- Tests with Arome resolution (2.5km) and « CRM » resolutions (500m, 250m)
- Tests with different sizes of bubbles
- Sensitivity tests
  - Impact of time step length
  - Impact of horizontal numerical diffusion (spectral or SLHD)
  - Impact of numerical options (PC, LGWADV etc)
  - ....
- *(Also help for debugging in general)*
- ***Comparison with Méso-NH***

- tests with 3 types of spectral truncation :
  - Elliptic, standard troncation : (I/2-1)*(J/2-1) modes, all modes outside the ellipse are set to zero
  - pseudo-rectangular : (I/2-1)*(J/2-1) modes, no modes set to zero except the last ones.
  - rectangular, phys-spec bijection : I*J modes, no modes set to zero

(for I points in the x-direction, J points in the y direction)

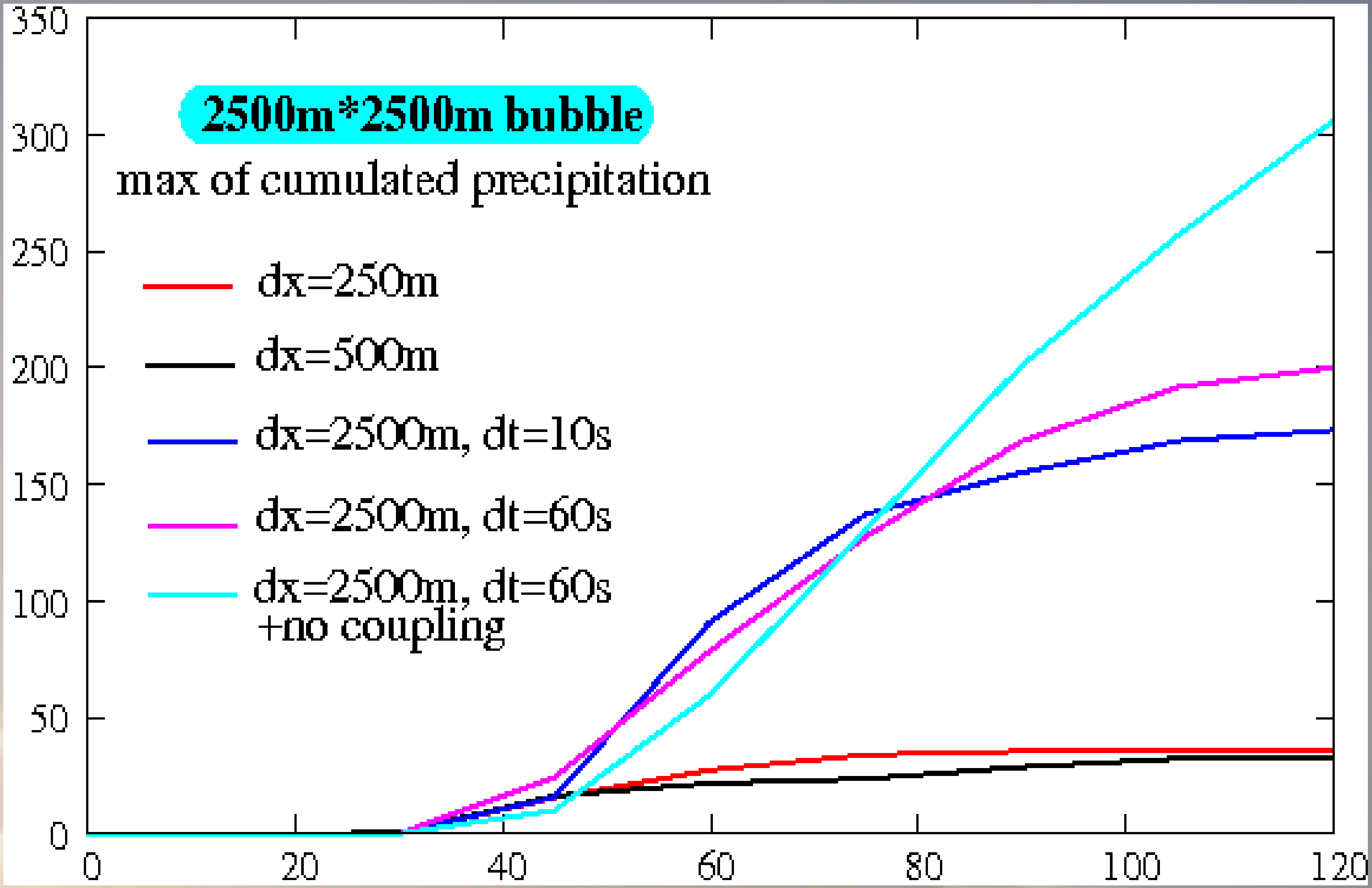
- Academic simulations are running on PCs or supercomputers (+Olive) for cycles 32t3 to 34
- The case preparation uses a simple tool (ascii2fa3D) running on PCs

- Usefull tool for general debugging and testing
- Usefull tools for preliminary sensitivity tests
- It may help to solve some questions but it may also ask some new ones.....

A few examples

- Accumulated precipitations
- Bubbles of 2.5*2.5km and 5*5km for different resolutions
- First steps in the sensitivity tests

Tests with a 2.5*2.5 km bubble



Tests with a 2.5*2.5 km bubble

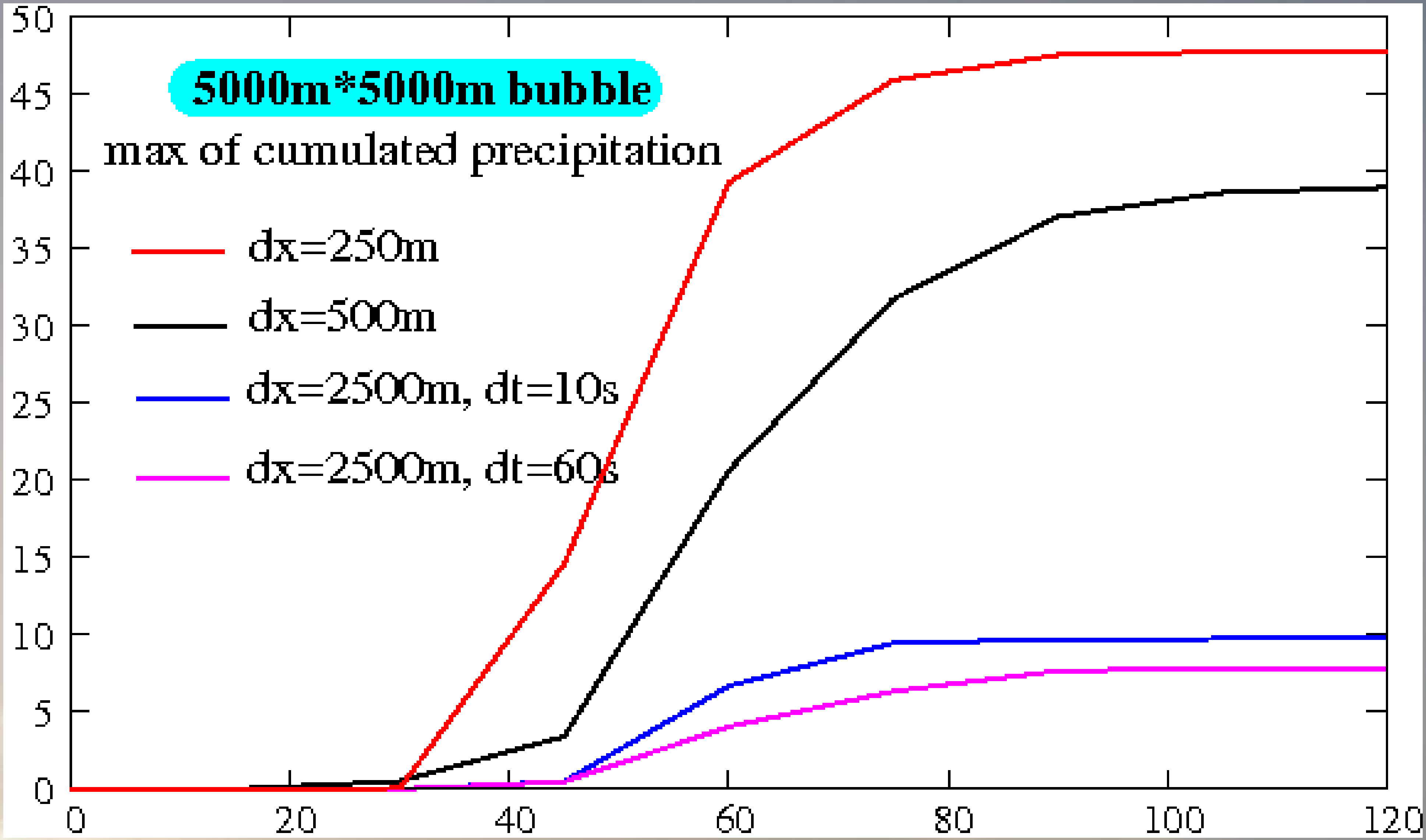
Integrated rain at the surface

dx=250m : 0.68 E9 liters

dx=500m : 1.51 E9 liters

dx=2500m : 56.98 E9 liters

Tests with a 5*5 km bubble



Tests with a 5*5 km bubble

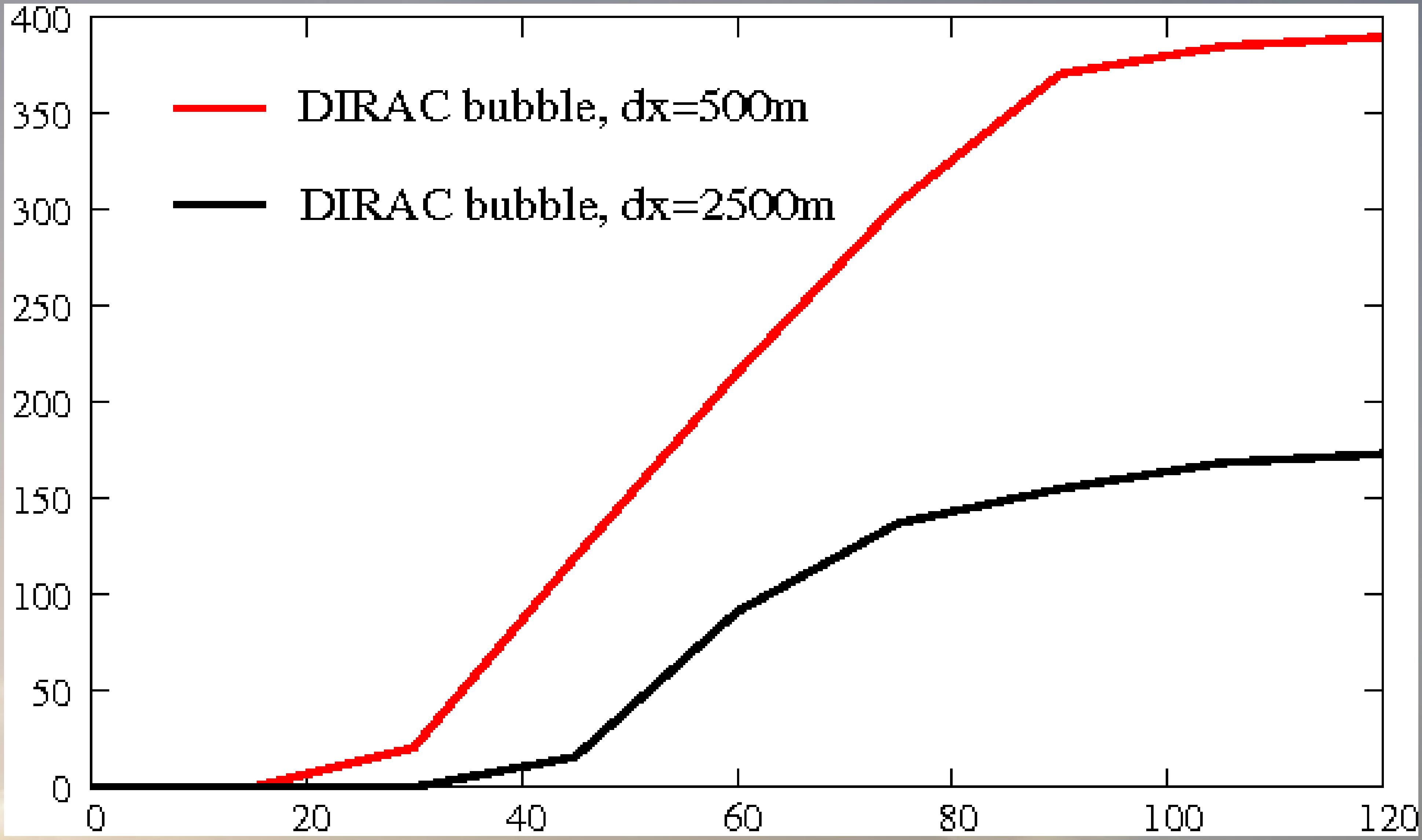
Integrated rain at the surface

dx=250m : 2.22 E9 liters

dx=500m : 2.66 E9 liters

dx=2500m : 4.00 E9 liters

Test with a dirac bubble for dx=500m



Preliminary conclusion

- Stange behaviour of the model for « DIRAC » bubbles (is there a link with the important sensitivity to numerical diffusion and truncation?)
- But are « DIRAC » bubbles represented in « real » forecasts? (do we think that this stange behaviour may influence Arome forecasts?)
- This behaviour is also observed with Aladin microphysics (even if less empharsized)
- Coherent results for well sampled bubbles

Ideas for more tests

- Re-test the impact of truncation
- Re-test the impact of microphysics
- Test the impact of diffusion (spectral and SLHD)
- Continue the comparisons with Méso-NH
- ?