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Pedagogical input of idealized numerical simulations performed by Meso-NH model in order to illustrate and understand the complex processes associated with deep and moist convection

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For pedagogical purposes, it is useful to combine different approaches in order to have a better understanding of all the complex processes that drive convection. Thus, beyond theoric courses and case studies, idealized numerical simulations are relevant training tools.

At the French School of Meteorology (ENM), idealized numerical simulations have been performed by the french convection-permitting research model Meso-NH. The idealized environment was based on KW78 (Klemp and Wilhelmson, 1978): a warm bubble with varying intensities and lengths in an unstable environment.

Several sensitivity tests were done, concerning:
- the resolution (horizontal and vertical)
- the warm bubble's characteristics (altitude, shape and intensity)
- the environment (vertical wind shear, temperature, humidity)
- the microphysics scheme

The goal of those simulations was to reproduce and visualize most of the characteristics of deep and moist convection:
- the role of shear on the convective mode and the intensity of convection
- the influence of drier air at mid-levels
- the intensity of the warm bubble
- the link between vertical velocities and buoyancy
- the pressure perturbations and their location
- the rainfall intensity and the cold pool
- the outflow and its associated vortices

To improve the pedagogic approach, a dedicated web interface has been developed allowing to modify easily the characteristics of the warm bubble and its environment, and to visualize (and compare) simulations. In the future, this interface could be improved and offer the opportunity to compute online simulations.