

Turbulent effects and dynamics of the cloud-environment interface in a LES of a growing cumulus congestus

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A Large-Eddy Simulation (LES) of a cumulus congestus has been performed using the Méso-NHmodel with a 5-m resolution in order to study the fine-scale dynamics and mixing on its edges. Toroidal circulation eddies have a strong signature on the resolved turbulent fluxes.

A partition of the cloud and its environment is used to characterize the dynamics, buoyancy and turbulence near the cloud edges. At the vicinity of the cloud-environment interface, downdrafts caused by eddies coexist with a buoyancy inversion while the cloud interior is mostly rising with positive buoyancy. Turbulence on the edges is finer scale than inside the cloud.

An alternative simulation, where evaporative cooling effects are suppressed, indicates that those effects are mainly present near the edges and contribute to attenuate the convective circulation. Evaporative cooling has also an impact on the buoyancy inversion and on the path of the entrained air.