Object-oriented analysis of coherent boundary-layer structures in high-resolution simulations

Florent Brient1, Fleur Couvreux2, Rachel Honnert2, Catherine Rio2

In this study, we will characterize coherent ascending and descending structures in large-eddy simulations. In that aim, a methodology has recently been developed based on passive tracers emitted respectively at the surface, at cloud base and at cloud top. Applied to a simulation of marine stratocumulus boundary layer, it has shown that these coherent structures cover only a small domain fraction but contribute significantly to turbulent transports of heat and moisture, with a significant contribution of subsiding coherent plumes.

We are pursing this study by applying this method to various boundary layer simulations: clear sky, marine cumulus, continental cumulus and St-to-Cu transitions. We investigate the importance of subsiding structures and the relative importance of the physical processes controlling the triggering of these structures. Further work on the spatial organizations of clouds and the development of boundary-layer parameterizations will be discussed.