

Some boundary-layer characteristics over homogeneous and inhomogeneous terrain - field measurements with the KITcube

The Karlsruhe observatory for convection studies, KITcube, was designed to investigate processes ranging from the turbulent to the meso-scale. KITcube combines various instruments so that the whole process chain from energy exchange at the Earth's surface via boundary layer convection, thermally induced circulation, and cloud formation to precipitation is covered.

The measurement system was firstly deployed during the HyMeX field campaign in autumn 2012 on the Corsican Island. The investigations focused on the impact of turbulent mixing and thermally induced circulation systems on the development of the mountain ABL as well as on influence of the background flow on the evolution of the valley atmosphere.

Additionally, the dependence of deep convection on the spatial distribution of convection-related parameters and humidity was analysed.

In spring 2013 the KITcube contributed to HOPE – an experiment that was conducted in the lower Rhine embayment and which aims at investigating CBL characteristics on the mesoscale. Three lidar systems were installed in a triangle with side lengths of about 2.5 km. These measurements allowed to studying the turbulent structure of the CBL over flat terrain but with patchy land-use cover. Analyses of cloud-free and cloud-topped CBLs reveal turbulent characteristics like the standard deviation of the vertical wind speed under different conditions.