

Mixing and Entrainment at Stratocumulus Top

Szymon Malinowski

University of Warsaw, Faculty of Physics, Institute of Geophysics, Warsaw

In the talk preliminary results from a new setup of the laboratory chamber experiment aimed at investigation of smallest scales of cloud-clear-air mixing by means of particle image velocimetry (PIV) of cloud droplets will be presented. The goal is to characterize cloudy updraft impinging upon a stable layer of temperature inversion.

In order to generate an analog of stratocumulus top, the bottom part of the cloud chamber is gently filled with cloudy air: saturated and loaded with water droplets. Cloudy air is denser from the unsaturated warm air in the chamber and does not mix across the chamber depth. Evaporative cooling at the top of cloud layer results in occurrence of temperature inversion. In this way an analogue of “stratocumulus top” is created. This “cloud top” is enlightened from above by a planar sheet of laser light. Two CCD cameras of different fields of view are recording positions of cloud volumes and droplets in cloud top region. An updraft impinging upon inversion is generated in order to analyse two different situations:

1. Updraft of small kinetic energy, not penetrating into “free atmosphere” above inversion, diverging at the “stratocumulus cloud” top;
2. Updraft vigorous enough to penetrate the inversion.

Preliminary velocity retrievals from both cases, showing small-scale features of cloud-clear air mixing in these cases will be presented and discussed.