



Mixing on the top of a marine stratocumulus at scales less than 1m

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Entrainment of over-inversion air and subsequent mixing with the cloudy air is investigated in a nocturnal marine stratocumulus observed during the DYCOMS-II project over Eastern Pacific. The ultrafast thermometer UFT and Particle Volume Monitor PVM installed on the NCAR C-130 aircraft allowed to collect the data with 1 kHz frequency (about 10 cm spatial resolution). Records from other instruments working with poorer resolution (Fast Forward Scattering Spectrometer FFSSP, airspeed, pressure, humidity, 3D wind components) were also available. The aircraft was flying in a porpoising pattern with ca 200 m variation of altitude, close to the top of cloud which roughly coincided with sharp, strong inversion of temperature (6-8 K jump over few meters, coinciding with ca 0.5 g/kg drop of water vapor mixing ratio). Selected fragments of flight RF05 (18 July 2001) have been analyzed in details. At resolved scales down to 10 cm evidence of inhomogeneous mixing process has been found. In certain fragments of the flight penetration of the cloud top into the warm air over inversion has been observed either in form of small scale patches of cloudy air with or without visible disturbances of temperature or in form of small scale disturbances in temperature field only evidence of remainders of completely evaporated parts of the cloud. In other fragments of the flight evidence of penetration of dry air from above the inversion into the cloud layer has been detected, usually with little disturbance of temperature and little change of droplet spectra. Large variability of mixing cases is presented.