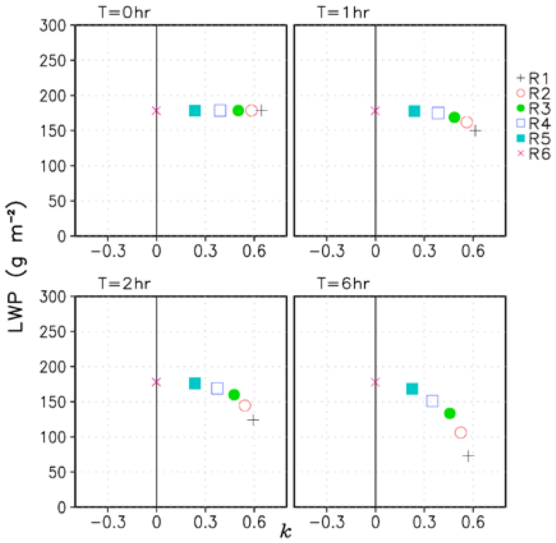
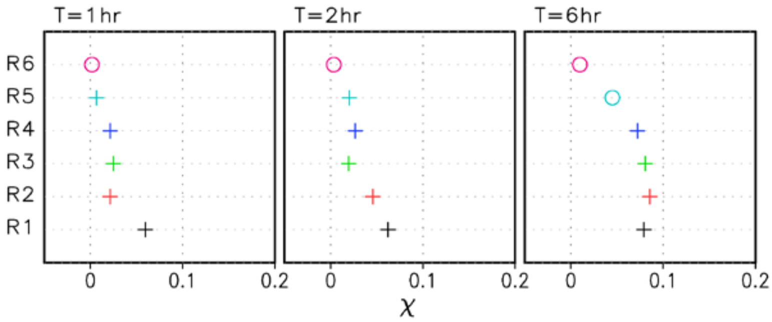
Noda, A. T., K. Nakamura, T. Iwasaki, and M. Satoh, 2013: A numerical study of a stratocumulus-topped boundary layer: Relations of decaying clouds with a stability parameter across inversion. *J. Meteor. Soc. Japan*, 91, 727–746.
http://dx.doi.org/10.2151/jmsj.2013-601



← Figure 1. Relationship between LWP (g m^{-2}) and k at times 0 hr to 6 hr for the six sensitivity experiments (R1–R6).

↓Figure 2. Mixing fraction at the top of the boundary layer in each experiment (R1–R6) after 1 hr, 2 hr, and 6 hr. Crosses and circles indicate negative and positive buoyancy, respectively.



- The mechanisms underlying a quasi-linear relation between liquid water path (LWP) and the so-called Randall's stability parameter, k (Fig. 1), are investigated, focusing on the transient phase in large-eddy simulations of marine stratocumulus clouds.
- The gradual development of an interfacial layer due to mixing of cold humid air below a cloud top and warmer dry air above it, acts to reduce the negative buoyancy of the mixture of the two air masses. Negative buoyancy reduces faster with k. The system reaches quasi-equilibrium by balancing buoyancy generation and dissipation of turbulent kinetic energy over a time scale of about 2 hr, which corresponds to a few turnover times of boundary-layer eddies.
- The mixing fraction (i.e., the fractional volume of boundary-layer air) reaches a value of about 0.1, corresponding to the maximum available negative buoyancy due to mixing. This shows a possible positive feedback between turbulence and evaporatively generated negative buoyancy (Fig. 2).