

Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Decay of convective boundary layer and effect of decreasing rate of surface heat flux MINGXIANG ZHAO, LIAN SHEN, University of Minnesota
— Decay of convective boundary layer (CBL) is a model of the late-afternoon transition of the unstably stratified atmospheric boundary layer. In this study, simulations were performed to investigate the decay process under different decreasing rates of the surface heat flux. We decomposed the turbulence fluctuations into different scales to investigate their responses to the decreasing surface heat flux. It is shown that the decreasing rate of the large-scale vertical velocity fluctuations is much greater than that of the small-scale fluctuations regardless how fast the decreasing rate of the surface heat flux is. Moreover, the large-scale fluctuations experience several stages of temporary enhancements due to the local upward heat flux, while the small-scale fluctuations decreases monotonously. For the decay process of temperature fluctuations, the present study showed essential differences from that of vertical velocity fluctuations. For instance, the temperature fluctuations respond to the decreasing surface heat flux more quickly and the small-scale fluctuations decay faster than the large-scale fluctuations.

Mingxiang Zhao
University of Minnesota

Date submitted: 29 Jul 2019

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