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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Stably stratified canopy flow in complex terrain" *by* X. Xu et al.

Anonymous Referee #3

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This study investigated 2-D stably stratified mean and turbulent flows above and within plan canopies in complex terrain by using the Renormalized Group (RNG) k-e turbulence model, an important topics in studying canopy micrometeorological processes. The stable stratification was generated by imposing persistent constant heat flux at the ground surface and linearly increasing cooling rate in the upper canopy layer. The terrain-induced influence in dynamic part was carried out by using a gentle hill and a steep hill. Mean and turbulence flows were then characterized by analyzing profiles of mean and turbulence quantities at different locations over the hill slopes. The model approach was sound enough for such a study; the analysis was comprehensive; the information was updated; and the results were unique. I would recommend its publication with minor revisions.

(1). Introduction: Might be good to mention limitations of linear analysis models in

studying stratified canopy flows over complex terrain.

(2). Lines 5-10 on page 28487. The last half sentence seems not belong to this speculation.

(3). Lines 13-17 page 28488. Rewrite this long sentence

(4). Lines 15-16 page 28489. Justify if these rates are commonly observed rates.

(5). Lines 16-17 page 28490. Was the surface cooling included in the boundary conditions instead of a source term?

(6). Page 28495. Explain in more detail why a strong inversion layer was found across the lower jar.

(7). Figure 1. Label the streamlines with wind speeds so as to give a clue about the distributions of wind fields.

(8). Section 3.1. How the dynamics influences the thermal structures is analyzed in some degree. A clear summary might be necessary to help readers construct a clear structure about these linkages.

(9) How much did the flow structures impact the formation of the primary/secondary stable layers?

(10). Explain more why UDF was deeper than the LDF on the gentle slope.

(11). It looked that the TKE was larger on the gentle slope than on the steep slope. Was that due to the small wake production?

(12). Given the closely packed iso-streamlines in figure 1, it seems that horizontal advection played an role in TKE. Please explain.

(13). Section 4 could be largely shorted and just emphasize the major conclusions

(14). It could be better to enlarge Figure 4.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 28483, 2014.