Comment on acp-2022-221
Anonymous Referee #1

Referee comment on "Triggering effects of large topography and boundary layer turbulence over the Tibetan Plateau on convection" by Xiangde Xu et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2022-221-RC1, 2022

Comments on “Triggering effects of large topography and boundary layer turbulence over the Tibetan Plateau on convection”

General Comments:

The manuscript try to analyze the diurnal variations and formation mechanism of low clouds at different elevations based on ERA5, the satellite cloud classification products and data sets from automatic weather stations from June to August of 2010-2019 in China. The author further discuss whether there exist triggering mechanism for convection over the Tibetan Plateau (TP), and whether there is an association among low air density, strong turbulence and ubiquitous "popcorn-like" cumulus clouds. The authors select two typical large topography regions (TP and Rocky mountains) to analyze the triggering effects of large topography and related dynamical structure within the boundary layer on convective clouds. Some interesting results have been obtained. I suggest that this manuscript could be accepted after minor revision.

Specific Comments and suggestion:

1) The writing of this manuscript needs to be improved. Such as the title maybe should change to “Triggering effects of large topography and boundary layer turbulence on convection over the Tibetan Plateau “
2) L110-113: The author used 0.25° x 0.25° ERA5 reanalysis data to calculate the
buoyancy term (BT) and shear term (ST) in the TKE equation for each grid. How to interpret this method compared with traditional calculation of BT and ST in a micro-scale micrometeorology especially on the large TP terrain with strong heterogeneity? On the other hand, is it reasonable to used M-O similarity theory in this grid?
3) L150: “Figure 1 (a)” should change to Figure 1. In fig 1 caption “The monthly mean” should be “The summer mean” (June to Aug).
4) Line 241 and 259: which is the relationship of BT and ST between calculated form the point measurement (such as soda) and from the ERA5 grid?
5) Move the text in line 290-294 to line 203, and add more descriptions to show why the author select TP and Rocky Mountain as two typical large topography regions in subsequent paragraphs.
6) Line 297: Please show the range of latitude and longitude for TP and Rocky Mountain. Same for line 303.