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Interactive comment on "The impact threshold of the aerosol radiation forcing on the boundary layer structure in the pollution region" *by* Dandan Zhao et al.

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The corrected Abstract is shown as below: Abstract: Recently, there has been increasing interest in the relation between particulate matter (PM) pollution and atmospheric boundary layer (ABL) structure. This study aimed to qualitatively assess the interaction between PM and ABL structure in essence, and to further quantitatively estimate the effects of aerosol radiative forcing (ARF) on the ABL structure. Multi-episode contrastive analysis stated the key to determining whether haze outbreak or dissipation was the ABL structure (i.e., stability and turbulence kinetic energy (TKE)) satisfied relevant conditions. However, it seemed that the ABL structure change was in turn highly

related to the PM level and ARF. |SFC-ATM| (SFC and ATM is respectively the ARF at the surface and interior of the atmospheric column) is the absolute difference between ground and atmosphere layer ARFs, and the change in |SFC-ATM| is linearly related to the PM mass concentration. However, the influence of ARF on the boundary layer structure is nonlinear. With increasing |SFC-ATM|, the TKE level exponentially decreased, which was notable in the lower layers/ABL but disappeared above the ABL. Moreover, the threshold of the ARF effects on the ABL structure was determined for the first time, namely, once |SFC-ATM| exceeded $\sim$ 55 W m-2, the ABL structure would quickly stabilize and would thereafter change little with increasing ARF. The threshold of the ARF effects on the boundary layer structure could provide useful information for relevant atmospheric environment improvement measures and policies, such as formulating the objectives of phased air pollution control.

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