

## ***Interactive comment on “Multiple technical observations of the atmospheric boundary layer structure of a red warning haze episode in Beijing” by Yu Shi et al.***

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I agree for publication of this article. It shows an overview about the different methods to determine the stability of the Atmospheric Boundary Layer and how the stability is influencing the concentration of Air pollution, indicated as PM<sub>2.5</sub> concentration. Only in the beginning, a definition of the ABL and the different layers should be helpful, e.g. Mixing Layer, Surface Inversion Layer, Capping Inversion, Convective Mixed Layer, Residual Layer.

Usually the ABL is the turbelint layer with winds influenced by the earth surface. Within this definition the Wind Profile Radar (WPR – the full word should not only be used in

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the abstract) gives the best result of the ABL height.

In the air quality community the mixing layer and inversion layers are more common to use in the context of air pollution concentrations. These terms are explained at the beginning of chapter 3.2. But this could be done some more concisely., perhaps extracting one day of Fig. 3 and explaining it.

In Fig. 3 the heights  $H_c$  and  $H_u$  should be marked which are referred to later.

Table 2: The first column shows the air quality, I think these are PM2.5 concentration ranges. It should be mentioned. There is a general influence of humidity. But not so clear. That is why the humidity depends on the origin of the advected air (more wet or more dry). Important is the decrease jump at the inversion layer, shown in Fig. 4 and not the absolute value of the humidity. Page 13 line 5: ... " $H_c$  is even heightened slightly but  $H_u$  (not  $H_c$ ) reduces by ..."

In the conclusion the role of the mixing layer and the inversion layers should be highlighted in the context with air pollution concentrations. And these layers are best determined by radiosonde soundings and lidar. The tower measurements are also helpful to determine the surface inversions height, if the inversion layer is lower than the tower height. With the Wind Profile Radar (WPR) the height of the Atmospheric Boundary Layer (turbulent) can be well determined. But for the air pollutant concentrations (PM 2.5) the inversion Layers and the Mixing Layer are relevant which is shown in this paper.

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