

Interactive comment on “Determination and climatology of diurnal cycle of atmospheric mixing layer height over Beijing 2013–2018: Lidar measurements and implication for airpollution” by Haofei Wang et al.

Anonymous Referee #2

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This manuscript reports climatological values of mixing layer height (MLH) over Beijing for from Lidar measurements, their evaluation against radiosonde based MLH calculation and argues that MLH values derived from Lidar is better than that from RS for estimation of PM_{2.5} at surface. The manuscript needs a lot of improvement before publication. Please see comments and suggestions below:

1) The first part of the results and discussion, where the comparison of the various approaches to estimate MLH is presented is not satisfactory. First, the English language is poorly written which makes it hard to understand what is being conveyed. Also, the

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text corresponding to Figures 2-4 lacks any discussion of the features seen in them. More detailed discussion and language improvement is needed.

2) Fig 3d: why is MLH_RS detected at 0.6 km? it should be ~ 2 km as seen in Fig 3c.

3) Actually, the whole context of the first 4 figures is not understood. Why are these days shown here? why not any other day? Is it meant to show seasonal variability i.e one for one season? If the figures are introduced to show various types of differences between the 3 methods, then the discussion should be organized in that manner and the inter comparison figure 5 should be discussed in context of features seen in these figures 1-4. Better organization is needed.

4) Please give more details about the cloud screen/flag used (Line 111). How was cloud detected, at what resolution etc?

5) Fig 1a, 2a,3a,4a all are stretched, the fonts are of different sizes compared to other panels and should be made consistent. Figure 1b have an undefined variable MLH2 in the figure label?

6) Evaluation of MLH_lidar is essential for second half of this manuscript. Hence, more detailed comparison and discussion is necessary. scatter plots in supplementary should be presented in main and discussed in detail. Moreover, as seasonal variability is significant on MLH, the comparison in Figure 6 should include and discuss scatter plots for all the seasons, separately.

7) From Fig 1-5, MLH from Lidar is termed as MLH but in Fig 6, it is termed as MLH_Lidar. Please be consistent.

8) Fig 9: Is the MLH from RS also showing yearly variability similar to the MLH derived from Lidar? Please include the same from RS also in this figure and discuss.

9) In Figure 10d shows that correlations are highest when RMSE is also highest, this is non intuitive, please describe this feature. Also, the comparison in Figure 10 should be presented separately for each season as MLH has strong seasonal variations.

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10) Throughout the manuscript standard deviation and RMSE is used interchangeably, which should be corrected. They are not the same.

11) Please check carefully for the typos in the manuscript. The title itself has one “airpollution”.

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