Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2018-279-RC1, 2018

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Relationships between the planetary boundary layer height and surface pollutants derived from lidar observations over China" *by* Tianning Su et al.

Anonymous Referee #2

Received and published: 25 June 2018

General Comments: The manuscript studied the relationship between PBLH and PM2.5 concentration over different regions and seasons. Effects of aerosol, winds peed, topography etc. are also included in this study. Many data sources are included, multiple PBLH derived methods are compared, complex statistical relationships are revealed. Thus this study is comprehensive and valuable. While I do have some major revision suggestions since some part of the paper are confusing.

Specific Comments: 1) Section 2 is very confusing. I understand that this part describes many observation datasets including ground based (routine and campaign) and satellite. Also includes multiple PBLH derivation methods. Please reorganize the

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Discussion paper

section so that readers can have a very clear idea of the data sources and the purpose of the data. Two subsections of 2.1 Data and 2.2 PBLH derive method is good enough. For Data section, use a table to describe all the data used in this study. I included a sample table here. Current section 2.1 is a description of ground based observations, so CALIPSO related statements (line 126-130) are not fit in here. Please move the sentences to section 2.3 PBLH derived from CALIPSO.

2) PBLH is a fundamental variable in this study. Three observational dataset were used to derive PBL: ground MPL, space borne (CALIPSO), and radiosonde. CALIPSO-PBLH is verified by MPL-PBLH, MPL-PLBH is verified by radiosonde-PBLH. These three PBLH derivation methods have different theory bases which contributes discrepancies among them. Statistics as showed in Figure S1 are important, while please give examples of individual comparisons, e.g. one case of PBLH derivations from all the three observations/methods. Another suggestion is to include illustration figures for PBLH determination processes for both MPL and CALIPSO.

3) Section 2.4 MODIS AOD data is suddenly appeared and no explanation of how the data are going to be used and readers have to figure out after read the whole paper. Please add one or two sentences at the beginning to explain the usage. 4) Line 206-210: please move the brief description of MERRA data to Section 2. 5) Reorganize Figure 2 for easy comparison, suggestion: CALISPO at the left column, corresponding MERRA at the second column. 6) Table 1 is very hard to interpret. I suggest to put it in a figure with two y axes, left axis is for PBLH mean and std, right axis for PM2.5. x axis for four regions.

Please also note the supplement to this comment:
https://www.atmos-chem-phys-discuss.net/acp-2018-279/acp-2018-279-RC1-supplement.pdf

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