

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42

General comments:

The algorithm for PBL height retrieval from CALIPSO is still lacking due to the strong influence induced by attenuation of clouds in the PBL and complex meteorology. This manuscript proposed a novel graphic distribution algorithm to derive BLH, which are subject to further validation by comparing with BLHs from collocated radiosonde and ground-based lidar observations. Results are found to be interesting. The findings contribute a lot to the boundary layer community. Overall, this manuscript is well written, and the methodology is also sound. However, there are several issues to be clarified or addressed before it can be accepted for publication in AMT.

Major points

1. The biggest concerns of mine is the sounding time for RS is 2000 LT, which is roughly 6 hours before the CALIPSO nighttime overpass at Wuhan. The inter-comparison of BLH between CALIPSO and RS (Fig. 9) seems flawed. I guess that the authors hypothesize the PBL does not vary considerable over time during nighttime. At the very least, however, the authors should discuss this issue in detail.

2. In section 2 or section 3: Clarification for the averaging scheme for CALIPSO profiles by taking various horizontal smoothing number (i.e., 1, 3, 15 and 30) should be added. Also, to make the results more robust, the horizontal smoothing numbers of 1,3,6,9,12,15, 18 and 30 (i.e., 1/3, 1, 2, 3, 4, 5, 6 and 10km in the along-track direction) are suggested to take. As a result, Fig. 9 can be expanded to take into account more sensitive results.

Minor points:

Page 1 Line 17-24: It will be better to move “The algorithm provided a reliable result when the horizontal smoothing number was greater than 5.” before “This finding indicated...”. In addition, what is the logics for the threshold (i.e., 5) of horizontal smooth number claimed here, since you only analyzed the results by assuming “1, 3, 15 and 30” instead of “5”. From my understanding, Figs. 7 and 9 are not enough to draw this conclusion, and thus necessary clarification will be necessary.

Page 1 Line 28-35: The literature review seems in disorder, which can be improved only be rewriting. For example, the authors emphasized twice the role of BLH in environmental health, but I did not find any references supporting it. On top of this issue, the role of PBL is well recognized to be associated with aerosol pollution, which should be mentioned here. Towards this end, the review paper by Li et al, 2017 can be cited here.

43 Reference:

44 *Li Z., et al., 2017. Aerosol and boundary-layer interactions and impact on air quality,*
45 *National Science Review, 4 (6), 810–833. doi: 10.1093/nsr/nwx117.*

46

47

48 Page 2 Line 2: The acronym for “RS” refers to radiosonde? Given its first appearance
49 in this manuscript, its full name should be spelled here.

50

51 Page 2 Line 7: ...is usually TOO sparse..

52

53

54 Page 2 Line 10: ..can CONTINUOUSLY detect..

55

56

57 Page 2 Line 28: Guo et al. 2016 only focuses on the BLH retrieval from radiosonde in
58 China rather than that from satellite measurements. This citation can be replaced
59 with Zhang et al. 2016. Accordingly, Guo et al. 2016a can be considered to move to
60 Page Line 7 “(Seibert et al. 2000; Sawyer et al. 2013; Guo et al., 2016a)”.

61

62

63 Page 3 line 9: Liu et al. 2018a is missing in references. The authors can consider citing
64 the following reference here:

65

66 Reference:

67 *Liu, L., et al., 2018a. Elucidating the relationship between aerosol concentration and*
68 *summertime boundary layer structure in central China. Environmental Pollution*
69 *241, 646-653, doi: 10.1016/j.envpol.2018.06.008.*

70

71 Page 3 Line 12: not completely coincide WITH ground-based Lidar station ?? How
72 about the distance between CALIPSO track and radiosonde site? The track of
73 CALIPSO shown in Fig.1 should be for the nighttime, which deserves clarification.

74

75 Page 3 Line 29: Necessary justification is required for the authors only applying
76 nighttime CALIPSO measurements to estimate BLHs. One reason is that there is
77 higher SNR in nighttime relative to daytime SNR (Winker et al. 2009; Guo et al.,
78 2016b).

79

80 Reference:

81 *Guo, J. et al. , 2016b. Three-dimensional structure of aerosol in China: A perspective*
82 *from multi-satellite observations, Atmospheric Research, 178–179: 580–589. doi:*
83 *10.1016/j.atmosres.2016.05.010.*