

Comments on “Planetary boundary layer height from CALIOP compared to radiosonde over China”

The planetary boundary layer height (PBLH) is an important parameter for the weather and climate study, as well as atmospheric pollution study. This study tries to obtain global PBLH based on CALIPSO satellite observations, and carried out an intercomparison study with those from radiosondes and lidars here. The results suggest that they agree reasonably well in China regions. This is a valuable contribution to the science community to better understand the potential applicability of CALIPSO observations to obtain PBLH. However, this paper does need some improvement as detailed below, particularly regarding to the English writing. I would recommend the manuscript for publication in ACP, pending minor revisions.

Main Comments

- (1) The English writing strongly need improve. The paper descriptions could be more concise and accurate.
- (2) One key role of this study as the author expressed is “The PBLH retrieval from CALIOP is expected to complement the ground-based site measurement due to its large spatial coverage”. However, I think the pass of CALIPSO satellite over a specific location is limited. May you please provide more information about the CALIPSO passed regions?
- (3) Section 2.1, I would like to know the uncertainties in the PBLHs obtained from radiosondes, which is very important since the authors are using them to evaluate those from CALIOP.
- (4) Section 2.2, what is the uncertainties of PBLHs from lidars, and what are the extra uncertainties caused by the selection of compare region size?
- (5) Section 3.1, this is a comparison. If you would like to say ‘evaluation’, you need assume the accuracy of ground-based lidar-derived PBLH with at least clear uncertainty information.
- (6) Section 3.2, I would suggest you add the climatology of PBLH from the readiosonde profiles over China and compare this with your results from CALIPSO observations. This could let us know how reliable of your CALIPSO-derived PBLHs.

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- (1) Line 12: The description could be more concise: the accurate estimation of planetary boundary layer height (PBLH) The PBLH retrieved from ...”
- (2) Line 17: ground-based and satellite-based or ground-based and spaceborne
- (3) Line 17-18, for $r=0.59$ or 0.65 , could we say “good agreement”?
- (4) Line 19, ‘during 2011 to 2014’ -> ‘for the period from 2011 to 2014’
- (5) Line 19, lower values
- (6) What is the uncertainty for PBLH from radiosonde observations? What are the factors that could result in the differences in PBLH between satellite- and ground-based observations, and their contributions?

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- (7) Line 17, how do you arrange the order of references?
- (8) Line 18-20, the sentence have grammar error with 2 verbs.

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- (9) line 1-3, why is it required 4-8 times for IOP experiment?
- (10) line 4, how accurate of the PBL height is it for the measurements from radiosondes?
- (12) line 12-13, what do you mean with (ref) in these lines? Reference?

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- (13) line 13-15, what do you mean for this sentence: “large seasonal and diurnal variations in PBLHs were observed between the different methods applied to radiosonde, ground-based lidar, CALIOP observations over one site in South Africa”
- (14) what do you mean for “large scale land-based observations”?
- (15) how reliable for the ground-based lidar observation of PBLH?

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- (16) line 14, times -> time
- (17) line 15, why call the summer as flood season? It might be wet season, but not good as flood season?
- (18) line 16, what do you mean for “severe weather forecasting”?
- (19) line 16-19, ‘owe to ..., ... therefore...’?

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- (20) line 9, What are you comparing to regarding “a good agreement”?
- (21) line 9, ‘this methods of ... was ...’?

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- (22) line 6, ‘the algorithm in Zhang et al. (2015) are applied on ...’ -> “the algorithm developed by Zhang et al. (2015) are applied to ...”
- (23) line 7, what kind of profiles are you talking about? lidar profiles?
- (24) line 8-9, why do you choose the area with radius of 75 km?
- (25) line 10-13, what are the data volume fraction for these cases?
- (26) line 17-19, please correct the sentences, such as “It measures attenuated backscatter coefficients at resolutions of 1/3 km in the horizontal and 30 m in the vertical at the visible wavelength ...”

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- (27) line 7, “ in combination with and ...”?
- (28) line 8-9, “This is because that ...”, You do not need to explain since you have said for “cloud screening”
- (29) line 9-11, please indicate the advantage of your choosing method.
- (30) line 11, there are two periods.

(30) line 9-16, please tell readers the uncertainties or the uncertainty-influential factors for this determination method.

(31) line 16-19, this is redundant since you have mentioned the 75 km earlier. Also, why do you select 75 km, not 50 or 25 km?

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(32) line 1, what do you mean “valid” here? For the overpasses, are there invalid ones? I donot understand.

(33) line 4, How do you determine if the BL is convective or not?

(34) line 5-10, you just gave one case to show the good agreement between two algorithms (even 17 profiles averaged within a 5 km region). This is not enough to conclude that “the combined algorithms are reliable”.

(35) line 10, ‘is’ -> ‘are’

(36) line 13, are you sure your comparison study is “a first attempt”?

(37) line 15-16, how do you exclude the cases with cloud cover? In other words, how do you get the cloud coverage?

(38) line 17, “shows that”? I believe it should be just “shows”

(39) line 17-21, for so limited data samples, how reliable are the comparison results?

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(40) line 1-2, the correlation coefficients are low, why do you say ‘show a good agreement’?

(41) line 11-13, the variability in winter (0.4 km) is larger than that in summer (0.31 km), why do you say the lowest PBLH variability occurs in winter?

(42) line 13, “were occurred” -> “occur”

(43) line 14-15, please modify the description to make it more concise.

(44) line 19, ‘was’ -> ‘were’

(45) line 21, ‘may be suppressed by aerosol radiative effects and aerosol-wind interactions (Xia et al., 2007; Yang et al., 2016)’

Yang, X., C. Zhao, J. Guo, Y. Wang, 2016, JGR: intensification of air pollution associated with its feedback with surface solar radiation and winds in Beijing.

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(46) line 2, ‘had been’ -> “have been”

(47) line 5-7, this information has been described two times earlier. I would suggest a more detailed description for only one time.

(48) line 7-9, this also seems redundant.

(49) line 14, delete “On the other hand,”

(50) line 16, ‘can be’ -> ‘are’

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(51) line 8, what do you mean for “basically”?

(52) line 11-12, could you give me a little more explanation? I do not understand the logic here.

(53) line 16-17, “the PBLHs at all the 113 radiosonde sites have been successfully derived” and “so have the CALIOP-derived PBLHs” seem the same meaning to me.

(54) line 18-20, there is no verb in this sentence. Also, I do not understand what difference are you talking about? Do you mean “the difference of PBLH derived from CALIOP and from radiosonde”?

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(55) line 1-2, I believe you are talking that PBLH exhibit negative values, not sites exhibit negative values. Please correct the description.

(56) line 7-10, I believe the two sentences are expressing the same meanings, please delete one.

(57) line 12-15, please modify it to make it concise.

(58) line 19, occurrence frequency for what?

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(59) line 8, ‘are’ -> ‘is’