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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Determination and climatology of the planetary boundary layer height by in-situ and remote sensing methods as well as the COSMO model above the Swiss plateau" *by* M. Collaud Coen et al.

Anonymous Referee #3

Received and published: 14 September 2014

This manuscript reports an operational product for PBL height retrieved from radiosonde and several remote sensing instruments and methods. This product is further used to investigate seasonal cycles of the PBL heights, and to evaluate model performance in PBL height prediction.

This work is important, but the manuscript needs to be improved by 1) including in-depth analyses and discussions on the source of errors in model PBL height predictions; 2) providing more quantitative evidence for supporting some statements; and 3)

providing more clear and precise wording throughout the manuscript.

Specific comments -

1) Page 15422, the paragraph starting from Line 14: It is important to understand the strength/limitation of various methods for PBL heights reported in literature. Descriptions of this paragraph could be more concise and more quantitative.

2) Page 15422, Line 24: The sentence is not clear to me.

3) Page 15424, Line 21: What does “the low mode” mean? Please provide sufficient information for readers to understand.

4) The temporal resolutions reported in this manuscript (e.g., 30 min, 40 min) are quite coarse. Is the best resolution that can be achieved? They seem really long!

5) Page 15427: Why can’t cloud fraction be determined by ceilometer measurements?

6) Page 15428, the paragraph starting from Line 17: Please define when is “if needed” in line 20. Additionally, the sentence in Line 24 doesn’t read well and I cannot understand it. Also, RH and rho are not defined.

7) Page 15430, Line 4: shouldn’t it be rho_0?

8) Page 15430, Line 1–4: Please elaborate on this and provide sufficient information for readers to replicate results.

9) Page 15430, Line 8–10: Please describe clearly what “SNR slope and curvature” mean here.

10) Page 15431, Line 17: Please double check if this should be WP or WR.

11) Page 15432, Line 17: Please elaborate on this sentence a bit more. The current explanation doesn’t really help to explain the difference between two methods.

12) Page 15434, Line 4: Really? Can WP/SNR detect cloud top no matter how thick clouds are?

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13) Page 15434, Line 10: Isn't this section talking about clear-sky conditions? How come outliers in PBL heights can be attributed to "elevated cloud layers'?

14) Page 15435, section 3.4: Could the author please clarify if this comparison was conducted for all cases, or just for clear-sky cases? This should be clearly mentioned in the manuscript.

15) Page 15435, Line 23: What does it mean by 'physically meaningful systematic positive bias"? Also, please elaborate on the explanation for this systematic bias.

16) Page 15436, Line 4: Please provide evidence to support this statement.

17) Page 15436, Line 12: It is quite disappointing that this manuscript does not provide more analyses to identify the main sources of the model errors.

18) Page 15437, Line 20: The paragraph needs to be re-written in a more scientific way.

19) Page 15438, Line 1: Please provide quantitative evidence to support the statement.

20) Page 15438, Line 12: Could the author please comment why these two ground-sites have almost the same monthly variations of the sample size? Is it expected?

21) Page 15438, Line 1–15: Not all data points in 0–5 hours on the same day would be selected in the analyses. Therefore, it would be more scientifically/statistically correct and useful to count the sample size in terms of each data point, and then convert them to an equivalent length in days.

22) Page 15438, Line 22: How was this statement made? Evidence or reference?

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 15419, 2014.