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Interactive comment on "PathfinderTURB: an automatic boundary layer algorithm. Development, validation and application to study the impact on in-situ measurements at the Jungfraujoch" *by* Yann Poltera et al.

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Dear Reviewer,

We thank you for the detailed revision of our manuscript. We have considered all your suggestions and we have modified the manuscript accordingly. We have noticed that your review was based on the version of the paper before the technical revision. Nevertheless, the scientific content and the structure of the paper have not changed much after the technical revision. We have then proceeded to the revision of the manuscript

based on your comments. Below we provide the answers to the general and detailed comments of the Reviewer.

General comments:

In general the core concepts of the manuscript are presented in a vague and confusing way with many repetitions. This manuscript as currently written will make readers work way too hard to understand the results. It contains too many misspellings and syntax mistakes. In general, could you please try to write shorter sentences (some of them exceed 60 words per sentence!). I suggest, that the manuscript needs a language editing by a native speaker. If the authors could clarify the analysis and structure, it would result in a much improved paper.

A thorough editorial revision of the manuscript has been done. The whole text has been improved for the written English, the readability and clearness of the independent sections. Many sections have been merged in order to clarify the manuscript's structure and all repetitions have been removed. Parts that were too technical and did not need to stay in the manuscript have been moved to the supplement.

Detailed comments:

Title p. 1,l.4-5: check order of name and first name.

Done.

Abstract Could you please clarify the structure of the abstract in order to improve readability (e.g. introduction, experimental sites and instrumentation, algorithm, validation, results, conclusion)?

The abstract has been rewritten and shortened. It now reads in a much clearer way.

What is the meaning of TURB in "PathfinderTURB"?

The meaning of the name PathfinderTURB is now provided directly in the introduction.

Manuscript: The extensive use of abbreviations and symbols makes reading the manuscript hard. Could you please reduce the number of abbreviations and symbols used in the ms?

We added a list of acronyms at the end of the manuscript to help finding the meaning of all of them in a same place. Moreover, we tried to limit the use of acronyms where possible throughout the text.

Check space between number and unit throughout the ms.

Done.

Check space between number and unit throughout the ms.

We have moved section 4 after section 2 and right before section 3. Section 4 (now Section 3) has been re-written to improve the readability and avoid all repetitions that occurred in the previous version.

p.3 l.10-13: "The difference between the ML and the CBL is in the 10 term "mixed" (and not "mixing") where the mixed layer indicates a layer in which the profiles 11 of potential temperature and humidity do not vary much in height and the particles and gases 12 are well-mixed, but are not necessarily still mixing." Please delete first part of the sentence. Why do you use italic type for "mixed layer"?.

The sentence has been removed.

p.4, l.1 What do you mean with "atmospheric concentration observations"?

The sentence has been replaced by: "observations of atmospheric compounds at different concentrations".

p.4, l.13 Delete "respectively".

Done

p.5, l.1-8 Maybe this belongs rather to chapter 3?

The paragraph has been shortened and rephrased.

p.6 Suggestion: Describe the Pathfinder algorithm and the new PathfinderTURB algorithm in chapter 3. Please delete the description of the measuring sites. Describe the measuring sites first, so you can refer to this chapter without repeating this information several times in your ms.

Done.

p.7, l.20 "compared with the night"?

The phrase has been replaced by "...the SNR drops below the value 0.6745 already at low altitudes due to the enhanced solar background".

p.14, l.3 "Remote sensing and in-situ observations at Payerne and Kleine Scheidegg". What about the JFJ?

The title of the new Section 3 is now: 3 Description of instruments and sites.

p.14 Please refer only to the measuring devices used in this study.

Done.

p.15, l.9 Please be consistent using "m a.s.l.".

Done.

p. 16 Information about the tilted zenith angle of the ceilometer was given several times (e.g. p16, 17, 38).

Repetitions have been removed.

p. 16-17 Be consistent when introducing symbols (e.g. p.16, l. 12 vs. l.13, p. 17, l. 12 etc.).

Symbols in the equations and in the text are now consistent with each other.

p.17, l.28 ff. Maybe you put all Methods in a method section and all results in a separate

chapter. Try to omit repetitions

Section 5 has been re-written and parts that were too technical and did not bring essential information to the reader have been moved to the Supplement . We tried to remove all repetitions.

p.17, l.32 "We believe" ?.

We have removed it.

p.18, l.2 "Therefore, the PathfinderTURB algorithm".

Done.

p.18, l.10 Please write formulas in a convenient way (a = b+c).

The equation has been removed.

p.18 Please re-write chapter 5.1 "Human expert CBLH retrieval" in a straight way, so that it is easy to understand. Concentrate on the most important facts. Do not use the appendix for repetitions. What is the reason for the division of the experts in the test group and the reference?

Section 5 has been re-written and parts that were too technical and did not bring essential information to the reader have been moved to the Supplement . We tried to remove all repetitions.

p.18,l.9 Remove space between "cases" and full stop.

Done

p. 20,l.10 Change "timeseries" to "time series".

Done.

p.21,l.4 Write "w.r.t" out.

Done

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Discussion paper

p.22, l.1 What do you mean by "unphysical jumps"?

the sentence has been removed

p.22, chapter 5.2 Could you reduce the number of symbols and abbreviations used in the text. It is way too hard to read the ms.

We added a list of acronyms at the end of the manuscript to help finding the meaning of all of them in a same place. Moreover, we tried to limit the use of acronyms where possible throughout the text.

Be consistent when referring to Figures (Fig. X or Figure X).

Done

p.25,l.14 Change "(Henne at al., 13 2004)This" to "(Henne at al., 13 2004) .This".

Done

p.25-28 seems to be a combination of literature review methods and repetitions.

We have partially re-written and shortened Section 6. Nevertheless, the first part of Section 6 before section 6.1 it's fundamental to explain the dynamics occurring in complex topography.

p.35 "amplitude (max/min)". Delete (max/min)

The whole section does not exist anymore, it has been entirely rewritten.

Fig.1: The quality of the printed graph is not very good. Especially in the third panel it is difficult to differentiate between TCAL and CBH and the background colours.

Figure 1 (now Figure 2) has been edited and the quality improved.

Fig.2: The aerial view is not very meaningful and could be deleted.

Done.

Fig.3 and 4 upper panel: Could you insert the standard deviation or measuring error in the scatter plots for both methods?

Done.

Fig.3 and 4 upper panel: Could you insert the standard deviation or measuring error in the scatter plots for both methods?

We added error bars in Figure 4a. The error bars were not possible in Figure 3a, but the RMSE is indicated.

Fig. 6: I don't get the meaning of the left legend. Furthermore, it is not easy to detect the line of the 1h.running median TCAL. Please delete the doubled full stop in the caption (p.31, l.4).

The "iqr" stays for inter-quartile range, this is now clearly stated in the text and the caption. We have enhanced the DPI of the figure and the 1h-running mean line is now more visible. We removed the double full stop.

Fig.8 and 9: Use smaller dots to minimize overlapping dots. Could you please improve readability of the symbols in the legend?

Figures 8 and 9 have been replaced by new figures.

Literature Check order of name and first name (Baars et al. 2008, Balzani et al. 2008), placement of the year (Henne et al. 2010)

Done

Please also note the supplement to this comment:
http://www.atmos-chem-phys-discuss.net/acp-2016-962/acp-2016-962-AC1-supplement.pdf

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2016-962,

2017.