

# ***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.***

## **Anonymous Referee #2**

Received and published: 11 April 2017

This manuscript deals with the retrieval of the convective boundary layer (CBL) height and the continuous aerosol layer (CAL) from ceilometer backscatter data using the PathfinderTURB algorithm. The result of this method were compared to manual detection of the convective boundary layer height and the results of the Richardson's method applied on Radiosonde data. After a successful validation the PathfinderTURB algorithm was applied to a tilted ceilometer in a location with extreme terrain variations in order to detect the height of the CBL and CAL above the Sphinx observatory. In this observatory, in-situ aerosol measurements are carried out which can usually be assigned to take place in the free atmosphere. Along the way, the authors utilize an impressive

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data set from different remote and in-situ sensors. The data and results themselves are highly interesting.

However, the manuscript has several weaknesses and major revisions are needed. 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.

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

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)?

What is the meaning of TURB in “PathfinderTURB”?

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?

Check space between number and unit throughout the ms.

p.2, l.21-p.3, l.6: Description of the ceilometer belongs rather to 4.2.

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”?

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

p.4, l.13 Delete “respectively“.

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

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.

p.7, l.20 “compared with the night“?

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

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

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

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

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

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.

p.17, l.32 “We believe” ?

p.18, l.2 “Therefore, the PathfinderTURB algorithm”

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

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

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appendix for repetitions. What is the reason for the division of the experts in the test group and the reference?

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

p. 20,l.10 Change “timeseries” to “time series”

p.21,l.4 Write “w.r.t” out.

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

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

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

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

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

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

Figures Please be consistent in the use of brackets around units.

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.

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

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

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).

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

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

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Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-962, 2017.

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