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Atmospheric Measurement Techniques Discussions

# *Interactive comment on* "Ceilometer-lidar inter-comparison: backscatter coefficient retrieval and signal-to-noise ratio determination" *by* B. Heese et al.

**Anonymous Referee #3**

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With the implementation of a increasingly large number of ceilometers operated by national weather services it is very important to know, what sort of information with respect to aerosols can be obtained. The answer to this question should be representative, and the accuracy of the retrieved aerosol parameters should be given or at least comprehensibly be estimated. Heese and his co-authors contribute to this problem, and thus the paper is worth reading.

However, some points are not accurately formulated and it is not at all convincing that the conclusions are justified in general. With respect to this problem the authors must



either give better evidence or weaken their statements. The former would require discussions of much more cases, the latter would require the re-formulation of the conclusions. I would suggest to go for the second way: this means that the authors clearly state, that they only outline an approach how the potential of ceilometers can be assessed (under favorable condition, e.g. additional infrastructure) and omit any conclusions that could be misunderstood as 'generally applicable'. For a general assessment, two case studies are not sufficient! Furthermore, the proposed procedures cannot be routinely applied.

Before publication, these issue must be solved.

Further comments below (ordered as they appear in the text, not according to relevance):

- Page 3908, line 14:

  The number of 150 m for complete overlap seems to me unrealistic. Can the authors give evidence to this (one of the authors is from Jenoptics).

- Page 3909, line 24:

  'being setting up' → 'set up' ?

- Page 3908, line 26:

  modify to 'a narrow'

- Page 3909:

  It is not very clear (whole paper), whether the discussed comparisons were provided in EARLI09 or separately, and if the 'ceilometer' is the CHM15k or CHM15k-X. Please give details to help the reader.

- Page 3909, line 14:

'quantitatively detect': the meaning how the authors use 'detect' (throughout the paper) is not clear to me: 'detection' could be a yes/no answer, whereas 'quantitatively' should be associated to physical quantities, e.g. backscatter coefficient.

- Page 3909, line 26:

  Give a reference to EARLI09 if available.

- Page 3910, line 2:

  It is not clear whether the comparison described in the paper is a EARLI09-activity or just a IfT/DWD-activity. If the former is correct the comparison must be done with respect to an EARLINET- or EARLI09-standard, and this standard must be explained.

- Page 3910, line 9:

  CLIC is not explained, only mentioned in the abstract.

- Page 3911, line 1:

  84 $\mu$J: is this true? decimal point missing!?

- Page 3911, line 18:

  'several thousands': It seems to me that the total number is 2880 data sets per day; so 'several' only means 3.

- Page 3911, line 21:

  'at least 150 m': this is an even stronger statement than before, suggesting that the overlap begins at 100 m or so. I don't believe this, give evidence!

- Page 3912, line 11:

  'exacerbates': I would rather say 'makes it impossible'.



- Page 3912, line 13:

  It is surprising that first 25/05/2009 is selected as an example to show the potential of the ceilometer (Fig.1), and then it is switched to another date (Fig.2). What is the reason?

- Page 3911, line 16:

  The authors never mention the fact, that AOD-measurements by a sunphotometer are only possible during day-time, under cloud-free conditions and that a stable aerosol stratification is required for the time period between photometer- and ceilometer-measurements. This is not acceptable.

- Page 3912, line 18:

  'at Leipzig' can be omitted (already stated 'at IfT')

- Page 3912, line 19/20:

  Genitive-apostrophes are missing.

- Page 3913, line 1:

  'extrapolated as constant and' can be omitted.

- Page 3913, line 4:

  It seems that the errors are indeed 'estimates', just numbers that sound familiar. In this case, 50% seems too pessimistic; what kind of boundary layer should produce such a large error? Why have the profiles an overlap of 1000 m in this example; it should be either 150 m or 1500 m according to previous statements.

- Page 3913, line 5:

  BLT is not defined.

- Page 3913, line 10:

  What is 'ceilonet'?

- Page 3914, line 1-6:

  Is this relevant for this paper?

- Page 3914, line 9-11:

  I don't understand the numbers given (0.18/0.17/0.15); they are in contradiction to Fig.2. And I don't come up with errors of 11/12%, if I use the given numbers.

- Page 3914, line 17:

  'was calculated from the ratio...'. This procedure must be explained in more detail. It must be clear, whether the agreement between the green and blue curves is a inherent consequence of this procedure or an independent criterion for quality assurance. If the former is true, then it is not an 'agreement'!

- Page 3914, line 23-27:

  What is the relevance of this statement? Under normal conditions lidar measurements of a cirrus for calibration are not available. So, this method cannot be used operationally.

- Page 3915, line 13:

  How is the AOD derived from sun-photometer data during night-time. This is impossible (see one of my previous comments).

- Page 3915, line 22:

  'wanted and unwanted': maybe better wording possible.

- Page 3916, line 6:

  If 'all' equations are given, one should add $\Delta P = \sqrt{P}$ as well.



- Page 3916, line 8:

  typo: 'square-root'.

- Page 3916, line 16:

  'receiver power' sounds a little bit weird.

- Page 3917, line 1-2 and 3917/14:

  This statement is too general. It certainly depends also on the optical depth of the boundary layer.

- Page 3917, line 5:

  The SNR does not 'increases again' as can be clearly seen from the figure.

- Page 3917, line 6-10:

  'Thus, although...': I don't understand this sentence. What is the message?

- Page 3917, line 22:

  'Here, also...'. This is a severe problem, that deserved more than one short sentence.

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Interactive comment on Atmos. Meas. Tech. Discuss., 3, 3907, 2010.