

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

Anonymous Referee #1

Received and published: 24 September 2010

General comment:

The research article “Ceilometer-Lidar Inter-Comparison: Backscatter Coefficient Retrieval and Signal-to-Noise Ratio Determination”, by B. Heese, H. Flentje, D. Althausen, A. Ansmann, and S. Frey, deals with the lidar-to-ceilometer (elastic channels) comparison using the supplementary lidar Raman channel to ground the main backscatter products assessed by the analysis. The analysis is well presented though not always clear lacking to provide useful details for the reader’s comprehension. Nevertheless, the study is successful in delivering useful information on the ceilometers’ potentialities

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and limitations, shading light on a very actual topic in the remote sensing field. Few aspects of the analysis and interpretation of the figures need better explanation.

Specific comments:

1 Introduction, p 3909, lines 17-20: the 2 km-distance between the ceilometer and the PollyXT could have an impact on backscatter profiles comparison due to very local updraft structures building up during the afternoon convection (probably present in Apr and May). Anyway, the very close profiles shown in figure 2 suggest that this doesn’t happen or that the averaging process smoothes out the local effects.

3 Data evaluation

p 3912, lines 1-4: explain better how you retrieve the extinction directly.

p 3912, lines 11-13: a piece of information is lacking here about which ceilometer is being compared to the lidar in Figure 2.

p 3913, lines 2-5: the statement is not clearly expressed, please rephrase it. How do you get to 20% and 50% error? over- under-estimation?

p 3913, line 6: I guess this is sliding average, please clarify.

4.1 Daytime case

p 3913, lines 16-19: Again, which ceilometer is being compared to the lidar in Figure 2?

4.2 Night-time case

p 3914, lines 24-28: backscatter wavelength independence within clouds is used to adjust the signal from the two instruments. Fig. 3 doesn’t allow a clear visualization of the cirrus cloud; please extend the axis limits to allow the entire cirrus to fit in. The authors should explain more clearly how this adjustment/calibration works and what is the effect on the presented data. It seems that this auto-calibration might have an

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impact on the obtained backscatter coefficients.

p 3915, line 1: in which way the above-mentioned adjustment proves the correctness of the retrieved BSCs?

p 3915, lines 8-10: any explanation about why the BSC of the ceilometer is lower?

5 Signal-to-noise ratio

p 3916, equation (2): please explain how P_{sig} and P_{bg} are obtained.

p 3916, lines 13-14: a vertical line at $SNR=1$ should be added to Fig 4 to allow a more straightforward visualization of the “clean” and “noisy” part of the signal.

Technical corrections:

p 3911, line 1: should be $8.4 \mu m$

p 3915, line 1: proof

p 3917, line 4: SNR is greater than 1 up to 8.5 (rather than 6.5)

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