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# *Interactive comment on* "Mixing layer height as an indicator for urban air quality?" *by* Alexander Geiß et al.

## Anonymous Referee #1

Received and published: 13 April 2017

General comments:

In this generally well-written paper, ceilometer-based mixing heights are derived, using three versions of the proprietary software BL-VIEW provided by the manufacturer, Vaisala, and an own algorithm, COBOLT. The latter shows fewer cases where the residual layer is mis-interpreted as the mixing height. Furthermore, the relationship between MLH and near surface pollutant concentrations has been investigated. Whereas for ozone a clear correlation was found, PM10 and NOx show more complex patterns, indicating that the mixing height is not the only parameter influencing the levels of these pollutants.

While these results are plausible and well explained, the paper currently suffers from a few serious deficiencies. First, the investigation comprises only two summer months,

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and day-night differences in the relationship MLH and pollutants are not at all considered. Second, the whole area of Berlin is represented by only one ceilometer. It is however well known that the mixing height will show some variation over such a large area both day and night, depending on the degree of urbanization and other surface-related influences. A discussion on this issue is needed. The short investigation period and the use of only one ceilometer are currently briefly discussed in the conclusions, promising to tackle these issues in the future. However, these shortcomings have to be discussed more deeply, including references. An investigation of day-night differences has to be included in a revised version. Some of the figures need improvement (see below).

Specific comments:

p. 3, line 1: The statement is too optimistic (frequently used approach); if true, provide more references. I think determining MLH from ceilometers in a reliable manner is quite a new subject.

p. 3, line 20: The short investigation period is mentioned here for the first time (see General commentsp. 4, line 7: The main shortcoming of Sodar and RASS is that they usually cannot provide the whole diurnal cycle of MLH in Central Europe, especially in summer. A Sodar alone can give a reliable estimate of MLH only with careful data analysis, see e.g. Bound.-Layer Meterorol. 124, 3-24 (2007).

p. 4, lines 17-18: The advantage of spatial coverage of a network of ceilometers is not used in this study.

p. 8, line 5: please elaborate statement (one ceilometer is representative for a metropolitan area; see also General comments).

p. 10, last paragraph: A graphical sketch (Fig. 2 is not sufficient) on how the COBOLT algorithm works would facilitate understanding. How is "the parameter" defined?

p. 12, discussion of Fig. 2 (bottom): from visual inspection, L1 seems to work best in

comparison with COBOLT. Do the quality flags really improve the comparison? This aspect is not discussed.

p. 18, top: Only one ceilometer: this is indeed the main drawback of the investigation (see also General comment).

p. 24, lines 11 and 12: Robustness and representativeness are also not really investigated in this paper.

Technical corrections:

p. 1, line 5: ...has been investigated p. 1, line 7: July and August p. 2, line 9: ... and when meteorological conditions ... p. 2, line 13: mass concentrations p. 2, line 27: either "for a chemical box model" or "for chemical box models" p. 3, line 3: In particular, p. 3, line 4: are established, p. 5, line 8: These findings p. 19, Fig. 7: The lines for the outskirts stations are missing p. 21, line 13: probably: ... larger at the outskirts sites. p. 22, Fig. 9, Fig. 10: The lines for the outskirts stations are missing

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