



## **Mixing layer heights derived from ceilometers: Useful for air quality studies?**

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Ceilometers have been used for several meteorological applications, often in the framework of air quality studies. Whereas the particle backscatter coefficient can be retrieved in a quantitative way only recently (with the improvements of the hardware, Wiegner et al., 2014), mixing layer heights (MLH) have been derived for more than two decades. Several approaches are documented in the literature, however, automated procedures are still prone to errors because of difficulties in the recognition and attribution of discontinuities (“steps”) in the backscatter profiles. For example, it is often not clear whether a detected change in the vertical distribution of aerosol backscatter indicates the residual layer, the stable boundary layer, or an elevated layer. Thus, an assessment of the reliability and accuracy of MLH-retrievals is relevant for air quality studies: on the one hand MLHs are often inversely correlated with ground-based in-situ measurements of particulate matter and gaseous pollutant concentrations, and on the other hand, MLH-retrievals can be used to validate chemistry transport models.

To understand the benefit of MLH in the context of air quality, we have compared several retrievals of the MLH from ceilometer measurements during a field-campaign in summer 2014 (Bonn et al., 2016) for background and polluted sites in Berlin. Correlations between the concentrations of several pollutants and MLH are analyzed, and how they are influenced by the uncertainty of the derived MLH.

### References:

Bonn, B. et al.: BAERLIN2014 – the influence of land surface types on and the horizontal heterogeneity of air pollutant levels in Berlin, *Atmos. Chem. Phys.*, 16, 7785-7811, doi:10.5194/acp-16-7785-2016, 2016.

Wiegner, M. et al. (2014): What is the benefit of ceilometers for aerosol remote sensing? An answer from EARLINET, *Atmos. Meas. Tech.*, 7, 1979-1997, doi:10.5194/amt-7-1979-2014, 2014.