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Atmospheric Measurement Techniques Discussions

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

Anonymous Referee #2

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General comments

The paper 'Mixing layer height as an indicator for urban air quality?' investigates the relationship between ceilometer retrieved mixing layer heights and near surface pollutant concentration. Three different versions of BL-VIEW and a novel approach called COBOLT were used to derive the Mixing Layer Height at one selected station in the urban area of Berlin. Whereas for ozone the approach seems to show meaningful results, NOx and PM10 reveal a much more complicated picture and MLH might be difficult to be defined as main factor influencing near surface levels. Overall, the paper is well written and easy to follow, but however needs some more critical discussion on certain points.

In my point of view, using just one ceilometers/ location might not be sufficient to answer

the question given in the title. It is clear, that it is difficult to extent the study to other locations at that stage, but however, this aspect should be discussed more in detail. As highlighted by reviewer 1, I share the opinion that a day/night comparison might be interesting.

For meteorological conditions being a main driver of turbulent mixing it might be interesting to include some meteorological observations characterizing the measurement location and selected study period. With a observation height of about 5m it might be interesting, which amount of the measured concentration is originated from the actual location and which amount is advected from neighboring areas or 'removed' by vertical mixing. Here again a night/day difference would be interesting. How does this aspect influence on the analysis at one selected point?

Specific comments:

p.2 line 3-4: Is there evidence in your study? Otherwise put this sentence in the introduction or conclusion.

p.2 line 19: measurements, data instead of techniques

p.2, line 27: box models

p.3, line 16: COBOLT: add one sentence highlighting novelty, functionality

p.3, line 19: aim to instead of may

p.4, line 1: specify 'active remote sensing networks' (e.g. . ..)

p.5, line 15: chemical processes? What about Ozone? Where does it come from – downward mixing, secondary formation?

p.5 line 28-31: This is not part of your analysis and could be moved to the conclusion.

p.6, line 9: specify 'secondary material'

p.6, line 14: hourly measurement

p.8, line 1: how representative is the measurement location in 5m height for near surface pm10 concentration? How does this impact the representativeness for the MHL measurements for this area?

p.16 Figure 5: legend has to be added

p.17 line 2 ff: this chapter defines the scope of the study and in my opinion appears to late in the manuscript which results in a misbalance between introduction/methods and results. The first part until 5.1is more an introduction to a new topic than a presentation of results. I might be helpful to include some of these aspects ion the introduction (without changing the whole manuscript). Line 2: Ozone and NOx also measured at BLUME?

p.18 line 8: it is unclear on which basis the median was calculated. 67 measurements each hour at every station? p.18, line 16-20: can you proof your assumptions by adding meteorological observation here? Is there a secondary circulation generated by the Urban Heat Island? Please specify the term 'meteorological interpretation'.

p.20, line 31f: see comment above

p.21 general: here you mention briefly the problem of point measurements. This aspect could be further discussed. It is interesting if there is a mismatch between the timing of MLH and air quality observation. Does a low MLH mean a high concentration at the same time? What is the order of the processes? Where do meteorological conditions come into play?

Chapter 6 It is not the extended mixing layer itself which is the initial precursor of dilution of pollutants near the ground. Several processes interact which each other which might as well lead to an extension of the mixing layer height.

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