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Comment

Interactive comment on “Lidar measurement of planetary boundary layer height and comparison with microwave profiling radiometer observation” by Z. Wang et al.

Z. Wang et al.

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Response to Referee 1

We thank the reviewer for carefully reading the manuscript and for providing constructive comments. We address the comments below.

1) the authors should shortly discuss to difference between "mixing-layer height" and "boundary-layer height". They should define which of these two heights is derived from the lidar and from the microwave profiler data. 2) no clear explanation is given how the boundary layer height is derived from the microwave profiler data.

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In this paper, the parcel method is used to derive BLH from temperature profile. Its basic idea is to follow the dry adiabat starting at the surface with the measured temperature up to its intersection with the temperature profile. It determines the BLH as the equilibrium level of a hypothetical rising parcel of air representing a thermal. In the case of lidar, the BLH is derived from the vertical distribution of aerosol that is indirectly related to the thermal condition in boundary layer, it represents aerosol mixing-layer height. In the revised manuscript BLHaerosol and BLHtemp are used to represent the BLH from aerosol distribution and temperature profile, respectively, corresponding discussion have been added in the introduction part of results.

3) a discussion of the typical diurnal variation of the vertical structure of the boundary layer is missing. Phenomena such as the development of nocturnal residual layers could easily help to explain the large discrepancies found from the night-time observations.

We agree, in the afternoon the convective BL departs into residual layer and stable layer, the BLHaerosol likely represents the height of residual layer since it is actually the aerosol layer height. However, the BLHtemp is the equilibrium level of a hypothetical rising parcel of air and strongly depends on the surface temperature. In the afternoon the surface temperature decrease and the BLHtemp decline and diminish accordingly.

4) the meteorological characterization in Section 4.1 is not sufficient. The development of the boundary layer height does not depend just on cloudiness. Wind speed is an important parameter as well. Probably, also relative humidity is influencing the height indirectly via thermal counter-radiation.

Yes, the development of the boundary layer depends on the kinematic heat flux and wind speed. Cloudiness is only a rough description about meteorological characterization, and contains little information. So we delete this part because the wind and humidity measurements are not available.

5) there are many entries in the reference list of this manuscript that are not mentioned

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in the text. These references should be mentioned, because they are quite relevant for the subject discussed in this manuscript.

We have added some mentions to these references.

Interactive comment on Atmos. Meas. Tech. Discuss., 5, 1233, 2012.

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