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Atmospheric Measurement Techniques Discussions

# *Interactive comment on* "Error estimation for localized signal properties: application to atmospheric mixing height retrievals" *by* G. Biavati et al.

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The manuscript deals with the determination of the uncertainty in the boundary-layer height from a single radiosounding. The uncertainty in the temperature signal is derived by use of Eq. A1, which account for the error in the measurements, which in this case is the uncertainty in the temperature measurements by the sensor, which is set to 0.125 K. However, the temperature fluctuations in atmospheric convective conditions are larger than this. My main criticism of the manuscript is related to the lack of accounting for the physics of the convective boundary layer. Basically the growth of the convective boundary layer is driven by convective updrafts that entrain into the stable free atmosphere – in this process kinetic energy of the updrafts is converted into



potential energy when encroaching the stable free atmosphere – in this way the mixing layer grows. The entrainment layer is thus a zone of vigorous mixing with large oscillations in depth according to the strength of the updrafts/downdrafts. A radiosonde provides a snapshot of the temperature/wind profile and therefore does not account for the oscillating behavior of the border between the convective boundary layer and the free atmosphere. The real mixing height is somewhere in the entrainment zone and cannot be derived from a radiosonde profile (gives only a snapshot estimate, this limitation is well known in the community and one of the sources for the many comparisons of mixing height estimates in the literature). Therefore when the manuscript deals with an estimate of the uncertainty of the mixing height estimated by analysis of a single radiosonde profile, it does not account for the physics in the entrainment zone, which is the real source of uncertainty in the determination of the mixing height from radiosonde profiles. It is only the rather insignificant uncertainty from the sensor. The method presented is general and here applied on a radiosounding. It might be of interest in other types of measurements. Considering the reputation and high scientific level of the Atmospheric Measurement Techniques journal, I find the method described in the manuscript lacks essential physics on the atmospheric boundary-layer to justify publication.

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 5105, 2015.