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Atmospheric Measurement Techniques Discussions

Interactive comment on "Observation of sensible and latent heat flux profiles with lidar" *by* A. Behrendt et al.

Anonymous Referee #1

Received and published: 4 November 2019

The paper presents the measurement of latent and sensible heat flux profiles in the convective boundary layer (CBL) derived from temperature, humidity and wind data from three co-located lidar systems. The profiles are derived from a 45 min time period in a well developed CBL and show the expected shape demonstrating primarily the capability of the method. The paper fits in AMT's scope. The method and data are well described, the results are convincing and the text is very well written. I recommend the paper for publication in AMT with minor revisions.

Minor revisions:

L95: From my own experience, I still believe the main challenge for PRR measurements is not the low cross section but the system stability in combination with a relatively weak temperature dependence of the ratio of the PRR signals. Hence, neither laser power

nor detector efficiency is key for success, but system stability. I'd appreciate a comment on this.

L118: Please specify what type of calibration function has been used.

L151: Please specify how many standard deviations were used in this study to flag outliers.

L159: This is not an interpolation but a fit to the data. Change wording.

L160: S* is a matrix rather than a profile. Change wording.

L180: Why is N height dependent?

L185: Since "error" is not further used in this sense here, I don't see the need for this clarification in parenthesis. "Error" rather appears at several other locations in the text to refer to measurement error of both systematic and random nature (L78, L171, L310, L324, L591).

L226: "The most. . ." this phrase is not clear and should be reworded.

L231 and l240: "uncertainty variance" is not a good term. It is rather uncertainty expressed as a variance.

L305: I would assume that all eddies contain energy and hence don't understand why the authors refer to "energy-containing" eddies. Please comment.

L329: adopt the terminology from section 3.3, i.e. "vertical divergence of . . .".

Figures 1 and 2: Fonts of the axis labels are to small.

Technical corrections:

L165: perfect instead of prefect.

L227: is instead of it

L291: add a comma after "buoyancy"

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