

Interactive comment on “Footprint issues in scintillometry over heterogeneous landscapes” by W. J. Timmermans et al.

Anonymous Referee #1

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General comments: The heterogeneity of land surface is a significant problem faced by the applying of LAS observation and validation of surface fluxes estimated from remote sensing with ground measurements. The objective of this paper is to verify different aggregation methods based on EC and LAS measurements, as well as footprint model. However, the analysis of this paper is not comprehensive; more substantial improvements need to be done before its publication.

Major comments:

(1)When EC and LAS measurements are constructed over heterogeneous surfaces, the measuring errors are inevitable, so rigorous post processing is needed. The author neither indicates the data processing of EC and LAS measurements, nor how about the data quality of the data used, so the results are suspicious. (2)It is stated in this pa-

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per that the EC data used were 10min averaged, but from the principle of EC system, 30min interval is the optimum averaging time. (3)The paper indicate the LAS measurements cannot discriminate the direction of sensible heat flux, but the author make no judgment on the atmosphere stability, so some data under stable conditions may be included in the analysis, such as the circled points in Fig.4a. (4)In the “Discussion” part, the author analyzed the reasons of the difference between Href and Hsim. Besides aggregation methods, the fluxes for components that were not covered by EC, incorrect component fluxes because of different source areas of EC and LAS, etc, there are still other reasons, such as measuring errors of EC and LAS, the existing of large eddies which cannot captured by EC (Von Randow et al., 2008), how about the heterogeneity of the surface layer. (5)The author considers the single landcover as “pure” or “homogeneous”, but in fact, the heterogeneity of soil condition or surface temperature should be explained using thermal infrared satellite imagery (Hoedjes et al., 2007). This may be one of the reasons caused the discrepancies between Hlas and Href in Fig.5a. (6)The author only gave limited dataset, only 69 datasets, to get the results, so the analysis is not reliable enough. (7)Fig 1, 3, 4, 5 are not clear and hard to read, it would be better to indicate the data source and method used in the graph.

References:

Hoedjes J.C.B., Chehbouni A., Ezzahar J., Escadafal R., de Bruin H.A.R., 2007. Comparison of large aperture scintillometer and eddy covariance measurements: Can thermal infrared data be used to capture footprint-induced differences. *Journal of hydrometeorology* 8: 144-159.

Von Randow C., Kruijt B., Holtslag A.A.M., de Oliveira M.B.L., 2008. Exploring eddy-covariance and large-aperture scintillometer measurements in an Amazonian rain forest. *Agricultural and forest meteorology* 148: 680-690.

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