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Hydrology and Earth System Sciences Discussions

Interactive comment on "Measurements of energy and water vapor fluxes over different surfaces in the Heihe River Basin, China" *by* S. Liu et al.

Anonymous Referee #3

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The title chosen for the paper makes it appear to be not very interesting, because there are many papers of this type available which do not make a significant contribution to recent scientific problems. Nevertheless the paper does have an interesting topic: the comparison of eddy-covariance measurements and Large Aperture Scintillometer measurements in respect to the energy balance closure problem. Perhaps a change of title would highlight the paper to a larger group of scientists.

Because the data calculation and the analysis are at a high level the paper can be accepted with minor revisions and the following additional investigation: Because the ratio of HEC and HLAS changes with the energy balance closure it may be interesting to determine which conditions are responsible for a lower or higher energy balance

closure. Perhaps this can be investigated depending on wind velocity, stability and land use characteristics in the footprint of both instruments. The following papers are probably also interesting for this problem: Meijninger et al. (2006), Foken et al. (2010)

p. 8745: Because of climate change uniform time periods for climate date may be better – such as 1961-1990 – for all stations.

p. 8746: It would be good to have the reference to Table 1 already on this page.

p. 8748-9: Eq. 3 is based not on the Monin-Obukhov similarity theory (Monin and Obukhov, 1954) but on the paper by Obukhov (1960).

p. 8749: L is nowadays only called Obukhov length (Businger and Yaglom, 1971; Foken, 2006).

p. 8749: In Eq. 5, only the integral of the universal function Ψ is given. A function fT, probably the universal function for temperature, ismissing in Eqs. 1-5. This part must be more clearly written.

p. 8749: Explain in a few words what is special about the method by Yang et al. (2003) for determining the roughness length in comparison to the textbook knowledge.

p. 8752: Why have you deleted night time data – because of stable stratification and the larger footprint?

p. 8782: The conclusion is more a summary. The authors can probably give some hints to other investigators as to which are relevant problems for such investigations and how to solve them.

p. 8773: Include LAS in the middle row of the figures to provide a better visual separation of the EC and LAS footprint. Generally (also other figures), the legend is very short and the reader has problems in understanding the figures without knowing the whole text.

p. 8767: citation Yang et al. (2003) is wrong, it is volume 106

References:

Businger, J. A., and Yaglom, A. M.: Introduction to Obukhov's paper "Turbulence in an atmosphere with a non-uniform temperature", Boundary-Layer Meteorol., 2, 3-6, 1971.

Foken, T.: 50 years of the Monin-Obukhov similarity theory, Boundary-Layer Meteorol., 119, 431-447, 2006.

Foken, T., Mauder, M., Liebethal, C., Wimmer, F., Beyrich, F., Leps, J.-P., Raasch, S., DeBruin, H. A. R., Meijninger, W. M. L., and Bange, J.: Energy balance closure for the LITFASS-2003 experiment, Theor. Appl. Climat., 101, 149-160, DOI 10.1007/s00704-009-0216-8, 2010.

Meijninger, W. M. L., Lüdi, A., Beyrich, F., Kohsiek, W., and DeBruin, H. A. R.: Scintillometer-based turbulent surface fluxes of sensible and latent heat over heterogeneous a land surface - A contribution to LITFASS-2003, Boundary-Layer Meteorol., 121, 89-110, 2006.

Monin, A. S., and Obukhov, A. M.: Osnovnye zakonomernosti turbulentnogo peremesivanija v prizemnom sloe atmosfery (Basic laws of turbulent mixing in the atmosphere near the ground), Trudy geofiz. inst. AN SSSR, 24 (151), 163-187, 1954.

Obukhov, A. M.: O strukture temperaturnogo polja i polja skorostej v uslovijach konvekcii (Structure of the temperature and velocity fields under conditions of free convection), Izv. AN SSSR, ser. Geofiz., 1392-1396, 1960.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 8741, 2010.