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Hydrology and Earth System Sciences Discussions

Interactive comment on "Influence of wave phase difference between surface soil heat flux and soil surface temperature on land surface energy balance closure" *by* Z. Gao et al.

Anonymous Referee #1

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General comments:

The understanding of the factors that mainly affect the closure of surface energy balance has strong implications on the interpretation of energy flux measurements. This paper concluded that the phase difference of soil surface heat flux from those of net radiation, sensible heat and latent heat fluxes was an inherent source to surface energy balance closure failure by theoretical analysis and experimental evaluation. However, the analysis is not comprehensive and systematic. This paper needs substantial improvement before its publication.

Major comments:

(1)In introduction, this paper does not include recent research advancements on the energy balance closure problem, such as Foken et al.(2006,2008), Cava et al.(2008), etc. (2)"Experimental evaluation" may need a reconstruction. This paper evaluated the theoretical analysis only using one day data, it's questionable. The imbalance was prevalent not only on an half-hour basis, but also on a daily or an annual basis (Wilson et al. 2002).So several days or months data are needed to validate if " the phase difference of soil surface heat flux from those of net radiation, sensible heat and latent heat fluxes" is closed related to surface energy balance closure failure". (3)In summary, this paper stated that H+LE was always less than Rn-G0 even if all energy components were accurately measured, their footprints were strictly matched and all corrections were made, but it is inadequate. Firstly, their source areas can not be matched. Because the horizontal scale for Rn is 10m(1-2m,height), for H and LE are 100m(2-10m,height), while only 0.1m for G0 (Foken,2008). Secondly, except for measurement errors and storage terms, long wave eddies or organized turbulence structures is also one of the main reasons of the closure problem. But the authors didn't show any analysis.

References:

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 1089, 2009.