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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Estimating evapotranspiration with thermal UAV data and two source energy balance models" *by* H. Hoffmann et al.

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General

This is a nice early application of UAV/TIR for evaporation estimates. The results are very promising and will undoubtedly serve to expedite this technique to become more mainstream. My main concern regards the soil heat flux, truly the orphan of the energy balance. I think Santanello and Friedl have not done the community a favor by somehow inferring that soil heat flux is more or less a percentage of net radiation. Partitioning takes place at the surface. Over longer periods, that is not a

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problem but for near-instantaneous satellite and UAV observations it is. If we take a perfectly clear day, the surface is hottest at noon. Until then there will be a downward heat flux. As soon as the surface become a bit cooler in the very early afternoon, the soil heat flux reverses and goes back up. Soil heat flux plates are not a good way to measure soil heat flux at depth, except perhaps in the coarsest way, but they definitely do not say anything about the partitioning at the surface. Our own work showed this and also extreme spatial variation of soil heat flux within a bare field (bit obscure: http://iahs.info/uploads/dms/16743.28-140-144-343-10-Jansen.pdf). Of even more direct relevance for this article is the work by Pierre Gentine (f.e. doi 10.1029/2010WR010203). He clearly shows that high frequency changes in incoming radiation can lead to very large soil heat fluxes at the top. This is exactly the situation under which the results in the present study go wrong (intermittently cloudy, near bare soil). So with a bit more careful consideration of soil heat flux, not only will your physics improve but your method may yield better results as well.

Minor comments

Please replace 'evapotranspiration' by 'evaporation' throughout. See, f.e., doi 10.1002/hyp.5563 for why.

P7470 l27: What is 'explicates'?

P7473 l 1: Is it not rather tens or hundreds of meters?

P7473: So what would you say is the main difference between your UAV/evaporation work and that of others? Would be good to say that in one sentence or so before line 25.

P7474: Why not put 'Site description' under materials and methods instead of as a single paragraph?

P7475 l15: Reference does not fit reference in reference list. This is just one my eye fell on so please check throughout or use some system that does not allow for such

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differences.

P7475: I find the explanation of TSEB a bit long. If you can refer more to literature, that would not be a loss in my opinion.

P7478: I find “Data description and processing” a strange heading and it contains a mix of methods and results. Please redistribute accordingly for it does not help the reader to be going back and forth between the two.

P7480 l 25-29: This paragraph is rather unclear. Please rewrite.

P7481 l2: ‘value’ and ‘has’ seems more correct.

P7481 l18: ‘is’ should be ‘was’

P7482 l17: Please include a good reference for EddyPro.

P7482 l28: Unclear sentence, mainly due to the fact that there is no clear agent behind ‘applying’ (dangling modifier).

P7483 l25: ‘likely to contain’

P7486: In general, the paper is well written but this page needs some re-writing. There are again these dangling modifiers without agents ibn lines 3 and 12. Lines 20-25 is a good example of a run-on sentence.

P7487 l6: Would ‘concatenated’ not be better than ‘generated’?

P7487 l15: Instead of ‘Comparing’ you could say A comparison…. reveals that…

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 7469, 2015.