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Hydrology and Earth System Sciences Discussions

Interactive comment on "Analysis of effective resistance calculation methods and their effect on modelling evapotranspiration in two different patches of vegetation in semi-arid SE Spain" *by* A. Were et al.

Anonymous Referee #2

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General comments

A question that is relevant to the Hydrology community, i.e. parametrisation in Penman-Monteith evapotranspiration modeling, was assessed using state-of-the-art measurement methodolgy (as far as I can judge) for each single term, and, according to the cited litearture, state-of-the-art aggregation methods to be compared (which I cannot really judge). The manuscript is innovative in that it thoroughly examines the ability of these different aggregation methods to regain real evapotranspiration for a particular environment representing difficult aggregation conditions, i.e. scattered vegetation with

almost bare interspace.

There is only one major point of worry to me (any other criticism is in the specific comments/technical corrections and will be easily met). This is the footprint (fetch) of the Eddy Covariance measurement on the herbaceaus patch. If it was really only 100 m^2 = 10 m x 10 m, this is far too small (about 100 m x 100 m would probably just be enough). Good energy balance closure is not a sufficient indication that these measurements were "correct" (in that they represented the patch). There are simple (probably sufficient for your terrain) freely available footprint models as by Schmid (1997, Agricultural and Forest Meteorology 87, 179-200, http://www.indiana.edu/~climate/SAM/SAM_FSAM.html) or Kormann and Meixner (2001, Boundary-Layer Meteorology 99, 207-224). With such a model, the contribution of the herbaceous patch to the measured turbulent flux above the ground can be estimated (it will be less than 50%, I think). Comparing estimated evapotranspiration to a flux average of R. sphaerocarpa and herbaceous weighted by their modeled contribution would be the most straightforward way to test parameter aggregation a posteriori (a priori, the best way would be a bigger patch or an advection correction measurement set-up). Another interesting (but simplifying) possibilty would be to regard all eddy covariance measurements as R. sphaerocarpa measurements (however, this way a herbaceous patch reference measurement for atmospheric aerodynamic resistance would be completely missing). Maybe you have other suggestions to solve it, but it cannot be left like this regarding the 2.5 high vapour flux over such a small patch as its evapotranspiration.

Specific comments

p 245 l 14 ff: The sentence beginning "This may be due to..." is unsatisfying both from a linguistic and a topical point of view. Try to explain in more sentences more clearly what you want to say, or if you are very unsure, don't try to explain in the abstract at all.

p 251 l 4: Is it really 100 m^2 = 10 m x 10 m? See "General comments".

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p 251 l 15: To me, as well as maybe to other readers, the term "Biomass is picked in spring" is unclear even though it may be a correct technical term. Was there some kind of harvest?

p 252 l 252: Calling z0+d the "mean flow height" is unfamiliar to me. It seems inappropriate as theoretically this is just where flow becomes 0.

p 258, 1st paragraph: What about data where the wind direction was inappropriate for measuring the patch (e.g. North for the herbaceaus patch)? Why are so few data left?

p. 261, l. 22 ff: The slope (b) of regression is difficult to interpret as an indicator of "goodness" if R^2«0.95. It will often be lower than 1 simply because of the fact that uncertainty in the correlation is replaced by y estimates closer to the average. You will see what I mean if you change x and y, and probably find that 1/b (x on y) > b (y on x). A more meaningful slope for such cases is explained by Webster 1997, European Journal of soil scinece 48, 557-566. As this would probably go to far here, I simply suggest to put less stress on b.

p. 262, l. 5 ff: This way to measure the "goodness" of estimates is indeed much better for your purpose than the regression (see comment above). Its results should be given priority in the discussion and conclusion. It would be intersting, however, to check if the same ranking results from the (percentage) root of the mean squared differences. This will give big differences a greater ("bad") weight and be closer to the regression philosophy.

p. 264, l. 6 ff: See comment above, the second half of the sentence seems more meaningful to me than the first, especially if it also withstands the RMS (root of mean squares) criterion.

Technical corrections

p 246 l 18: I think it would be "(micro- and meso-scale..."

p 246 l 21: Replace "Which" by "This" or another construction.

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p 249 Eqn. 4: k is first introduced here but not yet explained.

p. 254 l 1: "z0 is roughness height" (or "...length") would be better.

p. 256 l 11, ii: something (maybe "measurements", "values",...) seems to be missing after "9".

p 257, l. 6 ff: The "sum" looks a bit as if the two soil heat flux plate measurements in each patch were added (probably it refers to the stored heat later in the sentence).

p. 265, l. 11: An "i" seems to be missing in "Andaluca".

p. 269, l. 14: The name of the second author is "Pearman" rather than "Rearman".

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 4, 243, 2007.