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Hydrology and Earth System Sciences Discussions

Interactive comment on "Measurement and modelling of evaporation from a coastal wetland in Maputaland, South Africa" *by* A. D. Clulow et al.

Anonymous Referee #1

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This paper outlines a measurement and modeling approach to capture the dynamics of evaporation and transpiration fluxes from two sites associated with Lake St. Lucia in KwaZulu Natal, South Africa. The study approach was relatively straightforward, and the manuscript, overall, is fairly solid. I have a few comments of a technical nature, and a few editorial suggestions to make.

1. The technical emphases felt unbalanced. As a hydrologist, the theory underlying the Penman Monteith Equation and the Priestly Taylor Equation is fairly standard fare. I had never, however, encountered the Surface Renewal approach for inferring the sensible heat fluxes from a surface based on fine wire thermocouple measurements. My suspicion is that this might be similar for many readers of the paper. I was therefore disappointed not to find a more detailed exposition of the theory, method, advantages

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and limitations of the SR approach outlined in the manuscript. In fact, I had to go to other published literature to confirm the basic theory and parameters of this approach, because the treatment in this manuscript was so brief. I strongly suggest, since it is the methodological foundation of this study, that the authors provide more information about this theory, and a review of its use. In contrast, a briefer treatment of the PM and PT equations could probably be sustained. Some of the results – e.g. that the PT equation would generally overestimate summer ET in sites where water stress could occur – are quite obvious.

2. I wonder if the appropriate equations are being used to estimate ET. From reading the paper I did not have a concrete sense of the surface conditions of the Mire, and in particular, whether or not there were large areas of free standing water during the year, along with the spatial patchiness of the landscape. ET estimates from free water surfaces require estimates of the change in heat storage and temperature gradients within the surface water body itself, which I don't think were computed. If there are significant areas of free water, would a foot print analysis from the EC measurements be useful to allow partitioning of the fluxes from vegetated versus free areas to be estimated? And would use of a hybrid method to account for vegetation and free water sources to the atmosphere be more appropriate? Obviously, if there is no expression of surface water in the mire, and the vegetation cover is homogeneous, then this would not be an issue – nonetheless I wonder if it would be worth considering a classification analysis of the tower site and a foot print analysis, even if the distinction is between bare soil and vegetation cover?

3. Whenever I read the discussion and conclusions of a study that is highly site specific, I am looking for 2 things: (a) the management implications of the study for the site itself, and (b) the implications of the science to the broader scientific community. I think there is scope to sharpen and broaden the implications of this research by addressing both issues here. Having made these measurements, what are the potential implications for the management of Lake St. Lucia, and what future studies (field or modeling)

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are needed to firm these up? Beyond the methodological findings, what does the behavior of the Mfabeni Mire reveal about wetland evaporation dynamics that might be transferable or unique? Are Southern Hemisphere wetlands different than their northern hemisphere counterparts in ways that were revealed by this study? What processes and patterns should be targeted by future studies to pin down these effects? Why is the LAI so low? My concern is that without an attempt to link the specific case to a broad set of hypotheses, observations and fundamental questions, studies like this one offer - for many readers - a data point in a meta-analysis. Finding ways to make the study speak to ongoing questions with global relevance should help it pack more of a punch.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 1741, 2012.

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