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Biogeosciences Discussions

Interactive comment on "Response of carbon fluxes to water relations in a savanna ecosystem in South Africa" *by* W. L. Kutsch et al.

Anonymous Referee #3

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General comments

The author’s present research on the impact of soil water availability on carbon fluxes in an African savanna ecosystem. Ecosystem scale fluxes were measured using the eddy covariance technique over a 9-month period, including the dry and rainy seasons. This is a relatively good paper that provides useful information on savanna ecosystem processes applicable for many disciplines (e.g. modeling, climate change, remote sensing, etc). However, the authors do not provide much discussion on the limitations of the EC method to derive their results or clearly highlight the results which make this study unique. While I believe that the authors the potential to produce a manuscript acceptable for publication, I am currently not satisfied with the presentation of results and provide the following recommendations to assist in the improvement of

the manuscript.

Primary concerns

1) As this study focuses on the influence of water availability on ecosystem fluxes, is there an effect of landform on soil water? In other words, in the methods section the topography is described and it is explained that the Combretum vegetation type is found on the “crests” and Acacia found below on the lower part of the slope. How does this influence results? Does the topographic position influence the Q10 response? Please explain if this influenced results.

2) There needs to be more clarification on the details of the study area. Please provide more specifics. For example, what is topographic positioning of the flux tower? Is it located in the lower part of the landform or a crest position? What are the coordinates?

3) There are two many figures. In addition, the figures are out of order (e.g. referencing fig. 8c before fig 5). This needs to be corrected in order to improve the flow of the manuscript.

4) Much of the intro is redundant and can be removed or inserted into the methods section.

5) If possible, the authors should provide more detailed information on the seasonal course of LAI in the adjacent ecosystems. Provide a table or a brief discussion in results. This data would improve the understanding and presentation of results.

6) On page 2205 paragraph 3 you introduce t0 and t-1, please explain these parameters.

7) On page 2205 paragraph 3, what is I, did you mean h?

8) How was the u* threshold chosen? Please explain.

9) Is FR respiration? Please define. In addition, please define FP,sat and TANHYP. While the avid eddy covariance reader will understand acronyms, other interested

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readers may not be aware of all the techniques for data transformation (i.e. TANHYP function).

10) P 2207 L7. The authors present a theoretical maximum canopy conductance of 2000 mmol m-2 s-1 citing “…in that study.” What study is being referenced?

11) The results describing nighttime respiration contain much discussion. Consider moving some of this text to the discussion section.

12) In addition, there are references to previous studies within the results section that should be moved to the discussion. For example, P 2211 L2.

13) How is WUE defined in this study?

Other suggestions

1) P. 2199, L8. The list of references is to lengthy, consider reducing and instead citing as follows “….controlling savanna carbon and water vapor exchange (e.g. Levy, 1995; Verhoef et al., 1996; Lloyd et al., 1997) using the most relevant references.

2) Reduce the length of the discussion.

Minor corrections

1) P 2203 L1 remove ‘ from Schole et al (2001) 2) P 2203 L2. add an s to as in “…nutrients such a nitrogen..” 3) P 2207 L12. Sentence beginning is unclear, please rephrase 4) Add an a and b in figure 1 5) P 2210 L28. Sentence beginning on this line is awkward.

Interactive comment on Biogeosciences Discuss., 5, 2197, 2008.