

Interactive comment on “Drivers of interannual variability in Net Ecosystem Exchange in a semi-arid savanna ecosystem, South Africa” by S. Archibald et al.

S. Archibald et al.

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1 Response to editor comments:

1.1 Why not use the Reichstein approach to deal with the different response curves at different soil moistures?

We agree that Reichstein et al (2005) developed a novel and ingenious method for interpolating respiration in systems not solely governed by soil temperature. In fact, it was through reading and experimenting with his method that we derived our own respiration-filling techniques. We think this matter is worthy of further investigation

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and have been in contact with Reichstein about it. However, there were a number of reasons why the method explained in Reichstein (2005) did not fit our purposes - not least because of the shape of the temperature curve used, and also the time-steps of the moving window analysis. This matter still seems still to be up for debate, and if Reichstein's method (perhaps modified to use alternative temperature-functions and time-steps) proves as good or better in interpolating day-time respiration we would be happy to use it in our own work in the future.

The main differences between our method and Reichstein's are:

1: We use a generalised Poisson temperature function and Reichstein et al use the Lloyd Taylor.

2: Reichstein et al use a 4-day moving moving window to determine the "reference respiration" we use the mean value each night as a "reference respiration" for the following day.

3: Reichstein et al derive the parameters of the temperature curve by fitting curves over the whole year and in smaller (15 day) windows. We determine one temperature curve for the entire dataset so we don't adjust the shape of the curve, only the vertical axis.

1: Our reasons for using the generalised Poisson are well described in the text.

2: An analysis experimenting with moving windows from 4-15 days indicated to us that the factors we were trying to account for (soil moisture and Fapar) vary too much to generalise over more than one day. In fact, on a day that a thunderstorm occurs, even generalising over one day can give odd results - but see answers to reviewer 1 to see that this does not happen very often.

3: We are waiting for results from our experimental manipulation of temperature and soil moisture before we can decide on the best way to extract parameters for the temperature function, but it is very possible that Reichstein's method could be superior and

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this is the subject of further work.

1.2 Differences in the two vegetation/soil complexes

Please see general comments on the ecotone analysis

1.3 Error bars on Table 5 and Figure 6

Please see general comments on error estimation

1.4 Is there evidence that precipitation drives FAPAR?

YES. Please see general comments

1.5 Figure 3 show daily sum of NEE (gC/m2d)

We are not sure what is meant by this comment. This figure is intended to show the time-course of NEE over an average day under wet, dry, green and leafless conditions. We therefore plot the average NEE (in mgC/m2/s) for each half-hour timestep. The net exchange value reported below the graph has already been converted to a daily sum, so if the reader multiplies this value by the number of days for each condition they can get an annual sum estimated using this method.

ACTION TAKEN: We indicate more clearly what the different values represent.

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1.6 Figure 4: are the input data the same?

It has recently been brought to our attention that there seems to be some confusion about whether the meteorological data used to run the Fluxnet algorithm were in fact processed in the same way as the data that we were using. The data were both sourced from Chris Williams, but at different times.

ACTION TAKEN: After extensive consultation with Dario Papale and Markus Reichstein we decided to exclude this figure and do a more detailed comparison when we are sure of using the same input data.

[Interactive comment on Biogeosciences Discuss., 5, 3221, 2008.](#)

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