

## ***Interactive comment on “Improving land surface models with FLUXNET data” by M. Williams et al.***

**Dr Williams**

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Improving land surface models with FLUXNET data

M Williams, AD Richardson, M Reichstein, PC Stoy, P Peylin, H Verbeeck, N Carvalhais, M Jung, DY Hollinger, J Kattge, R Leuning, Y Luo, E Tomelleri, C Trudinger, and Y-P Wang

Anonymous Referee #1

Below we respond to the referee’s comments, point by point:

1. The referencing was a bit sloppy - I only had to go as far as the first author in the references section to find inconsistencies. This included both the relationship between what was cited in the text and what was printed in the references as well as the de-

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tails about particular papers (authors, years etc). This clearly needs rechecking and amending.

-We have checked the references and now believe they are exact and correct.

2. Page 2796-2797: the sentence over these pages should perhaps end with "how environmental factors influence key model parameters" rather than "how environmental factors influences of key model parameters".

-We agree that this change should be made.

3. Page 2802, line 10: "combination of different kind of data" should read "kinds of data".

-We agree that this change should be made.

4. Page 2804, last paragraph: a sentence is repeated.

-We agree that this change should be made.

5. Page 2806, in the section addressing equifinality: I would agree that additional data sources can help to constrain unidentifiable parameters, but what should also be mentioned is that including several cost functions that have different diagnostic signatures can often help as well, without the need for additional data.

This is an interesting point and we suggest our text should be modified to read: "Addressing equifinality requires identification of covariances between parameter estimates, the use of multiple, orthogonal data sets, and testing a variety of cost functions to constrain unidentifiable parameters."

6. I am not convinced in Figure 9 that "it is clear that turnover rates of foliage... were well constrained by NEE data" The final PDF essentially covers prior range and the real value is not in the histogram bin with the highest frequency - could this just be a lucky pick?

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-We suggest that the text is rephrased to say that “it is clear that turnover rates of foliage and soil organic matter were better constrained by NEE data”

7. I would also caution in Section 6.6 that cost function residuals approximating a Gaussian distribution are not necessarily a sign of good approximation. Consider, for example, a constant model ( $=0$ ) approximating a zero mean sinusoidal process (not really Gaussian, I understand, but evenly distributed about the mean, nonetheless).

-We agree with this point and suggest the text should state the residuals are checked to be “Gaussian and not autocorrelated”.

8. I heartily applaud the authors’ insistence that model parameters must be fixed in time - the ecological community has taken some time to recognise this axiom.

-Thank you.

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Interactive comment on Biogeosciences Discuss., 6, 2785, 2009.

**BGD**

6, C839–C841, 2009

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