

Interactive comment on “An empirical model simulating long-term diurnal CO₂ flux for diverse vegetation types” by M. Saito et al.

G. Wohlfahrt (Editor)

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The manuscript has received moderately favourably to sceptical reviews.

A major problem is the fact that no independent test is provided for the model, e.g. by applying the model to sites not used in the calibration procedure (but within the domain of meteorological drivers). Such a test would surely greatly improve the manuscript, e.g. by applying it to other Ameriflux sites. In addition, any modelling paper comparing measurements and model simulations should report appropriate statistic allowing to quantitatively judge the quality of model simulations. As a result - the manuscript appears, in many parts, very vague. I also have difficulties imagining that the model performs well for ecosystems where the amount of leaf area varies in a very dynamic fashion, e.g. managed grasslands. Is there a way of incorporating this into the model,

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e.g. by using data derived from remote sensing - this would provide an important step towards the application of the model on the landscape-scale - which is one of the aims formulated in the intro. In case this is not important, this would appear an important finding to me - that climate alone is sufficient to explain most of the seasonal variability in NEE across a very wide range of ecosystem types.

I agree with both reviewers who suggest that major revisions will be necessary for the manuscript to become acceptable for publication in Biogeosciences. I thus suggest the authors consider all the comments by the reviewers, as well as mine (see above and below), and submit an appropriately revised manuscript. In accordance with reviewer #2 I suggest the final author, who is a native speaker, provides a final check of the English of the revised manuscript.

Further comments: (1) Title: why is the focus on the diurnal variability where the seasonal variability is at least as important ? maybe the fact that the model is driven only by climate forcings should be emphasised in the title (2) p. 4005: l. 26: was a moving window used ? (3) p. 4008, l. 18: do you mean bin-averages over temperature classes ? (4) Eq. 8: each equation MUST be consistent in terms of units, i.e. the left and the right hand side of Eq. 8 must have the same units and the term in the exponential has to be dimensionless (5) Fig. 3: do not extend the line beyond the range of measurements

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