**Biogeosciences
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# Interactive comment on "An empirical model simulating long-term diurnal $CO_2$ flux for diverse vegetation types" *by* M. Saito et al.

**M. Saito et al.**

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**Dr. G. Wohlfahrt (Editor)**

Enclosed please find the revised manuscript as well as the responses to the referees. We appreciate the referees for their valuable comments, which truly help up improve the manuscript. We tried to follow the referees comments as many as we could, and substantially revised the manuscript. We apologise for the delay of reply.

Our main revisions in this manuscript are listed below.

**Title:** We have change title of the paper to manifest our purpose.

**Methods:** In response to the referees, the proposed model were tested using the data

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from 10 AmeriFlux and four AsiaFlux data, and the degree of model prediction was evaluated by regression analysis. In addition, Eqs. (4) and (8) were revised, and the disturbed grassland data were removed from analyses.

**New Tables 3, 4, and 5:** New data using for the test of model performance are listed in tables.

**New Figures 1, 2, 8, 9, 10, and 12:** New analyses and results are now plotted in figures.

Responses to the points raised by the editor follows.

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.

   Title was revised to "An empirical model simulating diurnal and seasonal $CO_2$ flux for diverse vegetation types and climate conditions"

2. P. 4005: L. 26: was a moving window used ?

   We removed this artificial filter to simplify the model.

3. P. 4008, L. 18: do you mean bin-averages over temperature classes?

   We has used bib-averages over temperature classes in old manuscript. But RE was calculated using all available data with new Eq. (8).

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.

   We appreciate this comments and revised Eq. (8).

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5. Fig. 3: do not extent the line beyond the range of measurements.

We revised as advised, and plotted in new Fig. 5c.

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