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Geoscientific Model Development Discussions
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Interactive comment on "Influences of calibration data length and data period on model parameterization and quantification of terrestrial ecosystem carbon dynamics" *by* Q. Zhu and Q. Zhuang

Q. Zhu and Q. Zhuang

zhuq@purdue.edu

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Comment#1.Knorr and Kattge (2005) did not investigate two grassland sites. They studied a grassland site in Kansas (USA) and a pine forest site in the Netherlands.

Response: Thanks for putting this out. Indeed, Knorr and Kattge (2005) studied a FIFE (First ISLSCP Field Experiment)C4 tall grass site in Northeastern Kansas, (USA 39N, 96W) and a Loobos forest site dominated by Pinus sylvestris in Netherlands (52N, 51E) with an understory of the Deschampsia flexuosa grass. We have corrected it in

this revision.

Comment#2.What do the authors mean by: "Model calibrations only improve the mean of the parameters?" I guess that depends on the method that is being used. The authors later show that the parameter uncertainties could also be reduced after calibrating the model, so I really don't understand this statement.

Response: We were trying to say "During the model calibration or parameterization, we need to focus on not only the value of model parameter but also the uncertainty reduction of the parameter." We have corrected the statement in this revision.

Comment#3.I am wondering if it would be better to show the PDF or histogram instead of the CDF for Figures 2-5.

Response: The main reason of using cumulative distribution function (CDF) is that we try to follow the tradition from published data length and data variability studies (e.g., Yapo et al., 1996; Xia et al., 2004). Those studies used CDF to compare performances of calibrated models. If steepness of a CDF increases, it indicates reducing sensitivity of model performance to selection of data set. If the distribution shifts towards the left (smaller Root Mean Square Error), it indicates improvement of model performance with selected data sets (Yapo et al., 1996). Using the same criterion, we could draw similar conclusions based on CDF steepness and central values. We considered the suggestion from the reviewer to use probability density function (PDF) to evaluate model performance. Here, we plotted the empirical PDF of: (1) on-year, two-year and three-year calibration experiments (Figure 1); (2) calibration experiments grouped into above-ClimVar-mean and below-ClimVar-mean categories (Figure 2). In Figure 1, it is hard to distinguish two-year experiment (green line) from three-year experiment (blue line). In Figure 2, it is even harder to draw conclusion of which calibration category (dash line or solid line) performs better. That is because the shapes of PDFs are irregular and really hard to compare. As a result, we decided to use CDF to compare model performance. We thank the reviewer for his suggestion though.

Comment#4."The steepness of the CDF was low ..." Explain what this means and what the implications are.

Response: Implications of CDF steepness are: (1) the steepness of CDF indicates how sensitive of calibrated model performance to the selection of dataset; (2) the steeper the slope of the CDF in an interval, the higher the probability in that interval. The most likely values are associated with those where the CDF is steepest (corresponding to peaks of empirical PDF). The original statement is: "The steepness of CDF was low and has not been significantly increased when we progressed from one-year to three-year experiments at Harvard deciduous broadleaf forest site and Howland coniferous forest site." The steepness of CDF at Harvard and Howland forest sites was low, which meant the calibrated model performance was sensitive to the selection of data. When the calibration data length increases from one-year to three-year, we expect to see that the steepness of CDF increases. That is because three-year time series data has potentially included more information than that of one-year time series data. However, we didn't find an obvious increase of CDF steepness.

Comment#5.Knorr and Kattge (2005) did not use AmeriFlux data.

Response: Knorr and Kattge (2005) used a FIFE grass site (Kim, and Verma 1991) and Loobos forest site (Dolman et al., 2002). We have corrected the original statement in this revision.

Other minor corrections: we have carefully checked the entire manuscript for spelling, grammar issues and sentence structure.

References: Dolman, A. J., E. J. Moors, and J. A. Elbers. "The carbon uptake of a mid latitude pine forest growing on sandy soil." Agricultural and Forest Meteorology 111.3:157-170.(2002). Kim, J., and S.Verma. "Modeling canopy photosynthesis: scaling up from a leaf to canopy in a temperate grassland ecosystem." Agricultural and forest meteorology 57.1: 187-208 (1991). Xia, Y., et al. "Impacts of data length on optimal parameter and uncertainty estimation of a land surface model." Journal of Geophysical

Research: Atmospheres (1984–2012) 109.D7 (2004). Yapo, P. O., H. V. Gupta, and S.Sorooshian. "Automatic calibration of conceptual rainfall-runoff models: sensitivity to calibration data." Journal of Hydrology 181.1: 23-48. (1996).

Interactive comment on Geosci. Model Dev. Discuss., 6, 6835, 2013.

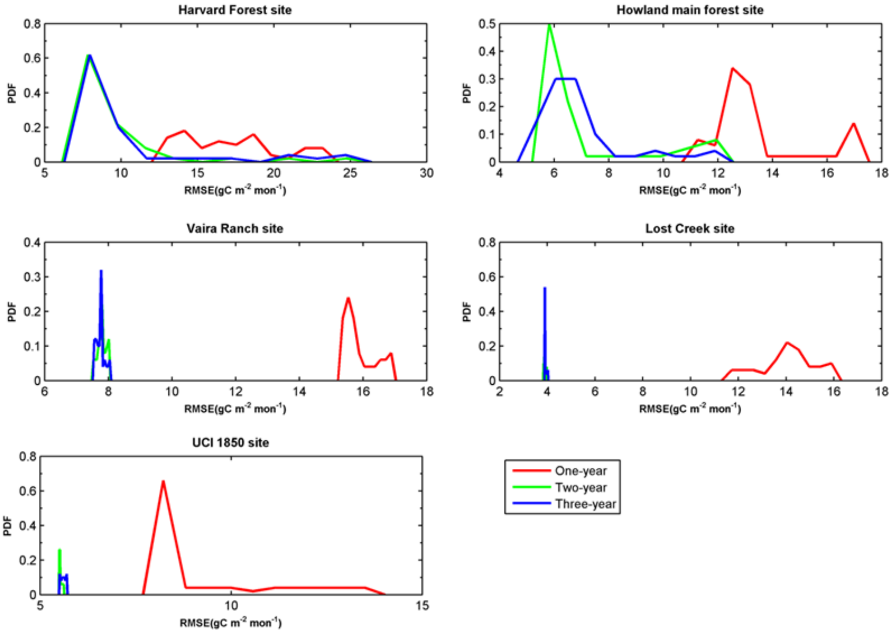

Figure 1.Empirical probability density function (PDF) of one-year (red line), two-year (green line) and three-year (blue line) calibration experiments. The model performance (*x* axis) is evaluated with Root Mean Square Errors (RMSE) between model simulations and observations

Fig. 1. Figure 1

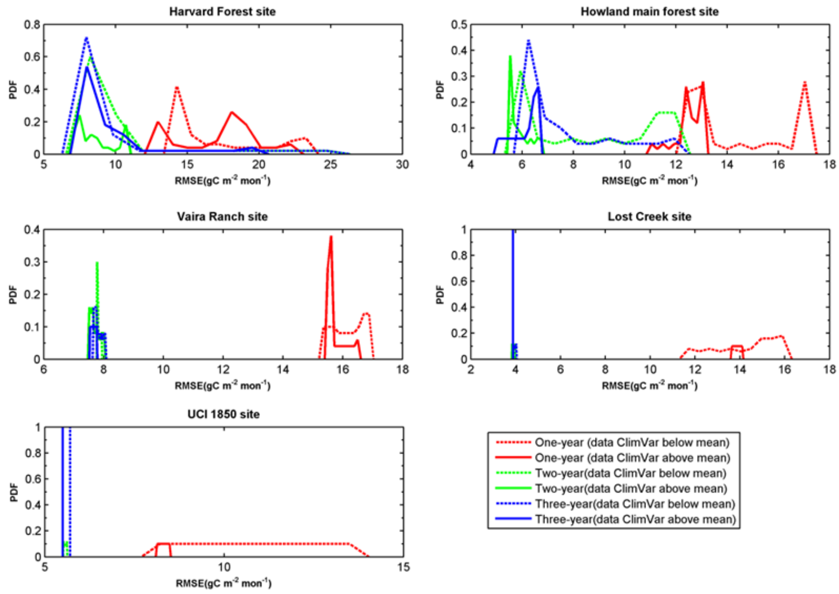

Figure 2.Empirical probability density function (PDF) of one-year (red line), two-year (green line) and three-year (blue line) calibration experiments are grouped into two categories: (1) category 1 refers to data ClimVar below mean and is shown with dash line; (2) category 2 refers to data ClimVar above mean and is shown with solid line.

Fig. 2. Figure 2