

Interactive comment on “Model–data fusion across ecosystems: from multi-site optimizations to global simulations” by S. Kuppel et al.

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Review 2 for “Model–data fusion across ecosystems: from multi-site optimizations to global simulations” I’ve written a second review because I realised my first one didn’t conform to the requested structure of GMDD (after re-reading my initial review request from GMDD)

General comments This study constrains a global ecosystem model (estimates of the most likely parameters) using multiple datasets from multiple sites and shows resulting improvements in model predictive performance in predicting the CO₂ fluxes as well as other performance metrics at multiple sites. Investigations of where predictive performance has been improved or made worse reveal insights into how the process has influenced the general applicability of the model – it has improved at capturing CO₂

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fluxed at tropical and temperate sites but has identifiable weaknesses in predicting tropical evergreen broadleaf forest dynamics which leads to the identification of new areas for research. They also illustrate the efficacy of the model at predicting CO₂ flux dynamics for a wider set of test sites and conduct a global scale evaluation. In sum, this to me is an excellent end-to-end analysis of the costs and benefits of undertaking this more sophisticated and improved model fitting approach and I recommend it for publication.

Specific comments It is perhaps worth noting in the results and discussion that, as far as I can see, none of your effects from parameter estimation lead to qualitative differences in the predictions of the model. They simply lead to quantitative improvements. This implies to me that when we are moving towards a situation that we have multiple data-constrained DGVMs being used in climate simulations, each will demonstrably predict the present day data better, but their predictions of the future, and the differences in their predictions of the present, will still vary widely. This to me implies that while you are improving the parameterisation under the assumed model structure, you are not improving the assumed model structure to make it better suited to modelling reality and it is this which needs more focus of the attention of DGVMers.

For other specific comments I refer you to my comment. SC C637: ‘Review for Kuppel et al 2014’, Matthew Smith, 27 May 2014 Printer-friendly Version [reply]

Technical corrections See SC C637: ‘Review for Kuppel et al 2014’, Matthew Smith, 27 May 2014 Printer-friendly Version [reply]

Interactive comment on Geosci. Model Dev. Discuss., 7, 2961, 2014.