

Interactive comment on “Estimating maximum global land surface wind power extractability and associated climatic consequences” by L. M. Miller et al.

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Interactive Discussion

Discussion Paper

Author response to D.B. Kirk-Davidoff "Interactive comment on 'Estimating maximum global land surface wind power extractability and associated climatic consequences' by L.M. Miller, F. Gans, and A. Kleidon"

L.M. Miller, F. Gans, and A. Kleidon

A detailed response to D.B. Kirk-Davidoff's review is included as supplementary material.

We appreciate D.B. Kirk-Davidoff's clear analysis of our submitted manuscript and sincerely appreciate several of the suggestions and comments he raised.

Authors conclusions — D. B. Kirk-Davidoff has a well-founded perspective on modeling wind power and we sincerely appreciate his comments and suggestions. We will explicitly state the numerous simplifications and assumptions that are included in the process hierarchy, illustrated as a back-of-the-envelope estimate. We agree with D.B. Kirk-Davidoff that an estimate for extractable wind power derived this way includes many dynamics that would not be present and we will state these clearly while also noting the added understanding and complexity of the simple momentum balance model and general circulation model simulations. We have illustrated why our application of

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the simple momentum balance model is not flawed because of our stated assumptions but this will also be further clarified. We agree that some maps of climate impacts from wind power extraction are necessary to reinforce the impacts to the global climate while also noting that the extreme nature of this study suggests that a similar 'real-world' scenario will never be realized. Finally, we intend to include a suite of 4 sensitivity analyses of 13 simulations of varied spectral and horizontal resolutions. This suggestion by D.B. Kirk-Davidoff is appreciated, as it will further clarify our intention to provide a suite of estimates, all thermodynamically consistent regarding realizable wind power potentials and direct climatic consequences from wind power extraction.

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