Biogeosciences

Discussions

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Interactive comment on "Functional convergence of biosphere–atmosphere interactions in response to meteorology" *by* Christopher Krich et al.

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This paper aims to show that biosphere-atmosphere interactions are driven by meteorological conditions, and that these meteorological conditions produce similar biosphere-atmosphere interactions, regardless of climate gradient and ecosystem type. It concludes that based on these results, similar principles can be used to serve as empirical references for global vegetation models regardless of region and ecosystem type. This study uses observational FLUXNET data, combined with a novel causal method known as PCMCI. Should these results be true, I believe that the findings have the potential to be quite helpful to the modeling community and perhaps we can stop trying to incorporate so many individual processes that vary between regions, and instead streamline

the process using the knowledge of this shared behavior. However, there is not a lot of information on the methods, making a reader feel that either one must simply 'trust' the results, or go on one's own intense literature search to try and understand the paper. This is not a well-known methodology, and thus it is even more important than usual to go above and beyond convincing the reader that this is a sound and reliable method. While including other papers as references to the method is great, a reader should not be required to track these down to make sense of the paper. Additionally, the figures that accompany the methods are non-intuitive and need better description– once again, making the paper, including the results section, quite difficult to follow.

We are pleased to receive support from the reviewer. Obviously, as pointed out also by the other reviewers, we have to work on the accessibility of the methods and results.

1. **Minor comments: Line 28: Change from 'they allow to infer' to 'they allow one to infer' Line 88: MCI has been previously defined Line 100-102 Remove the word 'well' Line 143- Add 'The' before following Line 164- Insert 'as' into 'Are not as much' Table A1 This table would be better with more information. Potentially adding ecosystem type/climate zone/type determined by PCMCI analysis of each fluxtower site would be useful.**

   Thanks for pointing to these potential improvements. We will incorporate them when revising the manuscript.

2. **L114-What characteristics impinge on performance? This isn't explained. Also, why use precipitation as binary (rain/no rain) rather than a time series? Why can't precipitation be used in the model? Table B1 Shouldn't radiation be added as a variable?**

   The characteristics that impinge on network estimation (not performance) are those that are mentioned in the subsequent sentences. The difficulties of SWC

will be added (see reviewer comment 1). We did try to incorporate precipitation as a time series and the time series has some binary character because it is typically zero (no precipitation) and seldom unequal to zero (precipitation). Thus it can happen that there is no precipitation during the estimation of a network. This however causes PCMCI to yield an error when attempting to standardise the time series.

Radiation is incorporated in the network structure. Excluding Rg at the parameter 'selected_variables', Rg is set as the main driver and no effects of other variables on Rg are estimated (see answer to comment 11 of reviewer 1 and to comment 7 of reviewer 2).

Interactive comment on Biogeosciences Discuss., https://doi.org/10.5194/bg-2020-374, 2020.