Appeal of rejection of GCB-20-1713

Dear Editor:

We would like to appeal the reject decision of our manuscript "Global patterns of forest autotrophic carbon fluxes" (GCB-20-1713) on the grounds that Reviewer 1 (1) provided an inaccurate assessment of the scope of our analysis relative to previous studies, (2) under-valued high-quality synthesis, (3) set expectations for this type of analysis that are out of line with the state of the field, and (4) recommended a completely inappropriate alternate venue. We detail these objections below. We note that Reviewer 2 was supportive, and her/his comments could easily be addressed.

(1) Reviewer 1 provided an inaccurate assessment of the scope of our analysis relative to previous studies. The reviewer states, "the findings seem not improving contemporary knowledge of forest carbon cycling, and the study appears to be a simple statistical analyses of literature data" and "the analyses performed were too conventional that similar analyses with a smaller size of similar datasets have been performed a decade ago." These statements betray a lack of perspective on the scope of our analysis relative to previous studies. Whereas most studies consider at most a few flux variables, ours considers nine. The most comprehensive similar study is Luyssaert et al. (2007), which was published in *GCB* more than a decade ago, was based on a database <25% the size of the ForC version used here, did not control for effects of stand age/ disturbance history, and examined latitudinal/ global climatic trends in only three variables. Thus, the current analysis will be at the clear forefront of studies examining correlations between forest carbon flux and climate at the global scale.

(2) We feel that Reviewer 1 under-valued high-quality synthesis that produces unsurprising results. The reviewer objects that the results are not surprising–e.g., that it is not a new finding that C flux declines with latitude and increases with mean annual temperature. We agree that the results are not surprising, but a crucial part of science is built on high-quality synthesis that clarifies current understanding and probes for unexpected relationships, which is our goal. Such syntheses are often published as review papers, but given that our analysis entails original analysis, we submitted it as a Primary Research Article. Perhaps it would be better suited, and reviewed with more appropriate expectations, as a Research Review (*sensu* Anderson-Teixeira et al., 2016).

(3) Reviewer 1 set an unrealistic expectation that an analysis of this nature would reveal mechanisms, which is out of line with the state of the field. The reviewer objects that our study does not "reveal the biological mechanisms lead to the detected pattern", stating, "Our contemporary knowledge on forest carbon cycling has moved well beyond using mean climatic variable to extrapolate or guess the response of forest carbon cycling to climate change. The spatial gradient do not necessarily represent the response of forests to climate change." We agree, and fully acknowledge in the paper, that this study does not reveal the biological mechanisms. Further, we do not argue that the spatial gradient represents the response of forests to climate change, as clearly discussed in the final paragraph of the discussion. However, we do argue that elucidating broad-scale patterns in C cycling across climatic gradients is a complementary approach to addressing a challenging problem (*sensu* Anderson-Teixeira et al., 2013, *GCB*). We note that studies using this approach have been published recently in *Science* (Sullivan et al., 2020), *GCB* (Trugman et al., 2019), *JGR* (Li et al., 2019), and *Scientific Reports* (Chen & Yu, 2019).

The reviewer's apparent wholesale rejection of this approach seems short-sighted, and the expectation that a single study attempt to explain mechanisms behind global patterns in nine flux variables seems naïve. The implied standard that studies of this type should "reveal the biological mechanisms" could be interpreted in various ways, but the best way of getting at underlying biological mechanisms would be through modeling. Until databases such as ForC are fully integrated with mechanistic ecosystem models, our ability to provide

truly mechanistic explanations of the observed patterns remains limited, but the observed correlations provide important insights into the broad-scale constraints of climate on forest carbon cycling.

(4) Reviewer 1's suggestion that the work be published in a data journal betrays carelessness of review and/or limited understanding of appropriate publishing standards. The reviewer suggested (twice) that we "consider a data journal like ESSD". This suggestion is completely inappropriate for two reasons. First, the hypothesis-testing analyses presented here would be completely inappropriate for a data journal. Second, the ForC database is already published (tropical portion only in Anderson-Teixeira et al., 2016, *GCB*, full database as a data paper in Anderson-Teixeira et al. 2018, *Ecology*). Even a semi-careful review would not have missed this fact, which was prominently cited in the last paragraph of the introduction and the first sentence of the methods. Thus, this suggestion betrays carelessness of review and/or limited understanding of appropriate standards for judging where scientific work should be published. Either way, it does not seem appropriate that *GCB* should put much stake in this review.

We continue to believe that this manuscript has potential to become a "classic" reference on the subject of carbon cycling in forests globally, and that *GCB* is an excellent fit, given the legacy of publishing important analyses on this theme (e.g., Luyssaert et al., 2007; Anderson-Teixeira et al., 2016). We would like to be confident that the decision reflects a careful assessment of this manuscript's potential.

Thank you,

Kristina Anderson-Teixeira (on behalf of all coauthors)

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