April 21, 2020

Dear Dr. Alistair Hetherington,

Please consider our manuscript **“A derivation error that affects carbon balance models exists in the current implementation of the Johnson et al. (1942) modified Arrhenius function”** by Bridget K. Murphy and Joseph R. Stinziano as a Modelling/Theory Manuscript for publication in New Phytologist. This work was previously submitted to Global Change Biology and is available on the preprint server BioRXiv (BIORXIV/2020/921973). We have attached our response to the reviewers and a version of the manuscript with tracked changes for review only.

*What questions does this work address?*

The manuscript addresses whether a derivation error in the modified Arrhenius equation from Johnson et al. (1942) substantially impacts modelled temperature responses of photosynthesis and plant carbon fluxes.

*How does this work advance our current understanding of plant science?*

As new, thermodynamically-grounded temperature response models are developed, it is important to revisit the derivation of the models in widespread use (e.g. the Medlyn et al. (2002) version of Johnson et al. (1942)) to assess potential issues and whether it is time to switch conceptual models.

*Why is this work important and timely?*

Irrefutably, the use of an incorrect derivation with a missing term in current temperature response modelling should be amended as it may lead to meaningful deviations in activation energy and daily carbon balances. An error in the modified Arrhenius equation creates inaccuracies in predicting carbon fluxes at the whole plant level that may scale to stand-level fluxes.

We look forward to your decision.

Sincerely,



Bridget K. Murphy, on behalf of myself and Joseph R. Stinziano

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