

2424 Main Mall
Vancouver, BC Canada V6T 1Z4
Ph: 604.827.5246



Dear Dr. Sudgen:

Please consider our manuscript, entitled “The illusion of declining temperature sensitivity with warming,” for publication as a Report (?) in *Science*.

The biological consequences of climate change are profoundly important, with studies based on both experimental (1; 2; 3; 4) and observational (5; 6; 7; 8; 9) approaches often appearing in high profile journals. We present the first large-scale effort—using newly compiled data covering over 200 years and comprising 1,560 species—to compare biotic responses in warming experiments to observational trends. We show that experimental studies underpredict advances in leaf and flowering phenology with global warming by at least 4.6X compared to long-term studies. This suggests that the magnitude of plant responses to climate change cannot be explained or predicted by experimental warming studies. Further, because phenology is the most frequently reported measure of plant responses to climate, across both experiments and observations, it is our best option to robustly examine differences between study types. We fully expect that this discrepancy in phenological responses is mirrored by other critical metrics, such as productivity, for which such extensive data are not available. This study is a key product of an interdisciplinary NCEAS working group (‘Forecasting Phenology’) and includes perspectives from some of the top ecologists, climate scientists and evolutionary biologists working on phenology and climate change.

Our main result has extensive consequences for predictions of species diversity, ecosystem services and global models of future change, with clear implications for how climate change experiments and long-term monitoring are designed and interpreted. As such, we expect our manuscript to be controversial and challenging to current practitioners in the field. We believe, however, that the accuracy of warming experiments when compared to long-term observational data is an important issue as there is much at stake in predicting the ecological outcomes of global change. Given this, we especially request that reviewers represent both those experienced in observational as well as experimental phenological studies who can provide a fair critique of what we have already found to be quite controversial results among more experimentally-focused ecologists. We have suggested a mix (David Inouye, Jennifer Dunne, F. Stuart Chapin, This Rutishauser, Eric Post) of potential reviewers through the online submission site. Prior to submission Matthew Ayres, Lara Kueppers, David Moore, and Mary O’Connor reviewed the manuscript.

This manuscript is not under consideration elsewhere, nor has it been previously submitted. All authors approved of this version for submission. All data underlying the analyses presented here will be publicly available via the Knowledge Network for Biodiversity (KNB, <http://knb.ecoinformatics.org/>) within 6 months.

Sincerely,



Elizabeth M Wolkovich
Associate Professor of Forest & Conservation Sciences
University of British Columbia

References

- [1] J. Harte, R. Shaw, *Science* **267**, 876 (1995).
- [2] A. K. Knapp, *et al.*, *Science* **298**, 2202 (2002).
- [3] J. P. Harmon, N. A. Moran, A. R. Ives, *Science* **323**, 1347 (2009).
- [4] J. A. Langley, J. P. Megonigal, *Nature* **466**, 96 (2010).
- [5] A. H. Fitter, R. S. R. Fitter, *Science* **296**, 1689 (2002).
- [6] S. R. Loarie, *et al.*, *Nature* **462**, 1052 (2009).
- [7] S. L. Lewis, *et al.*, *Nature* **457**, 1003 (2009).
- [8] B. Bond-Lamberty, A. Thomson, *Nature* **464**, 579 (2010).
- [9] D. G. Boyce, M. R. Lewis, B. Worm, *Nature* **466**, 591 (2010).