

Interactive comment on “Ideas and Perspectives: When ocean acidification experiments are not the same, reproducibility is not tested” by Phillip Williamson et al.

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This type of comment fosters discussions that we need to continue within science in general, and especially within global change biology research. As the field continues to evolve, what has struck me the most has been the variability in responses at many scales. In this commentary, Williamson et al. raise a valid point that looking at consensus of many studies in the field, particularly when they can encompass a variety of regional or life history based trends, should be the basis of drawing major conclusions. At the same time, the validity of single studies - in this case, whether Clark et al. 2020 or the studies under question therein - remains important in relation to that

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consensus. What does it mean for a study to have a different or controversial result? Typically, this means that as a community of scientists we do not fully understand the mechanisms or processes at play. In this sense, the different results obtained given several small changes in methodology should be used to identify which mechanisms warrant further study. In science and in climate change biology especially, the book is not always closed.

Students especially will benefit from interactive discussions with global experts on issues of reproducibility but also learning how scientific consensus is formed and what is required for it to be overturned. How should one weigh the results of a single study in relation to the consensus of the field? How might questions and interpretations arising from a single study impact the direction of a field, or mechanisms to focus on in future study, relative to consensus science? If one study has shown something interesting, what are the next steps to build consensus across systems and organisms?

This discussion is timely and it is to everyone's benefit that it continue. Recently, I completed training workshops for science communication with policy makers. The primary take-home of this workshop was that we must always present consensus science to non-scientists, and refrain from the temptation to share our dearest and most exciting new results. Just as points in our datasets, single studies build a confidence envelope around our consensus, but we cannot build a solid argument around single observations.

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