

Dear Dr. Bates, Dr. Dornelas and Dr. Field,

Please consider this manuscript: **Using plant invasions to compare occurrence- and abundance-based calculations of biotic homogenization: are results complementary or contradictory?** as a “Method” paper in *Global Ecology and Biogeography*.

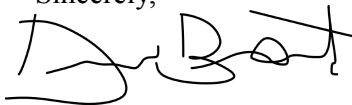
Beta diversity quantifies the distinctiveness of ecological communities, and its decline, known as biotic homogenization, is a predicted consequence of anthropogenic global change, and in particular, biological invasions. With the recognition that biotic homogenization is a critical dimension of human-induced global change, its indicators have become central to biogeographical assessment and monitoring programs. However, species occurrence- (presence/absence) and abundance-based metrics of beta diversity can result in contradictory assessments of the magnitude and direction of biotic homogenization. While previous work suggests these contradictions should be rare in nature, an increasing number of empirical studies report discrepancies between occurrence- and abundance-based approaches. To accurately assess biotic homogenization, it is critical to understand how often occurrence- and abundance-based calculations provide complementary or conflicting inference on patterns in beta diversity. To date, large-scale empirical analyses of this question are lacking.

In our study, we leveraged a dataset of more than 70,000 vegetation survey plots across the full diversity of ecosystem types of the contiguous United States to assess differences in biotic homogenization when calculated with both occurrence- and abundance-based metrics of beta diversity. While we found that abundance- and occurrence-based calculations were generally well correlated, but in ~20% of cases one metric showed homogenization while the other showed differentiation. These results underscore that our perception about the extent to which biotic homogenization is occurring could be biased by whether or not we consider species' abundance in calculations of beta diversity. In this manuscript, we further unpack the nuances of these discrepancies and demonstrate how combining the two approaches can offer unique insights into the role of invasions and local extirpations in driving biotic homogenization or its opposite, differentiation.

Our study provides a “critical evaluation of methods in macroecology” that we believe offers a road map for improving future studies in the increasingly important research area of biotic homogenization. While our study is focused on biological invasion in plant communities, the insights we offer are relevant to other study systems and other drivers of biotic homogenization. As such, we believe this manuscript will be of broad interest to the diverse readership of *Global Ecology and Biogeography*.

This paper is co-authored by an international team of ecologists representing a variety of career stages, and is not under consideration anywhere else. We hope you will find it suitable for publication in *Global Ecology and Biogeography* and look forward to hearing from you.

Sincerely,

A handwritten signature in black ink, appearing to read 'D. Buonaiuto', with a stylized, flowing script.

Daniel Buonaiuto