Detection of diversity change across scales: The temporal perspective of macroecological patterns

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Résumé

Elucidating biodiversity changes is complex, and empirical studies report contradictory observations depending on the studies' scale and/or metric under scrutiny. Locally, species richness might increase, albeit a regional or global decline. Macroecological concepts rely on spatial patterns of species abundances and distributions, and its metrics integrate diversity from local to larger scales in a continuous way (e.g. Species Area Relationship, Distance Decay of Similarity). The way these metrics change over time not only indicates how diversity is changing at the different spatial scales (local, regional), but could also reveal underlying ecological mechanisms such as homogenization or differentiation. A multi-metric perspective would further allow the interpretation of compositional changes, e.g. between range-restricted and widespread taxa (Chase et al. 2019, Leroy et al. 2023). Surprisingly, despite the potential to enlighten the biodiversity crisis, only few studies yet considered the temporal perspective in their work (White et al. 2010; van Klink et al. 2023). We leverage this potential to investigate the dynamics of bird diversity at the French scale by analyzing the temporal variations of macroecological patterns. We used the french breeding bird survey, a dataset that comprises 330 species and spans > 2500 sites that were sampled up to 19 years. Our results reveal the underlying proximate components of diversity. We showed that changes in evenness were strong drivers of diversity change at local scale (alpha diversity), while change in spatial aggregation of birds was driving change in diversity at larger scale (gamma diversity). Besides the taxonomic perspective we will consider functional traits to further investigate this approach's potential to increase our understanding of the underlying processes behind changes in biodiversity.

Mots-Clés: biodiversity, functional diversity, macroecology, community, temporal dynamics

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