Deciphering selection process using Trait-Environment relationships

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Abstract

One of the major goals of community ecology is to understand how selection acts at ecological scales to shape community structure. Functional traits, as continuous measures of individual's characteristics determining their fitness in a given environment, are used as a powerful tool to understand the mechanism of selection. By understanding how traits vary along environmental gradients, one can understand how environmental conditions favor or discard different strategies and trade-offs in resource allocation. However, a lot of challenges remain, as the role of biotic filtering, the inclusion of phenotypic diversity and the necessity appropriate scale to look at. We propose here a structure approach decoupling biotic and abiotic conditions, based on crossed gradients of fertility and species diversity, with a focus on individuals. We used Bayesian distributional regressions to disentangle the consequences of selection both on community trait distributions and on the variation of dominant species niches. By a rigorous selection of models predicting the distributions of a set of seven traits related to different strategic axis, we were able to show that the displacement of mean of community trait distribution were coordinated with varying constraints on trait diversity along an abiotic gradient. Moreover, our principal results clearly states that the realized niche of dominant species of an ecosystems depends upon the number of species with which they grow. Our results highlight the need to include population levels considerations to understand community assemblage.

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