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ABSTRACT

Aim

There is little consensus on which environmental variables are best at predicting multiple dimensions of diversity. We ask whether there are common environmental correlates of diversity, despite ecological differences, across nine clades of plants and animals distributed along a single rainforest domain. For that, we compare the environmental correlates of species richness, phylogenetic diversity, and phylogenetic endemism.

Location

Brazilian Atlantic Forest.

Taxon: Five clades of plants (Bromelioideae, Miconieae, Bertolonia, Cambessedesieae, and the Fridericia and allies) and four clades of animals (butterflies in the tribe Ithomiini, frogs in the genera Boana and Proceratophrys, and birds in the subfamily Thraupinae).

Methods

Using curated occurrence localities and phylogenetic data, we generated maps of (a) species richness, (b) phylogenetic diversity, (c) residuals of phylogenetic diversity regressed on species richness, and (d) phylogenetic endemism for all groups. We also compiled a set of 30 environmental descriptors, including records of current temperature and precipitation, climatic stability over time, and topography. Through a machine learning framework, we explored the environmental correlates of each of these diversity measures for each group.

Results

The environmental variables used here were strong predictors of diversity for all studied groups. However, models for phylogenetic endemism had lower predictive power. Although patterns of diversity are different among groups, correlates of diversity are consistent across taxa. For both species richness and phylogenetic diversity, current

precipitation and precipitation stability over time were consistently ranked among the variables that strongly correlate with diversity patterns. The correlates of phylogenetic endemism were less homogeneous across groups. The results suggest that including climate stability over time is important when predicting diversity measures that reflect historical components.