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Improving predictive performance of trait-SDMs by parameterising variation in trait-environment relationships across environmental gradients

Traits modulate species' responses to environmental gradients. By adding trait-environment interaction terms into multi-species distribution models, it is easier to predict rare species' distributions. Prior work has shown that trait-SDMs built in restricted geographic space may not predict species distributions very well in regions where the environmental conditions differ. This is likely related to varying relationship between traits and environmental variables along an environmental gradient. In this work we examine the generality of trait-environment relationships that underpin trait-SMDs using trait-SDMs fit across 19 biogeographic regions in Southeast Australia. Using a fine-scale occupancy dataset of 100 eucalyptus species and associated leaf, reproductive, and habit traits, we compare the trait-environment interaction parameters across environmental gradients. We demonstrate how incorporating a parameter for the trait-environment relationship along an environmental gradient can be used to improve predictions from region-wide trait-SDMs.