

# A latitudinal signal in the relationship between species geographic range size and climatic niche area

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## Abstract

Species with broader niches may have the opportunity to occupy larger geographic areas, assuming no limitations on dispersal and a relatively homogeneous environmental space. While there is general support for positive \textit{geographic range size – climatic niche area} relationships, a great deal of variation exists across taxonomic and spatial gradients. Here, we use data on a large set of mammal ( $n = 1225$ ), bird ( $n = 1829$ ), and tree ( $n = 341$ ) species distributed across the Americas to examine the \textbf{1} relationship between geographic range size and climatic niche area, \textbf{2} influence of species traits on species departures from the best fit geographic range size – climatic niche area relationship, and \textbf{3} how detection of these relationships is sensitive to how species range size and climatic niche area are estimated. We find positive \textit{geographic range size – climatic niche area} relationships for all taxa. Residual variation in this relationship contained a strong latitudinal signal. Subsampling the occurrence data to create a null expectation, we found that residual variation did not strongly deviate from the null expectation. Together, we provide support for the generality of \textit{geographic range size – climatic niche area} relationships, which may be constrained by latitude but are agnostic to species identity, suggesting that species traits are far less responsible than geographic barriers and the distribution of land area and available environmental space.

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