Introducing a novel methodology for quantifying niche overlap

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Abstract: Niche conservatism is defined as the retention of niche-related ecological traits over time (Wiens et al., 2010). Niche conservatism can be applied to a a wide range of questions, including invasive species, speciation processes and responses to global climate change. One method of testing for niche conservatism is by looking at the degree of niche overlap between sister pairs. Current methods for quantifying niche overlap present limitations such as the use of reciprocal tests for each sister pair (Warren et al., 2008), the restriction to two environmental variables (Broennimann et al., 2012), the arbitrary selection of 'background' regions and the underlying assumptions when constructing traditional ecological niche models (Warren et al., 2008 and Broennimann et al., 2012). We developed a novel methodology to quantify for niche overlap between two species which alleviates these key problems. The new test is multi-dimensional, unidirectional, requires no 'background' points and involves an innovative null biogeographic model which is distinct from traditional ecological niche models. We created virtual species occurrence data and climatic gradient layers to assess the metric's ability to quantify niche overlap. The new metric was capable of identifying different degrees of niche overlap and therefore we regard it as a suitable alternative for addressing questions on niche conservatism.

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