Niche Conservatism Above the Species Level

Summary

Niche conservatism as a model for evolution through geological time has typically been applied at the species level and examined in terms of how climate change affects the niche range of a species. The authors of this paper argue that niche conservatism operates at the genus and family levels as well and that people interested in examining how niches change for a species should be looking at genus level changes.

Niche conservatism is studied by examining species range and distribution. Species distribution is “the environment space in which the species has a positive intrinsic growth rate” and climate changes typically changes a species’ distribution across a landscape. Models operate on the assumption that species today are occupying their maximum range of environments and are close to occupying their fundamental niche; hindcasting models attempt to reconstruct species occupancy of the environment based on climate changes. While these models can help examine how climate changes have impacted individual species, the authors of this paper are arguing for a deeper examination of biotic interactions of species within their genus level because traits found in niches at a species level may be less important than traits at a genus level niche. In this study, the authors looked at the distribution of 63 mammalian genera in the late Pleistocene and late Holocene. They found that the number of species in a genera was correlated to it’s success of survival at a climate transition period, that geographic occupation has remained fairly consistent at the genus level after each climate change, and that geographic difference in range between species in the same genus suggests that species interactions plays a large role in combination with biotic changes for determining the extinction of a species.

What I liked

I liked how this article was not structured like a typical scientific article. Listing the Materials and Methods at the end gives the reader a choice to go over this section if they want to and so doesn’t distract or clutter the rest of the document. Having a longer introduction also allowed the authors to take a stronger stance on their argument and provide sufficient definitions and background to what they studied. The authors also did a good job highlighting why this research is important not only for information about past species but how realizing that conservation efforts can target genus or familial conservation as opposed to species conservation since biotic factors are not the only influence on the survival and niche occupation of specific species.

What I didn’t like

The authors took their data and analyzed it effectively but then said that their results can lead to inferences about niche conservatism. For having such a strong argument that is almost a call-to-action for the scientific community the authors then fill their discussion with how their findings can only lead to implications and assumptions about correlations between climate and niche occupation. Additionally, there was one suggestion for further exploration and vaguely describes a model to create instead of in-depth research on past or extant species and genera.

Figures

Figure 1 is a great visual for representing the change in a species’ area occupancy based on when the greatest increase in range size occurred. Having a colored system and bars to denote the amount of range increase helps the reader visualize each species in a concise form. Figure 2 and 3 are also elegant representations of range changes and correlations for different species between the two time periods. Following the color-coding scheme throughout the paper was also very helpful and Figure 4 was a useful representation of how a genus-level change in range is seen.