

Interactive comment on “Phylogenetic support for the Tropical Niche Conservatism Hypothesis despite the absence of a clear latitudinal species richness gradient in Yunnan’s woody flora” by G. Tang et al.

Anonymous Referee #4

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As there is already a lively discussion going on, and there is no need to repeat comments raised by the other reviewers.

My point is a bit broader than some of the others that have been raised: with respect to the "Tropical Niche Conservatism Hypothesis", the authors very clearly lay out three pieces of the hypothesis (Lines 49-58). Points one and two in this description are clearly statements of current knowledge. The third point is the one that I want to discuss in greater detail.

The authors say: "the colonization of non-tropical biomes is difficult due to niche con-
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servatism". "Difficult" is the key word here and it is perhaps not the most precise term. I take it to mean that evolutionary transitions from tropical to non-tropical environments were rare over the ~200 million years of angiosperm evolution.

This is clearly a macro-evolutionary hypothesis: I certainly don't see an analysis of local to regional phylogenetic diversity as having much to inform our understanding of the global rates of transition from tropical to non-tropical biomes. There is a lot more going on in terms of history, dispersal, biogeography, and extinction that would obfuscate any pattern left by the global rates of tropical to non-tropical transition. So I believe there is a major problem with scale here. That is not to say that this dataset is not of interest—I think it's very interesting; however I don't think it's particularly relevant with respect to the Tropical Niche Conservatism Hypothesis.

Of interest on this topic is a recent global scale analysis of these very transition rates in Zanne et al. 2014. I am not sure if the Zanne et al (2014) analysis supports or refutes the Tropical Niche Conservatism Hypothesis, because the definition of "difficult" is vague.

(As a side note: it is highly likely that the branch lengths in the tree the authors used are wildly wrong. Using the giant molecular tree in the Zanne et al. paper instead of the APG II tree would alleviate many of the concerns raised about this tree.)

Finally, I will venture an alternate hypothesis to the Tropical Niche Conservatism Hypothesis: Weir and Schluter (2007) found much higher rates of extinction at high latitudes. All else equal, this will also lead to older clades (on average) in the tropics which is the pattern the authors found.

In other words, the Weir and Schluter (2007) idea has nothing to do with the Tropical Niche Conservatism Hypothesis, but it would create the exact same pattern that the authors found.

Zanne, Amy E., et al. "Three keys to the radiation of angiosperms into freezing envi-

ronments." *Nature* (2014)

Weir, Jason T., and Dolph Schluter. "The latitudinal gradient in recent speciation and extinction rates of birds and mammals." (2007).

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