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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 #3

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The work seeks to test the tropical conservatism hypothesis (TCH) proposed to explain the latitudinal diversity gradient in plants. The present work focuses exclusively on Yunnan, China and woody plants in particular. There have been many articles recently testing the very basic prediction that tropical latitudes contain older lineages than temperate lineages with the mechanism being that cold tolerance is 'difficult' to evolve. Typically such papers have measured the mean family age of species in the tropics versus the temperate. A related approach, and the one taken here, is to quantify the degree of phylogenetic clustering across latitude with the expectation of clustering in

temperate latitudes due to recent diversification in temperate latitudes.

I have to say, despite my interest in this hypothesis and its general importance, I find the present test (and recent tests using family age) to be fairly uninformative. That is, they are weak tests of the hypothesis. Of course, we know tropical families are on average older, but this does not preclude alternative hypothesis. The phylogenetic clustering of lineages using NRI is an even less optimal test. For example, you could have a recent radiation that causes an actual higher richness in the temperate zone and still get 'phylogenetic clustering' in the tropics using a metric like NRI due to the age of the radiation. Thus, NRI by itself is not enough to really disentangle the mechanisms underlying latitudinal gradients nor is the mean family age. If we are to truly progress and test the TCH we must move beyond such simplistic analyses that do not robustly support or reject the hypothesis. The paper would be much better if some more detailed information about climatic niches and physiology was included. Otherwise, we simply have yet another paper saying tropical lineages are phylogenetically widespread and older. We know this and another paper pointing this out isn't progressing our science.

I found the focus on only Yunnan to be a major methodological weak point when considering the latitudinal species richness gradient. Yunnan is extraordinary in its climatic diversity, but that does not mean it is sufficient to serve as an adequate laboratory for studying latitude and species richness.

Lastly, I'm not quite sure where this paper fits into the scope of this journal which is typically concerned with ecosystems processes and biogeochemistry. It seems a rather strange venue for the work and I can't help but wonder why it would be submitted here and not to a macroecological or biogeographic journal. It might be outside the scope of the journal.

In sum, I found the results to be something any botanist could predict, the results do not advance our understanding of latitudinal gradients, the work does not strongly support or reject any major hypothesis and the work is too geographically restricted to have

great meaning.

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