

## ***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.***

**G. Tang et al.**

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AGAIN, OUR COMMENTS IN CAPS

The authors have made effort to defend what they did in the study. However, from their responses to reviewers’ comments, I see more severe problems with their study. The data that they used are not appropriate to address the issues of their study. I strongly disagree with all of their responses to my comments. As an example, here are my comments to some of their responses. OK THAT’S ALLOWED

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Data quality: As I mentioned in my previous comments, the 40% of Yunnan woody species used in the study may not appropriately represent the entire woody flora of Yunnan. However, the problem with their data is much more severe than this incompleteness of the floristic data. A more severe problem is with the species that they used in their study. Their modeled species distributions were generated based on herbarium collection records and climate data. Herbarium collections of a given species generally cover a small percentage of the distribution area and possibly habitat types of the species. Localities of herbarium collections for a species in their study are as few as five. Using such few records is unlikely to generate relatively accurate distributions of the species across 4936 grid cells of 10 km by 10 km in Yunnan, which covers 394000 km<sup>2</sup> and a great variety of habitats. YES, THIS IS INDEED A POINT OF CONCERN. ONE MAY ARGUE THAT WE UNDERESTIMATED TO POTENTIAL SUITABLE HABITAT OF SPECIES WITH FEW COLLECTION LOCALITIES. HOWEVER, KEEP IN MIND THAT FEW COLLECTION LOCALITIES DOES NOT AUTOMATICALLY EQUATE TO FEW COLLECTIONS! THERE MAY BE HUNDREDS OF COLLECTIONS FOR A SPECIES, BUT IF IT IS STRONGLY RESTRICTED TO A CERTAIN SPECIFIC HABITAT, THE NUMBER OF LOCALITIES WHERE IT CAN BE FOUND WILL ALWAYS BE LOW. THE SAME FOR ENDEMIC SPECIES, WHICH WE WILL COME BACK TO BELOW. IN GENERAL UNDERESTIMATION OF SPECIES SUITABLE HABITAT (A CONSERVATIVE ESTIMATE) IS LESS OF A PROBLEM THAN OVERESTIMATION. IN ANY CASE, THIS IS A PROBLEM THAT HAPPENS IN ALL MODELLING EXERCISES BECAUSE OCCASIONS OF PERFECT DATA ARE RARE. WE MIGHT HAVE INCREASED THE THRESHOLD FOR INCLUSION INTO THE ANALYSIS TO SPECIES OCCURRING IN AT LEAST 10 OR 50 LOCATIONS, BUT THIS WOULD EFFECTIVELY ELIMINATE SMALL RANGE, SPECIALIZED SPECIES, WHILE AT THE SAME TIME REDUCING THE NUMBER OF WOODY PLANT SPECIES INCLUDED IN THE ANALYSIS EVEN FURTHER.

Furthermore, Yunnan is geographically rather rugged and distributions of many species within Yunnan are driven by geographical/historical processes such as the rising of

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the Himalayas due to the collision of the Indian plate with the Asian plate, rather than driven by climate. Thus, species distributions generated by models based in part on climate must be biased. TRUE, THIS IS ESPECIALLY TRUE FOR NORTHWEST YUNNAN. THESE KIND OF BIOGEOGRAPHIC PATTERNS ARE STILL DIFFICULT TO INCLUDE IN CURRENT MODELS. FOR EXAMPLE, WHAT ABOUT ENDEMICS? ARE THEY ENDEMICS BECAUSE THEY ARE RESTRICTED TO A CERTAIN KIND OF HABITAT THAT IS RARE AND CAN ONLY BE FOUND WHERE THE SPECIES ARE FOUND, OR DO ENDEMICS REPRESENT NEW SPECIES THAT HAVE NOT YET SPREAD, OR ALTERNATIVELY, OLD SPECIES ON THE BRINK OF EXTINCTION? IN ANY CASE, BECAUSE THE ENVIRONMENT WAS SO STRONGLY SPATIALLY STRUCTURED (AS WE SHOWED IN OUR ANALYSIS), OUR ENVIRONMENTAL VARIABLES ALSO FORM GOOD PROXIES FOR SPATIAL (BIOGEOGRAPHIC) PATTERNS. I.E. THE BIOGEOGRAPHY IS INDIRECTLY ACCOUNTED FOR IN THE MODELS.

Another critical problem with the study is that the authors used climate data to generate species distributions and then used the model-generated species distributions to relate to climate in testing for the Tropical Niche Conservatism Hypothesis. This is a typical example of circularity. THIS COMMENT ON SPECIES DISTRIBUTION APPROACHES IS COMMON, AND WOULD INDEED BE TRUE IF WE WOULD HAVE BEEN LOOKING AT INDIVIDUAL SPECIES. HOWEVER, WHAT WE DO IS LOOK AT THE PATTERN THAT EMERGES AFTER STACKING OF MORE THAN 1900 INDIVIDUAL SPECIES MODELS. THESE SPECIES MODELS WERE DERIVED INDEPENDENTLY OF EACH OTHER. THE OVERALL DIVERSITY PATTERN THAT EMERGES FROM THESE >1900 INDIVIDUAL SPECIES MODELS DOES NOT HAVE TO BE LINKED TO THE ENVIRONMENTAL VARIABLES AT ALL. SO IT IS NOT A CIRCULAR APPROACH.

APG II versus APG III: The explanation by the authors for not using APG III is unacceptable. APG III (published in 2009) is a substantially updated version of APG II

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(published in 2003). If there are no substantial updates in APG III, one would not expect that the top international botanical journal (BJLS) would have published APG III. In fact, there are many dramatic changes in APG III, even at very deep divisions of the phylogeny. For example, eudicots are sister to a clade including both monocots and magnoliids in APG II but magnoliids are sister to a clade including both eudicots and monocots in APG III. Such a change is dramatic. Regardless of whether using APG III in the study would change the general pattern found by the study based on APG II, an appropriate way to do science is to use the most current knowledge, rather than outdated knowledge. YES, WE AGREE WITH THIS. THERE IS HOWEVER A PRACTICAL PROBLEM WITH THIS AS THE STUDENT WHO ORIGINALLY DID THIS WORK IS ALREADY LONG GRADUATED AND NO LONGER AVAILABLE TO REDO THE WHOLE ANALYSIS. FURTHERMORE, ALTHOUGH THERE WERE OFF COURSE SOME FUNDAMENTAL CHANGES BETWEEN APGII AND APGIII, THE CHANGES WERE NOT SO LARGE AS TO SERIOUSLY ALTER OUR RESULTS. FOR EXAMPLE, THE SHIFT OF THE MONOCOTS IN THE PHYLOGENY WOULD NOT ALTER OUR RESULTS MUCH BECAUSE RELATIVE BRANCH LENGTHS WOULD BE MINIMALLY AFFECTED. THE CHANGES BETWEEN APGII AND APGIII ARE OFF COURSE MORE SERIOUS FOR TAXONOMISTS (AT WHICH THE APG EFFORT WAS ORIGINALLY AIMED) BECAUSE IT AFFECTS THEIR CLASSIFICATION AND NAMING SYSTEMS.

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