

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.

ferryslik@hotmail.com

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I HAVE PLACED MY COMMENTS TO THE REVIEW REPORT IN CAPS DIRECTLY INTO REFEREE'S 1 REPORT BELOW:

This is an excellent paper well worth publishing that could be further improved by expansion of the discussion as indicated below. THANKS

Issues of scale I note that in Fig. 1h that part of the Yangtze river centered around Lijiang does not appear on Fig. 1h in blue on the map. I wonder is this because the

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spatial scale of mapping and analysis (10x10 km) hides it? This comment highlights a general issue in that the scale of the GIS is quite large considering the complex topography of the region. I am not sure if there is any way round this as I accept the argument about higher precision information made by the authors – I wonder is it possible to try a limited run with higher precision data to see what happens? In any case the issue of the scale of mapping relative to extremely rugged topography of Yunnan needs to be discussed somewhere (it is mentioned in Zhang's 2013 Global Ecology paper but only in passing and should be part of the discussion here). YES, SCALE IS, UNFORTUNATELY, AN ISSUE HERE THAT WILL BE VERY DIFFICULT TO COUNTER. MOST COLLECTIONS AVAILABLE HAD NO GPS COORDINATES AVAILABLE AND INDICATED (IN WORDS) THE APPROXIMATE LOCATION OF THE COLLECTION. WE HAD TO FIND THESE SITES BACK IN AN ATLAS, BUT IN MOST CASES THE PRECISION REMAINED ARBITRARY TO WITHIN SEVERAL KILOMETERS. SO EVEN THOUGH CLIMATE AND SOIL DATA ARE NOW AVAILABLE AT A 1 X 1 KM RESOLUTION, OUR COLLECTION LOCALITIES ONLY ALLOWED A PRECISION OF 10 X 10 KM. WE AGREE THAT THIS MAY BE MENTIONED MORE CLEARLY IN THE DISCUSSION, I.E. WE WILL TRY TO ADD AN ADDITIONAL PARAGRAPH ON THIS TOPIC AND ITS POSSIBLE IMPLICATIONS FOR OUR RESULTS.

I also wonder if setting the boundaries on a political basis could have any impact on the patterns observed – in other words do the same patterns appear if neighbouring areas are included in the analysis? THIS MAY INDEED HAVE INFLUENCED OUR RESULTS AS MANY SPECIES ALONG THE BOUNDARIES OF YUNNAN ARE ALSO FOUND IN THE NEIGHBOURING COUNTRIES/PROVINCES, I.E. WE WERE UNABLE TO INCLUDE THE FULL ENVIRONMENTAL RANGE OF THOSE SPECIES IN OUR MODELLING EXERCISE. HOWEVER, YUNNAN, BEING EXCEPTIONALLY DIVERSE IN ITS ENVIRONMENTAL CONDITIONS, DOES INCLUDE MOST CLIMATE AND SOIL TYPES THAT CAN BE FOUND IN THE SURROUNDING COUNTRIES AND REGIONS. THIS COMBINED WITH OUR LARGE SAMPLE SIZE OF COLLECTIONS, MAKES US QUITE CONFIDENT THAT THE MODELLED SPECIES DISTRIBUTIONS

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REFLECT THEIR TRUE RANGE REASONABLY WELL. WE ARE ESPECIALLY CONFIDENT THAT THE BROAD PATTERNS OBSERVED ALONG THE LATITUDINAL GRADIENT ARE RELIABLE BECAUSE OF THE STEEP GRADIENT FROM TROPICAL TO SUBTROPICAL, TEMPERATE AND BOREAL CLIMATES WITHIN SEVERAL HUNDREDS OF KILOMETERS FROM SOUTH TO NORTH. IT IS UNLIKELY THAT THE SPECIES DISTRIBUTIONS WOULD HAVE INCLUDED SUCH LARGE ENVIRONMENTAL RANGES IF WE WOULD HAVE KNOWN THEIR FULL ENVIRONMENTAL TOLERANCES.

Issues of statistical analysis and presentation In terms of the Environmental data why was Pearson's r used and not Spearman's as the data are probably not normally distributed? This issue may also affect the PCA analysis – it looks good but PCA assumes both some sort of continuous scale in the data, and normal distribution of the data. Were these checked for the data used? A statement on this is required. WE WILL DOUBLE CHECK THIS. FOR THE PCA ALL VARIABLES WERE STANDARDIZED BEFORE ANALYSIS AND IN GENERAL, PCA IS QUITE ROBUST AGAINST VIOLATIONS OF ITS BASIC ASSUMPTIONS. HOWEVER, THIS IS AN IMPORTANT POINT AND WE WILL TAKE A GOOD LOOK AT THIS AGAIN.

pH is, of course, not measured on a linear scale – does that have any impact on the interpretation of the results? In Fig. 1i the two red spots are obviously of interest – I may well be wrong but are these areas of acid soils? What's the pH difference between the different colours? In general, we need to know what the boundaries are in the rainbow spectrum scale in Fig. 1. WE DON'T THINK THE ACTUAL VALUES OF THE SPECTRUM IS IMPORTANT HERE. WE JUST WANTED TO VISUALIZE THE ENVIRONMENTAL PATTERNS SO THAT THE READERS CAN COMPARE THEM WITH THE DIVERSITY MAPS THAT WE PRODUCED. ESPECIALLY THE VALUES OF THE SOIL DATA WOULD MAKE NO SENSE AS THESE ARE BASED ON THE PCA-AXES SCORES AND THUS GIVE NO INFORMATION ON ANY OF THE INDIVIDUAL SOIL PARAMETERS. FIG. 1i RELATES TO SOIL AXIS 2 WHICH MOSTLY REFLECTS

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SOIL FERTILITY SO THE RED DOTS MUST REPRESENT SOME HIGHLY FERTILE SOILS. THE SOILS THERE ARE ACTUALLY NOT ACID BECAUSE pH WAS POSITIVELY CORRELATED WITH THIS AXIS, SO RED COLOUR INDICATES HIGH pH. TOGETHER WITH THE LIGHT BLUE REGIONS IN CENTRAL AND SOUTH YUNNAN, THESE SOILS PROBABLY REPRESENT AREAS RICH IN LIMESTONE.

Issues of data The authors have made clear that the Fagaceae were not included in their analysis and that the Gymnosperms were later excluded. I accept that the Fagaceae could, unfortunately, not be included but it'd be good to discuss the potential consequences of this to the results as the Fagaceae are so important biologically. YES TRUE, THEY ARE ESPECIALLY IMPORTANT IN THE NORTHWEST DIVERSITY HOTSPOT, SO WE MAY HAVE UNDERESTIMATED THE DIVERSITY THERE. HOWEVER, SINCE THEY REPRESENT A SINGLE FAMILY, THEY WOULD HAVE CONFIRMED OUR FINDING OF THE RELATIVE PHYLOGENETIC CLUSTERING AND DECLINING STANDARDIZED PHYLOGENETIC DIVERSITY TOWARDS THE NORTH.

I was also unclear what led to the exclusion of ca. 18,000 records from the ca. 60,000 that were georeferenced – what was wrong with them? IN TOTAL WE HAD ~85,000 COLLECTIONS AVAILABLE. HOWEVER, ~25,000 OF THESE WERE LACKING LOCATION DATA, OR THE LOCATION DATA WERE TOO GENERAL TO BE PIN-POINTED TO A LOCATION AT THE REQUIRED RESOLUTION OF A FEW KM. THEREFORE WE HAD TO EXCLUDE THESE SPECIMENS FROM FURTHER ANALYSIS.

Of course, the Gymnosperms were excluded from the Phylogenetic analysis as it is based on APGII. But why was APGII used and not the more up-to-date and somewhat different APGIII? Can the consequences of this be discussed? YES, THIS IS UNFORTUNATE. THIS IS A CONSEQUENCE OF THE FACT THAT THE ANALYSES FOR THIS STUDY WERE ACTUALLY DONE SEVERAL YEARS BACK IN 2008/9 WHEN APGIII WAS NOT YET AVAILABLE. TO ADD APGIII NOW WOULD MEAN

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COMPLETE REANALYSIS OF ALL DATA. BECAUSE THE CHANGES BETWEEN APGII AND APGIII ARE NOT DRAMATIC, IT IS UNLIKELY THAT SUCH A REANALYSIS WOULD ALTER THE GENERAL PATTERNS AND CONCLUSIONS OF THE PRESENT STUDY.

Also excluding the Gymnosperms from the phylogeny seems to remove 2319-1898 = 421 species from the analysis – is this correct or were other species from other groups removed for some reason? If so what groups and why? I think that there are only about 200 more likely 250 species of Gymnosperm in the whole of China so there appears to be a mismatch. THIS GROUP OF REMOVED SPECIES INCLUDED THE GYM-NOSPERMS AND ALL SPECIES THAT SHOWED NO SIGNIFICANT HABITAT ASSOCIATION (WHEN CORRECTED FOR COLLECTING BIAS). THE LATTER WERE REMOVED BECAUSE THEY PROVIDE NO INFORMATION TO THE ANALYSIS AS THEY ARE EQUALLY LIKELY TO OCCUR ANYWHERE IN YUNNAN.

References The authors' conclusions are really interesting and it may be worth their relating them to other issues – in particular the work of J.L. Baltzer et al. in 2008 (*Functional Ecology* 22: 221-231) and in 2009 (*Am. J. Bot.* 96: 2214-2223) and that of A.C. Hughes et al. in 2011 (*J. Biogeog.* 38: 2362-2372) all of which relate to the Isthmus of Kra as cited in J. Parnell in 2013 (*Nordic J. Bot.* 31: 1-15.). It would seem as if drought/water stress is potentially much more important than previously though in a range of ways. YES, WE AGREE. WE WILL LOOK INTO THESE PUBLICATIONS AND TRY TO INCLUDE THEM IN THE FINAL VERSION OF THE MANUSCRIPT.

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