

Interactive comment on “Research Paper: Detecting climatically driven phylogenetic and morphological divergence among spruce species (*Picea*) worldwide” by Guo-Hong Wang et al.

Anonymous Referee #2

Received and published: 13 December 2016

Wang et al., analyzed the relations between current climate and ecological (phylogenetic and morphological) divergence among spruce species at a global scale. The topic is suitable for Biogeosciences, but I do not think it is suitable for this special issue “Ecosystem processes and functioning across current and future dryness gradients in arid and semi-arid lands”. The range of spruce (we could see in Figure 1) is not only limited in arid and semi-arid lands, but also covers a lot of other more wet regions. The main results of this paper is clear, that phylogenetic and morphological divergence are driven by different climate variables, i.e., temperature for phylo and precipitation for morpho. But I have several questions/comments, which need carefully revised by the authors. Firstly, the abstract is not well written. Too much information on methods

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and results. Usually, we first need some background, importance of the study, come up with the question, and what we do, what we found, and finally the importance of our findings. Furthermore, some information in the abstract are repeated, e.g., line 30-34 and line 40-41. Other minor problems in Abstract include: bioclimatic or climatic (should be consistent here and other parts of this paper); global and northern hemisphere are different; there are ecological divergence, phylo divergence, morpho divergence and divergence, should be consistent or clearly defined; younger nodes are called remaining/terminal/end nodes/splits, should be consistent. Secondly, the use of current climate. The author also discussed this problem. As far as I know, there are not only current climate data in worldclim, but also paleoclimate. Although the paleoclimate there only date back to LGM, it still could reflect the climate situation for a longer time to some extent. I am wondering if this paleoclimate could be a better choice than current climate. Thirdly, the authors did PCA analysis and found that the first three axis could explain 75.67% of the variance, but the following analysis used 8 separate climate variables. I want to know why they choose these 8 variables, and not using the first three axis. Generally, 75% variance is OK. I guess the 4 temperature variables the author used are highly correlated, as well as the four precipitation variables. So I doubt the necessary to use so many climate variables. By the way, the numbers in the main text is not consistent with the numbers in table 1. For instance, the first axis explain 43.52% of the variance in Table 1, but 29.8% in the main text; other numbers are also wrong. In table 1, the first column, how did the authors choose the bold variables. I mean temperature seasonality is -0.928, and mean temperature of the coldest quarter is 0.946, higher than the AMT. The use of elevation is also questionable. The author at list did not discuss the effect of elevation in discussion. Other minor suggestions include: 1. The results do not need to be divided into 6 parts, I think the last 4 parts could be merged into 1. 2. Some logic in the text is not reasonable. For instance, in line 87, information before “thus” and after “thus”, I don’t think they are well connected; line 178-189, the sequence of these part is mess, line 188-189 should move to the front of the introduction of the SEEVA. The come up with several hypotheses in the

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introduction also feel not well connected with the text there. Anyway, the authors need to carefully check this throughout in the text. 3. Line 148, mainland China and Taiwan? 4. Line 158-166, I am wondering if it's necessary to list all the climate variables here. 5. Line 349-350, how did the authors conclude like that? 6. Cannot or could not?

Interactive comment on Biogeosciences Discuss., doi:10.5194/bg-2016-465, 2016.

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