

## ***Interactive comment on “Spatial estimation of soil carbon, nitrogen and phosphorus stoichiometry in complex terrains: a case study of Schrenk’s spruce forest in the Tianshan Mountains” by Zhonglin Xu et al.***

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Dear Editor, Dear reviewers Thank you for your letter and for the reviewers’ comments concerning our manuscript entitled “Spatial estimation of soil carbon, nitrogen and phosphorus stoichiometry in complex terrains: a case study of Schrenk’s spruce forest in the Tianshan Mountains” . Those comments are all valuable and very helpful for revising and improving our paper, as well as the important guiding significance to our researches. We have studied comments carefully and the responds to the reviewers’ comments are as following: General Comments: (1) The authors stated the application

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of multiple linear regression (MLR) models in this study. I am not convinced based on the interpretation in introduction and material and method sections. By the way, did you test other models when you stated the reliability of MLR models in discussion? Response: We will revise and expand the Introduction and Material and Method in response to this comment. Additionally, for the spatial estimation, we are collecting more soil samples across the study area at this time, after the laboratory analysis (predicted to be finished at end of June), we will add the results of Kriging interpolation and nonlinear model.

General Comments: (2) How did you choose the climatic variables (MAT, MAP or others) or did you test these variables in the models based on Aikake Information Criterion (AIC)? Are you sure all the dependent variables (C, N, P and C:N:P ratios) have the same independent variables such as MAT, MAP, Elevation, TTQ, TWI, PWQ? Response: We agree with the reviewer’s worry and stepwise regression based on AIC will be used in the revised manuscript. Actually, we will consider the contribution of other possible variables (climatic variables from Worldclim dataset and topographic variables calculated from DEM) based on PCA analysis, and then the principle components will be used for the spatial estimation.

General Comments: (3) I do not understand the purpose of 3.1 in result section. It seems to be not well-linked in your result. Could you explain it a little more? Response: we agree and will modify this section.

General Comments: (4) There are no page number and line number after line 274. Response: we are sorry for the inconvenience and will add page and line number in the revised manuscript.

Specific Comments: Lines 13-16 This sentence is correct, but not understandable here. Please rewrite and clarify it. Response: We agree with the comments and will update accordingly.

Specific Comments: Lines 21-22 How many sampling sites do you have collected from

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2012-2017? Response: currently we have seven sampling sites, we are collecting more sites, the specific number of sites will be noted in the revised manuscript.

Specific Comments: Line 22 which climate variables? Response: will add the specific climatic variables in the revised manuscript.

Specific Comments: Lines 23-25 Please clarify the “different”? Response: will delete “different but” in the manuscript.

Specific Comments: Lines 27-28 Suggest to delete it since it is not related to you study. Response: will delete the sentence.

Specific Comments: Line 29 Did you analyze the results by other models? Response: As mentioned in the response to the general comments (1) and (2), we will add more variables and conduct PCA, then use stepwise regression and Kriging interpolation to estimate the spatial pattern of stoichiometric characteristics.

Specific Comments: Line 30 It may be better to add a sentence to highlight you work and the contribution. Response: will modify text.

Specific Comments: Lines 42-49 it is too long and complex. Please rewrite it. Response: we agree and will modify the text.

Specific Comments: Line 49-55 Please write the important ones that are closed to this research. Response: will delete the community dynamics and symbiosis relationships.

Specific Comments: Line 55 Why add the aquatic ecosystems, but this is not your focus on. Response: will delete the aquatic ecosystems.

Specific Comments: Line 65 which disturbances? Please add them. Response: will delete “disturbances”.

Specific Comments: Line 67-73 It is not long, and not understandable. Response: We agree with these comments and will update accordingly

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Specific Comments: Line 75 The year of 2013 is not recent? Response: will delete “recently” and update text accordingly.

Specific Comments: Line 78-79 What is the meaning for moderate spatial dependence? Response: will delete “moderate”.

Specific Comments: Lines 104-110 Please rewrite this sentence. Response: we will rewrite the sentence as suggested.

Specific Comments: Lines 147-149 Why only combination of elevation and climate variables? Why it is a linear regression but not nonlinear? Response: As mentioned in the previous response, we will add more variables and conduct PCA, then use stepwise regression and Kriging interpolation to obtain the spatial distribution. Here, “linear” will be removed and we will find nonlinear relationships.

Specific Comments: Line 176 The size of fig 1 is too small. Please add more information on the sampling sites and total numbers. Please clarify why these sites can be representative for the whole forests. Response: will upload a clear version of Fig.1. Since we are collecting more samples, the specific number of sampling sites will be added in the revised manuscript. The representativeness of these sites will be added accordingly.

Specific Comments: Lines 211-217 Did you test the variables based on your data? Response: will used stepwise regression in the revised manuscript.

Specific Comments: Lines 229-234 as proposed in general comment 2. There is no line number after line 274. The fig 3, 4 are not high quality. Please change it. Response: will add page and line number in the revised manuscript. Fig. 3 and 4 will be replaced by high-quality ones.

Specific Comments: 4.2 How can you conclude that reliability of MLR models since you did not analyze the data using other models. Response: we will add the results of Kriging interpolation and nonlinear models in the revised version.

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Specific Comments: There are repeat literature in the references. Please revise it.  
Response: will deleted the following two repeat literatures: Peñuelas, J., Sardans, J., Rivas-Ubach, A., and Janssens, I. A.: The human-induced imbalance between C, N and P in Earth's life system, *Glob. Chang. Biol.*, 18, 3-6, 2015.

and

Tian, H., Chen, G., Zhang, C., Melillo, J. M., and Hall, C. A. S.: Pattern and variation of C:N:P ratios in China's soils: a synthesis of observational data, *Biogeochemistry*, 98, 139-151, 2010b.

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