Biogeosciences

Discussions

Open Access

EGU

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.

Zhonglin Xu et al.

galinwa@gmail.com

Received and published: 25 May 2018

Dear Editor, Dear reviewer We thank reviewer for detailed and constructive comments on the manuscript. Their suggestions have enabled us to improve our work. Based on the instructions provided in your letter, we have studied comments carefully and have made correction which we hope meet with approval. The main corrections in the paper and the responds to the reviewers' comments are as following:

General Comments: Soil sampling: According to the Materials and Methods Sec-

tion, soil samples at 10 cm intervals were collected using a soil auger at each study site. However, the topsoil of many forest soils consists of two separate sections which strongly differ with respect to their ecological traits as well as their C:N:S stoichiometry: The forest floor (organic surface layer with an OC concentration > 15 mg/g) and the Ah horizon (humic mineral topsoil with a OC concentration <15 mg/g). I suppose that at least in some of the samples (according to the reported range of C concentrations and the statement on "litter fall accumulation above soils" made by the authors on page 20) a forest floor is present. Pooling forest floor and humic mineral topsoil to a single is not scientifically sound. Response: We agree with the reviewer comments about "Pooling forest floor and humic mineral topsoil to a single is not scientifically sound", we will (1) check our soil samples and data, and (2) add more data from soil samples which we are collecting now, the collection will be finished at June and corresponding laboratory analysis will be finished before August. We will update all the tables and figures accordingly.

General Comments: More important, the reported soil C:N ratios (49-1327) are far too wide to be true. The C/N ratio of microbial organic matter is around 8, that of typical forest topsoils ranges between 15 and 30. The extremely wide C/N ratios presented in the paper probably are caused by wrong (far too small) N concentrations (0.02- 0.74 mg/g). As the N concentrations are a key parameter for the stoichiometry assessments in the paper, the entire paper is based on wrong input data. In my opinion this is a crucial fault making a publication impossible. Response: now we are collecting more soil samples across the study area, the collection will be finished at end of June, all the soil samples (samples collected during past fieldwork and during the current one) will be re-analyzed.

General Comments: Probably also the P concentrations have been underestimated, because perchloric acid digestion does not completely mobilize/recover silicate-bound P, resulting in wrong C:P stoichiometry data. Response: again, soil samples will be re-analyzed as soon as possible.

General Comments: Moreover, I want to emphasize that the MLR model partly is based on inappropriate assumptions. In contrast to the authors I do not think that the reported soil C and N concentrations as well as N:P ratios are normally-distributed, but skewed (as clearly to be recognized in the Histograms presented in Figure 2 and the Scatter plots presented in Figure 5a,b. Probably the K-S test has been applied inadequately. Response: now we are collecting more soil samples across the study area, the collection will be finished at end of June, the tables and figures will be updated after we obtain new data.

General Comments: Moreover, in contrast to the statement made by the authors in the paper, the model explains only a small part of the data variance (according to the R^2 values presented in Table 1 only 16% for C, about 40% for N and P). This means that 84% of the variance of the C concentrations remains unexplained by the model. 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.

Specific comments: The introduction is far too long. It must be shortened considerably. Response: it will be shortened in the revised manuscript.

Specific comments: L68 Citation Müller et al 2017: wrong position in reference list. Response: will modify, thank you.

Specific comments: L127 "Soil nutrient stock": Very general and vague phrase. Response: we checked the paper and found the soil nutrient actually means organic matter, total N and total P, will revise the sentence.

Specific comments: L144/145: Independent and dependent variables probably are mixed up here. Response: we agree and will modify, thank you.

Specific comments: L188/189: Why was the soil sampled using an auger, even though profiles were available? Response: actually, soil profile were hard to collect, we only collected soil samples use auger during our fieldwork, will delete the profile in the revised manuscript.

Specific comments: Page 11ff: No line numbers are given. Response: sorry for inconvenience, we will insert line number in revised manuscript.

Specific comments: Results Section: Results are presented "over/pseudo-exact" (not warranted by the analysis precision): e.g. C concentrations 15.85 g/kg; C:N ratio: 123.84, etc.) Response: soil samples will be re-analyzed, we will update all the data, tables and figures after statistical analysis.

Specific comments: Table 1: No units are given. Data are too "pseudo-precise". C/N ratio unrealistic. Response: as mentioned previously, we will add more data based on current sampling, all tables and figures will be updated.

Specific comments: Page 20, lower paragraph: Soil C concentrations are also strongly governed by soil texture (protection of OC by clay, Fe, Al oxides, aggregates). The statement that "the more suitable the temperature and precipitation conditions (are), the more litter fall accumulates above soils" is wrong. O layer accumulation is maximal at particularly wet and cool conditions, which cannot be termed particularly suitable Response: We agree with the comments and will update accordingly.

Interactive comment on Biogeosciences Discuss., https://doi.org/10.5194/bg-2017-536, 2018.