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Discussions

Interactive comment on "Agricultural uses reshape soil C, N, and P stoichiometry in subtropical ecosystems" *by* H. Y. Liu et al.

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Thanks to both reviewers for raising this important issue. In their both opinion, the conclusion about "agricultural uses reshape soil C, N, and P stoichiometry" is not convincing due to the distribution of woodlands in the uplands and tea and rice in the lowlands. The question is due to the fact that we did not explain the distributions of both the contents of soil C, N and P, and the area percentages of land use across the gradients of elevation and slope in detail in the last manuscript. Here, we will further explain "why agricultural uses reshape the contents of soil C, N, P and their stoichiometry" using more new Supplement materials. We also gave more presentations of used methods in the manuscript according to S. Rolinski's comments.

In the following we would like to argue, why in our opinion it is true that agricultural

land uses reshape the contents of soil C, N, P and their stoichiometry in the Jinjing catchment in a subtropical hilly region, China.

In subtropical, hilly regions of China, farming activities are from lowlands to high lands due to high population load and limited arable land availability. The same condition occurs in our research area, a classically subtropical, hilly catchment. In our research area, elevation varied from 59 to 416m and the slope from 0 to 71.6°. The majority of the region was below 200 m elevation and at a slope <30.6°. We calculated the area percent for paddy field (PF), tea farmlands (TF), and woodland (WL) under different gradients of elevation and slope. We found that the agricultural lands (PF and TF) and woodlands scatter across the lowland to uplands. Generally, the area percentage of PF and TF decreased with the increasing of elevation and slope, and that of WL has a significant opposite tendency (Fig S1).

In common, along with the comment of S. Rolinski, there are higher contents of soil nutrients in the lowlands than in the highlands. However, this is not true in our research area. We analyzed the changes of contents of soil SOC, TN and TP along the gradients of elevation and slope for the three types of land use of PF, TF and WL (Fig. S2-S3). For PF and TF, the contents of SOC, TN, and TP did not significantly change across the different gradients of elevation or slope. In contrast, the SOC and TN contents for WL in highlands at higher elevation and steeper slope were larger than under the same vegetation in the lowlands. Moreover, there were significant differences of SOC, TN and TP between the land uses PF, TF and WL within an individual class of elevation or slope (Fig. S2-S3). For a given elevation or slope group, the SOC, TN and TP contents at PF were generally larger than at the corresponding group at TF and WL, and TP contents were lowest at WL. Additionally, the TN contents for TF were lowest among three land use types, irrespectively of elevation or slope. This clearly indicates the impact of elevation and slope on nutrient stoichiometry in case of a near natural vegetation, while a transformation to agricultural use leads to characteristic changes of the stoichiometry, irrespectively of the site condition. We are therefore convinced that our study is not biased due to the fact of preferential agricultural utilization of better soils at lower elevation.

We further analyzed the changes in C:N, C:P, and N:P molar ratios along the gradients of elevation and slope for the three types of land use of PF, TF and WL (Fig. S4-5). Except for WL, C:N, C:P, and N:P molar ratios of PF and TF did not significantly change across the different gradients of elevation or slope. But for WL, these stoichiometric ratios increased with increasing elevation and steepness of slope. Within individual classes of elevation or slope, the molar ratios of C:N and C:P between PF and TF had no significant differences, while the ones of C:P, and N:P for WL were always highest among the three land uses.

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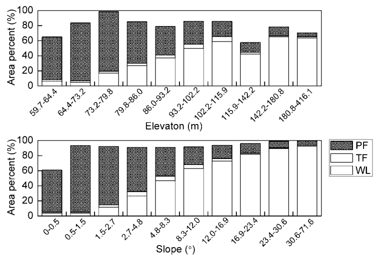

Figure S1. The area percent for paddy field (PF), tea farmlands (TF), and woodland (WL) under different gradients of elevation and slope.

Fig. 1.

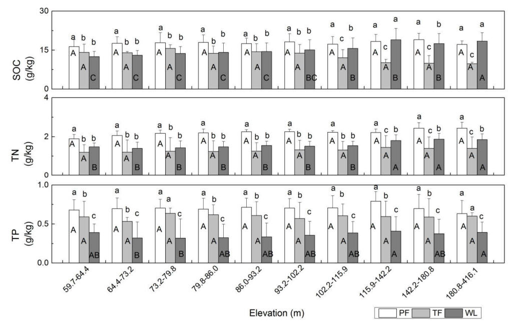

Figure S2. The contents of SOC, TN, and TP contents for paddy field (PF), tea farmlands (TF), and woodland (WL) under different elevation. Different uppercase letters denote significant differences among elevation classes for a given land use type. Different lowercase italic letters denote significant differences among land use types, within an individual elevation group ($p < 0.05$). Bars represent standard error.

Fig. 2.

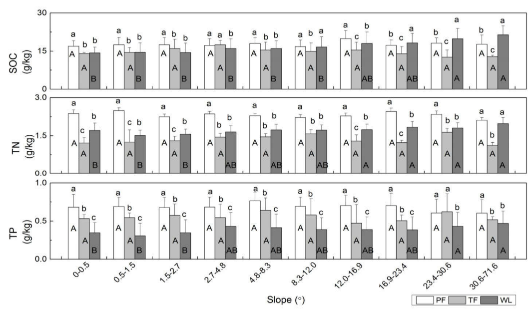

Figure S3. The contents of SOC, TN, and TP for paddy field (PF), tea farmlands (TF), and woodland (WL) under different slope. Different uppercase letters denote significant differences among slope classes for a given land use type. Different lowercase italic letters denote significant differences among land use types, within an individual elevation ($p < 0.05$). Bars represent standard error.

Fig. 3.

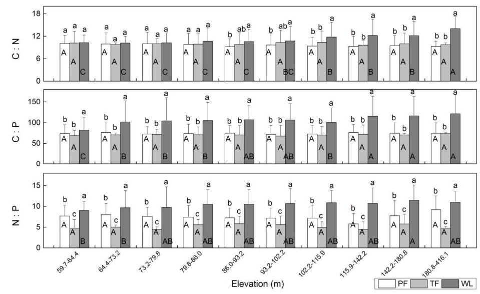

Figure S4. The molar ratios of C:N, C:P, and N:P for paddy field (PF), tea farmlands (TF), and woodland (WL) under different elevation. Different uppercase letters denote significant differences among elevation classes for a given land use type. Different lowercase italic letters denote significant differences among land use types, within an individual elevation ($p < 0.05$). Bars represent standard error.

Fig. 4.

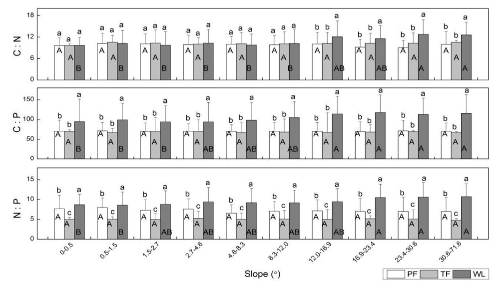

Figure S5. The molar ratios of C:N, C:P, and N:P for paddy field (PF), tea farmlands (TF), and woodland (WL) under different gradients of slope. Different uppercase letters denote significant differences among elevation classes for a given land use type. Different lowercase italic letters denote significant differences among land use types, within an individual elevation ($p < 0.05$). Bars represent standard error.

Fig. 5.