**Biogeosciences
Discussions**

Interactive
Comment

Interactive comment on "Effects of environmental factors and soil properties on topographic variations of soil respiration" *by* K. Tamai

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I appreciate the anonymous referee #1 for his valuable comments and suggestions. The following is the list of the author's reply to the interactive comments on "Effects of environmental factors and soil properties on topographic variations of soil respiration" by K. Tamai. I am very sorry that this reply has not proofread by native English speaker. I shall submit the revised manuscript after proofread by native speaker.

General comments: This study focused on the comparison of soil respiration between different forest types with different topographic locations. Author tried to use the environmental factors and soil properties to explain the controlling factors on the spatial variation of soil respiration between the two different forest types. However, there are fundamental flaws in this study.

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Interactive Discussion

Discussion Paper

[Comment] 1. Author focused on the spatial variation of soil respiration as shown in the title but did not provide detailed spatial information of soil respiration, soil moisture, soil temperature,ãĂĂand soil properties for each collar. In stead, authors provided with temporal variation of the measured parameters. [Reply] As noted in "Introduction", soil respiration varies in spatial from dozens centimeter scale to national scale. I compare the averaged soil respiration rates in each plot because this manuscript focuses on the spatial variation in slope scale. Anonymous Reference #1 demands the information of the spatial variations among soil collars in each plot. I admit that the spatial variation in dozens centimeter scale is also important and interesting topic. However, this topic should be dealt in the other manuscript. I shall add the description that this manuscript focuses on the spatial variation in slope scale in "Introduction.".

[Comment] 2. Experimental Design: The use of difference in the averaged variables betweenãĂĂdifferent plots suffered from psudoreplication. In the first forest, there is only one replicates.ãĂĂIn the second forest, it seems they have three replicates. Nevertheless, theyãĂĂuse the same control plots, thus it is not true replicates. [Reply] The statistic analysis is not performed in this manuscript. Thus, the different number of the plots among the two forest sites is not the serious problem. I admit that the observation with more plots has the larger possibility to gain the larger effects data. However, the larger effects data was expected to be gained in this study. Because the plots were located at highest and lowest parts in both forest sites, in where the environmental factors and soil properties are supposed to be most different.

[Comment] 3. Data Analysis: In order to examine the impacts of soil temperature, soil moisture, and soil properties on soil respiration across spatial scales. It is critical for authors to measure all the parameters around each soil collars and then use linear and stepwise multiple regressions to identify the major and minor contributors of environmental factors to spatial variability of soil respiration. [Reply] This manuscript focuses on the spatial variations of soil respiration in the slope scale. Thus, all the parameters around each soil collars nor the soil respiration rates at each soil collars are not dealt

in this manuscript. The estimation methods of the effects by environmental factors and soil properties are based on Palmroth et al. (2005) and expected to identify the major and minor contributors of environmental factors to spatial variability of soil respiration.

[Comment] 4. Lack of definition of critical scientific questions or solid hypothesis in the IntroductionãĂĂSections. List of previous studies does not necessarily refer to the importance ofãĂĂresearch on spatial variability of soil respiration and its controlling factors. [Reply] ãĂĂI define the solid hypothesis is "Soil moisture is supposed to vary in slope. Soil property is also supposed to vary in slope. Because, soil is developed under the different moisture environment." The definition of critical scientific questions is which has more large effect on the soil respiration variations in a slope." I shall add these definitions more clear in "Introduction".

[Comment] 5. Lack of deep discussion on how and why environmental factors control over spatial variability of soil respiration. Comparison with studies in other sites gives no new insights on the underlying mechanisms of spatial controls over soil respiration. Overall, this study is routine measurement and adds little information to our understanding on soil respiration and its underlying mechanisms. [Reply] The following result and discussion are thought to be new insights. "To compare the effects by soil moisture and soil property on the spatial variations of soil respiration in slope scale, the soil property has a little effect in the immature soil. It has more effect in the more mature soil than soil moisture." "The cause the fewer soil respiration at the lower part of the slope is from the soil property, not wetter soil moisture in this study." I shall revise the explanation of "Result" and "Discussion" to make clear these ideas.

Specific Comments [Comment] Introduction: It seemed that author listed the factor which influenced soil respiration in terrestrial ecosystems. However, the studies on all these controlling factors and their relationships with soil respiration should be presented in this section. In paragraph 3, authors hould listed the results of the related previous studies and the underlying explanation or mechanism. The results of the author in other unpublished papers were too long in the section.

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Interactive Discussion

Discussion Paper

[Reply] Following this comment, I shall add the explanation of the controlling factors and their relationships with soil respiration of the previous studies in paragraph 3. I shall delete the mention of the results of the author in other unpublished papers. This unpublished paper has already accepted in Japanese Journal of Forest Environment.

Methodology: [Comment] What were the shape and size for those plots? How many automatic chambers were there in each plot? Where was the chamber located in the plot: center, upper, or lower part? How far away were the manual chambers from each other and from the automatic chambers?

[Reply] The plots size is 10x10m. One automated chamber was settled at the center of the plot, and 8 soil collars for manual chamber around the auto mated chamber at each plot in Yamashiro site. The 24 soil collars are settled in the center of the each plot in Kahoku site. The distances between automated chambers and soil collars are around 20-30cm each other. I shall add these explanation in Observation methodology.

3.2. [CommentãĂ■ Line2: "is" may be "was" [Reply] This mention is the result of the proof read by native English speaker. This mention will be proofread once more by native English speaker.

[Comment] Line7:stuidy-study [Reply] I am very sorry that I can not find the commented part in my manuscript. I shall correct it when I find it.

Results: [Comment] Figs 2 and 4: Bar seems that the error bars and the numbers should be more that it showed in the figs. [Reply] Mentioned in the regend of Figs 2 and 4, bar shows the maximum and minimum rates of observed soil respiration by manual chamber, not error bar. Numbers of the bars are 11 in plot V and 10 in plot R in Yamashiro site, and 13-14 in each plots in Kahoku site. The mention of the observation times in plot R is not correct (page 10940 line22). I shall correct it.

[Comment] Fig.3 : The unit is wrong? [Reply] I confirm that the unit is correct to be $mgCO_2m^{-2}s^{-1}$.

[Comment] 5.2. The details of results of analysis were listed in the Result Section. The reason and explanation should not be presented in this section (Paragraph 2). [Reply] Following the comment, I shall move the Paragraph 2 to the Discussion part.

Discussion [Comment] The description of the table and information of the experiment is too much. In this section, the author should give some comparisons between yourself and the previous studies, and then try to give mechanistic explanation based on the results of the data analysis. [Reply] I think more information will give more beneficial to the scientists reading this manuscript. I would give mechanistic explanation based on the results of the data analysis in this manuscript. I shall try to revise it to give more mechanical explanation in "Discussion".

Interactive comment on Biogeosciences Discuss., 6, 10935, 2009.