

## ***Interactive comment on “Hydrologically transported dissolved organic carbon influences soil respiration in a tropical rainforest” by W.-J. Zhou et al.***

**W.-J. Zhou et al.**

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Dear anonymous referee, We feel grateful for your sincere and constructive comments about this manuscript. We have revised our manuscript thoroughly and carefully according to your suggestions. Here are the answers and some details for your comments. Wish you can give us more comments to improve it. Sincerely yours, Wen-Jun Zhou Corresponding author: Yi-Ping Zhang (yipingzh@xtbg.ac.cn) Major comments (1) The authors found that there was clear seasonal variability in soil respiration, increasing in rainy season and decreasing in dry season. The variation of soil respiration strongly correlated with soil temperature, more than those with soil moisture content and water fluxes. Does this mean seasonal variation from rainy season to dry sea-

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son was clearer in soil temperature than in soil moisture content and water fluxes? Since rainy and dry season is generally defined by the amount of precipitation, it is hard to understand why the seasonal variation of soil respiration was explained by temperature, not water relating factors. The author should add the seasonal data of these explanatory factors in Fig. 2 to show how it looks like and also check the auto-correlation between them. Answer: 1)Thanks, we have added the dynamics figure of soil temperature at 5cm and soil water content at 10cm depth as Fig2b.

2) We have checked the correlation between soil temperature at 5cm depth (T5) and soil water content at 10 cm (SWC10) showed  $SWC10 = 1.38 + 1.00 T5$  ( $r^2 = 0.3293$ ,  $p < 0.0001$ ), this indicated soil temperature at 5cm depth explained 32.93% soil water content. This showed soil temperature was not all in covariance with soil water content(Fig 2b). This can induce that soil respiration is in the similar dynamic with soil temperature. While with the water input, soil microbe will be influenced by soil water content and DOC- the more activity C fraction, thus, water input also contributed to the good correlation between soil temperature and soil respiration which can proved by table 3.

(2) There are no information how many locations where soil moisture content was measured. Since spatial heterogeneity of soil moisture content is very high in tropical forest ecosystem, certain amount of replicate is necessary. Answer: Thanks, we have detected 30 chambers(5 trench plots  $\times$  3 chambers + 5 control plots  $\times$  3 chambers) soil moisture and soil temperature.

(3) It is questionable whether the sensitivity of soil respiration can be compared between the different explanatory variables that has different ranges of variation. I think the range of seasonal variation have to be standardized to compare the sensitivity of SR between different variables. Answer: First of all, thanks for your question of great insight. We have standardized all the parameters and recalculated the sensitive indices as the following steps: Firstly, weekly soil respirations fluxes, weekly average of soil temperature (T) and soil water content (SWC), weekly water and DOC fluxes were standardized by the ratio of measured value to the mean value during the observation

period. Secondly, linear regression equitation was used between the standardized soil respirations values and T, SWC, water and DOC fluxes respectively. Thirdly, we considered the slope of the linear regression as the sensitivity indices which showed the soil respirations variation rate with soil temperature, soil water content, water and DOC fluxes changing.

Specific comments (1) Line 102, relative high: What means “relatively”? With do you compare? Answer: Thanks, this sentence is confused, so we revised it to “We hypothesized that throughfall and litter leachate DOC flux are important in carbon budget” with more clear expression.

2) Line 128: It is unclear how many replicate each group has. Answer: Each group has a throughfall, a litter leachate, and a soil water (20 cm depth) collectors in each group, so there are 4 replicates for every hydrological processes. We revised this sentence to “To sample throughfall, litter leachate, and soil water (20 cm depth), four groups of replicate collectors were set for each of these measurements” to “There were four replicates of throughfall, litter leachate, and soil water (20 cm depth) respectively. All the collectors were set around the eddy flux tower randomly.”

(3) Line 155, in the soil of tropical rainforests: Reference is needed. Answer: Thanks, we have added the reference in the text and the reference list.

(4) Line 158: You just mentioned the information of gas analyzer. Please explain how you measured soil respiration using the analyzer. Answer: The soil respiration was measured using a Li-820 system (Li-Cor Inc., Lincoln, NE, USA), which consisted of an infrared gas analyzer with a polyvinyl chloride chamber(diameter of 15cm and height of 15.0 cm). a polyvinyl chloride collar(diameter of 15cm an height of 5cm) was installed in the forest floor to a depth of ~3 cm. All the leaf litter and small branches were left in the collar. Soil respirations were detected from 09:00 to 14:00 local time when was taken to represent respiration in that day (Sha et al. 2005, Yao et al. 2011).

(5) Line 298 sensitivity indices: I recommend you to explain this in the Calculation and

statistics. Answer: Thanks, we have added it in the calculation and statistics details. “In order to evaluate the variation of soil temperature, soil water content, water and DOC fluxes to soil respirations in tropical, we have standardized all the parameters by the measured value sub the means of the observation period. And consider the slope of linear regression between soil respiration and soil temperature, soil water content and water and DOC fluxes as the sensitivity indices. In this way, we compared sensitivity of soil respirations to all of these parameters.”

(6) Line 422-429: This is a repeat of previous sentences. Answer: We have deleted these lines.

Please also note the supplement to this comment:

<http://www.biogeosciences-discuss.net/bg-2016-225/bg-2016-225-AC4-supplement.pdf>

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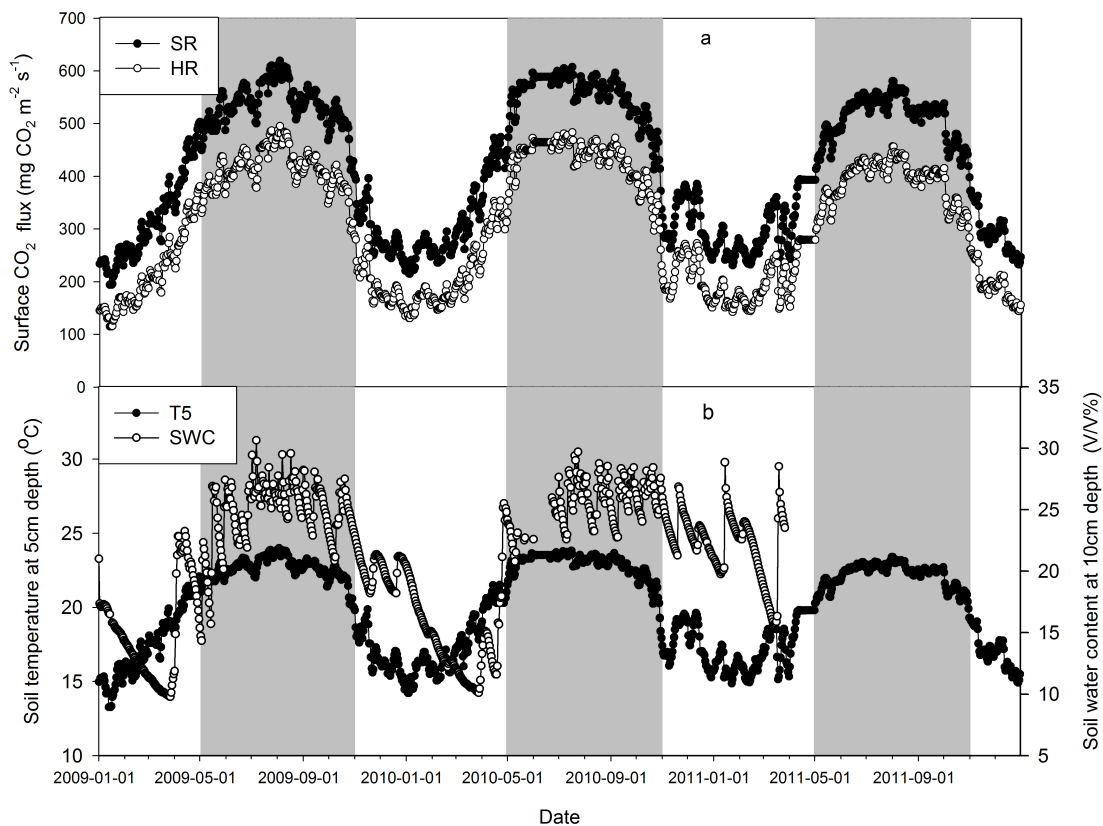
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**Fig. 1.** Figure 2 Dynamics of soil respiration (SR) and heterotrophic respiration (HR) (a) and soil temperature at 5cm and soil water content at 10cm (b) in the tropical rainforest at Xishuangbanna, southwest

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