Biogeosciences Discuss.,
doi:10.5194/bg-2016-225-AC3, 2016

Biogeosciences Discussions

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

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Received and published: 2 August 2016

Dear anonymous referee, We deeply appreciate your considerations of our manuscript for Biogeosciences. We have carefully considered all yours comments and suggestions and made the revision accordingly. Below, we briefly introduce how we revised the manuscript. We would like to express our thankfulness to you for taking time and effort to provide such insightful comments which further improved our research paper. We look forward to receiving any further comments from you. Thank you and best regards! Yours sincerely: Wen-Jun Zhou Corresponding author: Yi-Ping Zhang (yipingzh@xtbg.ac.cn) Major comments 1 One is about the sensitivity index. We know that soil respiration increases with increasing temperature, and Q10 is widely used to de-

termine the temperature sensitivity. The authors developed similar sensitivity index for soil respiration to water fluxes, DOC fluxes and soil water content. I believe that these kinds of sensitivity index are useful when comparing them among different sites, as is the Q10. However, I don't think we can compare among the temperature sensitivity, soil water content sensitivity, water flux sensitivity, DOC flux sensitivity within the same site, because they are different parameters and the units for each parameter are different. Thus the authors need to provide the rationales for these comparisons, otherwise the conclusions stated by lines 35 to 38 are different to stand. Answer: Thanks for your significant comments and suggestion on the sensitivity indices. In order to be able to evaluate the sensitivity of soil respiration towards soil temperature, soil water content, water and DOC fluxes to soil respirations in tropical , we have standardized all the parameters by the ratio of measured value to the means of the observation period. And consider the slop of linear regression between soil respiration and soil temperature, soil water content and water and DOC fluxes as the sensitivity indies. In this way, we compared sensitivity of soil respirations to all of these parameters which originally have different unit.

2 The other concern is about the importance of DOC. DON input from throughfall accounted for about 7% of the net ecosystem C exchange. However, it may be even minor when compared to soil respiration. So it needs to not overstate the importance of DOC in C budget. The phrase of "key" in the abstract (line 32) and throughout the manuscript may be not proper, to my point of view. It may be better to use "important" instead "key".

Answer: thanks for your advise, we use the "important" for all the description of DOC role the text.

Specific comments:

1) Line 96, in a tropical forest;

Answer: This sentence was revised to "Our study was performed in a tropical rainforest

at Xishuangbanna in southwest China, on the northern edge of a tropical region." As your suggestion.

2) Line 124, how large is your study plot?

Answer: We have added the plot area as the following description "At the study plot (a 23.4 ha catchment)".

3) Line 127, "the" may be not necessary;

Answer: Thanks for your careful suggestion, we have deleted "the" in this sentence and revised to "To sample throughfall, litter leachate, and soil water (20 cm depth), four groups of replicate collectors were set for each of these measurements."

4) Line 179, 2 to 6 mg? what standards were used to calibrate the measured values for plant and soil samples, as well as for DOC samples? Answer: We revised the sample weights to"1.00-3.00 mg plant samples and 10-40 mg soil sample dried and sieved through 100 mesh size "according to the analyzing original records. We used low organic soil standard (CatNo.B2153) for soil and DOC and wheat flour standard (CatNo.B2157) for plant sample determination of δ13C respectively. The standards were certified in Organic Analytical Standard (IAS/OAS) at Elemental Microanalysis Ltd(Oakhampton, Devon, UK).

5) Line 291, the contribution of HR to total soil respiration was 72%, which is in higher than many reports for forests? Is this normal? Answer: Hanson et al (2000) showed heterotrophic respiration is about 54% of total soil respiration globally. The ratio is 30-83% of the total soil respiration in temperature and tropical forests(Behera et al,1990; Epron et al 1999, Tomotsune et al, 2013) and 7-50% in boreal forest (Matsushita,2015). So HR contributed 72% of the total soil respiration of this research is in the higher level compared to the research in the global. Behara, N., Joshi ,S. K., Pati, D. P.: Root contribution to total soil metabolism in a tropical forest soil from Orissa, India, Forest Ecology and Management. 36: 125–134, 1990. Epron, D., Farque, L., Lucot, E.,

Badot, P-M.: Soil CO2 efflux in a beech forest: the contribution of root respiration, Ann For Sci. 56: 289-295,1999. Hanson, P., Edwards, N., Garten, C. & Andrews, J. Separating root and soil microbial contributions to soil respiration: a review of methods and observations, Biogeochemistry. 48, 115–146,2000. Matsushita,K., Tomotsune, M., Sakamaki, Y., Koizumi,H.: Effects of management treatments on the carbon cycle of a cool-temperate broad-leaved deciduous forest and its potential as a bioenergy source, Ecological Research. 30(2): 293-302,2015. Tomotsune, M., Yoshitake, S., Watanabe, S., Koizumi, H. (2013). Separation of root and heterotrophic respiration within soil respiration by trenching, root biomass regression, and root excising methods in a cool-temperate deciduous forest in Japan. Ecological Research, 28, 259-269.

6) Line 299, sensitivity of soil respiration to soil moisture has not shown in Fig S2. Answer: Thanks for your reminder, we added this in FigS2.

7) Line 309-310, how did you calculate DOC-flux-dependent sensitivity indices for SR (3.62) and HR (5.12)? These numbers are not shown in Table 2. Answer: We calculated all the hydrological processes DOC-flux-dependent sensitivity as the average$\pm$standadr deviation for both SR and HR.

8) Table 1, it is better to have significance test for the differences between rainy and dry season. Answer: Thanks, We have added the statistic results in the table which has been changed to Table 2 between rainy and dry season and between hydrological processes.

Table 2 DOC ïĄď13C dynamics along the hydrological processes (R, rainfall, TF, throughfall, LL, litter leachate) and the ïĄď13C in leaves, litter, and surface soil in the tropical rainforest at Xishuangbanna, southwest China

Season R TF LL Soil water (0–20 cm) Leaves Litter Soil (0–20 cm) Rainy season –23.9$\pm$3.3a –28.7$\pm$1.7 bc –28.1$\pm$2.7 bc –23.9$\pm$1.6 a * –32.4$\pm$0.6d –30.4$\pm$0.2cd –27.3$\pm$0.1b Dry season –23.8$\pm$1.3a –29.1$\pm$1.6 bc –28.1$\pm$1.5 bc –27.1$\pm$2.2b –32.5$\pm$0.5d –30.2$\pm$0.1cd –27.3$\pm$0.1bc

R indicates rainfall, TF indicates throughfall, LL indicates litter leachate, SW20 indicates soil water at a depth of 20 cm. Different superior letters indicate significant differences between the treatments according to Lsd test (P < 0.05). *indicates the significant seasonal difference according to independent sample t test (p < 0.1)

Please also note the supplement to this comment:
http://www.biogeosciences-discuss.net/bg-2016-225/bg-2016-225-AC3-supplement.pdf

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Interactive comment on Biogeosciences Discuss., doi:10.5194/bg-2016-225, 2016.

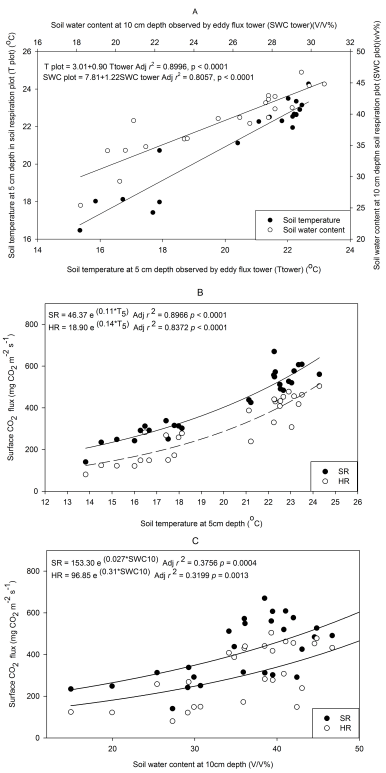

Fig. 1. Figure S2 Correlation between soil temperature and soil water content of CO2 from eddy flux tower explained during soil respiration observation plot from Feb. 2008 to Jan. 2009 (a), soil respiration a