

Interactive comment on “Effects of precipitation on soil respiration and its temperature/moisture sensitivity in three subtropical forests in Southern China” by H. Jiang et al.

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Received and published: 2 January 2013

Responses to short comments

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— General comments —

In this manuscript the authors present the impact changes in precipitation regime changes have on soil respiration in three contrasting subtropical forest ecosystems. This through-fall manipulation experiment provides a In this short comment, I want to present one major concern I have. This corresponds to the plot size used; in my opin-

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ion 3x3m plots are far too small to generalize ecosystem responses – especially the autotrophic component. Roots extend far beyond the tree and are not only localized below your plots. I recognize that this is not the first study to present results using such small plots, but in my opinion this should not validate their further use.

Response: We thank the reviewer for the comments and suggestions. We agree with this reviewer that plot size is an important part in experimental design. We carefully considered it when we designed the experiment. First, we checked the plot sizes used by other similar manipulation experiments. As this reviewer agrees, there were several precipitation manipulation experiments using small plots (Borken et al., 2006; Zhou et al., 2006; Cleveland et al., 2010). For example, a recent precipitation manipulation experiment in a tropical rain forest used 2.4m×2.4m plot (Cleveland et al., 2010). Second, we considered the availability of plots to build the precipitation interception and redistribution facility. As plot size increases, it is not easy to find adequate places to set the plots and replicates, and difficult to build the facility. Third, heterogeneity would increase if plot size is too large. We understand that the roots grew everywhere and not just in the plots. We considered the tree locations when we chose plot locations and tried to find plots with considerable roots. In this study, we measured fine root instead of total root. Compared to coarse deep roots, the fine root is more sensitive to climate change. Accordingly, we found that the drought treatment significantly decreased fine root and soil microbial biomass in the top of 30cm soil layer, which is the main source of soil respiration. Anyway, in the discussion section, we added one paragraph to explain our choice of plot size and acknowledge the limitation of the experimental design seeing in the below:

4.4 Limitation of the study

In this study, we selected three typical forest ecosystems in the south of China and tested the effects of precipitation alteration on soil respiration. One shortcoming of the experimental design was the plot size used. We decided the plot size based on the common practices in manipulation experiments, availability of adequate plots for

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building precipitation interception and redistribution facility, and heterogeneity of plots. While the 3m×3m plots were employed for drought treatments (EP), it is difficult to detect the whole ecosystem responses – mainly deep root respiration. Thus, the inferences regarding to the response of autotrophic respiration to drought should be read with cautions. Further studies are needed to draw rigorous conclusions regarding forest ecosystem responses using larger plots.

Other comments/ recommended changes

1. Introduction:

P15670. L.10: An additional reference here is van Straaten et al 2011. In this paper we present the results of a drought manipulation experiment in a tropical forest ecosystem in Indonesia. It is available at: <http://www.esajournals.org/doi/pdf/10.1890/ES11-00079.1>

Response: We cited this reference. Thanks for the suggestion.

2. Materials and Methods:

2.1 Site description: Would it be possible to add a table with the basic site characteristics of the three forests? This should include both climatic conditions, soil characteristics (pH, texture, ECEC) and species compositions.

Response: We have reported climatic conditions and species compositions in the Site Description section. Stand characteristics of the three forests have been also reported in Deng et al. (2012). We referred this in the revision.

2.2 Experimental design:

P15673. L.4-5: clarify – not clear: “...distance is only 5 cm.”

Response: The distance is between the pipes and the soil surface, which was added in the revision.

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P15673. L.5: Remove “the” from: “Around each EP plot, the thick PVC: : :”

Response: Corrected

2.3 Soil respiration measurements:

Please add some more details on (1) Chamber volume, (2) length of measurement (minutes), (3) calibration of the LICOR, and (4) location of chambers in respect to the edge of the plot (was there a buffer zone)

Response: There were many studies using Li-6400-09 to measure soil respiration and the measurement method is universally known. The soil chamber volume of Li-6400-09 is 991 cm³ (zero insertion depth). The length of measurement is typically 1-3 minutes in a measurement cycle, depending on the calculation of the instrument. The company suggests every two years for factory calibration. In order to ensure the measuring stability of the instrument, soil respiration was measured three times for each soil collar in this study. Once the soil respiration values in the three time measurements vary greatly and no obvious disturbance was found, we would calibrate instrument and measure again. Five PVC soil collars are up to 50 cm from the edge of the plot.

2.4 Statistical analysis:

Instead of a repeated measure ANOVA, a linear mixed effects model has a stronger statistical power.

Response: The repeated measure ANOVA used here is a linear mixed model.

Interactive comment on Biogeosciences Discuss., 9, 15667, 2012.

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