

Interactive
Comment

***Interactive comment on* “Inter-annual precipitation fluctuations alter the responses of above- and belowground biomass to water and N enrichment” by D. L. Kong et al.**

D. L. Kong et al.

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Review 1 Specific comments The Introduction considers the role of extreme events, but less so the role of variation in "inter-annual precipitation", which is in the title of the paper. The reader is left wondering is the paper going to be about an extreme event or more just variation among years. Authors need to think about emphasis here - see my comments below around clarity of extreme events. Response: Here, in this study, we focus on influence of a naturally occurring extreme rainfall event on plant response to water and N enrichment. This extreme rainfall event was the main cause of difference of precipitation between the two years of our study, 2007 and 2008. Thus,

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the topic in the text of this manuscript shifts to the pattern and mechanism for the effect of this extreme rainfall event. As another reviewer also talked about this issue, we try to make a revision of the title by change by stressing on the extreme rainfall event. This title reads as follows: Inter-annual precipitation fluctuations caused by an extreme rainfall event alter the responses of above- and belowground biomass to water and N enrichment.

The study focuses on an experiment that is subject to an uncontrollable across all treatments among years (precipitation). However, little is said about whether there is another uncontrollable across treatments among years (nutrients). Nutrients could vary among years through dry or wet deposition (for example, through high precipitation) or through some effect of changes in soil moisture among years on nutrient mineralisation. I would like to see some consideration of this topic in the Introduction. In fact it is one of these, nutrient leaching/loss, among years that gives the more surprising result from this study. This is the basis for arguing maybe experiments for a biome should run long enough to characterise the decadal level fluctuations found at a site. Response: The authors appreciate for this valuable comment. As discussed in the manuscript, variation of soil nutrient was an important mechanism to interpret the influence of extreme rainfall event on water and N effects on plant growth. In the Introduction, we focus on the effects of these events on soil nutrients. In fact, inter-annual variation of precipitation could be caused to a much extent by the extreme rainfall events. Therefore, in the revised version, we stressed on the importance of extreme rainfall events in contributing to inter-annual precipitation fluctuation. In addition, as the reviewer suggested, we added some few sentences in the first paragraph of Introduction to give the general pattern of soil nutrients variation in dry and wet years.

Detailed comments on text Page 13429 Line 6 Delete "changes of" Response: We have deleted "changes of"

Page 13430 Line 26 Surely must read "individual rainfall event size" Page 13431 Line 9 In what way is your ca. 500 m² study area representative of the Eurasian steppe?

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Your location is not random and you only have one location. I would drop the word representative Response: We have dropped the word “representative” and this sentence was revised as follows, “This study was conducted in semiarid grassland belonging to Eurasian steppe”.

Page 13433 Line 11 Why did you average biomass across the four sampling dates per year? Response: Here, this analysis to show the treatment effect on the over all biomass over the two years. This was done because repeated measures ANOVA, as shown in the data analysis section, had been conducted within years. Thus, it is necessary to give the general pattern of treatment effects over the two years. Biomass averaged across the four sampling dates per year can be a convenient way for this purpose.

Page 13434 line 15 Now I see the focus is not on one extreme event, but a number of large events. Response: We have revised this sentence and stressed on the importance of a single extreme rainfall event.

Page 13436 Line 18 Now we see large rainfall events but extreme rainfall events in the next line. What is meant by large versus extreme, and then what is typical? Response: We have changed the “large” into “extreme” because the word of “large” is more general to describe the character of an extreme rainfall event and may cause confusion of the topic of this study.

Page 13437Line 16 I don't find the sentence starting "To illustrate, " that informative. It does not provide a clear link between the previous and next sentence Response: We have changed the "To illustrate, " into “This could be demonstrated by the fact that”, which could make the sentences read fluently.

Page 13437 Line 23 Now it's an extreme rainfall event not events Response: In this study, we stressed the importance of natural occurring extreme rainfall event in our study.

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Page 13438 Line 4 Can you integrate your data on soil nutrient availability through time in the Results to support your view in the Discussion Response: Although we did not provide the dynamic of soil available N in the two years, this result could be found in two of our previous papers. This first paper is Lü (2011) as indicated in the references section of our study. Another paper is Lü (2009) in Plant and Soil with title 'Nutrient resorption responses to water and nitrogen amendment in semi-arid grassland of Inner Mongolia, China'. As soil available N in these two years has been presented clearly in these two papers, we did not give these data in our study.

Page 13439 Line 3 Is it not possible in 2008 that plants were not N limited so didnt increase roots to improve uptake, but just increased above ground growth to get height. Response: We acknowledge that this possibility may exist in 2008. However, as presented in our study, we argue that it is likely that plants may also be N limited in 2008.

Page 13439 Line 6 Needs rewording. Response: We have reworded this sentence as follows: Given that NO₃⁻-N might leach from the soil more easily than NH₄⁺-N after the extreme rainfall event.

Page 13440 Line 3 But on Page 13434 Line 14 it gives an average amount per event??? Response: We revised the Page 13434 Line 14 by stressing the important contribution of the extreme rainfall event in 2008 to the higher average rainfall intensity in August of 2008 than that of the same period in 2007.

Interactive comment on Biogeosciences Discuss., 10, 13427, 2013.

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