

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.

Anonymous Referee #2

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General comments The authors use two growing seasons with contrasting rainfall totals, to examine the influence of rainfall events on pasture growth in the Eurasian steppe. The experiment takes advantage of a fortuitous single, intense rainfall event to examine the grassland response, with and without the addition of water and nitrogen. This type of investigation is crucial to the understanding of both natural and managed ecosystems, especially with forecasts in changes in the amount and intensity of precipitation.

I was confused whether this manuscript was looking at inter annual variation in the amount of precipitation, or just the effect of a single extreme rainfall event. Changes in rainfall from one year to the next may be due to changes in intensity, changes in
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the intervals between rainfall events, and changes in the total amount. It would be interesting to know if the rainfall outside the single major event was similar for both years. The authors need to clarify their purpose for the research, and also consider changing their title from fluctuations to something that reflects single events. The text can be shortened and tightened to make the points clearer, but the figures and tables are very clear and well presented.

There is some confusion in the introduction about the nature of the experiment. Obviously it was set up for human controlled manipulations, but nature intervened with a single large pulse of rain, which the authors used to examine effects of such events. It is interesting to consider the consequences of this same amount of rain occurring earlier or later in the season. Too early in the season and the temperatures might have been too cold for a response, or the soil might have already been saturated. If it occurred at the optimal time there might have been a large response in growth due to the long term effect of filling soil water reservoirs, later in the season the grasses may not have had time to respond as they flowered and started to senesce. Although this is a one off event it does nicely exemplify the flow on effects of large rainfall events have on other controlling variables.

Since nutrient status of the grassland is an important consideration and is also a treatment, some more information about the status of nutrients before commencement of the experiment, and also some discussion on the likely natural inputs of nitrogen that might occur. These inputs might also vary between years, confounding the results.

Detailed comments on the text P13429 L 22+24. The authors don't say if the increases or decreases in ecosystem carbon fluxes are gains or losses of carbon from the ecosystem. P13431 L 11. We need more information about the site, altitude, past history, nutrient status before the experiment, grazing and fertilizer history. P13432 L26 A little bit more information about the methods used to determine the soil moisture would be helpful. P13433 L16 Is the precipitation really summed for the whole year, or just this part of the growing season? What happens in the rest of the year? Is the

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soil fully saturated at the beginning of May? P13434 L15 With a single large event, the average of all the events will be increased. The seasonal average is strongly skewed by the single event. It would be nice to know if 2008 was a typical year for precipitation, except for the single large event.

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

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