

Interactive comment on “Response of plant community composition and productivity to warming and nitrogen deposition in a temperate meadow ecosystem” by T. Zhang et al.

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Response to reviewer Thank you for your comments and good suggestion on our manuscript. The following is the explanation how we complied with your suggestions. We hope that you will point out the errors that we can correct during further revision.

1. The novelty of this study is unclear. The effects of warming and N addition to vegetation have been previously studied. Therefore, the authors must review those studies first and show the novelty of their own study in comparison with those studies. Thanks, we accepted and reviewed the previous studies on the warming and N addition. Most of these previous studies only focused the effects of warming and N

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addition on plant diversity or productivity, but the relationships between plant diversity and productivity are not consistent, so we think that elucidate the effects of warming and N addition on plant community composition and productivity simultaneously will help us understand the impact of potential global warming and N deposition on ecosystem structure and functions. 2. The interpretation of statistical analyses is inconsistent throughout the manuscript. Although the effects of warming and N addition tested by ANOVA and multiple comparison tests were sometimes discrepant, the authors adopted either result arbitrarily depending on the discussion. As a result, contradicting conclusions are found in the manuscript (P. 6659, L. 26–27 vs. P. 6660, L. 14–15). Thanks for your good suggestion. We changed it and added methods and process of the necessary statistical analyses. 3. The Discussion is superficial, probably because the novelty and meaning of this study were not clearly shown. The flow of the Discussion is unclear, and most parts are merely a comparison of results between the present study and prior studies. The manuscript appears to be too descriptive. Thank you, we rediscussed some parts of discussion and deleted those contradictory and redundancy. Please review prior studies such as Shaw et al. (2002) *Science*, Zavaleta et al. (2003) *Ecological Monographs*, Hutchison & Henry (2010) *Ecosystems*, and Gill (2014) *Plant and Soil*, on the effects of warming and N addition on vegetation. And then please show the novelty of your study in comparison with these studies. Accepted, we reviewed these prior studies and show the novelty of our study in introduction and discussion parts. <Materials & Methods> How did you measure the frequency and cover of each species? We measured the frequency and cover of each species using a modified point-frame method (Cook and Stubbendieck, 1986). As arid vegetation is sensitive to the amount of precipitation, it is preferable to show precipitation data of the experimental period. Thanks, we added the precipitation and air temperature data of experimental period in result part (Fig. 1). P. 6652, L. 15: Remove the terms “species richness.” We deleted it. P. 6656, L. 15–16: According to Table 2, the effect of warming is not significant for all the vegetation parameters. Thanks, we changed it to “Across the four experimental years warming

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had no significant impact on species richness (Table 2) but tended to increase (Fig. 3a) in the studied meadow steppe community, which is in accordance with the results observed in annual grassland (Zavaleta et al., 2003);” P. 6656, L. 20–21: Please show evidence that warming increased the number of the forbs species. We added the forb species appeared in warming treatment plots in revision. P. 6656, L. 22: I think the opposite is true. This may be related to the changes in soil moisture induced by warming. Accepted, and we reexplained it “In Songnen grassland, soil structure is very compact and waterlogging appears frequently. Warming aggravated soil evapotranspiration and reduced soil moisture; besides, N addition improved plant growth and uptake of water, so the lowest soil moisture appeared in warming plus N addition treatment. Moreover, this may be related to soil nutrients availability, in our another studies we found that warming increased soil net N mineralization rate and soil total N and P tended to improve (Ma et al., 2011; Zhang et al., 2013). The results suggest that short-lived forbs are more sensitive to global warming.” P. 6657, L. 20–22 and L. 28–29: Please provide data supporting these discussions. I think you can show the changes in abundance of *L. chinensis*, because you surveyed the vegetation according to the species. Thanks, we added the changes of *L. chinensis* abundance. P. 6658, L. 15: The description of the result is incorrect. According to Table 2, the effect of warming was not significant in graminoids or forbs. Accepted, this sentence should be changed to “N addition highly improved the IV of gramineous species, while warming decreased it in 2008 and 2009 and increased importance value of forbs in 2007 (Fig. 4).” P. 6658, L. 21–27: This discussion is too abrupt and unnecessary. I recommend deleting it. Thanks, we deleted it. P. 6659, L. 16–18: Please show evidence. The relationship between aboveground biomass and precipitation should be provided. Accepted. P. 6659, L. 19–20: Incorrect description of the result. Significant decreases in aboveground biomass due to warming were found only in 2006 (Fig. 4a). Thanks, we changed it as follows “Except in 2008 warming significantly increased aboveground biomass, warming tended to decline aboveground biomass and a significant reduction was detected in 2006 in Songnen meadow ecosystem.” P.

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6659, L. 23–24: Please discuss why the effect of warming differed among years. We discussed why the effect of warming differed among years “The effect of warming differed among years which might be related to the fluctuation of precipitation and atmosphere temperature (Fig. 1). The mean atmosphere temperature was lower than other years whereas precipitation was higher, which decreased the negative effect of warming on aboveground biomass, while high temperature beyond plant capacity and drought induced by warming will severely affect the growth of plant species (Wan et al., 2005).” P. 6659, L. 26–27: This description contradicts that on P. 6660, L. 15. Interpretation of results must be consistent throughout the manuscript. Thanks, we are sorry to make some errors. We changed and described it in revision. P. 6660: The Conclusions and Implications should be more concise. Accepted, we deleted the redundancy in conclusions part. P. 6660, L. 7–9: Incorrect description of the result. Evenness was not significantly affected by warming or N addition (Fig. 2b, Table 2). Accepted, we revised it as follows “Although warming had no significant impact on species richness, but tended to increase it. N addition highly decreased the species richness and diversity, and the decline of species richness and diversity increased gradually with N enrichment.” P. 6660, L. 15: This contradicts the description on P. 6659, L. 26–27. Thanks, we changed the sentence to “Warming had no significant effect on aboveground and belowground biomass.” Moreover, we revised some other errors in manuscript.

Please also note the supplement to this comment:

<http://www.biogeosciences-discuss.net/11/C2735/2014/bgd-11-C2735-2014-supplement.pdf>

Interactive comment on Biogeosciences Discuss., 11, 6647, 2014.

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