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Biogeosciences Discussions

Interactive comment on "A positive correlation between plant diversity and productivity is indirectly caused by environmental factors driving spatial pattern of vegetation composition in semiarid sandy grassland" *by* X. A. Zuo et al.

Anonymous Referee #1

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General comments Zuo et al. investigate the drivers of the diversity-productivity relationship in semi-arid sandy grassland ecosystems in Inner Mongolia. Although the results are not particularly novel, the use of structural equation modelling to determine the direct and indirect drivers of the relationship is both novel and interesting. Although well written in places, the bulk of the text is unfortunately very wordy and the grammar is poor, which makes the paper difficult to read and understand what the authors are trying to communicate. The main scientific issue I have is with the use of total above-ground biomass as a surrogate for productivity, and this needs to be carefully justified

in the methods section for the reader to have confidence in the authors results.

Specific comments Title – although this effectively communicates the main result it is long and cumbersome and I would recommend trying to shorten it – e.g. "Indirect drivers of diversity-productivity relationship in semiarid sandy grassland"

Abstract, P 11796, Line 11/12 – I think you should mention the use of ordination to analyse vegetation composition here

Methods, page 11799, line 5 – How is agriculture different from pasture? Do you mean cropland and pasture?

Methods, Page 11799, line 19 – This reads like there are no non-native species present in these ecosystems – which seems unlikely. Is this correct?

Methods, page 11799, Line 25 – is August the moth of peak biomass in all these ecosystems?

Methods, page 11800, line 2-10 – this seems like a very low level of sampling per site. Please provide some indication of the level of within-site heterogeneity in soil/plant communities/biomass compared with among site heterogeneity?

Methods, Page 11800, Lines 4-6. I am not convinced that the use of total above-ground biomass as a surrogate for productivity is appropriate in these ecosystems. Although this is an established method for assessing productivity of (annual) grasslands, there are a number of perennial shrub species listed as being present in the study areas. The use of total above-ground biomass is likely to vastly overestimate annual productivity where these shrubs are present. Did the authors separate out current year's growth from previous season's growth as per Bai et al. (2007) (cited in text)? How was this done for perennial grasses (if any were present)? Were the sites grazed and what effect did this have on peak standing biomass? This is a key issue that needs to be properly explained in the methods section so that readers have confidence that the measure of productivity is accurate.

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Methods, Page 11800, Line 22. What is the difference between relative abundance and relative cover? This, and the following sentence (lines 23-25), is unclear

Results, page 11805, line 11-12, it seems a bit weird that you were able to explain 100% of the site variation – perhaps this is because each site only has one replicate? Also, variation in what?

Results/Discussion – this all hinges on the assumption that your use of total above-ground biomass is an accurate measure of productivity. I am not convinced, given the information presented currently. Also, much of this text is wordy and unclear and could be shortened.

Discussion, page 11810, lines 1-12 – this is good discussion and is comparatively well written.

Technical comments There are numerous grammatical flaws throughout the text – and I strongly recommend professional editing to improve the English. Some examples from abstract and introduction: Abstract "The analysis from optimization model of structural equation suggests" should be "The analysis from the optimal structural equation model suggests" or even better "Structural equation modelling suggests". Abstract, final sentence "vegetation composition determined by environmental gradients" should be "vegetation composition which, in turn, is determined by environmental gradients" Intro, Page 11797, Line 2, "..ecosystems include.." should be "..ecosystems. These include.." Intro, Page 11797, lines 11-18, This whole paragraph is unclear due to poor grammar. Intro, Page 11797, line 19 – "environmental gradient" should be "environmental gradients", and also which gradients are being referred to here? Intro, Page 11797, line 24-27 – this is a question and needs a question mark (?). Also "how environmental factors" should be "how do environmental factors" Intro, page 11798, line 1 "compositions" – should be "composition" Intro, page 11798, line 20-21. Point (1) needs re-wording

There are numerous other examples throughout the text that I have not listed here.

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Interactive comment on Biogeosciences Discuss., 8, 11795, 2011.