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Biogeosciences Discussions

Interactive comment on "Differences in plant cover and species composition of semiarid grassland communities of Central Mexico and its effects on net ecosystem exchange" *by* J. Delgado-Balbuena et al.

Anonymous Referee #1

Received and published: 17 January 2013

The authors measured daytime and night time NEE in five ecosystem types (resulting from different land use) varying in species cover and composition in Mexico. They also related these fluxes to biotic and abiotic variables and calculated the NEE balance for each ecosystem. The paper is very well written, however, I have some concerns about the general setup of the study as well as the methods as well as some inconsistences in terminology used. Please see more details below. I also listed some minor comments after that.

Major comments:

My main concern is about the selection of the sites. It seems that the exclosure does not represent the native vegetation within the area (as it is no longer grazed) and thus cannot really be used to assess land use changes on CO2 exchange. I think this becomes evident by the fact that the exclosure features a net loss of C. If this would be a truly native grassland, then this would not be sustainable over longer terms. Thus, I do not think that the exclosure can be used as a baseline for the other four ecosystem types that have been converted in one way or the other. A solution to this problem would be to take out all reference to land use change and that the exclosure represents the native short-grass prairie and just talk about these different "ecosystem types". But then the authors have to find a new justification for the story.

Further, I was surprised that the authors only had one replicate per ecosystem type. From these results they generalize, which seems a bit weak. I know how time consuming these measurements are and that this can no longer be changed, but at least it should be acknowledged within the manuscript.

The same goes for the fact that the measurements were not conducted simultaneously within the five plots, but one after the other on five consecutive days. There might have been rain events within these 5 days that might skew the measurement taken. Also, were the light conditions the same? Always completely clear sky? Was there a difference in cloud cover between the days? If the conditions were not close to identical then I do not think that a comparison between the five systems is valid. But maybe the authors could account for the fact that conditions were not identical somehow by correcting the data. Of course only if this were true.

I have never worked with these large chambers the authors used, but it seems that also these chambers would heat up during the time of measurement so that the conditions might be altered during the 120s. Did the authors account for that or use some sort of a cooling devise within the chamber during the measurements?

It is not clear how many replicate measurements the authors conducted per time pe-

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riod. They mention that they measured at 8:00, 12:00, 16:00 and 20:00 and took a 120s reading with and without cloth. But only once? Or more often? The authors should clarify this. On page 17109, line 17 it sounds as if the measurement took 3 hours (from 20:00 to 23:00). If this is true what exactly did the authors do do during the 3 hours?

The authors claim that there were differences in cover and biomass, but do not present this data. I think it would be nice to see the actual data and not just general numbers for these systems as presented in Table 1. Also, it would be nice to have some sense of proportion of C3 to C4 plant species in cover as well as biomass or LAI. Please present these data in a revised version of the manuscript. This would make the results as well as the discussion much stronger.

Finally, I was getting somewhat confused throughout the manuscript with NEE. It is not always clear if the author speak of daytime NEE, night time NEE or NEE balance. Please go through the manuscript and make clear what is meant at each time one of the above is used. Also, I could not find any statistics where the authors compare NEE balance among the plots. In the discussion, page 17116, line 24 they mention that there was no contrasting rates of NEE. Where are these results?

Minor comments:

Page 17104, lines 20 – 26: this description is somewhat confusing. Can you clarify?

Page 17106, lines 9-10: please mention what Ta and SWC are.

Page 17109, lines 23 ff: the authors explain how they calculated annual NNE rates, but do not present these values at all. There is some mention in the text, but then the values are g C m-2 d-1? Can the authors clarify this?

Page 17110, lines 20 – Page 17111, line 2: I do not quite understand why the bootstrapping was done. Was that due to missing replicates on the individual measurements per time unit?

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Page 17111, line 1: change calculated to calculate

Page 17114, line 13: not clear what the authors mean under point (i)

Page 17115, line 14: insert with before respects

Page 17117, lines 2 – 13: this part consists of results and probably would better fit into the results section.

Page 17118, line 24 – page 17119, line 9: this part consists of results and probably would better fit into the results section

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Interactive comment on Biogeosciences Discuss., 9, 17099, 2012.