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Interactive comment on "Cultivated grasslands present a higher soil organic carbon sequestration efficiency under leguminous than under gramineous species" *by* Yu Liu et al.

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Thank you very much for your positive and constructive comments and suggestions on our manuscript. We have tried to take these comments and suggestions seriously and addressed each of them in all details. We have replied to the comments point by point and all changes have been included in the MS-modified version attached as a supplement.

The experimental design was not clearly explained (factorial design, randomized block design, randomized plot design etc).

Response: Thank you for your suggestion, we have added the description of exper-

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Discussion paper

imental design in the section 2, and we have clearly explained that we designed the experiment to be a randomized plot design in our modified version.

The other factors must be constant so that the differences that can occur in dependent variables can be explained only by independent variables. The primary independent variable in this study is the grazing area. The other factors such as soil properties (soil depth, grain size distribution, aggregation), seeding rate, amount of irrigation may affect the soil carbon content were ignored. Thus this factor must be constant so that changes in soil carbon parameters can only be attributed to the grazing area.

Response: Thank you for your suggestion, the experimental site was originally under sorghum (Sorghum bicolor L.) continuously from 1970 to 2005 and it was abandoned from 2005 to 2007 (grazing exclusion). We conducted our experiment in 2007 and it was without grazing from 1970 to 2012, so we studied the effect of plant species on soil carbon.

The variation in climatic parameters over the years should also be noted.

Response: Thank you for your suggestion, we had compared the average of precipitation and temperature in this site before we analyzed the data. There was no significant difference from 2007 to 2012.

Differences in the grazing area that are considered to be factors were not clearly explained. What is the mean of uncultivated and natural grassland? I don't understand the differences between them.

Response: Thank you for your suggestion, uncultivated grassland in our paper represents abandon cropland, which convert from cropland to grassland. It was not ploughed during our study period, so we used uncultivated grassland. Natural grassland represents the grassland never has never been ploughed.

Why the seeding rates were different? How these rates determined?

Response: Thank you for your suggestion, the different seeding rates were contributed

to the percentage of germination, to guarantee the equal plant density in each grassland. The rates were determined by reference to local farmland crop density.

The differences between abandoned cropland and natural grassland in terms of plant covering rates were not given that they can impact the studied carbon parameters.

Response: Thank you for your suggestion, according to our investigation, the plant covering rates of abandoned cropland and natural grassland were no significant difference, so those were not showed in our manuscript.

How the bulk density that has been used in the relative calculation formula was measured is not clarified. Where this value was measured in soil profile? In one point or along the profile? As it is well known that soil bulk density can vary along the profile depending on differences in soil properties.

Response: Thank you for your suggestion, we calculated bulk density layer by layer (10 cm). We used an average of ten layers (0-100 cm) to show the bulk density in the depth of 0-100 cm.

Title is not suit for this manuscript. Only two grasslands (leguminous and gramineous grasslands) have been mentioned in the title. However, there are 4 types of grazing compared. The mistake made at the title of the article was also done in the abstract, only the findings of the omparison of the leguminous and gramineous grasslands were given in the summary section.

Response: Thank you for your suggestion, title is a brief summary of the main results of the article. Although there are 4 types of grasslands in our manuscript, the main results focus on leguminous and gramineous grasslands and uncultivated grassland and natural grassland are just control in our study.

The map showing the study area and sampling points were missing.

Response: Thank you for your suggestion, we have added a map and a schematic figure of the sampling strategy in Figure 1 to show the study area and sampling points.

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The descriptive statistics and normality test results of studied properties should be given with a table.

Response: Thank you for your suggestion, we have added the descriptive statistics and normality test results of studied properties in Table 2.

The basic soil properties such as grain size distribution, aggregation, pH etc of the grazing areas were not given.

Response: Thank you for your suggestion, we have added the relative content in section 2 experimental site and design in our modified version.

When the results are given, it should be indicated in the text that whether the differences are statistically significant or not.

Response: Thank you for your suggestion, we have revised our conclusion and abstract to show the main result and the implications of the results in our modified version.

Please also note the supplement to this comment:
http://www.solid-earth-discuss.net/se-2016-109/se-2016-109-AC6-supplement.pdf

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