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Interactive comment on "Soil organic carbon in the Sanjiang Plain of China: storage, distribution and controlling factors" *by* D. Mao et al.

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Response to comments of Referee 2 (bgd-11-C6494-2014)

Dear editor, We are pleased to receive your letter that contains the important and constructive revision comments from referee 2 about our manuscript (Title: Soil organic carbon in the Sanjiang Plain of China: storage, distribution and controlling factors, No.: bgd-11-14765-2014). We revised the manuscript as suggested in the comments and prepared the revised manuscript following the journal guidelines. We hope that, after this round of revision, the quality of the revised manuscript will be eligible for publication. If you have any questions about this paper, please feel free to contact us.

Our responses to the comments from anonymous referee 2 are as follows:

Overview of comment: "This study presented in this paper has a great significance for quantifying the SOC storage and density over the major food production region, the Sanjiang Plain in China. On the whole, the paper was written well. However, its value of practicability is far beyond its creativity in study methods, So some necessary minor revision is needed for further publication." Response: We appreciate the endorsement and detailed comments from anonymous referee 2 about our manuscript. We have tried our best to address these comments. Our responses are as follows.

1. Comments for Data and methods 1.1 "Subsection 2.2, Page14769, Line 21-24: Some detailed information on HJ satellite imagery used in this study should be listed, and one classification accuracy (error matrix) should be added. Alternatively, adding a reference about the data source here is also acceptable. Response: Thanks for this positive advice. A reference about the data source of HJ satellite imagery and land cover has been added in the revised manuscript.

1.2 Page14769-70, Line 26-27: Same as above, add the data source information of soil data. Response: We agree this kind suggestion. A reference about the source information of soil data also have been added in the revised manuscript

1.3 Subsection 2.3. When were the soil samples collected? Which year? Response: Thanks for this comment. The soil investigation mentioned in this paper was developed in 2012. The time has been added in the revised manuscript.

1.4 Subsection 2.5. Is the unit "kg hm-2" correct? It should be "Kg ha-1", right? Response: We thank referee for this comment. The unit "kg hm-2" in subsection 2.5 have been replaced with "kg ha-1".

1.5 Subsection 2.6. Page14772, Line 5: After the phrase "Bemmelen index (0.58)", one reference should be added. Response: Thanks for this positive advice. Following the previous comment from Prof. Ding (bgd-11-C6414), this sentence including "Bemmelen index (0.58)" has been deleted. Therefore, the reference don't need here.

2. Comments for Results 2.1 “Page14774, Line 15: After the phrase “clay content (p<0.01)”, add “(Fig. 6c1-c3)”; Line 19: After the phrase “: : : 30 cm of soil”, add “(Fig. 6e1-e3)”.” Response: We agree. Following this comment, “(Fig. 6c1-c3)” and “(Fig. 6e1-e3)” have been added after the phrase “clay content (p<0.01)” and “. . . 30 cm of soil”, respectively.

2.2 “Line22: In Table 2, what does the “SS” mean? Give its full name, please.” Response: Thans for this comment. SS means the proportion of variances explained by variable. The full name should be “sum of squares”, which has been added in Table 2.

2.3 “Page14775, Line 1-2: From Table 2, how can the authors get the finding “precipitation exhibited more significant effects than temperature on SOCD”? Give some explanation, please.” Response: We thank referee for this comment. This sentence has been refrased to be “Temperature exhibited more significant effects than precipitation on SOCD of the top 1 m. We can get this finding according to the larger proportion explained by temperature than precipitation on variances of SOCD within the 1 m of soil (Table 2) and larger regressive coefficient (Fig. 6 A3, B3). Related explanations have been added in the revised manuscript.

3. Comments for Discussions 3.1 “Line 10-16: The authors compared the approaches of mapping SOC used in this paper with Yang et al.’s, i.e. Geostatistical Kriging interpolation vs. remote sensing VI method. In the following paragraphs, the authors also compared the estimated SOCD results in Sanjiang Plain with that published in some previous studies in Loess Plateau in China, as well as that in France. What is the objective of these comparison? What topics do the authors want to discuss here? From these comparison, what are the advantages or disadvantages in this present study?” Response: We thank the referee for this comment. In our manuscript, we made comparisons with other publications from the method and results. First, selecting a suitable method is essential to map the spatial distribution of SOC and quantify the SOC storage in the Sanjiang Plain. Therefore, the remote sensing VI method was compared with the Geostatistical Kriging interpolation used in this manuscript. Remote sensing

VI method isn’t selected because of the bad correlations between SOCD and Vis induced by rich ecosystem types. Second, the SOC in the Sanjiang Plain with temperate continental climate was compared to that in different regions on the earth, such as Loess Plateau in China, Laos, and France. The Loess Plateau in China located in a arid zone has a drier climate than the Sanjiang Plain. The Laos dominated in tropical monsoon climate is warmer than the Sanjiang Plain. The France has the same humid climate with the Sanjiang Plain. Different climate types induced the variances of vegetation type and distribution. Therefore, the SOCD in the Sanjiang Plain was compared with SOCD in the three regions to discuss the effects of climate factors and vegetation on the pattern of SOC. This comparison also demonstrated the necessity of regional quantification of SOC. Additionally, these comparisons were developed following the comments by the editor who recommend us to add comparison with results from other regions on the total SOC amount and controlling factors obtained in this study. In our revised manuscript, we have added some sentences to display our objective or topic about those comparsions. And some sentences also have been refrased to improve the discussion.

3.2 “Likewise, in the last paragraph of this subsection 4.1, the estimated SOC storage (2.324 Pg C) in Sanjiang Plain was compared with SOC in Northeast China and in the whole Country (26.43 Pg C and 69.1 Pg C). The acquisition time of soil data in this present study were very different from that other two studies. So in Line 6-7, how did the authors make such conclusion as “significant underestimation of SOC storage”?” Response: We thank referee’s comment. Our results revealed that the farmland have a smaller SOCD than forestland and wetland. A negative correlation of SOCD with increasing temperature and positive correlation of SOCD with increasing precipitation were observed from our analyzes. Meanwhile, significant losses from forestland and wetland to farmland, obvious increase in temperature, as well as notable decrease in precipitation in the Sanjiang Plain were recognized. All those findings tend to be a loss of SOC storage. However, through concluding related pubilication, we found that a smaller SOCD of the Sanjiang Plain than the result observed in this study.We thus

deduce the underestimation of SOC storage in previous studies in the Sanjiang Plain. In the revised manuscript, new sentences and references have been added to support this finding.

3.3 “How about is the SOC of forestlands? The authors didn’t mention this land cover type here.” Response: Thanks for this positive advice. Forestland covering the second largest area of Sanjiang Plain had the second largest SOCD (23.4 kg m-2) among the landcover types and stocked the second largest SOC (827.5 Tg C) in the 1 m soil depth. Related information have been added in the revised manuscript.

3.4 “Some sentences are some descriptions on results of this study, not discussions. So, they should be moved into the corresponding subsection of “3 Results”, e.g. Page14778, Line 16-17; Page14779, Line 10-12 and Line 24-26; and others.” Response: Thanks for this kind suggestion. We accept this comment. These sentences displaying the descripations on results (e.g. Page14778, Line 16-17; Page14779, Line 10-12 and Line 24-26) have been moved to the section of Results in the revised manuscript.

4. Comments for Conclusions 4.1 “Page14782, Line 8-11: “Based on the comparison between our estimate and the previous studies, we demonstrated that the previous report at the Northeast China and the whole country level significantly underestimate the SOC storage in the Sanjiang Plain.” This conclusion is questionable because the soil data were acquired in different time/year.” Response: We thank the referee’s comment. Similar to the comment 3.2, we have gave the argument. Our results revealed that the farmland have a smaller SOCD than forestland and wetland. A negative correlation of SOCD with increasing temperature and positive correlation of SOCD with increasing precipitation were observed from our analyses. Meanwhile, significant loss of forestland and wetland to farmland, obvious increase in temperature, as well as notable decrease in precipitation in the Sanjiang Plain were recognized. However, through concluding related publication, we found that a smaller SOCD of the Sanjiang Plain than the result observed in this study. Extensive soil investigation taking

the land cover types and soil types into consideration in our study was developed to quantify the SOC stock. We demonstrated that the present estimation might better represent the actual SOC storage distributions in the Sanjiang Plain, and consequently that the previous report at the Northeast China and the whole country level significantly underestimate the SOC storage in the Sanjiang Plain.

Please also note the supplement to this comment:
http://www.biogeosciences-discuss.net/11/C6618/2014/bgd-11-C6618-2014-supplement.pdf

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