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Interactive comment on "Increase in soil organic carbon by agricultural intensification in northern China" *by* Y. Liao et al.

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The paper analysed the change in soil carbon stocks and content over a period of three decades for a county in northern China. Although the paper is well written, and the authors collected a relevant data set, the paper lacks details on the methodology and data sources, which should be added. The subject of the paper is interesting, but does not really provide a substantial contribution to scientiïňĄc progress, as there have been more studies that showed that agricultural intensiïňĄcation in China can lead to increased SOC levels.

[AUTHORs]: We hope our study can contribute to deeper and wider understanding of the impact of agricultural intensification on SOC levels in the flowing perspectives: 1) Long-term monitoring of SOC change at regional level. The study period in the

study was 30 years (from 1982 to 2011), covering the most dynamic stage of Chinese agricultural development. Most studies on SOC change in China are around 20 years (Table 3); 2) High densities of soil sampling. The least number of samples was 199 in 2003 and the largest number was 3637 in 2006. Average number of soil samplings was about 800 sampling annually. 3) Evolvement of straw incorporation. Wheat straw incorporation started in 1988 and the farmland area under incorporation gradually increased gradually. Maize straw incorporation reached 70% of total farmland in 2008. These three features are quite unique among studies on relationship between SOC level and farming managements and will provide an interesting and important scientific evidences for better management of SOC. For the methodology and data sources, we gave more details at line 113-115.

Minor comments: * Page 16499, line 7: Unit not clear

[AUTHORs]: This has been revised at Line 50.

* Page 16499, line 25: here is mentioned that few if any study exist on the SOC content and stock change, however, later in Table 3 several studies are mentioned for Northern China, thus change this text.

[AUTHORs]: This has been revised accordingly at Line 69-71.

* Page 16500: Add also some information on the total size of the county

[AUTHORs]: We have added the data of 509 km2 at Line 81.

* Page 16501: How many soil samples were derived from the Annual Soil Fertility Survey for each year?

[AUTHORs]: Information of soil sampling was included in a table in the early edition of this paper and the table was deleted according to the editor's suggestion. More information of annual soil fertility survey was added at line 113-115.

* Page 16501: It is not clear whether land use is also reported in the soil survey

[AUTHORs]: Land use was reported in the annual soil survey and was categorized to types of cropland, vegetable land and construction land.

* Page 16502: According to Pribyl (2010) a conversion factor of 0.5 would in most cases be more appropriate

[AUTHORs]: In China, 0.58 is a most commonly accepted conversion coefficient in soil organic matter/carbon research, and still adopted now in official soil organic matter monitoring program (Bao, S. D. Soil Agro-chemistry Analysis. Beijing: China Agriculture Press. 2005; Wu, H. B., Guo, Z. T., Peng, C. H. Land use induced changes of organic carbon storage in soils of China. Global Change Biology, 2003, 9: 305-315). We also used this coefficient in this paper to keep the consistence with the data of SOC in other studies like in Table 3. Thank the reviewer for this comment and in later research, we will consider the coefficient proposed by Pribyl (2010).

* Page 16502: At which level was the climate data obtained, average for the county or higher resolution? And temporal resolution?

[AUTHORs]: Climate data obtained is average for the county level. The data of temperature and precipitation is theÂădaily values. We revised the text at Line 148-149.

* Page 16503: Data analysis section should be extended, explaining better how the data were calculated, how many samples, and average for each land use?

[AUTHORs]: Equation (3) and (4) are used for SOC density and SOC storage, respectively, applicable for cropland, vegetable land and construction land. During the years when the annual soil survey was implemented and detailed soil data was obtained, the number of soil samplings ranged between 199 and 3637 with an average of 800 samples per year. Number of vegetable soils averaged 79. We added the information at Line 163-165.

*Page 16505 and Figure 2: How was the SOC stock under construction land determined? I would expect that this should be lower, as the top layer is often removed.

[AUTHORs]: Farmland protection is a basic policy in Huantai and China. When farmland is transferred to construction land, the top soil (0-30 cm) will be removed to other farmland or greenhouse. This meant that the process of construction/industrialization will not result in the significant loss of soil carbon. So the SOC content in the previous year was viewed as the SOC content of construction land after transformed from farmland.

* Page 16506, line 20: Not by precipitation, as that was not a signiĩňĄcant correlation according to Table 1

[AUTHORs]: We revised the text at Line 255-257 as this is a general statement.

* Page 16508, line 1: Why was the C input from organic fertilizers not included in the analysis, although not signiĩňĄcant, it could be added to Table 1.

[AUTHORs]: In Huantai, organic fertilizer was not applied in cropland since 1980s except in vegetable land and orchard. Our paper mainly analysis the relationship between SOC level and farming managements on cropland, so the C input from organic fertilizer was not included in the analysis.

* Page 16508: The N2O emissions will be even higher, here only the direct emissions are accounted for, but including the indirect emissions (ammonia volatilization and leaching and runoff) and the emissions from crop residues will double this value

[AUTHORs]: We agree with the reviewer's point. The text was revised at Line 306–308.

Interactive comment on Biogeosciences Discuss., 11, 16497, 2014.