

## ***Interactive comment on “Ground cover rice production system facilitates soil carbon and nitrogen stocks at regional scale” by M. Liu et al.***

### **Anonymous Referee #3**

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**General comments** The manuscript discussed an interesting issue that whether ground cover rice production system depletes soil carbon and nitrogen compared to traditional paddy rice system. The authors did a valuable job using a paired sampling method to examine the difference of soil carbon and nitrogen between these two systems at 49 sites on a regional scale. The results showed that the ground cover rice production system benefits soil C and N sequestration. The results are interesting and have been fully discussed in the manuscript. I think this study is worthy of publishing, but still needs improve huge.

**Specific comments 1** The sampling was selected from 49 paired sites. As mentioned in the manuscript, these sites represented a wide range of different soil types. The differences in soil C and N between the contrasting systems could vary considerably

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across soil types or sites. Therefore, spatial heterogeneity should be considered in the manuscript.

2 The root biomass samples were sampled from two N-treatment subplots. However, in Fig. 4, root dry matter of different soil depth in two farm systems was present. What the effect of N fertilizer on root biomass? Please check the values and analysis process.

3 A laboratory incubation experiment was conducted to test the hypothesis that GCRPS releases more soil carbon than paddy systems. However, the same controlled incubation conditions were dissimilar to the field conditions of the two systems. It seems better to conduct a field monitoring for test the hypothesis.

4 Greater stability of soil organic matter partly contribute to higher soil C under GCRPS systems. In addition, “the more frequent oscillation in redox conditions in GCRPS may have a strong positive influence on the generation of organo-mineral complex”, which implies that GCRPS may hold higher mineral-associated organic matter (s+c). However, SOC contents in various fractions were similar between the two systems before incubation experiments, as seen in Fig. 8, indicating the difference in SOM stability between the two systems were not large. The difference in potential SOM mineralization may attribute to other factors, such like microbial composition.

5 The manuscript requires significant language editing. Many of the paragraphs need to be tightened up and at times the sentence structure is confusing and needs to be simplified or edited carefully.

6 Sections describing the statistical analyses are poorly described.

Please also note the supplement to this comment:

<http://www.biogeosciences-discuss.net/12/C399/2015/bgd-12-C399-2015-supplement.pdf>

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Interactive comment on Biogeosciences Discuss., 12, 3647, 2015.

C400

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