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## ***Interactive comment on “Impact of mire reclamation on export potential and characteristics of dissolved carbons in the Sanjiang Plain, Northeast China” by Y. D. Guo et al.***

**Y. D. Guo et al.**

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Thanks very much for the comments from the Anonymous Referee ! The statements below is my reply to the comments, and I wish to obtain more advice from the referee and other researchers who have looked through my paper!

Comments 1: I am not sure if “mire reclamation” is an appropriate or common term used– if the reclamation refers to conversion of mire to paddy fields as described in Section 1, then maybe better to specify this.

Full Screen / Esc

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Interactive Discussion

Discussion Paper



Responses: Thanks for the suggestion! In fact, I have been puzzled by the exact expression of “conversion of mire to paddy fields” in English. But it seems there is really no other words more suitable than “reclamation” although its main idea is not “conversion”. It’s a good idea to specify the word at beginning of the paper.

Comments 2: Running title – For consistency, it might be better to use “dissolved carbon” instead of DOC as the study looked at both DIC and DOC.

Responses: I completely consent and accept the opinion. Indeed, my paper discussed not only DOC, but also DIC.

Comments 3: P5348, L7 – Was the snowmelt period included in the growing season data? If not, the period with the greatest amount of DOC export might be missed.

Responses: Thanks for the question which is really valuable. The snowmelt period is partly included in the growing season. In the Sanjiang Plain, the surface snow begins to melt usually at middle April and disappeared completely in early May in the mires, while in farmland, surface snow disappears in late April. But in fact, it is not the important factor affecting the DOC flux. In the Sanjiang Plain, the land surface is very flat with a infinitesimal land gradient in our study area. As most part converted to farmland, the study area export little runoff from snowmelt in the fluvial systems. On the other hand, the snowmelt here indicates only the melt of surface snow above mire surface, not the surfacial peat and soil in frozen with ice. The melt of surface peat and soil begins in May. In fact, I had collected the water samples in the degraded mire and ditches with little runoff in middle and late April in 2010. But the content of dissolved carbon is too low because the runoff only came from the surface snow. So I deleted the data to meet the consistency in the sampling time in 2009. So there is no the greatest amount of DOC flux missed in the research.

Comments 4: P5348, L9 – Suggest to present DIC result as well, as this will be useful to tell whether a higher total dissolved C content is predominantly caused by a higher DOC content. It is better to use TDC as the acronym for total dissolved C since the

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acronym TC is usually used for total C content, which includes also the particulate fraction.

Responses: I consent the opinion that using TDC as the acronym for total dissolved carbon.

Comments 5: P5348, L12 – Would discharge be a confounding factor when comparing the DOC concentration among sites?

Responses: There are close relationship between DOC export potential and surface runoff processes, but DOC export potential is close related to DOC production capacity which is not determined only by hydrological processes. So there is really some deviation when using a simple hydrological parameter to demonstrate the relationship with DOC flux. But our research concerns mainly the relative results in the different sites. The hydrological characteristics in the different sites are seemed as background. The detailed processes of regional hydrology are out of my concern.

Comments 6: P5348, L17 – “Obvious” is not an appropriate word, perhaps use “significant” if it is statistically significant?

Responses: I completely consent and accept the opinion.

Comments 7: P5349, L2 – Is this number referring to total organic carbon? If so, it should be specified as the flux of particulate C will also have a considerable influence.

Responses: Thanks for the several comments above about the exact definition for the different carbon. This number is referring to total dissolved carbon, and in this paper, only dissolved carbons are concerned.

Comments 8: P5349, L12-15 – It would be useful to cite the recent papers on the size of soil C pool in northern peatlands. Also, the contribution of DOC fluxes to the net ecosystem C balance of peatland should be discussed briefly with reference to the recent peatland C budget papers.

Full Screen / Esc

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Interactive Discussion

Discussion Paper

Responses: Thanks for the suggestion. I will add these discussion in the reversion.

Comments 9:P5350, L10-12 – Rather than describing one specific example, it might be useful to describe in general the land use changes in boreal wetlands. Drainage of peatlands is also done for peat harvesting, forestry, etc. in addition to improving the productivity of grazing grass.

Responses: Thanks for the suggestion. I will draw a conclusion from the samples and add this content in the reversed paper.

Comments 10: P5352, L1 – Mean monthly temperature? Responses: The temperature is mean monthly temperature.

Comments 11: P5352, L6 – Organic carbon or organic matter content? Responses: There is a error in my expression. It ought to be soil organic matter.

Comments 12:P5352, L16 – It will be useful to give the seasonal mean water table here. How is seasonally waterlogged mire defined? From your Figure 3, it appeared that both SLM and PLM had standing water above the soil surface throughout the growing season.

Responses: It is a good opinion to give the mean water table. We define seasonally waterlogged mire according to many years of observation of water table. In normal years, water table in SLM will decreased below surface in fall while it does not in PLM. But in 2009 and 2010, the rainfall quantity is more plentiful in fall and the water table does not decrease below the surface in SLM. The two years are somewhat exceptional. I will give more information in the reversion about the difference in the hydrological regime between the two sites.

Comments 13:P5352, L24 – Was it blocking or digging of ditches? Ditch blockage is a restorative measure and should lead to reduced mire degradation? How many water samples taken for degraded mire and drainage ditches?

Responses: There are some misunderstanding for my intangible expression. I mean

[Full Screen / Esc](#)[Printer-friendly Version](#)[Interactive Discussion](#)[Discussion Paper](#)

Interactive  
Comment

that the building the bank of ditches decreased the water supply to the mire. When sampling in the degraded mire and drainage ditches, two water samples of vertical blended water in the the course section were collected. For the width of the river course is less than 5 m, and I think two point samples is enough. But the sample come from one section, so there is no error bar screened.

Comments 14:P5353, L11 – I think it is a TOC analyzer rather than a DOC analyzer? DIC should have been removed after acidification and is estimated as the difference between TC and DOC. Hence, DOC is measured directly but not determined as the difference between TC and DIC? Responses: It is indeed a TOC analyzer. DOC is measured as the difference between TC and DIC.

Comments 15: P5354, L9 – 20 July of which year? Responses: On 20 July in 2010. I will add this information to my paper.

Comments 16: P5354, L24 – Any post-doc tests done to identify significant difference between specific pair(s) of sites?

Responses: There are no post\_doc tests were done. I think it is enough to use ANOVA analysis to compare the differences in population mean among the three sites. I have tried to do the analysis with the method, but there seems no more significant results. The significance of the difference among the sites could be detected successfully and simply by ANOVA analysis.

Comments 17: P5355, L11-13 – Any correlation analysis done to indicate the strength of relationship? Give the correlation coefficient here. It is a bit vague to say that the DIC-TC relationship is “closer” in the ditches.

Responses: Thanks for the suggest. The correlation coefficient ought to be given in the paper, and I will add this information.

Comments 18:P5355, L17-21 – While the decrease in dissolved C could be due to degradation processes as the authors suggested, it might also be partly related to

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Interactive  
Comment

increased dilution by ditch water. From the smaller capillary ditch to the much larger arterial ditch, there is likely an increase in the amount of discharge. To what extent would this effect explain your data?

Responses: The conclusion that the decrease in dissolved C is due to degradation is just a speculation according to other studies. I think there is a simple method to roughly distinguish the two kinds of effect: According to changes in the fluorescence strength of humic-like compounds, which is hard to degradation, from C-DD to A-DD, the effect of hydrological dilution will be evaluated and a dilution coefficient could be obtained. By comparing the coefficient to the degradation ratio of the dissolved carbon, the effect extent of dilution will be distinguished. I will add this method to the revised paper.

Comments 19:P5356, L7 – Could you show some actual data/result to support the claim that there is no direct relationship between air temp and dissolved C concentration?

Responses: The actual data to support the claim is in my another paper published in 2008. I could absolutely add the data about the relationship between air temperature and dissolved C, but I think there are too many of figures in the paper. I think it will be better to give a more detail expression in words or the formula in the context. I will add the information to the paper.

Comments 20: P5356, L11-13 – Any possible reasons for the different relationships between water level and TC concentrations in 2009 compared to the other two years? Also, why a different relationship (lower TC conc. with lower water level) is observed in SLM and PLM compared to degraded mire and ditches? Please elaborate.

Responses: Thanks for the valuable question! As to the different relationship in 2009, there is also a similar trend of DOC with the drawdown of water level. But the tendency in 2009 was not as clear as 2008 and 2010. So it is not there is no the trend, and just the trends in 2008 and 2010 were much more outstanding. As to the different relationship in SLM and PLM with other sites, it is my first time to obtain such a undoubted conclusion.

[Full Screen / Esc](#)[Printer-friendly Version](#)[Interactive Discussion](#)[Discussion Paper](#)

In fact I have been doing some work to reveal the phenomenon from 2011. But by now, I have not obtained reasonable data to reveal the trend. I will go on with the work and wish to be able to answer this question.

Comments 21: P5357, L22-25 – Any statistical analysis conducted on the difference in concentrations? Responses: The ANOVA analysis has been conducted. I should give the exact expression in statistical words. I will revise the sentence carefully to make it clear.

Comments 22: P5358, L1-9 – I wonder if it is appropriate to use CV to compare the seasonal variations among sites, since two very different temporal patterns can give the same CV value. Moreover, it would help to further elaborate on the possible reasons for the difference in seasonal variations in DOC components among the three sites.

Responses: It is really an important theoretical question using CV to describe seasonal variations among different sites. The valid method extensively admitted is to compare the variations of something along a series of years in one site. But in my study, the three sites belong to one river basin and were spatially related before 50 years. The spatial differences in the DOC among the sites are an indirect substitution for temporal series of different periods of reclamation. As to the whole experimental design, it is a basic point to use spatial differences among the three sites to reflect indirectly temporal processes after the reclamation. Moreover, the dynamics of DOC in the three sites are under the same conditions of temperature and rainfall, so I think the CV value is used correctly to explain the responses to the hydrological regime in different sites.

Comments 23: Figure 1 – I wonder whether the legend for the degraded mire and drainage ditches are mixed up? It will be useful to label the sites (e.g. A-DD) on the map as well. Responses: I am sorry to give the wrong legend for the degraded mire and drainage ditches. I will correct the legend and all the typos.

Finally, thanks again to the anonymous referee since I have really learned a lot from these comments! If there are some questions in the responses above, I will give more

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detailed answer.

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Interactive Discussion

Discussion Paper

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