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Biogeosciences Discussions

Interactive comment on "Nitrous oxide emission from highland winter wheat field after long-term fertilization" *by* X. R. Wei et al.

X. R. Wei et al.

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Response to Referee 1:

Dear Referee 1:

Thank you very much for your valuable comments and suggestions, our responses are as follows:

1. General comments:

We will add the following paragraph to the paper in order to show how the N2O emissions based on grain yields varied among the fertilizer treatments:

Because the major aim of fertilization is to increase crop yields, expressing N2O emis-

sions on a grain yield basis provides a useful option for evaluating fertilizer impacts. The biomass and grain yields in the NP, M and NPM treatments are significantly larger than those in the N and CK treatments for both 2006-2007 and 2007-2008 (Fig. 4 in the MS). The crop grain yield-based N2O emissions were significantly larger in the N treatment than in the CK treatment, while those in the NP, M, and NPM treatments were lower than that in the CK treatment (except for the NPM treatment in 2006-2007, which was similar to CK) (Please see the Fig 1-1 which will be added to the MS). Therefore, the combination of N fertilizer with P or manure improved production and environmental effects compared to single N fertilization alone.

2. Specific comments:

2.1 We will change the wording from "The chambers remained open for at least 2 hours between each measurement cycles" to "The chambers remained open between each measurement period".

2.2 We will change the wording from "...which were 160% and 218% lower than those..." to "...12.7 °C and 13.9 °C lower than those..."

2.3 "Page 4546, line 6: ": : :no significant soil temperature occurred within the fertilization treatments." What do you mean by this statement? Response: Here we mean that soil temperature was not significantly affected by the fertilizer treatments. We will reword to "... fertilization did not significantly influence soil temperature".

2.4 The entire text has been re-checked by a native English speaker, and several edits are included in the revised manuscript.

2.5 Section 4.1: "The application of mineral N fertilizer to soil reduces the C/N ratio, and thus increases N2O flux." In principle, yes. In this case (Table 1), the smallest C/N ratio is in the control (no fertiliser) treatment. Response: Yes, the lowest C/N ratio (7.3) in Table 1 is for the CK treatment, but the value is similar to that for the N treatment (7.4), we attributed this to temporal changes in C/N ratios (Please see the Fig 1-2 which

indicates how the C/N ratios change with time).

2.6 Thank you for your suggestion, here we will add the following text on the positive effects of manure fertilizers on soil structure, which also affects N2O emissions:

The application of manure fertilizer often improves soil structure (Bronick and Lal, 2005), increases soil porosity, and decreases WFPS, which reduces the denitrification rate and thus decreases N2O emissions. Liu et al. (2000) and Huo et al. (2008) reported that manure fertilizer has a large potential to increase soil porosity and aggregation in the Loess Plateau, which improves soil aeration. In our study, the WFPS in CK, N and NP were 3 to 20% higher than in M and NPM, which partly explains the manure effects on N2O emissions.

Thanks again for your comments, we welcome your further comments and suggestions.

Best wishes,

Xiaorong Wei

References:

Bronick, C.J., Lal, T.: Soil structure and management: a review. Geoderma, 2005, 124: 3-22

Huo, L., Wu, T.Y., Lin, H.M., Cao, S.Y., Tang, W.X.: Effects of long-term fertilization on water stable aggregates in calcic kastanozem of the Loess Plateau. Chin. J. Appl. Ecol., 2008, 19(3), 545-550

Liu, J., Chang, Q.R., Li, G., Wei, Y.S.: Effect of different fertilization on soil characteristics of aggregate. Bull Soil Water Conserv., 2000, 20(4), 24-26

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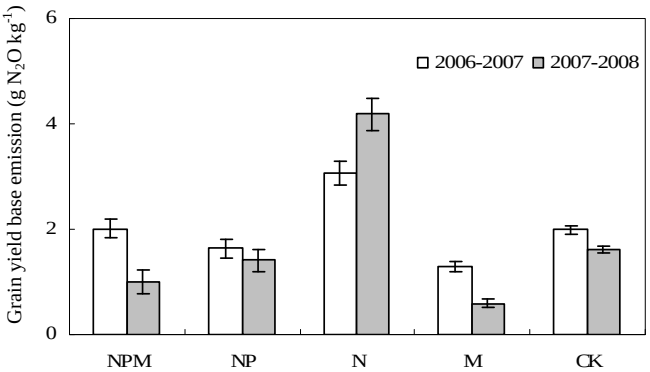

Fig 1-1. The grain base N_2O emission as affected by fertilization

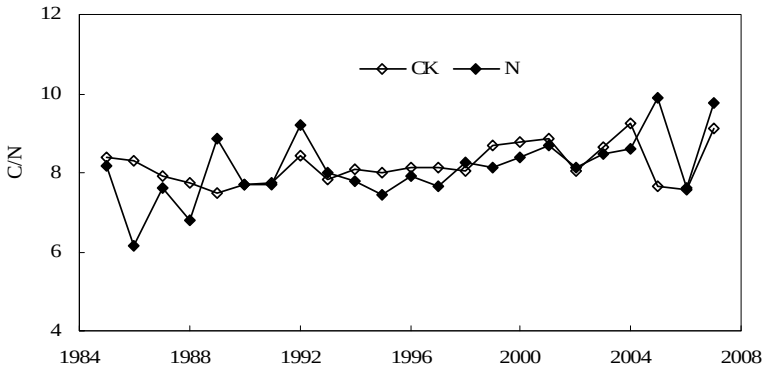

Fig 1-2 The temporal changes of soil C/N in CK and N treatments.