Biogeosciences Discuss., 10, C194–C196, 2013
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Biogeosciences
Discussions

Interactive comment on "Effects of nitrification inhibitors (DCD and DMPP) on nitrous oxide emission, crop yield and nitrogen uptake in a wheat-maize cropping system" *by* C. Liu et al.

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Received and published: 4 March 2013

We would like to thank Dr. Reiner Ruser for his professional and careful comments. The comments are very helpful to improve the discussion paper. We do agree to adopt most of the suggestions to revise the manuscript. Reply to Dr. Reiner Ruser: General aspects: (1) If the daily fluxes were missing due to power failure and system maintenance, the missing values were replaced by means of daily fluxes of adjacent four days to calculate the cumulative emissions. The missing hourly fluxes were not interpolated since most of the missing hourly fluxes happened in the low emission period (November-February). The fluxes in the period did not show clearly daily patterns and

only accounted for 5–7% of the annual total emissions. (2) We have rewritten the paragraph. The former version seems to criticize the low-frequency measurements. It shouldn't be like this. In the revised version, we evaluated the possible deviation induced by the intermittent measurements and also recommended the optimized manual sampling schedules to minimize the deviation. If the intermittent sampling was conducted daily after the main field managements and once per week during the remaining period at the times when daily mean air temperature appeared, the estimated deviations were less than 12%. (3) Yes, the interaction of environmental factors may overestimate the degree of explanation when running a multiple regression analysis. We do agree to add the results of stepwise multiple regression in Table 3. (4) Microbial nitrification and denitrification rely on different form of soil inorganic nitrogen. However, the production and emission of N2O derive from both nitrification and denitrification. One process is always simultaneous with the other. Therefore, we do not separate the soil inorganic nitrogen form to do the regression analysis. Smaller remarks and suggestions: (1) The sentence has been reworded as: "Nitrification inhibitors can delay the microbial oxidation of NH4+ to nitrite for a certain period (several weeks or months) and are therefore very effective at blocking microbial nitrification and subsequent denitrification." (2) Yes, you are right! "The annual fertilizer rates were 430-60-30 kg N-P-K ha-1." (3) "Each flux was calculated from five N2O concentrations of the chamber headspace air using a first-order differential or linear equation (Liu et al., 2010; Wang et al., 2013)." It has been revised. (4) The part has been rewritten in the revised version. (5) The soil inorganic nitrogen contents only indicated the availability of nitrogen substrate for microbial nitrification and denitrification. The conversion processes between ammonium and nitrate contributed to the production and emission of N2O. The application of nitrification inhibitors inhibited the conversion processes and therefore the slopes for the treatments with inhibitors were lower than for the treatment without inhibitors. (6) Weiske et al. (2001) and Di & Cameron (2012) observed that the very low application rates of DMPP resulted in comparable or even better inhibition effects of N2O emission in percentage compared with DCD (Table 4). (7) We agree to add the median values

for flux in Table 2.

Interactive comment on Biogeosciences Discuss., 10, 711, 2013.