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Interactive comment on "Nitrous oxide emissions from maize-wheat field during four successive years in the North China Plain" *by* Y. Zhang et al.

Anonymous Referee #1

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This manuscript reports the emissions of N2O from nitrogen-fertilized wheat and maize crops grown in the North China Plain over 4 successive seasons, and demonstrates that there is (a) a generally higher emission factor (EF) for the maize crops than for the wheat crops, associated at least in part with soil temperature differences, and (b) a considerable inter-seasonal variation in EF related to rainfall events close to the timing of fertilizer applications. The summary results – seasonal emissions and EFs – and the fluctuations in soil variables and emission rates, are clearly presented in tables and figures.

However, I am concerned about the statistical design of the experiment, and lack of some details relating to methods. As I understand the manuscript, there was just a single plot of 6.5 x 3.5 m2 in each of the two treatments – unfertilized and N-fertilized – with

the plots separated by a 1.2 m zone to prevent nutrient transfer between treatments. Three chamber bases ("pedestals") were inserted in each plot, and crop seeds were sown within the chambers. Presumably the same density of sowing was employed in the surrounding plot area? The text does not say.

The methodology section raises several issues: 1) The use of single plots„irrespective of the number of replicate chambers, appears to constitute pseudo-replication, and this raises problems with statistical analysis. I have consulted the Zhang et al 2011 paper, and the same plot system appears to be true of the work in that paper. 2) There is inadequate experimental detail; how were the flux measurements conducted when the crop height exceeded that of the chambers (90 cm)? Conceivably the wheat was a short-straw variety that could be covered by the chambers even at full height, but that would not be true for the maize, so were the plants bent down in order to enclose them, or was some other procedure used? 3) What form of N was applied? There is international interest in whether different N forms vary in their emissions, and unless this is routinely reported, valuable information goes to waste. 4) Even though the earlier paper has full details of the gas sampling and related matters, I think it is important to present here at least a summary of how things were done, rather than forcing the reader to look up the literature for all the information.

As regards the overall findings reported, the differences between the crops and seasons are discussed, and the authors' findings are compared with those reported by others for crops in the same area, in Table 4. However, my impression is that the EFs reported here are generally greater that those reported elsewhere. This merits more discussion.

Typos:

line 10, p18341: delete "y" at the end of "chromatography". It should be "chromatograph".

The cited author's name in line 21, p18343 and line 19, p 18349 should, I think, be

Interactive comment on Biogeosciences Discuss., 10, 18337, 2013.