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Biogeosciences
Discussions

Interactive comment on "N_2O emission from organic barley cultivation as affected by green manure management" *by* S. Nadeem et al.

S. Nadeem et al.

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Anonymous Referee #3

The paper addresses timely issues related to the environmental impacts of organic vs. conventional crop production systems and should be of interest to readers of the journal. The introduction is informative and for the most part the methods are well described. The results are interesting and comparing emissions in the context of greenhouse gas intensity provides useful information.

A.R.We are thankful to the reviewer for the interest in our manuscript.

R3-1: I think the biggest limitations to the paper are gaps in sampling during the spring season and low sampling frequency (1to 2 times per week during the growing season).

The authors are aware of these limitations and it is debatable the extent to which these reduce confidence in some of the conclusions. Estimates of cumulative fluxes are the most suspect. On the other hand, measurements of yields, soil mineral N, and daily N2O fluxes are likely to be more reliable. I recommend that the authors make clear in the abstract that estimates of cumulative emissions are uncertain. Unfortunately, this means that estimates of GHG intensity are also uncertain. I recommend publication if the authors can make a convincing case that despite the limitations, the paper advances our understanding of the processes that control N2O emissions, crop yields, and soil N and water dynamics

A.R. Under the climate conditions prevailing in Norway in general and the weather in winter 2009/10 in particular, conventionally operated whole-year-round chamber measurements were impossible; snow pack in winter 2009/10 reached 1.5 m which made it impossible to find the microplots. The lack of winter measurements and their possible effect on the magnitude of annual emissions are dealt with at the beginning of the discussion. Likewise, we address the lack of emission data during the critical phase after ploughing (cf. response 2-5). We agree that the low sampling frequency (once a week) makes our cumulative estimates uncertain. To compensate for this, we would like to point at some assets of our study: i) we conducted N2O emission measurements in 6 treatments throughout two years with contrasting cultivation regimes, addressing a cultivation regime ("stockless organic farming") involving organic amendments which are notoriously difficult to study, ii) we produced time series data on emission fluxes and ancillary variables allowing us to identify seasonal patterns and environmental controls between the years, iii) we performed a comparative study on green manure management rather than estimating annual N2O emissions, iv) we provide the first data set of its kind for cool-temperate Norway and v) we addresses a current trend in European farming, namely the increase of stockless farming, replacing animal manure with green manure.

RC3-2: Specific comment Line 25: cite a more recent reference.

A.R. Done

RC3-3 The figure captions state that standard deviations are omitted to increase clarity but I would like to see some quantification of standard deviations at the daily scale stated.

A.R. We now indicate dates of significant difference in N2O flux among treatments by asterisks in the figures and discuss the differences in more detail (see response to reviewer 1-4 and 2-7).

Interactive comment on Biogeosciences Discuss., 9, 2307, 2012.