

## ***Interactive comment on “Review of key causes and sources for N<sub>2</sub>O emissions and NO<sub>3</sub>-leaching from organic arable crop rotations” by Sissel Hansen et al.***

**Sissel Hansen et al.**

sissel.hansen@norsok.no

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The comments are given in the attached file which is easier to read. It is the same file for referee 1 and 2 because referee 2 had posted his/her comment in the same file as referee 1. Below are only the general comments.

Responses to general comments from referee 1 The authors are grateful that the referee has taken the time to work thoroughly with the manuscript and for the many useful comments that will improve the paper. 1) Lack of organization We understand that the referee found the manuscript difficult to follow, and we have therefore simplified the structure of the paper. We have also reformulated and simplified the research questions and

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improved the reasoning for the new research questions in the introduction, thus providing a more focused review. In section 3, we explain the nitrogen cycle in organic arable farming with focus on aspects that influence N<sub>2</sub>O emissions and N-leaching. This provides the background for understanding and discussing how crop and soil management in organic farming can be adapted to reduce N losses. In comment no 28, the referee suggests that section 3 and 4 should be a part of the introduction. We think there is a risk that this will make the introduction too long and ill focused. Instead we have moved part of section 3 (crop rotation) to the introduction, and we have targeted section 3 towards supply of organic matter and soil N-dynamics in organic arable crop rotations. We have shortened and included the previous section 5 “Dynamics of SMN in organic arable crop production” in the new section 3. We have removed the section on soil acidity, and the section on soil structure has been moved to the section on N<sub>2</sub>O (New section 5). The text on crop yields has been moved to the new discussion section. The previous section 4.3 has been moved to the introduction. As a start of the new sections 4 and 5 we focus on the processes responsible for N<sub>2</sub>O emission and NO<sub>3</sub>-leaching, respectively, and we show that the same mechanisms are responsible in organic and non-organic systems.

2) Tables or figures of the data in the paper The referees do miss tables and figures within the paper. We are providing a new figure illustrating N-dynamics in organic arable crop rotations, a new table with performance of selected indicators of SMN dynamic in organic and conventional arable systems (Extract from S1), and new figures that are extracting the essence of N<sub>2</sub>O data presented in S2 and NO<sub>3</sub>-leaching data presented in S3.

3) Want multivariate analyses instead of regression Given the actual problems and data we find regression analysis to be the most relevant. As long as the referee do not suggest one or more other specific multivariate methods / models that can be used to solve our problems in a better way using our data, we keep regression analysis as a good method to use in our situation.

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Responses to general comments from referee 2 4) Not comprehensively explored or the explanations are not sufficiently considered As we intended to find a balance between giving a comprehensive and enough explanations and not being too detailed and thus making the paper too long, referee 2 need to be more specific in what he/she thinks need to be more comprehensively explored or more sufficiently considered, before we can respond to this comment.

5) Tables should be included in the main paper See response to comment 3).

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Interactive comment on Biogeosciences Discuss., <https://doi.org/10.5194/bg-2018-455>, 2018.

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## Reply to referee comments

<https://www.biogeosciences-discuss.net/bg-2018-455/#discussion>

Paper: Review of key causes and sources for N<sub>2</sub>O emissions and NO<sub>3</sub>-leaching from organic arable crop rotations

## General comments from referee 1

The subject matter "N<sub>2</sub>O and NO<sub>3</sub> losses from organic agriculture" is an interesting subject, unfortunately the paper is poorly written. A **lack of organization** (1) results in repetition of certain points and completely missing other points. This lack of organization also creates a lack of focus. By the time I finished reading the paper, I still didn't have a good idea of what the authors were trying to achieve. Also, I had difficulty following the paper in places because the authors just attached databases as supplementary material, rather than actually including summary tables or figures based on the supplementary materials. The authors need to find some way to summarize the data and present the summary in a meaningful way (either **tables or figures** (2)). Once the data has been summarized, patterns may emerge, which can then be explored. But everything right now just seems haphazard. I also got the impression that the authors only used simple regression to look at drivers of N<sub>2</sub>O/NO<sub>3</sub> losses. Why not some kind of **multivariate analysis** (3). There are also many more comments in the attached document.

## Responses to general comments from referee 1

The authors are grateful that the referee has taken the time to work thoroughly with the manuscript and for the many useful comments that will improve the paper.

1) **Lack of organization**

We understand that the referee found the manuscript difficult follow, and we have therefore simplified the structure of the paper. We have also reformulated and simplified the research questions and improved the reasoning for the new research questions in the introduction, thus providing a more focused review.

In section 3, we explain the nitrogen cycle in organic arable farming with focus on aspects that influence N<sub>2</sub>O emissions and N-leaching. This provides the background for understanding and discussing how crop and soil management in organic farming can be adapted to reduce N losses. In comment no 28, the referee suggests that section 3 and 4 should be a part of the introduction. We think there is a risk that this will make the introduction too long and ill focused. Instead we have moved part of section 3 (crop rotation) to the introduction, and we have targeted section 3 towards supply of organic matter and soil N-dynamics in organic arable crop rotations. We have shortened and included the previous section 5 "Dynamics of SMN in organic arable crop production" in the new section 3. We have removed the section on soil acidity, and the section on soil structure has been moved to the section on N<sub>2</sub>O (New section 5). The text on crop yields has been moved to the new discussion section. The previous section 4.3 has been moved to the introduction.

As a start of the new sections 4 and 5 we focus on the processes responsible for N<sub>2</sub>O emission and NO<sub>3</sub>-leaching, respectively, and we show that the same mechanisms are responsible in organic and non-organic systems.

The new table of contents is as follows:

Abstract

Abbreviations

1. Introduction

1

Fig. 1.

C4

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