

## ***Interactive comment on “An ecosystem approach to assess soil quality in organically and conventionally managed farms in Iceland and Austria” by J. P. van Leeuwen et al.***

**J. P. van Leeuwen et al.**

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Dear reviewer,

Thank you very much for providing valuable and helpful comments on our manuscript. We have used your comments to revise and improve our manuscript in several aspects. Below we will react on all your points raised and describe how we have addressed them in the new manuscript. We have printed your comments point-by-point (*italic font*), together with our response (*regular font*).

Comment-1: This paper utilizes Critical Zone Observatory sites in Iceland and Aus-

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tria that are under agricultural land use to compare soil quality metrics under organic and conventional management. Analyses include soil physical, chemical, and biological measurements selected to represent indicators of soil quality. The key findings are that soil organism diversity and evenness were consistently greater in organic systems, while soil physical and chemical variables were not significantly influenced by management systems.

The paper is clearly written and the depth of the soil analyses conducted at each site, including a detailed quantification of soil organisms, is a key strength. The primary weakness is the small sample size (2 pairs of farms in two countries), which limits the ability to generalize findings as representative of organic and conventional management systems.

Response-1: You are correct that the small sample size is limiting the possibilities to generalize the results. Furthermore, there are a number of factors that vary across farms, such as climate, soil type, farm type and farm management. On the other hand, some findings, e.g. micro-arthropod diversity were detected statistically significant, despite the limited sample sizes and differences between farms. We have addressed these points in the concluding paragraph in the discussion (page 20).

Comment-2: In addition, management legacy information is not presented for the different farms.

Reponse-2: We have included legacy information in the revised version (tables 1 and 2) You are indeed right with your suggestion that longer-term farming management could be an important factor in the (lack of) differences in soil physical and chemical parameters between organic and conventional farming. We have addressed this in the discussion (page 18, line 11).

Comment-3: How long has each farm has been under the current management regime prior to the 2011 sampling? Soil C and N pools can be slow to change and previous management legacies can be evident for decades. At a minimum, it would be helpful

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to have a 5-year crop rotation history for the annually-cropped farms. No total C and N input information is provided for the Austrian organic farms.

Response-3: We have added the crop rotation and fertilization history for the last ten years of the arable farms in Austria (see table 2), including inputs of C and N. The grasslands in Iceland were unchanged since the last tillage, 8-16 years before sampling (see table 1).

Comment-4: The definition of significance differs between sections within the paper. For analysis of MWD a p-value of 0.173 is considered significant whereas a p-value of 0.06 for soil bacteria is considered non-significant.

Response-4: We have clarified the manuscript by consistently mentioning statistical significance only at p-values below 0.05. When values are above 0.05 results are explicitly mentioned as not statistically significant. In some case we used the term “consistently different” to emphasize that the patterns observed were in agreement with each other, independent of statistical significance.

Comment-5. The authors make an important point that the lack of management system effects on soil C and N dynamics is likely because other factors are more variable at the larger spatial scales considered in this study relative to single-site studies. I suggest that one of these variables to consider is longer-term management legacies.

Response-5. We have addressed this in paragraph 4.1 in the discussion.

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Interactive comment on SOIL Discuss., 1, 201, 2014.