

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.

Anonymous Referee #2

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This manuscript showcases a purely descriptive study to compare physical, chemical and biological indicators between conventional and organic management systems. The main objective is to support the theory that organic practices support soil quality processes that deliver important ecosystem functions. The manuscript is well written, and the majority of methods are clearly defined. The novelty of the study is the use of the Critical Zone Observatories in two countries, Austria and Iceland. Though the conventional and organic systems were paired at each of four sites, these sites differed drastically in their vegetation cover and management, nutrient applications, soil types and climates. These differences made it very difficult to discern any set

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patterns in indicators which could be consistently subscribed to one or the other management system. The authors go into great detail to discuss various issues. But have not fully examined the underlying causes of specific differences. For one, total biomass of nematodes was different, but this was dependent mainly on the difference in herbivorous nematodes. More information regarding herbivorous rather than just total nematodes would be beneficial. For another, the apparent tillage effect in organic versus conventional grasslands was insufficiently supported with discussion. Tillage may have an immediate effect, but time since tillage can also impact recovery of organisms. Time since last tillage versus tillage intensity needs further discussion. The conclusions rest mainly on patterns that are not statistically significant leaving outcomes somewhat suspect and requiring further follow-up, which is not discussed. In particular, the one outcome from the discussion as relates to a soil quality assessment is the apparent effect on diversity of microarthropods. This outcome is quite questionable because there is little replication which does not satisfy the following important questions: does this diversity hold through different seasons; does this diversity hold for different crops in rotation; does this diversity hold through time? One easy approach to overcome the limitations of number of sites, would have been to replicate at least the biological, and/or biologically based chemical parameters over time. As this cannot be done at the current stage, the authors should clearly address the limitations of the approach used, and make necessary adjustments to their conclusions with these limitations in mind. In other words, be more critical of the aspects that are weakly supported, and strengthen support for the aspects that are not as questionable (over time: physical/chemical). Soil quality is a very broad term that clearly cannot be assessed by a single indicator, hence the multitude of parameters assessed in the present study. As a whole, the soil quality assessment does not clearly support one or the other management system as having better ‘quality’ or supporting more ecosystem services. As part of the reassessment suggested above, discussion of ‘soil quality’ as a whole should be conducted, even if that does seem to dispense the potential virtues of conventional practices.

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Please also note the supplement to this comment:
<http://www.soil-discuss.net/1/C41/2014/soild-1-C41-2014-supplement.pdf>

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