

Interactive comment on “Positive trends in organic carbon storage in Swedish agricultural soils due to unexpected socio-economic drivers” by C. Poeplau et al.

Anonymous Referee #3

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General comments

The paper by Poeplau et al. represents a really terrific endeavor to give an assay of positive SOC changes in Sweden soils in the time scale of decades. All the conclusions are well formulated and are based on a huge pool of well documented data. So, in general my impression is very positive.

Specific comments

The ideology of regional-scale or even national scale monitoring as a tool to study/control mitigating climatic changes by additional sink of atmospheric is of great importance. Also, since early 1990s researchers tried to estimate C balance on re-

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gional and global scales, one would expect from the article on SOC increase in soils some more “greenhouse-gas” oriented aspects. Namely, it would be great to know the authors’ viewpoint concerning the following issues:

1. It is urgent to clarify the method(s) of SOC and pH measurements. The matter is that difference in methodology, and therefore in systematic errors when measuring, might be found in context of accuracy of measuring organic (and sometimes inorganic?) C in soils. For example, SOC determined in 80s might have been measured by other than to-date CHNS procedure giving systematic difference in resulting C content.
2. My main concern is that the author’s conclusions are based on the SOC concentrations. However, a shift in vegetation from annuals to perennials leads to increase in roots mass and, as a result, to decrease in soil bulk density. So, the ley establishments might cause oppositely directed processes of i) increasing SOC concentration; ii) decreasing soil bulk density. In other words, was the increase in C stock real or apparent?
3. What was the effect of leys implementation expressed as percentage of CO₂ emission attributed to Sweden industry, fuel combustion etc?
4. How “globally” can be implemented this Swedish experience to other European regions or even to other continents?
5. Is it possible to compare the author’s data on SOC accumulation due to ley establishment with similar land use changes in other countries/regions?

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