SOIL Discuss.,
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Interactive comment on "Variation of soil organic carbon, stable isotopes and soil quality indicators across an eroding-deposition catena in an historical Spanish olive orchard" *by* José A. Gómez et al.

Anonymous Referee #1

Received and published: 29 November 2019

The manuscript is a case study in Spain to compare the variation of SOC, soil quantity indicators and isotopes induced by land-use change and erosion issues. The subjects addressed here were clear and worthy of investigation. Authors have chosen appropriate indexes (e.g. OC fractions, N, P et al.) to illustrate how olive orchard use coupled with soil erosion degrades soil quality, however, the data mining/ interpretation is insufficient and need to dig into further. In addition, the way of presenting results (Figures and Result section) are not well-structured and need to be reorganized.

Firstly, there are too many figures (29 figures) which are quite information poor. I highly

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recommend authors to reshape and combine some of them. For example, combine four individuals of Fig.3 into only one by a stacked bar chart (see attached Fig.1 as an example). Also, try to combine Fig. 2 A and B (Fig.2 as an example). Hopefully, it can reduce the number of figures from 29 to c. 11.

Secondly, a good dataset has been created in the manuscript but it is not deeply explored yet. Except for ANOVA, there are many statistics that would help out (e.g. PCA, correlation et al.). Why not try to correlate erosion/deposition rates with SOC or soil quality variables. In addition, authors have made ANOVA on reference vs orchard and orchard erosion vs orchard deposition, please give a further try to find a tendency on reference vs deposition if there are any.

Thirdly, please reorganize and give the subtitles for the Results section to make it clear and readable for audiences.

A couple of more comments:

1. L130 L170 How did you define unprotected, physically, chemically and biochemistry protected C? POM is unprotected C, iPOM physically protected C? Please clarify in Material & Method.

2. L120 Authors collected 13 micro pits from reference sites and 8 pits from olive orchard sites. Then you created one or three composite samples for fraction/isotopic measurement or measured all micro pigs as repeats?

3. L155 Please indicate the method you measuring bulk density, which was used in table 5

4. L205 Authors mentioned that “protected Corg in the reference and olive orchard area account for 87% and 64% of maximum soil stable Corg, respectively at the topsoil”, it means reference area has a higher percentage of protected SOC than that of an olive orchard. This tendency is contrary to what has shown in Fig.5. How do you explain it? Please detail the way you calculated maximum soil stable Corg in Material & Method

(insert equation for example?).

5. (L20 L300) authors suggested using δ15N as a proxy to identify degraded areas; does annual input of 5 kg N-P fertilizers play a role in the dynamic of δ15N?

Please also note the supplement to this comment:
https://www.soil-discuss.net/soil-2019-59/soil-2019-59-RC1-supplement.pdf

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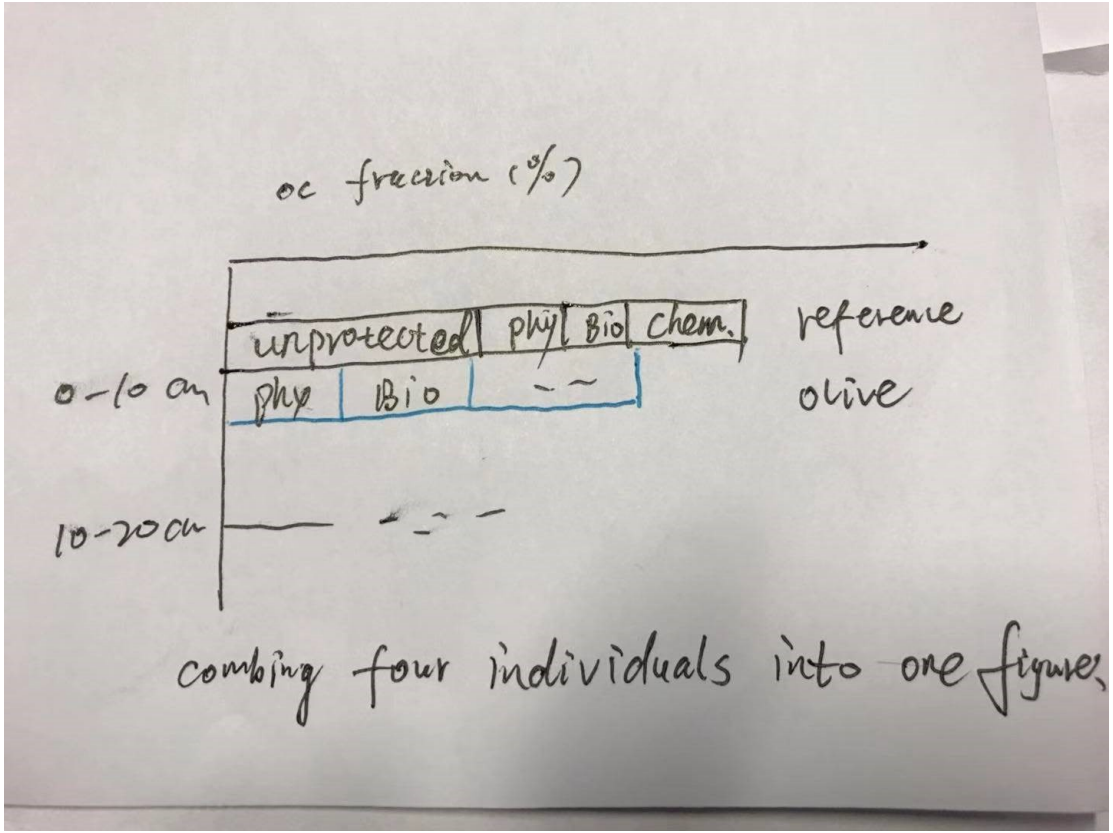

Fig. 1. example of re-shaping Fig. 3

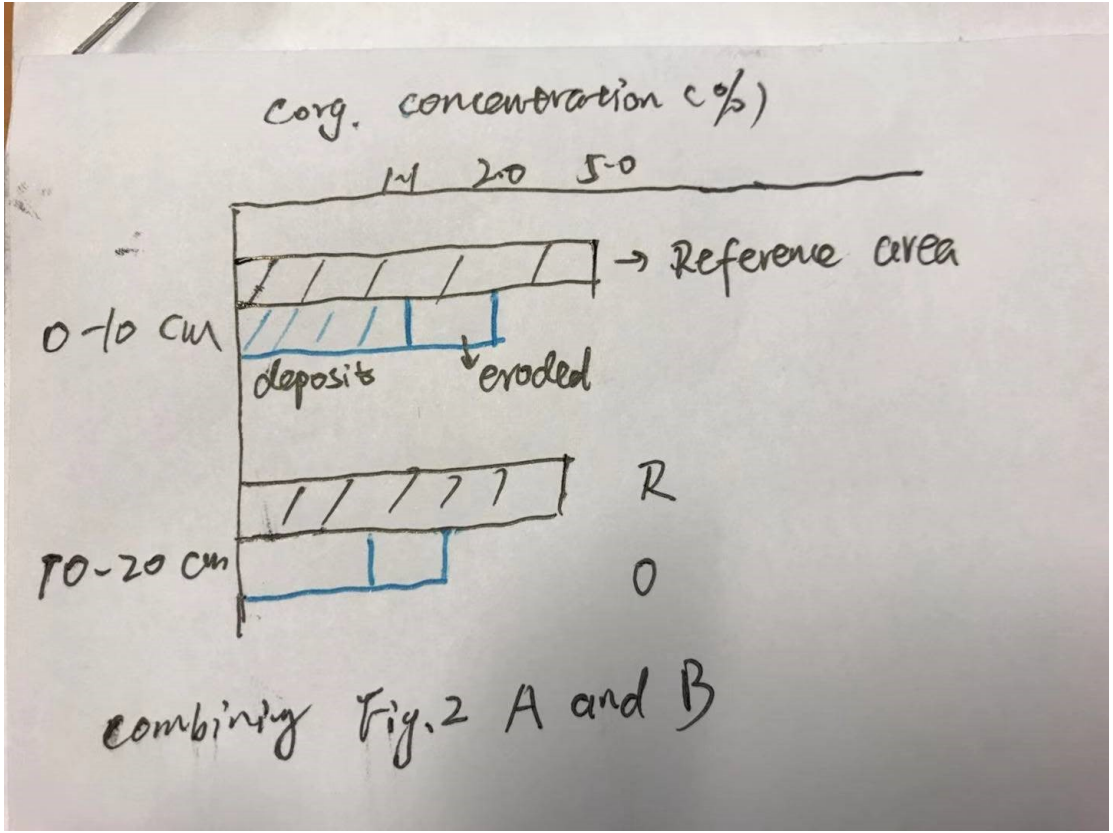

Fig. 2. example of re-shaping Fig. 2

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