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## ***Interactive comment on “Ecological soil quality affected by land use and management on semi-arid Crete” 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 describe how we addressed your comments in the revised version of the manuscript.

A main comment, appearing in all three reviews regarded the many differences among the sites, and the lack of true replication that hamper specific conclusions about specific site-characteristics, especially land management. In our original manuscript we already have recognized this limitation of our study, but based on the comments by the

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reviewers we now more accurately addressed this limitation in terms of the research aims, and hence the title of our manuscript. We followed a suggestion made by one of the other reviewers and changed the title into: "Biological soil properties under different land management types on semi-arid Crete", implying that we treat 'land management' just like other differences among the sites. In the new manuscript we have consistently revised the text accordingly.

Below we will react on all points raised and describe how we have addressed them in the new manuscript. We have printed your comments point-by-point together with our response.

Comment-1: The manuscript is focused on the effect of land use change on soil properties. The manuscript needs major revision (i.e the introduction and discussion can be improved) before to be accepted. In discussion and conclusion miss the description of the novelty of this work in comparison to previous papers.

Response-1: We have readdressed the introduction more towards the aim of investigating soil biological properties in semi-arid conditions, highlighting the novelty of this paper, i.e. the indicative value of commonly used soil biological parameters but under semi-arid conditions, which has not been done to our knowledge (page 190, lines 20-24).

Comment-2: Page 189 line 25 : add references

Response-2: We have adjusted the lines with specific references emphasizing the local characteristics.

Comment-3: Page 190 Line 1-5. Move this part in MM , or describe in general the land use classes in Crete.

Response-3: Paragraph in introduction (page 189 lines 23-28 and page 190 lines 1-5) is changed accordingly. Additionally, paragraph 2.1 has been changed. The introduction now describes the general land use types, while the M&M holds the information for

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the specific sampling sites.

Comment-4: The introduction is confused: Many paragraphs of introduction are related to MM; Moreover the first part is general and does not focus on the state of art of the issue of the present manuscript.

Response-4: Same remark was made by reviewer 1; We have readdressed the introduction more towards the aim of investigating soil biological properties in semi-arid conditions, highlighting the novelty of this paper, i.e. the indicative value of commonly used soil biological parameters but under semi-arid conditions, which has not been done to our knowledge (page 190, lines 20-24).

Comment-5: See the following papers to improve the introduction with update research in Mediterranean environment. (Fernández-Romero et al., Land degradation and development 2014; Zavala et al Land degradation and D. 2012; Novara et al., Catena 2012; Galati et al., Land degrad. 2015)

Response-5: We agree: In the revised introduction we have given more attention to the Mediterranean and we included the mentioned references, which are indeed relevant.

Comment-6: Line 2 page 191. Add also the contribution of microorganism of litter incorporation into the soil ( see Novara et al. Solid Earth)

Response-6: We agree: we added “and incorporation” (page 191, line 2)

Comment-7: MM The first sentence is repeated in Introduction ( delete here or in the introduction)

Response-7: We removed this duplication in the text. The sentence (page 191 lines 11-14) is moved to the introduction. The specific paragraph in introduction (page 189 lines 23-28 and page 190 lines 1-5) is now describing the general characteristics of land management types, while the M&M holds the information for the specific sampling sites. See also our response to comment-3 above.

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Comment-8: Lines 12-14 Page 191. This part is not MM Lines 20 -22 Page 191 . This part is not MM Response-8: See responses to comments 3 and 7 above.

Comment-9: Page 192 : Don't repeat the description of the site. It was done in the table 1, therefore delete this information from MM chapter. Response-9: We rephrased the text so that it now includes some additional information

Comment-10: Page 192 "Samples were taken in May 2010" All samples? Soil sample?

Response-10: Yes, all. We changed the sentence to "All soil samples were taken in May 2010"

Comment-11: Line 26 Page 192 Add reference

Response-11: We added a reference for this statement (Banwart et al., 2012).

Comment-12: The numbers in the axis of figure 1 are too small.

Response-12: Following a suggestion by reviewer 1, Figure 1 is removed from the manuscript.

Comment-13: Page 197 lines 4-7 Delete this part

Response-13: We had these sentences in the discussion as short summary of the main objectives of the study. We have no problems in leaving them out, such we did as the reviewer (and also reviewer 1) suggested.

Comment-14: The difference in SOC content among different land uses can be related to difference in altitude (discuss this point in discussion chapter; see Alberti et al. 2011).

Response-14: The second paragraph in chapter 4.1 has been adjusted to include the role of elevation (and the resulting differences in temperature and rainfall) as factor in the TOC content.

Comment-15: The conclusion talks about the choice of ecological indicators. This

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issue is not explained in the introduction.

Response-15: On page 190 lines 11-23, we have explained the use of biological parameters for assessing soil quality, and on page 191 lines 2-8, specific parameters (indicators) are mentioned.

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