Solid Earth Discuss., 6, C966–C968, 2014
www.solid-earth-discuss.net/6/C966/2014/

Solid Earth
Discussions
Open Access

Interactive comment on "Soil organic carbon along an altitudinal gradient in the Despeñaperros nature reserve, Southern Spain" *by* L. Parras-Alcántara

Anonymous Referee #1

Received and published: 18 September 2014

General comments:

The study of Parras-Alcantara et al. provides useful information regarding the influence of topography and soil depth on soil organic contents of natural areas of Southern Spain. Given the relevance of the topic and the lack of similar studies at detailed scales in the area, this article provides very useful information to the scientific community. In my opinion the article is an excellent contribution to the scientific progress within the scope of the journal Solid Earth. Although the paper is clear, well written and structured, some minor aspects could be improved.

Specific comments:

Introduction: Good summary of the state of art. I also recommend the following papers that are related to this work and report SOC analysis for different layers in Mediterranean and semi arid areas.

Albaladejo, J., Ortiz, R., Garcia-Franco, N., Ruiz Navarro, A., Almagro, M., Garcia Pintado, J., and Martínez-Mena, M.: Land use and climate change impacts on soil organic carbon stocks in semi-arid Spain, J. Soils Sediments, 13, 265–277, 2013.

Muñoz-Rojas, M., Jordán, A., Zavala, L.M., De la Rosa, D., Abd-Elmabod, S.K. and Anaya-Romero, M.: Organic carbon stocks in Mediterranean soil types under different land uses (Southern Spain). Solid Earth, 3, 375-386, 2012.

Muñoz-Rojas, M., Jordán, A., Zavala, L.M., González-Peñaloza, F.A., De la Rosa, D. and Anaya-Romero, M.: Modelling soil organic carbon stocks in global change scenarios: a CarboSOIL application. Biogeosciences, 10, 8253-8268, 2013.

Schrumpf, M., Schulze, E. D., Kaiser, K., and Schumacher, J.: How accurately can soil organic carbon stocks and stock changes be quantified by soil inventories?, Biogeosciences, 8, 1193-1212, doi:10.5194/bg-8-1193-2011, 2011

The objectives of this research are mainly to quantify soil organic carbon (SOC) contents and their vertical distribution in the area, and to evaluate the differences in the SOC stocks along an altitudinal gradient. Since the results include the characterization and description of the soils in the area, the authors might as well include that analysis as part of their objectives.

Methods: In this section, the authors refer to FAO (2006) for the sampling design although, in my opinion, a brief description of the methods that were used would be appropriate. Please consider adding a figure with the study area and toposequence.

Results and discussion: The authors discuss the variability of SOC contents/stocks in relation to factors such as texture and the influence at different soil depths. Yet, it would be interesting to elaborate in the implications of other possible factors. In the discussion

SED
6, C966–C968, 2014

the authors briefly refer to climate as a possible factor explaining low concentrations of OM at depth. Indeed, climate is a major factor explaining SOC distribution (spatially and vertically along the soil profile), in particular the effects of temperature that might affect decomposition of different soil fractions. However, at less broader scales, other factors might be involved such as land use change or land use history, mainly in the upper layers. Nonetheless, the study is carried out in a natural area covered by woodlands and scrublands so land use change processes are possibly not so relevant. Could you please elaborate on these aspects?

To compare your results with similar studies you could read the papers suggested above (comments for the introduction section), particularly the studies of Muñoz-Rojas et al. (2012, 2013) in which SOC stocks are analysed a using the same soil control sections (0-25, 25-50 and 50-75 cm).

In Figure 1 the authors show the linear regression model for the total SOC stocks versus altitudinal gradient. It would be worth to try modelling this relationship considering the different layers as well.

Interactive comment on Solid Earth Discuss., 6, 2495, 2014.