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Interactive comment on "Comparison of spatial association approaches for landscape mapping of soil organic carbon stocks" *by* B. A. Miller et al.

Anonymous Referee #1

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Although I believe that the paper has been based on interesting methodological ideas as regards comparing the spatial output of SOC stock predictions and associated errors using a direct and indirect approach (i.e. calculating first SOC stocks and modelling SOC stock at once or modelling the components separately (e.g. SOC%, bulk density) and next calculate SOC stocks, respectively), I suggest not accepting the paper at this point for the following reasons:

Samples are taken in clusters covering only 12 fields in the study area (containing presumably a few 10^2 fields), with rather a poor spatial distribution. This will most probably affect the distribution of the data in the multi-dimensional space, and hence, do not cover enough the associated landscape complexity within the study area. These 2 concerns (poor spatial distribution and poor distribution in multi-dimensional space) are

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a major problem when the model is used for extrapolation / predicting pixels elsewhere in study area, i.e. outside the variable range covered by the calibration dataset.

As a consequence, it's quite possible that the differences in SOC stock maps between the two methods are more the consequence of the fact that the 2 modelling approaches (i.e. direct versus indirect) are reacting differently on this shortcoming (inappropriate multidimensional data cover) then it is actually reflecting a real difference in model output just/purely caused by the fact that 2 different approaches were used.

Finally, it's clear how the authors calculated errors on SOC stocks by using classical error propagation techniques for individual pixels (i.e. for both the direct and the indirect method (including error predictions on components)), but it's not clear if/how spatial autocorrelation was taken into account when mapping these errors. It's important to integrate this effect of spatial autocorrelation in order to make a fair comparison between the error maps obtained by the two methods.

I really hope the authors can use these thoughts in order to improve this research and/or clarify these comments in a future revised MS.

Interactive comment on SOIL Discuss., 1, 757, 2014.

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