

Interactive comment on “No Silver Bullet for Digital Soil Mapping: Country-specific Soil Organic Carbon Estimates across Latin America” by Mario Guevara et al.

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Responses to comments

We appreciate your comments and feedback to this effort. We agree that, regarding the data used, this is a "top-bottom" standardized approach. We are aware that there is more soil information (e.g., legacy pedon descriptions) on each country compared with what currently is contained in the WoSIS system. Most of these country-specific information has been used by each representative institution to deliver country-specific soil carbon information for the Global Soil Partnership initiative (GSP). To support these activities, the GSP has dedicated efforts to identify the institutions and individuals on

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each country with the mandate to generate and update soil information with a national perspective. These institutions and individuals were the participants of a series of training sessions on digital soil mapping and this study is one result of this collective effort. A spirit of transparent methods, data-sharing and recognition of the hard work across the institutions to provide the nation-wide datasets useful for digital soil mapping are also welcome ideas to improve bottom-up digital soil mapping practices. To empower institutions with state-of-the-art approaches to handle big data such as the Google earth based framework described by Padarian et al. (2016) would be also beneficial to progress with nation-wise digital soil mapping assessments. Please note that each country is facing different challenges mapping their own soil resources based on their own country-specific needs.

We appreciate your comment about variable selection, and we fully agree. Our point is to encourage the inclusion of a variable selection strategy before model soil properties, which would benefit both, the model interpretability and for the case of machine learning, it would also simplify the computational demand. We will clarify this idea in the revised manuscript. A variable selection strategy can be as simple as a correlation analysis or as complex as a genetic search algorithm for variable selection. For the first case (which we used), we will highlight in the revised version that, ideally, the best correlated selected predictors should be chosen in a source specific basis (e.g., the best climatic, the best topographic, the best vegetation index and so on). Please consider that some machine learning algorithms (e.g., random forest) do not have the assumption of multicollinearity in the covariate space. In addition, we are performing cross-validation and therefore, obtaining unbiased residuals, which supports the performance report of our predictions.

As explained in the responses to referee 2, from a bottom-up approach each country has important progress to report. Our conclusion is not affected by the use of the WoSIS dataset. From datasets harmonization efforts to parallel computing problems each Latin American country is developing capacities for digital soil mapping, not only

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Brazil or Chile. The ultimate goal would be to reduce the current uncertainty in the carbon cycle related estimates from country-specific-to-regional-(Latin America)-to-global scales. We agree that pioneer efforts such as yours, or Samuel-Rosa et al. (2017) for Brazil, or Angelini et al., (2017) in Argentina and others, should be cited in a revised version of our work. Please note that there are still large uncertainty on SOC across the multiple-scales of data availability (e.g., from 250 pixels to ~5x5km, Tifafi et al. 2017), so step by step we will address finer resolution digital soil mapping, hand by hand with the responsible institutions on each country, with the ultimate goal to build capacities on digital soil mapping. We would be delighted if you are interested in to contribute with your experience on this collective and true collaborative effort.

References

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