Interactive comment on "Mapping homogeneous spectral response zones in a soil profile" *by* Edward J. Jones and Alex B. McBratney

Anonymous Referee #1

Received and published: 4 July 2018

General comments

This paper deals with VNIR spectroscopy to asses horizon boundaries from soil profile. One of the main issue related to soil spectroscopy is the variability of the moisture condition. For this reason, the authors compared two methods, EPO and DS that were successfully used in the past to remove the effect of soil moisture on the spectral data. Although the paper is well written, it would need some improvements in all sections.

Abstract

The method to assess the goodness of the different techniques is unclear. Moreover, the authors should explain the meaning of LCCC.

Introduction

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Discussion paper

Some references in the Introduction are missing. At least other three important papers dealt with the soil moisture and VNIR spectroscopy:

Wu, C.-Y.; Jacobson, A.R.; Laba, M.; Baveye, P.C. Alleviating Moisture Content Effects on the Visible Near-Infrared Diffuse-Reflectance Sensing of Soils. Soil Sci. 2009, 174, 456–465.

Rienzi, E.A.; Mijatovic, B.; Mueller, T.G.; Matocha, C.J.; Sikora, F.J.; Castrignanò, A. Prediction of soil organic carbon under varying moisture levels using reflectance spectroscopy. Soil Sci. Soc. Am. J. 2014, 78, 958–967.

Castaldi, F., Palombo, A., Pascucci, S., Pignatti, S., Santini, F., Casa, R., 2015. Reducing the influence of soil moisture on the estimation of clay from hyperspectral data: A case study using simulated PRISMA data. Remote Sens. 7.

I suggest to read these papers to improve the introduction and in particular the proposed list of methods (L 55-64) The last paragraph of the Introduction is unclear (L. 86-91); the authors should better highlighted the novelty of their work.

Methods

Some information is missing in this section: âĂć The methodology for the soil properties measurements described in the Table 2 âĂć How did authors measure the soil moisture? They described the moisture content along the profile in the Results, without explaining the measurement protocol in the Methods section. âĂć The 'Constructing the projection matrices' section is not clear, the authors should explain how they built the library to construct EPO and DS. In my opinion, this is an important information for the readers. âĂć 'Structural differences in the EPO and DS matrices are immediately evident. . ..', do authors know the reason of these differences? Concerning the Equations, it is not clear the meaning of 'variable' for equation 2 and 'predicted value' and 'observed value' in equation 3. Moreover; there is x in the first two equations and y in the eq. 2 and 3, the authors should use different symbols if the meaning changes. For

example x is an observation in Eq.1 and a variable in eq.2, while y is a variable in eq.2 and the predicted/observed value in eq.3.

Result and discussion

The discussion is very poor in this chapter. Although, the results contain many interesting insights, sometime the discussion is completely missing, for example lines 216-224 where no explanation was provided for the PC results. The section 3.5 should be improved too, looking further into the differences between DS and EPO and the other approaches mentioned in the Introduction (lines 55-64). Moreover, this study concerns a single soil profile, the authors should discuss on the transferability of this approach at larger scale for soil mapping purposes. Conclusions This section is too short. The last sentence 'the approach can be easily upscaled to mapping soil units spatially' is not supported by results and discussion.

Technical corrections

L 133 'prospectr' instead of 'prospector'

Minasny et al 2011 is missing in the reference list

Figure 2: please insert horizon boundaries over the picture.

Figure 5: please insert horizon boundaries over the picture.