

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

Anonymous Referee #2

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General comment: The manuscript “Mapping homogeneous spectral response zones in a soil profile” generally fits to the focus of SOIL, but I think the title is misleading. As far as I understand the manuscript it is about different spectral treatments to reduce the effect of moisture on VisIR spectra and subsequently the classification to different diagnostic horizons. Therefore I suggest to change the title. Moreover, the whole manuscript is not focused around a clear problem or a possible outcome. In the end the whole study has nothing to do with a spatial arrangement or homogeneous spectral response zones (what are these?). By using a k-means with four classes on four horizons it is clear that you cannot find any heterogeneities in the horizons. What is the rationale of the study and what can other people take from it?

Abstract Line 7: Which type of spectra are you dealing with? On which scale are you

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working and from which spatial perspective do we start? Remote sensing, proximal sensing, soil profiles, soil surfaces? Line 8: Please add a short description like “The spectral preprocessing tools...” Line 13: What does pre-processing only means? Did you do a pre-processing before EPO and DS, too? Line 14-15: What do you mean with “in each case”? How many profiles were scanned?

What is the outcome and take-home message of this manuscript? Please put your results in a wider perspective.

Introduction Line 44-45: But there are studies! Please check the literature for spectroscopic assessment of soil profiles. A good starting point is the IUSS working group on Pedometrics and Alfred Hartemink’s review articles on this topic. There are groups in Ireland, USA, Germany... working and publishing on this topic – even on pre-processing and data treatment in general. Line 48: What about illumination in the field? Line 49-53: There is literature and even algorithms for this topic, too. Line 91: In order to do what?

Methods Line 106: What is magnetic gravel and why is it important? Line 117: How many bands were considered? Line 125: Which software was used for this step? Line 142-149: I think I understand why you did this, but please add one more sentence at the beginning of the paragraph to introduce the reason for the PCA. Btw PCA is not only used in spectroscopy – please change. Line 151-167: Please explain shortly why you are doing this.

Results and discussion Line 240: Structure is less spectrally active? Can you please explain how soil structure can be spectrally active in DRIFT spectroscopy? Or just reformulate this section. Chapter 3.4: k-means is an unsupervised classifier that splits the data in homogeneous subgroups. By giving 4 classes as the stopping criteria, a real understanding of the given heterogeneity and the effects of different pre-processing cannot be reached. Please let it run without a number of classes but with a number of iterations or percentage of samples that changed the classes. Figure 7: Can

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you please add the horizons like in figure 9? Figure 9: How variable are the horizons internally? These maps would be interesting if you could show the internal variability of each horizons and that with your approach the classifier can identify the internal heterogeneity and still identify the bigger variability between the different horizons (see comment to chapter 3.4).

The whole paragraph is written much too descriptive, it is not put into a wider context and not really discussed. What did other studies find? What are explanation for good/bad results? What is the most important outcome? And most important why did you do it?

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