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.
The authors are happy with the title. Homogeneous spectral response zones were mapped and "in a soil profile" implies in situ and overcoming issues associated with scanning in situ, such as variable soil moisture. If we were to describe everything that we did in the title it would be 40 words long.

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?). Homogeneous spectral response zones are defined in the opening line of the abstract, I will add further reference to them in the introduction and the discussion. By using a k-means with four classes on four horizons it is clear that you cannot find any heterogeneities in the horizons. If you observe Figure 9 PP In situ you will see that this is entirely possible, that is why EPO was necessary. What is the rational of the study and what can other people take from it? The main point of this paper is to identify if spectra scanned in situ and classes/zones/horizons identified with these spectra are coherent to those obtained in the laboratory under controlled, air-dried condition. Use of EPO was found to remove the negative effects of soil moisture sufficiently enough that spectra obtained in situ were correlated with those obtained in the laboratory, i.e. spectra obtained in situ under field conditions were actually useful. We can rephrase some sections to highlight this as suggested by RC2 in numerous comments below.

Abstract Line 7: Which type of spectra are you dealing with? On which scale are you working and from which spatial perspective do we start? Remote sensing, proximal sensing, soil profiles, soil surfaces?
All of this information is given in l. 10

Line 8: Please add a short description like "The spectral preprocessing tools..."
I think there would be debate as to whether EPO and DS are pre-processing, but I can reword the sentence.

Line 13: What does pre-processing only means? Did you do a pre-processing before EPO and DS, too? Described in ll. 125-40. ll.125-128 will be expanded as per SC1's comments.

Line 14-15: What do you mean with "in each case"? For each treatment How many profiles were scanned? One

What is the outcome and take-home message of this manuscript? Please put your results in a wider perspective. Will be expanded as per response given in paragraph two above.

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 preprocessing and data treatment in general.
There are many in situ analyses using VisNIR to predict clay content and organic matter vertically, but not horizons. Horizons have been predicted using XRF, image analysis and ex situ using imaging visNIR. Also papers on mapping soil units spatially using multi/hypersectral remote sensing. I will include some example papers.

Line 48: What about illumination in the field?
Illumination is via contact probe, when supplied with constant voltage this is not an issue

Line 49-53: There is literature and even algorithms for this topic, too.
Yes, they are discussed in ll. 55-86

Line 91: In order to do what? Will be expanded as per response given in paragraph two above.

Methods Line 106: What is magnetic gravel and why is it important? Magnetite/maghemite. They aren't, this is just a description of the soil profile.

Line 117: How many bands were considered?
This is described in the Data Processing section, l. 136 500-2540 nm, 1 nm resolution

Line 125: Which software was used for this step?
l. 130 "All data processing and analysis was performed in the R environment for statistical computing". This section will be expanded at the request of another reviewer.

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.
I think you are caught up on some intricacies of the language, I will rephrase this to make it clearer.

Line 151-167: Please explain shortly why you are doing this.
An additional introductory 1-2 sentences will be added.

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. Certain structural attributes may be related to VisNIR due to their relationship with spectrally active properties. i.e. Apedal single-grained will only occur in sandy soils, moderate to high pedality blocky, columnar or prismatic structure requires a minimum clay content. Lenticular structure is commonly associated with a high content of smectite clay. High concentrations of carbonates, iron oxides, organic matter and soil sodicity are also identifiable with visNIR and have their own effects on soil structure.

Chapter 3.4: k-means is an unsupervised classificator 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 preprocessing 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.
This is discussed briefly on ll. 164-166. The main point of this paper is to identify if spectra scanned in situ and classes/zones/horizons identified with these spectra are coherent to those obtained in the laboratory under controlled conditions.

Figure 7: Can you please add the horizons like in figure 9?
Horizons will be added to figure 7 and also to figures 2 and 7 as requested by another reviewer.

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 classificator can identify the internal heterogeneity and still identify the bigger variability between the different horizons (see comment to chapter 3.4).
I agree that this would be an interesting analysis but is beyond the focus of this manuscript.

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? Conclusion will be improved as per recommendations.