Interactive comment on "Soil classification based on spectral and environmental variables" *by* Andre Carnieletto Dotto et al.

Anonymous Referee #2

Received and published: 6 January 2020

It is an interesting manuscript on the exploitation of spectral data from soil profiles for soil classification. The results showed that some classes are well distingushed by spectral features (like Luvisols), while others are hard to distinguish (e.g. Arenools, Lixisols). It was also shown that adding terrain and climatic data improves the classification performance. But there are some issues remained uncleared, which need to be responded by the authors.

- What if just topsoil samples and/or measurements are available, can this classification work?

- The WRB system has 32 reference soil groups, while here just 10 classes were considered. It reflects the classes present in Brazil. Nevertheless, would it work similarly if other classes were also added? Try to discuss this issue at least theoretically.

- On my opinion it would be better to work on the current soil classification system rather than build a new one. Nevertheless, I see the potential of this approach in the possibility to improve the current system, to precise the distinction between classes to make them more easily distinguishable. Then the spectral data could help to identify the classes better.

- I misunderstood the way the spectral were treated (2287 soil with 3 horizons each). First the horizons were arbitrary selected – How can you derive real information about the soil horizons which are mandatory for soil classification? This arises a question: Does spectroscopy is sufficient to classify soils? I am not yet convinced from this study, as a profile has to be well sensed in situ and not from SSL. (see Ben-Dor, Eyal, Daniela Heller, and Alexandra Chudnovsky. "A novel method of classifying soil profiles in the field using optical means."Soil Science Society of America Journal 72, 4 (2008): 1113-1123.

- How the spectral information of each profile was analyzed? The soil orders were dependent values? The spectral were independent? If this soils belong to the SSL of Brazil, why not adding soil attributes such as clay content, organic matter and carbonates to the classification system that can be derived very easily?

- I did not understand figure 6. What exactly is shown here? Average of spectral that represents SEC? How was it done? No variation in each SEC? Needs more clarification. I would be more happy to see spectra profile represented each soil order, which show nice spectral variation from SEC to SEC.

- To be fully convinced, this kind of studies (just spectral information) should be applied on to another SSL from another region.

- Line 106. "optimal" should be instead of "optical".

Line 128. the 1900 nm can be H20 (also at around 1400 nm) from other sources than smectite!

- Line 138. why do you think these soil order provided the "largest improvement" relative to the others? Please explain.

- Line 158. "iron oxide are presented"

- Based on line 228 where it says "may be considered low" – perhaps you should re-title the paper?

- As mentioned color is important . Nonetheless, spectroscopy can depict the color. Please add it to the discussion.

- In several cases it says that incorporating the environmental factors in the analysis is low (line 227) and in others it concluded that it is good (line 285). It makes the reader a bit confused about the authors' opinion: is it good or bad to add environmental factors?

- Line 321. "incorporate" should be instead of "incorporated".

Generally, I would see the manuscript like minor revision.

Interactive comment on SOIL Discuss., https://doi.org/10.5194/soil-2019-77, 2019.