

## Reply on RC2

István Dunkl and Mareike Ließ

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Author comment on "On the benefits of clustering approaches in digital soil mapping: an application example concerning soil texture regionalization" by István Dunkl and Mareike Ließ, SOIL Discuss., <https://doi.org/10.5194/soil-2020-102-AC2>, 2021

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*We thank the reviewer for his/her attentive reading of the manuscript and constructive suggestions.*

Abstract: please add the brief obtained results, e.g., accuracy

*We added a summary of the model accuracy to the abstract.*

Line 16: add a relevant cit.

*We included references to the importance of soil texture maps and the role of soil texture for physical processes.*

Line 96: The soil texture of the soil legacy dataset used as model input or model output?

*The text was clarified in this regard.*

Line 107: please add a relevant cit. and software

*The used software are cited in line 116 and Table 1.*

Line 156: did you assign the number of clusters into 3?

*The description of the clustering application was adapted to clarify this aspect.*

Lines 160 to 184: are not clear. Adding a flowchart might enhance the clarification

*We considered the option to add an additional figure, but rejected this because of the high number of figures in the manuscript. Instead we clarified the text to make it more precise and allow the reader an easier overview of the FAMD procedure.*

Feature selection is also unclear. Did you specify the significant relationships between soil fractions and covariates? Please justify the paragraph

*We use a novel approach of a filter method to study the relationship between the individual predictors and the target variables. The corresponding text section was adapted to improve understandability.*

Did you transform soil fractions? If you use the raw data, the predicted maps do not guarantee the sum of 100%.

*We did not scale the results to 100% because it was in the objective of our study to investigate the individual predictability of each texture class and not to create a ready-to-use soil texture map. There are different ways to scale the data to 100% (scaling all texture classes equally, or scaling the texture classes which have the lowest model performance), and the scaling could be applied to the data to tend to the needs of the individual user. The reasoning for not scaling the results are given in the lines 314 – 318.*

Random oversampling is just “copy and paste” of the original data. Do not think if the approach resulted in overfitting?

*On the one hand, we applied a nested cross-validation approach to avoid overfitting on model training and tuning. On the other hand, the oversampling and other sampling approaches (Figure 3) were only applied to the respective training sets as indicated in Figure 4 and described in lines 214-216. This means it does not affect model evaluation and we are not overoptimistic of the predictive model performance.*

Line 245: please add a relevant explanation about the filter method in feature selection in the method section of the paper

*We extended the methods section accordingly.*

Please calculate line concordance instead of R squared.

*We are using  $R^2$  because it is a frequently used metric in model evaluation and therefore allows the comparison of our results with other studies.*

I also recommend reducing the size of the paper. There are many aspects of modeling are included in the current version. One possibility is to move them to the appendix.

*We are aware that the methods section is rather long. We have thoroughly considered to reduce it. However, the extent of the methods section is due to the methodological focus of the paper. The methods are at the center of its rationale, and all described aspects are important for understandability. Therefore, we refrain from shifting any of them to the appendix.*