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Comment

Interactive comment on “Quantifying soil and critical zone variability in a forested catchment through digital soil mapping” by M. Holleran et al.

M. Holleran et al.

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We thank Reviewer 2 for the constructive input and comments. Here we respond and address the general and specific points identified by Reviewer 2:

Page 2: lines 7-9 – We decided to keep these data in this sentence as they provide important physiographic context for the study location such that readers can quickly identify the study site setting and properties.

Page 2: line 25 – fixed.

Page 4: lines 16-19 – Done – this sentence has been restated.

Page 6: line 25 to page 8 line 23 – We feel the text is adequate in describing the

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environmental covariates used in this study and did not want to add another table to duplicate what is in the text.

Page 16: lines 1-25 – Done – we have now included all equations on separate lines with individual equation numbers.

Page 38: Table 2 – Done – we have modified the figure caption to indicate the meaning of F-ratio and P-value in the context of these data.

Page 39-40: Tables 4 and 5 – Table 4 presents the results only from the final PCA after multiple iterations and indicates the eigenvectors and values for each PC and environmental covariate included in the final PCA. The correlations of environmental covariates to each PC and soil variable are presented in Table 5. We did not include a table for each PCA iteration as this would provide an unreasonable number of tables for publication. Thus

Table 5 – we did not include soil variable correlations to each other in an attempt to minimize the size and information contained in the table. The table has now been extended to include the complete correlation matrix. Rechecking Table 5 indicated an error in which values were in bold indicating significance. This error was fixed and the spurious significant correlations fixed. We very much thank the reviewer for identifying this mistake so that this could be corrected. All significance values indicated were for $P < 0.05$. We have now added asterisks and modified the table caption to indicate multiple values for P. Any text describing correlations has been updated.

Specific comments: The general “rule of thumb” is that independent variables with correlations of > 0.7 may not be suitable for use in the same multiple linear regression model due to issues with colinearity and related inflation of model r^2 . The reviewer is correct in that we identified an r -value of 0.73 between `mod_depth` and `wet_index` – right at the “rule of thumb” cutoff. We thus went into the modeling component exercising caution when including both of these variables in a MLR model. However, while the VIF values indicated slightly greater influence of these parameters when combined in

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a single MLR model, eg VIF values of ~ 2.4 vs VIF values of ~ 1.0 for weakly correlated variables, all VIF values fell well below the accepted cutoff value of 5.0 that would indicate undue inflation of model r^2 due to colinearity. These parameters were also specifically not included together as an interaction term that would magnify any model r^2 inflation. Given the low VIF values, exclusion of any depth-wetness index interaction terms, and the LOOCV results that indicated reasonable r^2 values, we deemed it was appropriate to include these parameters together in three of the seven presented models.

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