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Interactive comment on "Disaggregating a Regional Extent Digital Soil Map using Bayesian Area-to-Point Regression Kriging for Farm-Scale Soil Carbon Assessment" *by* Sanjeewani Nimalka Somarathna Pallegedara Dewage et al.

Anonymous Referee #1

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General comments: This manuscript proposed the use of Bayesian Area-to-Point Regression Kriging (ATPRK) for spatial disaggregation of regional scale digital soil map to farm scale. This method is able to provide the uncertainty estimate associated with the disaggregation process. Throughout it had lower concordance correlation with the coarse map than dissever algorithm, the independent data showed that Bayesian ATPRK had a higher concordance correlation than dissever. Generally, the proposed method is interesting as it can provide the uncertainty related to the disaggregation process. However, from my point of view, the major uncertainty of disaggregated map

comes from the original map, thus it is more important to incorporate the uncertainty of the original map into disaggregation. Is the proposed method able to integrate this? Another limitation is the Results and Discussion section, where authors focused mostly on the results and rarely provided a more general discussion. I look forward to seeing the feedback from the authors on these two issues.

Specific comments:

Line 21: Why only mentioned underestimation? How about overestimation? Line 35: What is the difference in computing time? I know Bayesian ATPRK is a one-step process, and it saves computing time? Because sometimes an iteration process can also be efficient. Line 45: It is not "five standard soil depths" but "six standard depth intervals". Lines 71-72: I do not agree with the statement here, DSMART can also produce maps in a fine grid. Line 123: What do you mean "at N point"? Line 136: Since you listed many methods for deconvolution of the empirical variogram, it is better to show here why you chose Bayesian estimation. Lines 187-189: Do you think the proposed framework can integrate the uncertainty from the fitted mass-preserving splines as well as from the uncertainty estimates associated to these two SOC maps (0-5, 5-15 cm)? I understand that the Bayesian ATPRK can provide the uncertainty in the step of disaggregation, however, I think the major uncertainty comes from the original map, which should be not ignored in disaggregation. Lines 196-197: Why you choose 10 m as the final resolution? The finest covariate used here is in10 m (Elevation data), I think you should mention it in the very beginning. Line 268: I suggest adding PICP to assess the uncertainty. Lines 341-342: reduce the processing time? However, parallel computing can still not solve abrupt changes between two tiles. Maybe you need a laptop with larger RAM? Line 579: Figure 6 still showed an obvious block effect. In order to compare the original SOC map (Figure 1), please use the same legend and then we can tell the difference between them. Line 595: The map from Disserver looks smoother.

Technical corrections Line 21: DSM has not been defined in the previous texts. Line 48: DSM has been defined before. Line 91: SOC has not been defined yet. Line 200:

DEM has not been defined yet and Topographic Wetness Index can be replaced by TWI here. Line 209: and should not be in italic. Please have a careful check of all the parameters which should be in italic. Line 260: In “cm2”, 2 should be in superscript. Line 280: predicted SOC values. Line 285: LMM has not been defined. Line 290: In other texts, dissever is used. Please make it consistent. Line 539: Please use either Figure or Fig. in the text. Currently, it is a mix. Line 565: Better to put (a) and (b) in the upper right position.

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