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Hydrology and Earth System Sciences Discussions

Interactive comment on "Spatial variation of soil physical properties in adjacent alluvial and colluvial soils under Ustic moisture regime" *by* M. Sağlam et al.

Anonymous Referee #2

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General comments

The paper by SaÄ§lam et al. entitled 'Spatial variation of soil physical properties in adjacent alluvial and colluvial soils under Ustic moisture regime' presents a local geostatistical study of some soil properties. As such, it is a very limited interest to an international audience. At the end of the introduction section, the authors say (P.4263, L.27-28) that they 'mainly work to figure out the effects of the topography on soil' (sic). But they do not present any geostatistical analysis of slope, aspect, or any other topographical variable what so ever, that could serve a better understanding of the re-

lationship between topography and soil. Clearly, if the authors had this aim in mind, they simply missed their scientific objective. However, later in the same introductory paragraph, they state (P.4264, L.1-2) that their 'objectives (. . .) were to characterize spatial variation of soil physical properties' (sic). If this were their single scientific objective, then one can say that the authors have completed it. But this is an objective of very limited interest to the reader of HESSD. Further, the paper has many errors in the data Table 1, with incompatibilities with Fig. 2 that cast doubt on the quality of the data themselves, the data analysis, and the data interpretation. In addition, considering the data as given, several interpretation errors can be found (see specific comments). In that sense, my opinion is that this paper does not meet the standards for scientific publication. The paper also suffers from a bad organisation of the Results and Discussion sections, with the Discussion section highly redundant with the Results section. Most of the data interpretation comes from the visual comparison of kriged maps of the soil properties. It is really surprising that the authors did not think to calculate statistical and geostatistical correlations between properties to support their speculative assessments. So my recommendation would be the release of the paper, with the suggestion of a strong revision in order to meet scientific standards, the use of correlation tools (e.g. cross-variograms) to support the interpretation of the data, and a submission to a local scientific journal.

Specific comments

Abstract P.4262, L.7. The depth of the samples should be given. P.4262, L.18-19. The error made when using a global instead of local variogram should be characterised quantitatively. P.4262, L.21-23. 'water management' is a very generic concept. Please specify what you exactly meant.

1.Introduction P.4262, L.26-P.4263, L.1. The text 'differences in human activities' is too vague. In its generic meaning, it is not even true, as different human activities do not necessarily imply differentiation of soil properties. P.4263., L.1. It is not true that heterogeneity typifies soil distribution in space: saying that the soil is heterogeneous

does not inform us on its spatial distribution, only that it is not homogeneous (uniform distribution). P.4263, L.6-9. The sentence is unnecessary. P.4263, L.16-18. I did not catch the meaning of this sentence. P.4263, L.20-24. This long sentence has a problem of syntax. Revise it. Further, the results of Duffera et al. (2007) seem to be site-specific. Other studies should be referred to, in order to build a more general state of the art. P.4263, L.27. Did you mean 'due to various factors'? P.4263, L.27-28. If you wanted to study the effects of the topography only, then you need the other factors to be set constant. Or you need to set up your experimental design in order to be able to distinguish between the various factors in an unambiguous way. Further, you did not even study topographical attributes such as slope or aspect in this paper. P.4263, L.29. 'implications' is a term too vague. Please be more specific. P.4264, L.4. The 'source' of the spatial variation of the soil properties was not demonstrated in the paper.

2. Materials and methods 2.1. Site description P.4264, L.10. Elevation is certainly not homogeneous (500 m is an average?), otherwise there would be no topographical effects to be expected! Give more information about elevation within the studied site. P.4264, L.11-13. The site comprises several parent materials. How do these affect soil properties in regard to the effects of topography? P.4264, L.17-19. Information on slope should also concern the colluvial part of the site.

2.2. Field history Delineations of agricultural fields should be shown in Figure 1, as different agricultural managements can have potential effects on soil properties. P.4264, L.25-P.4265, L.2. Main crop rotation are biennial. Does this mean that vetch, corn, onions and sugar beet are minor crops? What are the proportion of the various crops at the field scale?

2.3 Sampling design and laboratory analysis There is no description of any of the laboratory (or field?: e.g. bulk density?) analysis that have been used in this paper. You need to explain how you measured particle size distribution, organic matter content, bulk density, available water content and saturated hydraulic conductivity.

2.4 Exploratory data analysis P.4265, L.16. No results on skewness or kurtosis are presented in the paper.

2.5 Geostatistical methods P.4266, L.3. What types of transformation have been used, and on which properties? P.4266, L.5. Data should also have been checked for any spatial trend. Otherwise ordinary kriging would be unsuitable. P.4266, L.8-10. Generally, the maximum lag distance is controlled by the minimum number of data pairs for variogram calculation. Some also take half of the maximum distance between data points. By the way, what is the maximum distance between two data points. P.4267, L.1. What do you mean by 'each time'?

3. Results P.4267, L.9-27. All this part of the results presentation should be supported by statistical tests on the means, variances and distributions of the various soil properties. This would help focussing this presentation on those properties which are truly different between the alluvial and colluvial areas. P.4267, L.16. 'unfavorable conditions' of what?, and 'unfavorable' to what? P.4267, L.17. 'addition' by what or by who? P.4267, L.15-19. This is highly speculative, unless you bring data on these unfavourable conditions, and on available water, pore space, aeration capacity. P.4268, L.2. You need to define a criterion for saying what is an 'abrupt' rise of a variogram. P.4268, L.4-5. Sill for SOM is also an exception. P.4268, L.6. Explain why small sill and range indicate continuous deposition for colluvium, and large sill and range stable conditions for alluvium. P.4268, L.9-11. Wrong assessment.

4. Discussion P.4268, L.18- P.4271, L.19. This discussion section is highly redundant with the results section. Organisation of both sections is to be completely revised. P.4268, L.18-19. Skewness and kurtosis values should be shown in Table 1 or experimental distributions should be presented. P.4268, L.19. Perform normality tests to support your assertion. P.4268, L.23. You did not prove that texture differed between sites. P.4268, L.24. You cannot say that soil is compacted unless you can compare it to a situation where soil is not trafficked. Further, a bulk density of 1.3 kg.dm-3 does not seem compatible with compaction. P.4268, L.26. Show a map of silt content to support

your assessment. P.4269, L.1-2. Do you have observation data on roots to support your assessment? P.4269, L.4-5. A high silt content is generally associated to high AWC. P.4269, L.8-9. How can you say that the characteristics of the spatial variation of sand content is related to slope if you did not analysed the spatial variation of slope? P.4269, L.11-13. You could calculate covariograms to support your assumption of a strong association between bulk density and texture. P.4269, L.15-17. Why don't you prove it? P.4269, L.17. What do you mean by 'land use'? All your study site is under agricultural use. P.4269, L.22. This is wrong: a smaller sill and range do not necessarily mean a more patchy distribution. P.4269, L.24 vs. P.4269, L.29. 'moderate' or 'high' nugget effect? P.4269, L.24-25. How can a 'moderate' nugget effect could result in a 'considerable amount of variation'?! P.4270, L.1. What do you mean by 'strong'? P.4270, L.4-6. Geometrical trends should show up in directional analysis. P.4270, L.6, and elsewhere. What do you mean by 'faint'? P.4270, L.4-8. Try cross-correlation between clay content and bulk density. P.4270, L.10-12. Idem. P.4270, L.8-9. Spatial patterns are not similar. P.4270, L.17. Evidence. P.4270, L.17-18. I seriously doubt that (see Fig. 3, 4). P.4270, L.20. You should locate the river on Fig.1. P.4270, L.22-23. Yes there is! See Fig.4. P.4270, L.26. What do you mean by 'rigorous'? If 'smaller', then why a higher OM return? (see P.4269, L.5-7). P.4270, L.27. Show cropping pattern in a Figure. P.4270, L.28. You should give information on tillage and cropping pattern in the Materials and Methods section. P.4271, L.1-2, L.10. Again show map of silt content. P.4271, L.2-3. Prove it by calculating a correlation coefficient. P.4271, L.3-5. The same. P.4271, L.6. Not supported by Fig.3. P.4271, L.7-8. Wrong assessment. P.4271, L.9. Again, wrong. P.4271, L.10-11. Contradictory with P.4269,L.4! P.4271, L.14-15. Is this sensitive to the class limits of the legend in Fig. 3 to 5? P.4271, L.17-19. What is the error made when using global variograms instead of local ones?

5. Conclusions P.4272, L.10-11. Why ? and What do you mean by 'physiographic land unit'?

Table 1. Nugget ratio and Spatial class must be defined in the text. How was AWC

calculated? Ks has generally a log-normal distribution: is it the case here? If yes, logKs values should be used.

Fig. 2. The number of points appearing on each variogram is not consistent with the experimental design (see P.4265, L.9). There should be 9 points between 0 and 500 m lag. Also, the number of points varies among properties. Why so? Why not show the variograms for all properties? Any nested structure due to the dual sampling design (transect vs. grid)? Fig.3-5. Some maps indicate that data could be affected by outliers. Did you perform any analysis for the detection of outliers? Fig.5. Maps seem to be hardly affected by the choice between global and local variograms (compared to Fig. 3 and 4). Maps of prediction error should be checked to see if the maps of property values predicted either by local or global variograms are significantly different.

Technical comments

Abstract P.4262, L.8. Write '28' as text in order to avoid any misunderstanding. P.4263, L.17-21. Revise the sentence for it is not understandable as written here.

1.Introduction P.4262, L.25. Delete 'can'. P.4263, L.2. Júnior et al. is 2005 in the References section. P.4263, L.2. Replace 'becomes' by 'is'. P.4263, L.4. Geostatistics is plural. P.4263, L.11. Reference is 'Issaks and Srivastava'. P.4263, L.13. Štípek et al. is 2004 in the References section. P.4263, L.14. Wilding and Drees is 1986 in the References section. P.4263, L.18-9. Replace 'would be extremely' by 'is'. P.4263, L.19. Delete 'the' before 'soils'.

2. Materials and methods 2.1. Site description P.4264, L.15. 'terrestrial' is not a climate type, unless you compare various planets!

2.3 Sampling design and laboratory analysis I would suggest the removal of 'fine' were referring to transects (P.4265, L. 5, and elsewhere). P.4265, L.9. Replace 'arranged as' by 'located at'.

2.5 Geostatistical methods P.4265, L.19. 'Semivariogram' should be plural, as well as

'distribution'. Replace 'in' by 'at'. P.4266, L.7. Replace 'with' by 'at'. P.4266, L.12. Replace 'be' by 'provide'. P.4266, L.19. Add 'by' after 'respectively'. P.4266, L.22. Put an upper case initial at 'Lagrange'. P.4267, L.1. Add 'the' before 'geostatistics'. P.4267, L.2. Delete 'the procedure'.

3. Results P.4267, L.9, and elsewhere. Use past tense for results presentation. P.4267, L.9. 'higher' than what ? P.4267, L.10. 'Finer' than what? Consider replacing 'finer' by 'fine'. P.4267, L.10. Information on slope should be in the Materials and methods section. P.4267, L.12. Delete 'was'. P.4267, L.14-19. This part of the paragraph should be in the Discussion section. P.4267, L.15. Replace 'occurred' by 'occurring'. P.4267, L.21, and elsewhere. Replace 'generally' by 'globally'. P.4267, L.23. Replace 'determined' by 'found'. Delete comma after 'whereas'. P.4267, L.24 and 25. Replace 'varied' by 'variable'. P.4268, L.1-2. Evidence. Delete sentence. P.4268, L.3. Delete 'to'. Replace 'in' by 'at'. P.4268, L.6. Replace 'later' by 'former'. P.4268, L.5-7. This sentence should be in the Materials and methods section.

4. Discussion P.4268, L.18-21. These results are in the wrong section. P.4268, L.20. Delete 'far'. P.4268, L.22. Repetition. P.4268, L.26. Insert 'more' before 'silty'. P.4269, L.2. Delete 'to'. Add 'content' after 'clay. P.4269, L.4-7. This description of data should be in the Results section. P.4269, L.6. Delete 'occurred'. P.4269, L.8. Replace 'that' by 'the'. 'colluvial' not 'collovial'. P.4269, L.9. Delete 'steepnes' (sic). P.4269, L.10. 'degree' is not suitable here. P.4269, L.20-23. Already stated before. P.4269, L.23, P.4271,L.26. 'colluvial' not 'colluvail'. P.4269, L.24. Insert 'and' before 'indicated'. P.4270, L.2-3. Already said in the results section. P.4270, L.5. Replace 'trend in' by 'trend with'. P.4270, L.17-18. Put 'trends' in singular. Displace 'clay' before 'distribution'. P.4270, L.18-19. Already stated. P.4271, L.10. Replace 'dominated' by 'dominant'. P.4271, L.14-15. Graphs in Fig.4 do not have the same scale as Fig. 3 and 5.

5. Conclusions P.4271, L.25. Delete 'comparable'. P.4272, L.1. Insert 'the' before 'lower'. Replace 'occurred' by 'occurring'. P.4272, L.2. Replace 'resulted' by 'resulting'.

Replace 'mostly' by 'the'. P.4272, L.3. Replace 'in' by 'at'.

Table 1. The first decimal of CV values is not compatible with the mean and standard deviation values. CV values for Clay-whole, Silt-whole, BD-whole are obviously erroneous. Sill values for Silt-whole, Sand-whole, BD, Ks, AWC-Coll, SOM are not compatible with standard deviation values.

Fig.1. Show creek on map. Fig.2. Ordinate axis of graphs should better be normalized by the variance for ease of comparison between properties and between areas. Fig.3-5. 'SOM' not 'OM'.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 4261, 2011.