

Interactive comment on “Estimating sediment thickness by using horizontal distance to outcrop as secondary information” by Nils-Otto Kitterød

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The author has written an admirably detailed manuscript of the value of kriging and co-kriging to estimate sediment thicknesses in Norway. I am not overly familiar with the content area, but am familiar with the methodology applied. As such, I have, for the most part, restricted my comments to an assessment of methodology. Below I include several comments that may be useful, but, at the editor's discretion, I see no major impediments to eventual publication.

Page 2, line 5: Typographical error.

Page 2, line 24: Throughout the manuscript the term “significant” is used to mean “large”. I would strongly reserving “significant” to refer to the result of a quantified statistical test. (Other examples are on page 13, line 28, and page 16, line 27.)

Page 3, line 5: While amusing, I didn't quite follow what was meant by "the big 'Zoo' of different methods".

Page 5, line 14: In my opinion, the removal of 750 sites belongs in the previous paragraph and the final number on line 13 should be revised accordingly.

Page 5, line 15: I found myself debating if this exploratory data analysis was more appropriate as a result. Page 5, line 16: Could the author provide some quantification of the normality of these values? Probability plot correlation coefficients or even probability plots may be useful in highlighting the non-normality.

Page 5, line 22: It is not immediately clear what is meant by "searching windows". Are these related to the windows discussed on page 7, line 10? Further explanation would be useful.

Page 6, line 24: I think "origin" is more common than "origo", but it may be a matter of style.

Page 7, line 20: Given the complexity of kriging methods applied, which almost certainly used computer approximations, it seems a bit odd that the author deferred to probability tables rather than using computer approximations.

Page 7, line 27: Please provide some additional discussion of the implications of not reproducing censored observations. How does this relate to over-estimation of low values seen later?

Page 9, line 12: Why was the exponential semivariogram chosen? Were others considered? Given the steepness and short range in Figure 6C, it appears that a constant model might have been more appropriate for the cross-semivariance.

Page 13, line 28: I find this point on over and under-estimation particularly interesting in light of my own work (DOI: 10.1002/2016WR019129). Please do not take this as a request to pad citations; I mention it only to encourage more discussion. Is this as an effect of model smoothing? The kriging algorithm, by nature, makes predictions as

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linear sums of observations. It is thereby expected that extremes might be moderated by less-extreme values, however smally-weighted, in the summation. Perhaps this is worthwhile discussion, perhaps not.

Page 14, line 1: I did not understand this sentence. Furthermore, by what hypothesis test was the difference determined to be significant?

Page 16, line 32: This paragraph borders on advocacy, a style I tend to shy away from in scientific literature. Furthermore, I think it belittles the purpose of this work: The impact of the manuscript is not in “increase[ing] research on data from GRANADA” but rather a strong demonstration of the usefulness of kriging co-kriging for interpolation of soil characteristics. I would support removing this entire paragraph.

Figures 10 and 11: Not being of the region, I though country outlines would be useful here.

Table 3 and 4: What are the definitions of the cases is not clear to me. Perhaps I missed it, but a description should be in the methods section.

I have not completed a complete editorial review of grammar and style. I notice a handful of typographical errors, but I leave these to copy editing.

Finally, thank you for the opportunity to review this manuscript. It represents a well-written application of kriging. I hope my comments have been useful and can be contacted if any additional information would prove useful.

Thank you,

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., doi:10.5194/hess-2016-658, 2017.

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