

Interactive comment on “Planning spatial sampling of the soil from an uncertain reconnaissance variogram” by R. Murray Lark et al.

R. Murray Lark et al.

mlark@nerc.ac.uk

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We are grateful to Dr Rossiter for his characteristically thorough review. In response to the issues he raises:

- *There is a large difference between the required grid spacings... Perhaps this message could be emphasized.* We agree that more can be said to emphasize the hazards of planning from an uncertain variogram without taking account of the uncertainty. We propose to add brief comments to this effect in the Results and Conclusions sections

C1

- *The restriction to regular grid sampling is not explained.....* We will refer to the possibility of using sample designs which are not regular grids in the Conclusions section of the revised paper.
- *The presented method assumes first-order stationarity of the target....* . The inference that a stationary mean is plausible was based on the post-plot of the data, and on the transitive behaviour of the empirical variogram. We shall make this explicit in section 2.2.1 of the revised paper.
- *Perhaps the authors can briefly mention adaptations that would be needed in the nonstationary case.* . We shall discuss the possible extension of the method to a case with a non-stationary mean in the Conclusions section of the revised paper
- *.. the use of FAO-Unesco 1974 soil classification is obsolete.* The map to which we refer was produced before the introduction of WRB, and so we have to refer to the actual classification on which the map legend was based. We shall make this explicit in section 2.1 of the revised paper.
- *"These latter two priors were judged to be acceptable..."*. Diggle and Ribeiro (2007) make the point that, in the absence of other information on which to base a prior distribution, a robust procedure is to select a uniform prior over sufficiently wide bounds that the posterior density is negligible at the extremes. This is the rationale for what we did, and we can make this specific reference at the end of section 2.2.1. Needless to say one does not select prior parameters on the basis of direct inspection of the data.
- *The choice of $k=2$ from the profile likelihood leads to a higher nugget proportion...* . We acknowledge the point that the profile likelihood is very flat near the minimum, and that smaller values are not implausible. We agree that the choice of 2.0 rather than a smaller value is likely to lead to slightly larger nugget variances,

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and point out that this is therefore conservative (we will have slightly larger kriging variances, other things being equal). We shall add comments to this effect in section 2.2.1.

- Technical corrections

1. We shall edit the sentence to read 'First, how can we make a robust decision on sampling intensity...'
2. Lark et al., 2017. This reference was still in press when the paper was first submitted. All publication details can be put in the revision.
3. The publication year for this article (2016) will be added.

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