Review of: "Spatial Analysis of Soil Fertility Using Geostatistical Techniques And Artificial Neural Networks"

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Potential competing interests: No potential competing interests to declare.

In this paper the authors evaluated the fertility of the soils in an experimental field, building a spatial model by means of an Artificial Neural Network system, starting from measured soil properties interpolated by Ordinary Kriging. The article is quite interesting, but absolutely not clear and well written. English language and style should be improved.

I would not use the acronym SOM for self-organizing maps, since it is commonly used to indicate soil organic matter, and this can generate confusion. Anyway, why defining an acronym that is not used any more in the text?

The methods adopted for soil analyses should be better specified.

The sentence “ordinary geostatistical kriging method” makes no sense, please riformulate. Ordinary Kriging is a particular interpolation algorithm, proper of geostatistics.

The description of the interpolation procedure is not exhaustive: please made explicit which are the transformation performed before calculating the semivariograms, and spend some words to explain why they were necessary; please better explain the procedure of fitting a theoretical model to the experimental semivariograms. Moreover, no explanation about the meaning of the semivariogram parameters is provided.

Which is the lag distance adopted for the calculation of the semivariograms?

It is not clear to which soil parameter the single plots reported in Figure 4 are referred, please add a letter to each of them and write the correspondance in the figure caption. Looking at them, anyway, it does not seem to me that the fitted model are the best ones: how was the best fit evaluated? For example, the upper ones appear to be Spherical and not Gaussian, and a Stable model usually means absence of spatial autocorrelation – in this case, Ordinary Kriging should not be applied.

The maps of prediction errors should be reported, too, since the main advantage of interpolating with Ordinary Kriging is that the errors are provided in each point.

The paragraph closing the subsection “Assessing the reliability of prediction models” is somewhat incorrect: first of all, you mention a best fit but how it was determined is not clear; after cross-validation, if the model accurately describes the spatial behaviour of the data, the RMSE should be approximately equal to the standard deviation, and the RMSSE should be close to 1 (you could refer to, e.g., Piccini et al., 2012). An intensification of sampling is beneficial when the nugget

value of the semivariograms is high, but the models you fitted for Clay and Silt have no nugget effect, while for Sand a very high value is reported. Please check the citation.

The subsection “Number of soil fertility classes” in Results and Discussion is somewhat confusing.

References are insufficient for an international publication context, and most of them are from the same authors. References in other language than English should be clearly indicated; they are too much for an international journal (40%!), anyway. Why two chapters of the same book (Marchetti et al., McKay et al.) are reported in different ways?

At the end, please carefully check the text also for typographical and formatting errors.

Suggested reference:

Marchetti, A., Piccini, C., Francaviglia, R., Mabit, L., 2012. Spatial distribution of soil organic matter using geostatistics: a key indicator to assess soil degradation status in central Italy. Pedosphere 22 (2), 230–242.