

Peer Review

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

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The article "Spatial Analysis of Soil Fertility Using Geostatistical Techniques and Artificial Neural Networks" presents a well-structured and methodologically sound study integrating ordinary kriging and a Fuzzy Kohonen Clustering Network (FKCN) to delineate soil fertility classes in a Venezuelan production field, offering a valuable contribution to digital soil mapping and precision agriculture. The combination of geostatistical modeling with neuro-fuzzy classification is a clear strength, particularly the systematic validation using cross-validation metrics and the reported 86% classification accuracy, which supports the robustness of the approach. The sampling design (70 points over 6.15 ha) is reasonable for exploratory mapping, and the detailed semivariogram modeling and reliability assessment enhance transparency. However, the manuscript would benefit from clearer justification of sampling density relative to the 59 m spatial dependence range, deeper comparison with alternative machine learning approaches (e.g., Random Forest or SVM), and a more critical discussion of limitations, especially regarding moderate spatial dependence in some variables and potential overfitting in the ANN component. Language editing is also recommended to improve conciseness and reduce repetition in the discussion. Overall, the study demonstrates solid technical execution and practical relevance for site-specific soil management, and with minor refinements in clarity and critical analysis, it represents a meaningful contribution to applied soil science and precision agriculture research.

Declarations

Potential competing interests: No potential competing interests to declare.