Evaluating Different Interpolation Methods to Predict Copper and Nickel Concentrations in Surface Soil

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Abstract

Determining the spatial distribution of different contaminants in soil is essential for the pollution assessment and risk control. Interpolation methods are widely used to estimate the concentrations of the heavy metals in the unstudied sites. In this study, the performances of interpolation methods (inverse distance weighting, local polynomials and ordinary Kriging and radial basis functions) were evaluated to estimate the topsoil contamination with copper and nickel in Golestan Province. 216 surface soil samples were collected from Golestan province, and their Cu and Ni concentrations were measured. Soil contamination was determined using different interpolation methods. Cross validation was applied to compare the methods and estimate their accuracy. The results showed that all the tested interpolation methods have an acceptable prediction accuracy of the mean content for soil heavy metals. RBF-IMQ and IDW1 methods had the lowest RMSE, whereas RBF-TPS method with the largest RMSE estimated a larger size for the polluted area. The greater the weighting power, the larger the polluted area estimated by IDW. Compared with the ''sample ratio over the pollution limits'' method, the polluted areas of Cu and Ni were reduced by 8.38% and 6.14%, respectively.

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