



Reproducing spatial variability using a novel multi-scale model: an example with dioxin data from sediments in an estuarine river

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Reproducing Spatial Variability Using A Novel Multi-Scale Model: An Example with Dioxin Data from Sediments in an Estuarine River

We developed a multi-scale model (the M-Scale model) to reproduce spatial variability for a certain spatial scale, and validated the performance of the model over ordinary kriging by artificial realizations. The model is particularly useful for delineating the remediation zone.

To reconfirm the performance of the M-Scale model in surveying applications, we compare the cross-validation results of the M-Scale model and ordinary kriging again to the rescaled sample set as the diagnostic approach. The 2,3,7,8-TCDD dataset of Passaic River study in New Jersey, USA is used as an example. Results indicate that the M-Scale model reproduced the spatial variability characterized from the sample set. Conditional realizations are also generated to show the sensitivity of this diagnostic approach, where confidence intervals are shown for quantile-quantile (Q-Q) plots and population variograms.

In addition to the diagnostic for selection of model, we also use the reproduction zone of the estimates to show the benefit of the M-Scale model over OK when a remediation zone needs to be evaluated. The reproduction zones are created under different levels of variability reproduction, where M-Scale model shows an apparent larger reproduction zone than OK does in all levels.

This method will provide an alternative for scientific multi-scale exploration, as well as the decision-support of a remediation plan.