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Scientific Visualization and Scattered Data Modeling of Sediment Contaminant Concentrations in the Lower Passaic River, Newark, New Jersey*

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Sediments in the Passaic River (New Jersey) are highly contaminated with polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), dioxins and furans, and many metals. Dioxins are present in extremely high concentrations in localized areas. A systematic evaluation of a 10-kilometer reach of the lower Passaic River is being undertaken by the US Environmental Protection Agency in order to determine the nature and extent of sediment contamination and to guide decisions about possible remedial actions. Contaminant concentrations were measured to varying depths at 0.30-meter increments. A total of 78 cores were obtained. These cores were taken close to the left- and right-banks and at the center of the river at 385-meter intervals along the 10-kilometer study region. A computer-aided analysis of the data was undertaken to format the data so that it could be easily understood and interpreted with respect to spatial changes as a function of position along the river or of depth below the surface. A spectral domain-decomposition scattered data model[1] combined with a commercial visualization model[2] was used to interpolate between data points to create an overall continuous map of the three-dimensional volume defined by the experimental data. Results for the calculated distributions of the contaminants will be shown. In particular, the existence of a localized volume highly contaminated with dioxins will be shown to emphasize the power of the method. Several options for possible remedial actions will be considered in light of the results of the visualization calculations.

1. Hong Ma. J. Of Comput. Physics, 109, 133-149 (1993).
2. IBM Corporation. IBM Visualization Data Explorer.

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