

Visualization Tools for Complex Spatial/Temporal Data

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This presentation focuses on three visualization tools for characterizing complex spatial/temporal data and corresponding statistical modeling results. The first tool was created to display predicted surfaces of air-concentration of different pollutants fitted by “fusing” different data sources, such as sparse monitoring data, continuous computer models (e.g., CMAQ), and satellite data using an underlying hierarchical Bayesian modeling approach. The tool is able to visualize multiple 3D-surfaces moving in time, with the option of overlying the monitoring data, the continuous data-sources as semi-transparent surfaces, and the predicted surface in solid color. The second tool was created to visualize the impact of different emission policies on the reduction in the air-concentration of different pollutants. The tool is able to interpolate, in real time, a high-dimensional policy space and to display the interpolated surfaces using a continuous heat-map to color the magnitude of the concentration. The third tool demonstrates results of a model that predicts how the risk of childhood lead poisoning has changed over time in different counties throughout the US, based on a model that accounts for spatial variability as well as demographic, environmental, and programmatic predictors. The underlying model for this tool leverages surveillance data from counties with high lead poisoning screening rates to make predictions for areas of the country in which the data are sparse. Each of these tools provide highly dynamic displays of multidimensional data, allowing the user to rotate the vantage point and visually isolate trends of interest in the underlying data, or in predicted results.

Please note: The visualization tool topic would work better for a presentation at a breakout session – allowing the audience to see the dynamic nature of these tools.