Project 87023
A New Framework for Adaptive Sampling and Analysis During Long-Term Monitoring and Remedial Action Management
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RESULTS TO DATE: The Argonne team has gathered available data on monitoring wells and measured hydraulic heads from the Argonne 317/319 site and sent it to UIUC. Xiaodong Li, a research assistant supported by the project, has reviewed the data and has fit initial spatiotemporal statistical models to it. Another research assistant, Yonas Demissie, has completed generation of the artificial data that will be used for model development and testing. In order to generate the artificial data a detailed groundwater flow and contaminant transport model was developed based upon characteristics of the 317/319 site. The model covers a multi-year time horizon that includes both before and after planting of the trees. As described in the proposal, the artificial data is created by adding ?measurement? error to the ?true? value from the numerical model. To date, only simple white noise error models have been considered. He is now reviewing the literature and beginning to develop a hierarchical modeling approach for the artificial data. Abhishek Singh, a third research assistant supported by the project, is implementing learning models for learning users preferences in an interactive genetic algorithm for solving the inverse problem. Meghna Babbar, the fourth research assistant supported by the project, has been improving the user interface for the interactive genetic algorithm and preparing a long-term monitoring design problem for testing the approach. Gayathri Gopalakrishnan, the last research assistant who is partially supported by the project, has collected substantial data from the 317/319 phytoremediation site at Argonne and has begun learning approaches for modeling these data.

DELIVERABLES: Michael, W. J., B. S. Minsker, D. Tcheng, A. J. Valocchi, and J. J. Quinn, "Integrating data sources to improve hydraulic head predictions: A hierarchical machine learning approach," Water Resources Research, submitted.