Darcy Lecture Series

national ground water research and educational foundation

Groundwater Science

Seeing Things Differently:
Rethinking the Relationship Between Data, Models, and Decision-Making

Dr. Ty Ferré
University of Arizona

at

Columbia Community College
Dogwood Forum
February 11, 3:00-4:30P.M.

Practicing hydrogeologists construct detailed numerical models to predict the responses of hydrologic systems to natural and applied stresses. These predictions form the basis for decisions that must balance optimal use of resources and ecosystem support. These decisions typically involve multiple interested parties with strongly differing priorities for water allocation. Despite the importance that stakeholders place on water resources, budgets for hydrogeologic studies are often limited. As a result, the hydrologic models used for decision support are severely data limited. This requires improved methods to identify the optimal set of observations to collect and to use model-predictions to support robust decision-making under considerable uncertainty. Dr. Ferré will build from the basic concepts of decision science to present concepts and recent developments in optimal design of hydrogeologic monitoring networks. He will also discuss how hydrogeologic models can be used for decision support under uncertainty. Finally, he will show that focusing hydrologic analysis on the specific, practical problems of interest can guide optimal measurement selection, advance hydrologic science, and improve the integration of science into economic and policy decisions. Approaches developed by leading researchers in the field will be presented, including work within Dr. Ferré's research group on the Discrimination-Inference for Reduced Expected Cost Technique—a framework for integrating multi-model analysis and decision science to improve the efficiency and effectiveness of hydrogeologic investigations. Examples will demonstrate the application of decision-guided hydrologic investigations to the design of a pump and treat system, prediction of off-site exposure risk, estimation of future water availability, and mediation of stakeholder conflicts over water use.

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