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Jef Caers* (jcaers@stanford.edu), Energy Resources Engineering Dept, 367 Panama St, Stanford, CA 94305-2220. *Managing the Earth: Modeling Data into Decisions under Geological and Engineering Uncertainty.*

Critical to managing the Earth is managing the lack of information available when making decisions in engineering projects. Decisions need to be made in the face of geological and engineering uncertainty. Currently, only partial solutions exist. Earth modeling tools such as geostatistics can model the spatial variation of key variables in great detail constrained to data. Management science and engineering provides methodologies for optimizing systems that address risk when uncertainty is present. However, these methods have been developed for systems that are well-controlled, are sampled at high frequency and do not account for the complex media considered in Earth Science applications as well as the sparse sampling.

I will outline new methods that marry both the engineering control and decision framework with state-of-the-art Earth modeling tools and show an application to the value of information calculation of gathering geophysical data in a groundwater decision framework. The key idea behind these methods is to formulate a distance between any two models created by Earth modeling tools and make this distance dependent on the particular decision at hand. I show that this seamlessly integrates the modeling process from data to decision. (Received September 17, 2009)