

Bayesian Environmetrics  
ISBA 2008 Satellite Workshop  
Queensland University of Technology, Brisbane, Australia

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## BAYESIAN ANALYSIS OF AN INVERSE PROBLEM IN GROUNDWATER CONTAMINANT TRANSPORT

David Draper<sup>1\*</sup>

<sup>1</sup> Department of Applied Mathematics and Statistics, University of California, Santa  
Cruz

\* [draper@ams.ucsc.edu](mailto:draper@ams.ucsc.edu)

In this talk I will present a re-analysis, from a Bayesian point of view, of data from an experiment conducted at the WIPP (Waste Isolation Pilot Plant) in New Mexico, to estimate the breakthrough curve of a contaminant introduced in groundwater with an injection well-extraction well configuration. I'll show that maximum-likelihood approaches, to learning the parameters of some simple and increasingly complicated fluid-dynamic models of contaminant transport, can be biased and have poor interval coverage properties with small sample sizes, whereas a Bayesian MCMC approach with diffuse prior distributions on the parameters has much better repeated-sampling properties. I'll also demonstrate that standard fluid-dynamic models for this data set fit poorly and that a change-point model motivated by changes in the physical regime of the medium through which the contaminant flowed, and fit by reversible-jump MCMC, fits much better.