Advanced Conceptual and Numerical Methods for Modeling Subsurface Processes Regarding Nuclear Waste Repository Systems

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Sandia National Laboratories

Probabilistic Performance Assessment:

Problem Summary

Sean A. McKenna

Sandia National Laboratories

Albuquerque, New Mexico, USA

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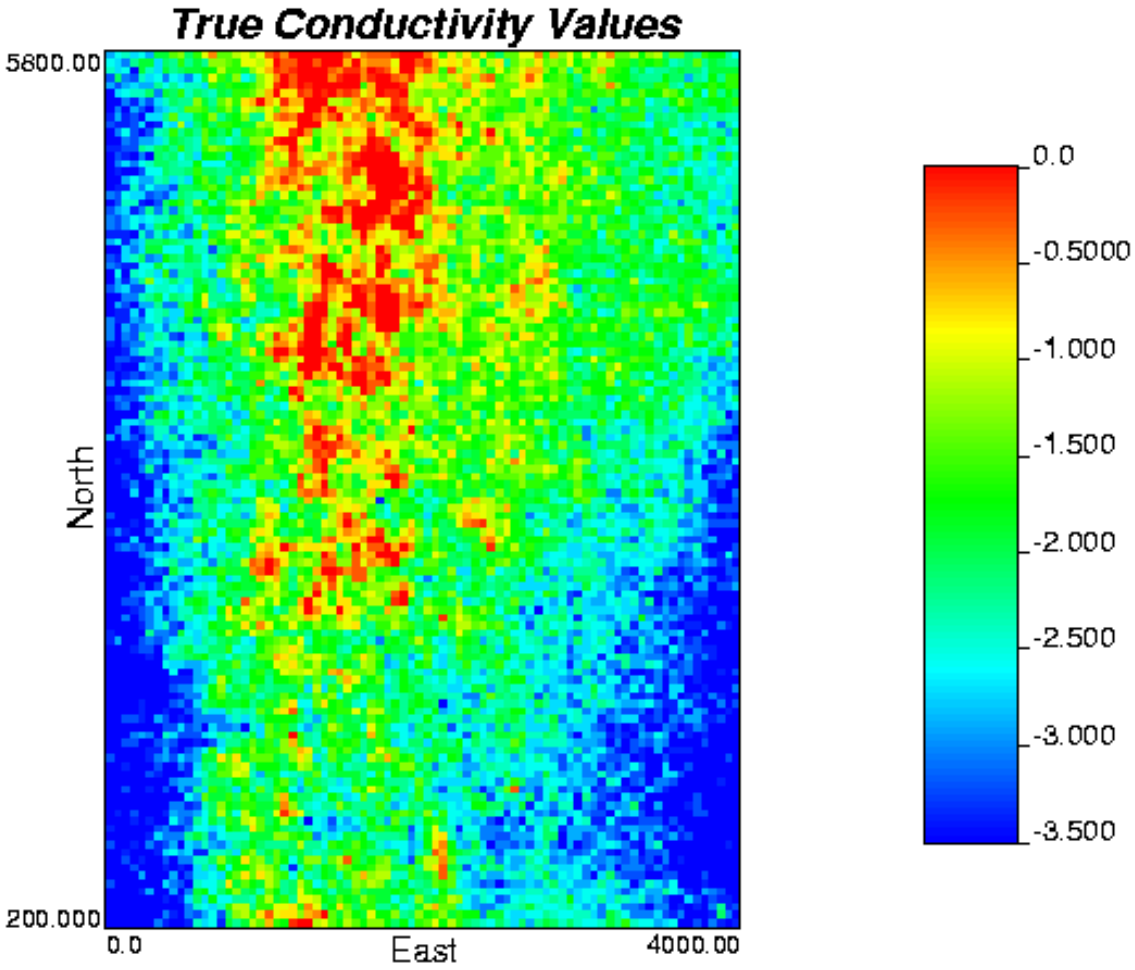
Evaluating Conceptual Models

- Conceptual model can only be evaluated against observations:
  - Cannot evaluate the transport model over 10,000 years, but can evaluate the hydraulic and transport properties that go into those predictions
  - Upscaling of properties is not something we covered here, but necessary in both space and time dimensions
- Here, we created 200 realizations of the hydraulic conductivity field for each of 6 different conceptual models
  - Each model created a prediction (travel time and length)
  - Each model also produced 50 predictions of head
  - Compare observed heads to measured heads

Evaluating Predicted Heads

- Last 4 columns of combine.out file are the min, median, mean and maximum of the head errors
  - Calculations done over all 50 wells for each realization
- Which of the 6 conceptual models has the lowest, absolute median error
  - Make a new column with absolute value of the median error
  - Take the average of those new values

Actual Heterogeneous Field

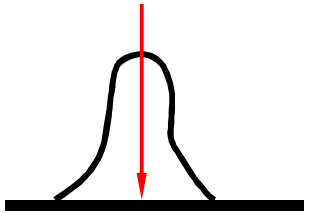
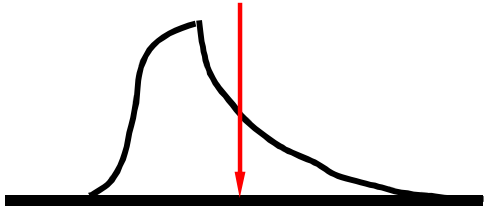
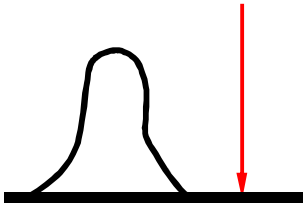
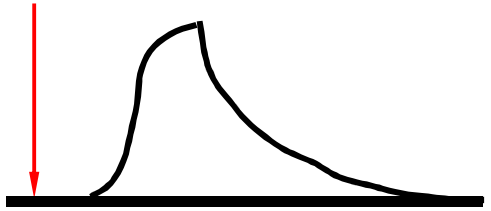


Compare this to the average over all realizations for each conceptual model

Actual travel times and exit coordinates:
3,489 years (4000m)
X = 1765.3m
10,080 years (1000m)
X = 1850.0m

Do your distributions capture the true travel times?

Accuracy and Precision

	Precise	Imprecise
Accurate		
	Accurate: *mean error = 0* ***Precise:*** *range is narrow*	***Accurate:*** *mean error = 0* ***Imprecise:*** *wide distribution*
Inaccurate		
	Inaccurate: *bias to the low side* ***Precise:*** *narrow range*	***Inaccurate:*** *high side bias* ***Imprecise:*** *wide distribution*