MULTIPLE POINT STATISTICS – 3 HYDROGEOLOGICAL CASE STUDIES

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The importance of handling uncertainty of data and being able to present the ambiguity of geo models of any kind have got more and more attention the last couple of years. In the same way as it is important for a geo modeler to understand the uncertainty and limitations of data to make an adequate geo model, it is important for a decision maker to understand the uncertainty and limitations of a geo model to perform adequate and qualified decisions. Whether the geo model is made to manage infrastructure projects or nature resources like oil, gas, or groundwater, being able to understand the uncertainty and limitations of a geo model potentially have great economic value.

One way of presenting the uncertainty and ambiguity of a geo model is to present a suite of geo models instead of just one. Due to the underdetermined nature of the inverse problem to be solved (making a geo model is an inverse problem), several solutions will all fit the available data and information about the problem. Multiple Point Statistics (MPS) is an overall methodology representing a series of simulation algorithms all utilizing the available information (geophysics, boreholes, background knowledge, etc.) to produce a series of geo model realizations all fitting the available information. Generating many of these realizations allow for any kind of statistical computations to be made: "What is the probability of having sand at a specific location and depth?", "What is the probability that location A and B are placed in a fully connected clay layer?", etc.

In this presentation we will present the results from 3 different case studies where MPS modelling is utilized in a hydrogeological context. The 3 case studies are from the Indian Wells Valley in California, the Shell Creek watershed in eastern Nebraska, and the Alnarp Valley in the southern part of Sweden.