

## **GENERALIZING GEOLOGICAL DATA FOR DEPOSIT MODELING**

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Deposits, including ore bodies, petroleum reservoirs, gas reservoirs, and aquifers are geological bodies within the earth's crust which are characterized by variables measured in three-dimensional space. Forward modeling and backstripping procedures may add a fourth dimension of time. Interpolation and other predictive methods can be used to fill spaces between observations, resulting in exceedingly large, multidimensional numeric arrays. The enormous memory requirements for these arrays limits our ability to make dynamic simulations, even with supercomputers, and spatial and temporal resolution sometimes must be sacrificed. Generalized information for deposit assessment can be derived from very large data sets by multivariate statistical methods, simplifying the starting point of process modeling. One generalization method is regionalized classification, which subdivides a volume of space into regions that are as uniform as possible in their properties and can be described by a small number of statistical parameters; regionalization reduces the volume of data in a manner that preserves the natural structure of geological bodies. The reduced data model can be used for approximate visualization of geology using GIS software to identify of favorable areas for mineral exploration, or as an initial static model of a reservoir or aquifer to model fluid flow processes. Examples include regionalization of ancient and modern marine sedimentary intervals, regional basin analysis of the North American Paleozoic Midcontinent Shelf and the Central European Depression, and models of aquifers and petroleum reservoirs in the midwest of the United States.