

Nonparametric Geostatistical Simulation of Subsurface Facies: Tools for Validating the Reproduction of, and Uncertainty in, Facies Geometry

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© 2018, International Association for Mathematical Geosciences. Delineation of facies in the subsurface and quantification of uncertainty in their boundaries are significant steps in mineral resource evaluation and reservoir modeling, which impact downstream analyses of a mining or petroleum project. This paper investigates the ability of nonparametric geostatistical simulation algorithms (sequential indicator, single normal equation and filter-based simulation) to construct realizations that reproduce some expected statistical and spatial features, namely facies proportions, boundary regularity, contact relationships and spatial correlation structure, as well as the expected fluctuations of these features across the realizations. The investigation is held through a synthetic case study and a real case study, in which a pluri-Gaussian model is considered as the reference for comparing the simulation results. Sequential indicator simulation and single normal equation simulation based on