Uncertainty analysis for 3D geological modeling using the Kriging variance

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The credible estimation of geological properties is critical in many geosciences fields including the geotechnical engineering, environmental engineering, mining engineering and petroleum engineering. Many interpolation techniques have been developed to estimate the geological properties from limited sampling data such as borehole logs. The Kriging is an interpolation technique that gives the best linear unbiased prediction of the intermediate values. It also provides the Kriging variance which quantifies the uncertainty of the kriging estimates. This study provides a new method to analyze the uncertainty in 3D geological modeling using the Kriging variance. The cut-off values determined by the Kriging variance were used to effectively visualize the 3D geological models with different confidence levels. This presentation describes the method for uncertainty analysis and a case study which evaluates the amount of recoverable resources by considering the uncertainty.