SBRE framework: Application to Olympic Dam deposit

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# ABSTRACT

Geostatistical simulations are the best practice to quantify uncertainty in the non-linear mineral value chain and provide an unbiased estimation of resources. Simulations are currently undertaken on an ad-hoc basis in the mining industry due to high requirements in computing environments and advanced geostatistics. SBRE project provides a standard framework to test, build, and run conditional simulation workflows. It was introduced on AUSIMM Mine Geology 2022. This work presents the application of the framework to the Olympic Dam deposit, the world’s fourth-largest deposit of copper and the world’s largest known single uranium deposit.

Modelling the Olympic Dam deposit using conventional geostatistical methods is a real challenge due to the high degree of non-stationarity, non-linear correlations between variables, hundreds of millions of grid blocks to simulate, and diffusive nature grade distribution. It requires testing a combination of various methods, such as projection pursuit multivariate transform, trend-residual decorrelation, pluri-gaussian simulations, turning-bands simulations, etc. Some techniques, such as turning-band simulations cannot work with soft boundaries, some demands a lot of memory, and others cannot run in parallel mode. To address the challenge above a combination of in-house developed applications, Autovariogram software (Varify), and the RMSP python library has been used. All computations are accomplished on the AWS cloud using the EC2-Batch service. The final set of simulations has been thoroughly validated using grade-tonnage curves, histograms, swath plots, variogram reproductions and most importantly using cross-validation (historical samples back-testing).

This work describes learning gained from trials of different combinations of methods (software) and highlights the importance of an automated, modular, and scalable framework in the development of conditional simulation workflows.