Geostatistics for Mining Engineers and Geologists

Integrating Various Data

- Combine all available data (ore grades, geology, contaminant or trace elements information, geophysics) in one single database for geologically oriented processing.

Getting the Best Sampling

- Assess the impact of sampling patterns on the reduction of uncertainty in resource evaluation.

Building a Robust and Accurate Block Model

- Achieve detailed domain analysis using advanced coding of data and block models.
- Reveal the spatial distribution of the mineralization and correlations between grades with advanced variographic analysis of your data.
- Build your block model using the kriging method suited to your deposit and data characteristics.
- Refine your block model with a consistent geological model to control the metal distribution.

Assessing the Risks

- Explore the grade distribution characteristics with the conditional simulations. Numerous equiprobable grade values are provided giving information on the variability of the block model.
- Identify the grade realizations which best represent the whole grade variability to characterize the risk attached to a project due to resource uncertainty.
- Improve grade control using the appropriate simulation technique to investigate the production sampling pattern.

Among different criteria measuring the kriging efficiency, the kriging variance is a good indicator for discriminating different drilling patterns and optimizing drilling mesh dimensions.

Soft or hard boundaries may be defined for accurate geological or production domaining.

In-depth data analysis allows to identify outliers and anisotropies.

Mine planning can be refined by introducing pessimistic and optimistic scenarios into the model.
Adjusting the Selective Mining Unit (SMU)

- Evaluate the **recoverable resources** (ore, metal quantities) from the Grade-Tonnage curves according to SMU size and economic grade cut-off.

![Graphs showing Grade-Tonnage curves](image)

Various techniques are used to check the Block Support Effect: Uniform Conditioning (multivariate), Global Correction (through the anamorphosis function), conditional simulations.

Evaluating the Information Effect

- Anticipate the **ore/waste decision** at the feasibility stage to avoid misclassification at the production stage using non-linear techniques.

Classifying the Resources

- Obtain **reliable classification of the resources** into measured, indicated or inferred categories from Confidence Intervals computations.
- Compare grades sampled at the plant facility with predicted grades for **reconciliation**.

![Graphs showing grade comparison](image)

Estimated grades on blocks are compared to grade values at the plant facility, accounting for polygons, i.e. blasts.

Automating the Geostatistical Process

- Set up routine production workflow using batch facilities. Day-to-day production samples are easily integrated to quickly **update grade estimates and enhance mine planning**.