Incorporating the Geologist's Interpretation in Conditional Simulation

In some mines it is the geological (lithological) uncertainty rather than the grade uncertainty that has the greater economic significance. In the absence of precise knowledge of the deposit geology, interpreted geological models are used to constrain spatially the estimated (or simulated) grade values which may influence significantly the contained metal.

Simulating Geology

Methods for assessing geological uncertainty quantitatively are rarely considered due to their perceived inability to consider exhaustive geological interpretations, and resulting models often appear geologically unrealistic. An example of Sequential Indicator Simulation (SIS) poorly representing geology in a lode-style gold deposit is shown below.
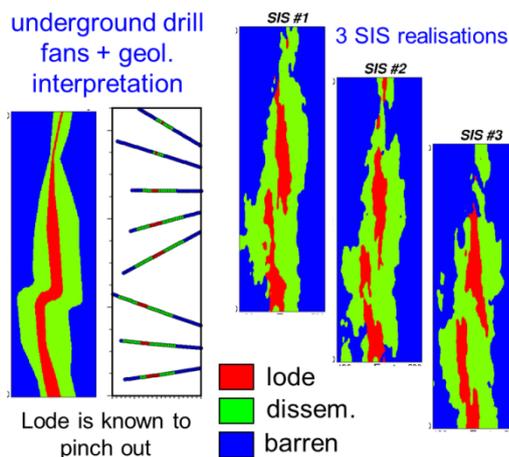
Multiple-point statistical approaches that produce realistic geological models call for geological training images (analogues such as geological interpretations). However, these training images are used to condition (influence) locally the resulting geological models based on global geological characteristics rather than interpreted local geological features.

Local Self-Healing

Martlet has integrated a simple algorithm into the SIS technique to correct locally the simulated realisations for the Geologist's interpretation. The algorithm is called *local self-healing* because the correction is administered with the aid of local distributions, and the size of the correction (or healing) depends on the

magnitude of the problem (related to local confidence in the interpretation). This new approach to stochastic simulation of lithology is shown below. Note that the simulations closely match the interpretation near drill holes, but vary between drill holes where the confidence is lower.
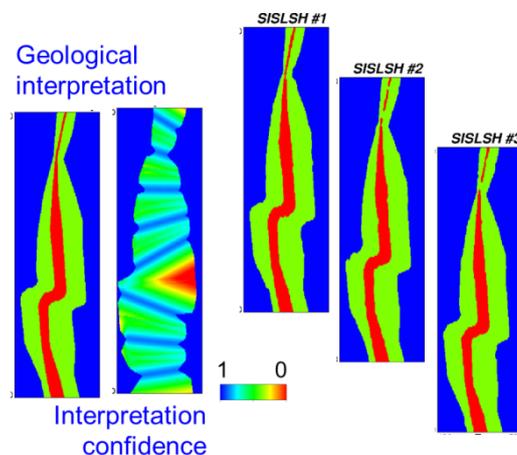
The histograms below compare the contained metal from simulating just the gold grades (left) as opposed to both gold grades and geology (right).
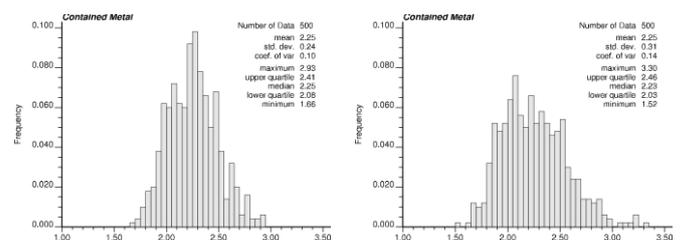
If you would like to build more robust models that incorporate the Geologist's interpretation and their confidence, please contact:

Dr Andrew Richmond
+61 4 1948 7267
+61 7 3878 7250
arichmond@martlet.com.au