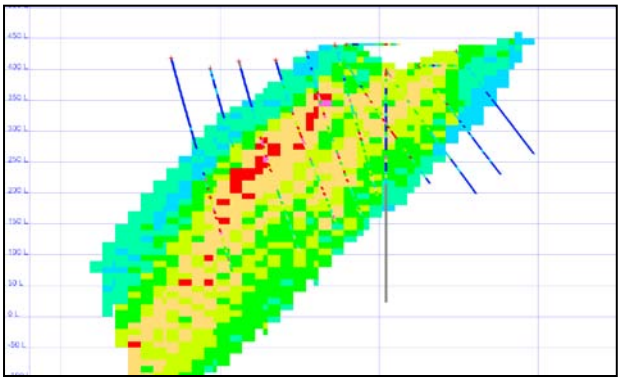
Martlet Consultants
Resource Evaluation Experts

Desmoothing Block Models for Underground Mine Design

Smoothed Block Models

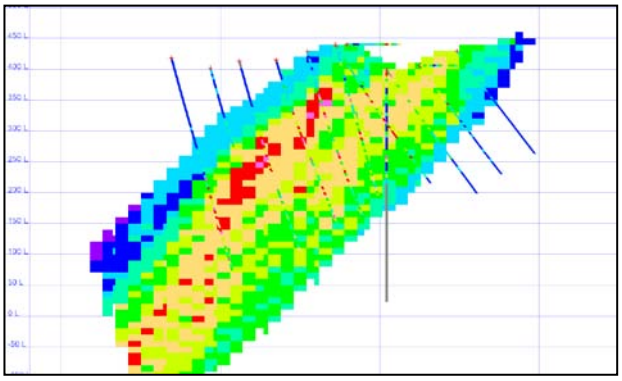
Block models generated with all linear interpolation algorithms contain inherent smoothing that typically results in an underestimation of grades and overestimation of tonnes in resource estimates. The degree of smoothing depends in part on the relationship between block size and drill hole spacing. For mineral deposits that are anticipated to be exploited by underground mining methods excessive smoothing may result in materially misleading estimates of mineral reserves. The plot below shows a section through a smoothed resource block model, where "colder" colours represent lower mineral grades and "hotter" colours represent higher mineral grades.



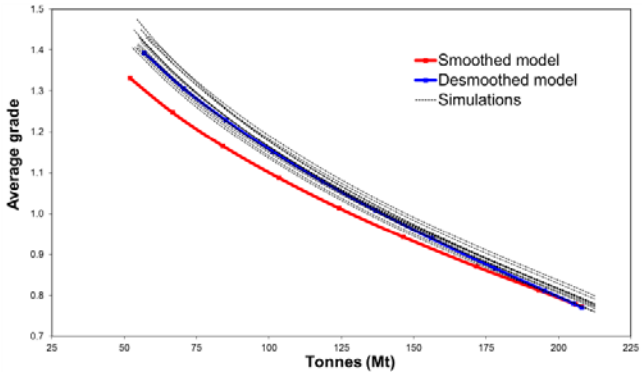
Desmoothing Block Models

For open pittable mineral deposits smoothing is typically overcome by "recoverable reserve" approaches (*e.g.* indicator or disjunctive kriging, or uniform conditioning) to estimating the mineral resource. However, for these estimation methods, very large blocks may be required and the outcomes provide non-spatially located proportions of the large blocks above the cut-off grade. Such estimation approaches are appropriate for open pit mine planning methods where all of the large block will be extracted, with ore and waste discriminated at the time of extraction. However, they are not suitable for underground mine planning where the actual location of material above cut-off is required to design its extraction.

To correct for excessive smoothing Martlet has developed a simple technique to post process a resource block model using an affine correction with a local variance adjustment or *F* factor. The affine correction is a well-known variance adjustment process that can "squeeze" or "stretch" a distribution whilst maintaining a constant mean grade value.The local *F* factor is introduced to account for the fact that smoothing tends to be higher for blocks located distant to sampled locations. In other words, the global variance adjustment factor typically used in the affine correction is adjusted locally to account for the distance between the block under consideration and sampled data locations. The results are shown below.



A significant difference is present in the grade tonnage curves of the smoothed and desmoothed resource block models, shown below, where conditional simulation has been used to validate the result.



If you would like to discuss desmoothing your resource block model to evaluate appropriately your mining project please contact:

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