**Risk assessment of iron mineral resources using conditional simulations**

**Abstract**

Investment decisions in the mineral resources sector are made on the basis of an assessment of the economic potential for a mineral deposit. Given some information on the confidence in supporting information for the location, scale, and quantity of the commodity of interest, miners and investors aim to make risk informed decisions on the value in further investment. The objective of resource classification is the synthesis of various types and quantities of geologic information used in resource model construction to assign confidence categories to the estimated mineral resources, which can then be used to support informed economic decisions. In this contribution a risk-based classification scheme for iron ore mineral resources using conditional simulations is presented. The method involves categorisation of each block according to a confidence level considering expected recoveries from a kriging model over mining production volumes. The realisations of the simulated model are used to assign risk-based confidence categories to zones of the ore deposit. One motivation for this work is to assess the sensitivity of the scheme to geologic uncertainties. Specifically that which uncertainty in the layout of mineralising alterations and weathering overprints influence variabilities of associated rock properties and the likelihood of obtaining expected ore recoveries. It is shown these risks are difficult to quantify and assess without conditional simulation based classification approaches and have material implications for a projects economic potential. We also show how the scheme can be extended to the grade control context and in doing so how the value subsequent grade control activities can be quantified.