Geostatistical Modelling of Geometallurgical Domains

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ABSTRACT

The spatial modelling of geometallurgical domains is an important step in the characterisation of an ore deposit allowing for the quantification of various rock types, their differing rock properties and the overall value of the project. The traditional approach to modelling such features is through the use of deterministic models, where by a single best estimate of the extents and structure of the ore deposit are mapped out by the geologist based on available data and their interpretation of the geological processes (Duke & Hanna, 2001). Any uncertainty in the layout of different domains is not accounted for and heterogeneities of chemical and physical properties the orebody are likely underestimated. Geostatistical simulations of categorical data such as geometallurgical domains can be applied to obtain multiple equiprobable realizations that define the layout of these domains, quantify the uncertainties in the location of boundaries between different domains. The plurigaussian model (Galli et al. 1994; LeLoc'h and Galli 1997) has proven to be a robust and versatile frame work for modelling of geological domains as chronological and topological constraints (contact relationships) can be honoured. In addition to this, domain proportions and the spatial correlation structure of the domains can also be reproduced. The construction of a model geostatistical simulation model for the geometallurgical domains at Orebody H; a complex stratabound Bedded Iron Ore deposit located in Western Australia's Pilbara region using the plurigaussian model is demonstrated. This could be used to identify zones of risk where collection of additional data might help mitigate or minimise these risks and in turn improve forecast production performances.