CONDITIONAL COSIMULATION OF COPPER GRADES AND LITHOLOGY AT RÍO BLANCO – LOS BRONCES COPPER DEPOSIT

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ABSTRACT

Conditional simulation is widely used to generate plausible scenarios of the spatial distribution of mineral grades in ore deposits. At present, the most common approach is to divide the deposit into rock-type domains and to simulate the grades within each rock type separately; the rock-type model can be obtained by a geological interpretation of the deposit and be deterministic, or be simulated prior to grade simulation. Even though this 'cascade' approach allows establishing an uncertainty model for the mineral resources in the deposit, it implicitly assumes a lack of stochastic dependence between the grades across rock-type domains and does not fully exploit the spatial relationship between the grades and the occurrence of given rock types.

This work presents a method that allows simultaneously simulating mineral grades and rock types and taking into account their spatial dependence, by using a combination of the multi-Gaussian model (for simulating grades) and truncated Gaussian model (for simulating rock types). The method is able to incorporate hard data (assays and logging from drill hole or blast hole samples) as well as prior geological knowledge, as conditioning information for the realizations of both grades and rock types. It is applied to the Río Blanco – Los Bronces porphyry copper deposit to co-simulate copper grades and the occurrence of tourmaline breccia, and compared with traditional approaches against production data.