

Ciências da Terra Department

Geological Zoning and Stochastic Modeling of Ore Grades in Shear Zones – Application to the Au and As grades of the mineralized areas of Boa Fé, Portugal



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Objectives

The modeling of disseminated gold deposits constitute one challenge of the mining industry due to the particular behaviour of this ore mineral (nugget effect). When applied in contexts of enormous geological and structural complexity as shear zones, interpretation and reserves estimation of this mineral deposits is a process strongly affected by uncertainty.

Using as a case study the mineralized occurrences in Boa Fé Shear Zone (Fg1), the presented PhD project intends to **develop and test a methodology for the 3D mapping of ore grades in shear zones controlled by complex geological features**. It is proposed to **test different techniques and approaches that allow the use of the geological information, at several scales, as a secondary data in the geostatistical modeling of the gold grades, which can help to reduce the uncertainty**.

Methodology

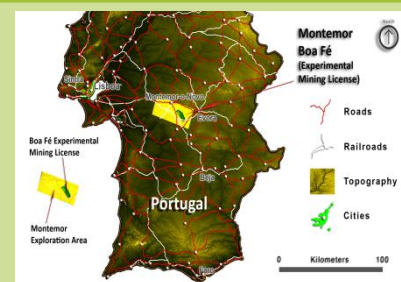
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| <p>1 – Development of an empirical geological model (object based model)
Evaluate and quantify the relationship between geological attributes (Fg3) with Au and As grades as well as with the mineralized volumes /intervals. Results are a 3D geological object model .</p> | <p>2 – Stochastic modeling of mineralized macro structures
Creation of a methodology and algorithm for the stochastic modelling of the mineralized macro-structures. An auxiliary variable (proportion of mineralized volume) will be created.</p> | <p>3 – 3D estimation and simulation of gold and arsenic grades. Resources evaluation, local and global uncertainty calculation
Creation of a 3D model of Au and As grades, constrained by previous results, by improved co-simulation algorithms. Economical evaluation and classification of resources.</p> |
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Expected Results

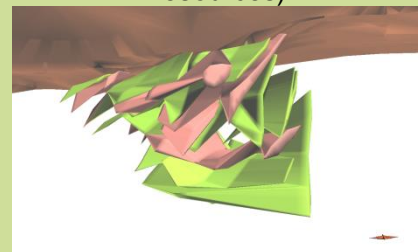
Main expected results are the **establish of the methodology** itself as well as **three 3D geological and grade models** - two from the first two main phases and a final grade one (outcome from the last phase of the project and constrained by the previous two), that materializes **Au and As grades and local and global uncertainty** for the mineralizations of Boa Fé shear zones.

Other results that must be pointed out:

- An **inverse methodology for stochastic modelling of mineralized volumes**;
- Quantification of the relationship between geological features and Au grades will allow **inferences about cause-effect relationships**;
- **Improvements in co-simulation procedures** for local histograms;
- **Contribute to Colt Resources work** in the exploration of Boa Fé Au mineralizations.



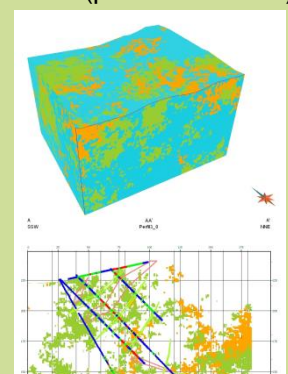
Fg1 – Location of Boa Fé mineralizations (by Colt Resources)



Fg2 – Vectorial geological model



Fg3 – Examples of studied material (phases 1 and 2).



Fg4 – 3D Au class model and illustrative section.

Funding:
Presented project is fund by Colt Resources (<http://www.coltresources.com/en>)
All data and information are provided by Colt, and the project is being developed in partnership with the work of prospecting, exploration and mine planning that are being undertaken by the company.