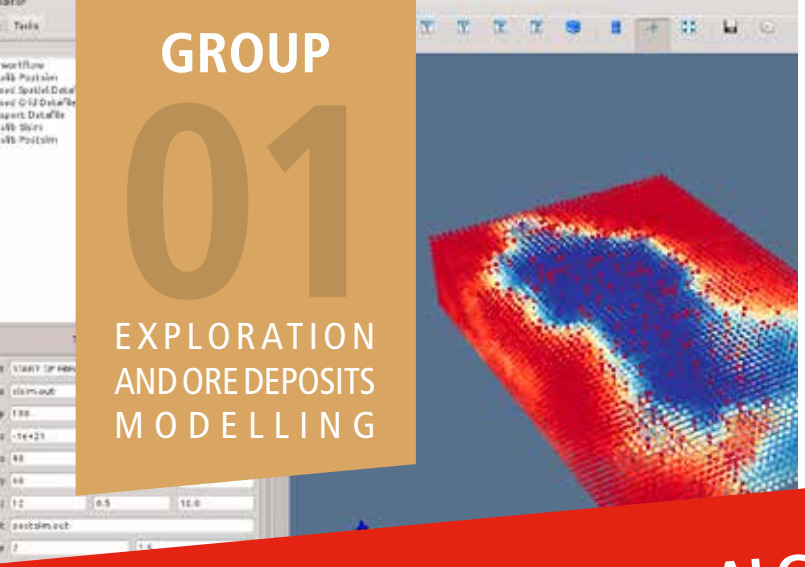
GROUP

01

EXPLORATION AND ORE DEPOSITS MODELLING



ALGES

(Advanced Laboratory for Geostatistics and Supercomputing)

MISSION

ALGES aims to develop tools, mathematical and numerical models for geostatistical applications, uncertainty quantification, data science and supercomputing.

TEAM

Principal researcher:

- Xavier Emery, PhD.

Associate researchers:

- Álvaro Egaña, Eng.
- Daniel Baeza, Eng.
- Felipe Navarro, Eng.
- Fabián Soto, Eng.

PhD. student:

- Gonzalo Díaz, MSc.

Undergraduate students:

- Cristóbal Silva
- Mauricio Garrido
- Sergio Liberman
- Antonio Barberán

FIELDS OF EXPERTISE

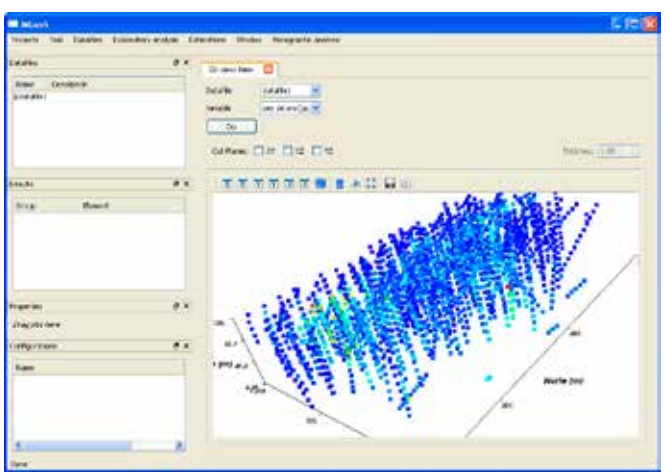
- Geostatistics and stochastic models.
- Ore deposits evaluation and sampling.
- Scientific software development.
- Image analysis.
- High performance computing.
- Combinatorial optimization.
- Data mining.
- Data science.

FIELDS OF APPLICATION

- Construction of resource models using estimation techniques and geostatistical simulation.
- Numerical characterization of uncertainty, associated with disposition and size of geological bodies in terms of types of rock, lithology, mineralogy, alterations, textures and geologic units as well as multi-variables law relations of elements of interest, sub-products and impurities and their geometallurgical characteristics.
- Visible spectral range and hyperspectral images analysis for geometallurgical applications: mineralogical recognition, lithology characterization, and others.
- Implementation of supercomputing algorithms in CPU and GPU clusters.

AWARDS

The laboratory has been awarded each year with the NVIDIA CUDA Research Center Award since 2012.

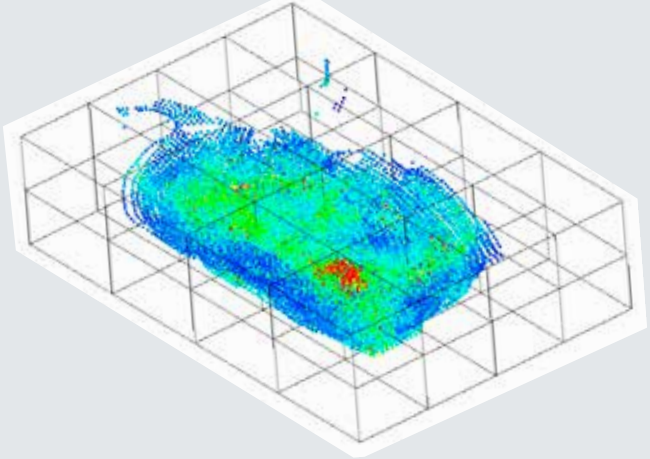


fcfm
FACULTAD DE CIENCIAS FÍSICAS Y MATEMÁTICAS UNIVERSIDAD DE CHILE

Av. Tupper 2007 · Santiago de Chile · Phone: (56-2) 2 9771000
contacto@amtc.cl · www.amtc.cl

amtc
ADVANCED MINING TECHNOLOGY CENTER

PROJECTS



1. U-FO

Fundamentals

Project U-Fo considers a strong component of research and development based on geostatistical techniques, computer geometry and supercomputing,. It incorporates mine site data to validate the proposed scientific solutions and collaborates closely with the mining industry to enable rapid technology transfer.

Goal

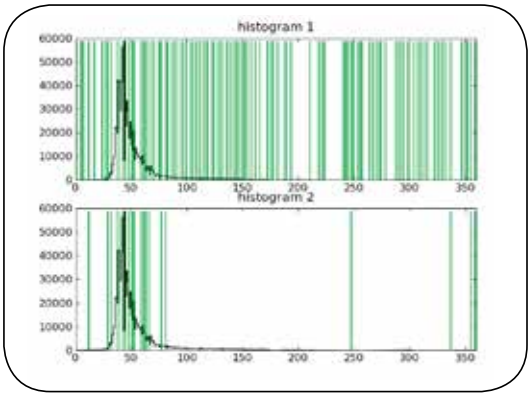
U-Fo aims to estimate geologic resources in ore deposits affected by complex geometries, faults, veins and folds, after mineralization.

Results

- Development of tools that allow the restitution of geological bodies affected by folds and faults, including reference surface construction algorithms, unfolding and fault correction (geometric-anchorage). In addition, U-Fo enables resources estimation and data visualization in 2D and 3D, optimizations, supercomputing, and big data techniques.
- Technology transfer to the mining industry through Software User Licenses.

Team

Álvaro Egaña, Fabián Soto, Felipe Navarro, Mauricio Garrido, Daniel Baeza.



Cooperation with other institutions

Yamana Gold Inc. has been using U-Fo since 2011 and declared it as part of the Company's official resource and reserve estimation software since 2012. Yamana Gold Inc. has been using the software in Chile, Argentina, Mexico and Brazil. U-Fo has allowed to obtain significant improvements in estimation and categorization of resources, valued at US$36M. This affected positively the Company's reserves reports, which, by presenting a lesser uncertainty, increased the deposits' economic value.

2. SOFTWARE FOR MULTI-VARIABLE RESOURCES EVALUATION IN COMPLEX GEOMETRIES:

Fundamentals

The project addresses the problem of uncertainty of the quantity of resources and reserves in mine deposits and their impact upon the expected exploitation benefits from an integral perspective. This project considers multi-variable modelling components, geologic modelling in complex geometries (unfolding) and distributed computing during the evaluation.

Goals

The project aims to develop and commercialized a high-performance software for multi-variable geostatistical modelling with application to complex geometries.

Results

- Packaging for Windows, Mac and Linux platforms.
- Validation of statistical analysis tools, multi-variable geostatistical estimation and simulation.

Team

Álvaro Egaña, Fabián Soto, Gonzalo Díaz, Mauricio Garrido, Cristóbal Silva.

Cooperation with other institutions

The team is developing the project in collaboration with Innovaxxion, which will have the software's commercialization rights.

www.publisiga.cl