




proEXPLO 2025

SHORT COURSE pre-congress

ALTERATION FROM FIELD DATA COLLECTION TO MACHINE LEARNING TARGET GENERATION

 SUNDAY
4TH MAY, 2025

 FROM 09:00
TO 17:00 HOURS

 LANGUAGE
SPANISH

 ON-SITE
(IIMP)

Abstract



This 8-hour short course was designed to provide the tools needed to describe, map, and collect alteration point data in the field and in the core shed in a way that can be seamlessly pre-processed and processed by machine learning target generation algorithms.

The first part of the course includes the basic concepts for recognising and describing altered rocks in the field and in the core shed, infrared spectroscopy sample collection, analysis, and pre-processing of field and analytical data for MLA.

The second part of the course involves an overview of machine learning methodologies applicable to alteration geology, including clustering, decision trees, and neural network methods.

Introduction: Why train a ML alteration model? + house-keeping rules 15 min

Part 1: Basic Concepts of Alteration Geology

- Recognising and describing hydrothermally altered rocks: 45 min
- Infrared spectroscopy applied to alteration analysis: 45 minutes
- Spectral and field data processing in TSG and pre-processing for GIS and ML analyses: 1 hour
- 3D modelling of alteration features versus MLAs: 10 minutes
- Exercise: Structurally controlled alteration mapping by infrared spectroscopy: 1 hour

Part 2: Basic concepts of MLA applied to alteration geology data

- Basics concepts of machine learning methods: training-test data sets, etc.: 1 hour
- Unsupervised learning analysis of alteration data: clustering methods: 1 hour
- Supervised regression analyses of alteration data: 1 hour
- Supervised classification of alteration data: 1 hour



Instructors

Anna Fonseca, MSC, PGEO, obtained a Master of Science degree in Structural Geology by the University of British Columbia, Canada in 1997, and a Bachelor of Science degree by the University of Alaska Fairbanks, USA in 1993. She is a Practicing Member of the Professional Geologists Ontario (PGO) association (Member Number 2194) and holds the voluntary position of Regional Representative for Central Asia and Middle East for the Society of Economic Geologists (SEG).

She has over 30 years of international experience and is an expert in the applications of integrated structural and infrared spectral geology in mineral exploration, geotechnical, rock mechanic and geometallurgical studies. She has conducted numerous field-based alteration and structure mapping 3D modelling projects in the South American Andes, and has taught applied structural and alteration geology courses in universities, conferences, and in mines and exploration projects.



Anna Fonseca

Alejandro Verri, BEng, CPIC, is a civil engineer with 27+ years of international experience in structural and seismic geotechnical engineering. He specialises in seismic hazard analysis and reliability-based seismic design for critical infrastructure, where he develops AI-driven workflows for seismic spectral analysis, simulation, and uncertainty modelling, development of ML techniques for propagating aleatory uncertainty in hazard assessments, detecting outliers, and handling complex datasets applied to predictive modelling of geotechnical and structural behaviour under seismic loading, including dynamic property variability and failure mechanisms.

In 2024, he started to apply his advanced spectral analysis techniques to infrared spectral data collected for geometallurgical and mineral exploration projects. These applications include robust methods for imputing below and above detection limit geochemical data, predicting clay intensity, and geochemical elements using the entire spectral datasets rather than specific absorption features.



Alejandro Verri

Investment

CATEGORIES	RATES US\$ INC. IGV	
	Until 09.03.2025	From 10.03.2025
Non - Associates	500	550
Associetes	450	500
Students	250	270
Teachers	320	350

- * The IIMP Active Member must be up to date with their 2025 dues.
- * The student and the teacher must present their respective university transcripts.
- * Includes digital certificate.

14TH INTERNATIONAL CONGRESS OF PROSPECTORS AND EXPLORERS

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