Spatial Data Analysis

Course Leader: Dr Arianne Ford, Kenex

10th - 12th July 2019
JCU Campus, Townsville

Geoscience
College of Science and Engineering
James Cook University
Townsville
Queensland, Australia
http://www.jcu.edu.au/egru/

Course Content

This 3-day workshop on spatial data analysis is designed to provide geoscientists with an introduction to geochemical data analysis and mineral potential (prospectivity) mapping with a focus on mineral exploration.

The course will cover the relevant theoretical background, however frequent practical exercises will be undertaken throughout.

Emphasis will be placed on using mineral system understanding to underpin the data analysis in order to maintain the relevant geological context at all stages.

Workshop participants should have at least a basic working knowledge of GIS to get the most out of this course.

Practical exercises will mainly be done using ArcGIS. The course will run in a JCU GIS computer laboratory with the required software.

Topics to be covered include:

- **Geochemical Anomaly Definition**
- **Traditional Statistics**
- **Non-parametric Statistics** (univariate and multivariate)
- **Analysis of Stream Sediment Data**
- **Mineral Potential Mapping**
- **Mineral Systems Analysis**
- **Knowledge Driven Methods**
- **Data Driven Methods**
Arianne Ford is a Senior GIS Analyst with Kenex in New Zealand, and previously spent 10 years in academia in Australia working on research projects focused on spatial data modelling for mineral exploration. She has presented a number of training courses to students, industry, and government on mineral potential mapping and spatial data analysis.

Registration Fees include:
- Morning & Afternoon Teas, Lunches
- Course Notes

Register on the EGRU website:
https://www.jcu.edu.au/economic-geology-research-centre-egru/professional-development/courses

Short Course Registration Fees (AUD inc GST)

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Day 1

**Geochemical Anomaly Definition**
- Traditional statistics for defining geochemical anomalies (mean, median, mode, etc.)
  - Review of traditional statistics and the pros and cons
- Updated methods for statistically defining geochemical anomalies
  - Data levelling
  - Univariate (single element) and multivariate (multiple element) anomaly definition
  - Multifractal analysis with practical exercises
  - Principle component analysis with practical exercises
- Analysis of stream sediment data
  - Watershed modelling for stream sediment data
  - Creating a watershed map (practical exercise)
  - Defining anomalous catchments (practical exercise)

Day 2

**Prospectivity Mapping**
- Mineral systems analysis
  - Understanding what it is you’re actually trying to model and how the theoretical model must be translated to mappable targeting criteria.
- Prospectivity analysis using knowledge-driven methods
  - Review of knowledge-driven prospectivity analysis with a focus on fuzzy logic, including the pros and cons.
  - Implementing fuzzy logic prospectivity models independently and group discussion of the results.
  - Implementing fuzzy logic prospectivity model as a group.

Day 3

**Prospectivity Mapping**
- Prospectivity analysis using data-driven methods
  - Review of data-driven prospectivity analysis with a focus on weights of evidence, including the pros and cons.
  - Implementing simple weights of evidence prospectivity models (practical exercises).
  - Comparing fuzzy logic results to weights of evidence results.
- Time permitting, the schedule could also include the following spatial data analysis techniques.
  - Point pattern analysis to establish trends - Fractal and Fry analysis
  - Mapping geological complexity

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