Spatial modelling techniques and data integration using GIS for target scale gold exploration in Finland

Spatial modelling techniques were used in this study to test the utility of high-resolution datasets for identifying potentially mineralized zones. The study area, located in the Fennoscandian Shield of northern Finland, was the subject of an ongoing exploration project.

The study involved the integration of various datasets using Geographic Information Systems (GIS) and quantitative spatial modelling techniques. The datasets included:

- Very high resolution airborne geophysical survey
- Magnetic
- Electromagnetic
- Radiometric
- High resolution gravity survey
- Till geochemistry
- Till geochemistry maps

These datasets were combined using various techniques:

- Fuzzy logic
- Logistic regression
- Weights of evidence

These methods were applied to create a prospectivity map, which was used to identify potential gold targets. Drilling samples with over 0.5 g/ton gold were used as a training set to determine the features that are most likely to indicate the presence of gold deposits.

The target scale geochemical sampling was done using 250 m grid intervals and the results were logged using ICP-AES and GAAS methods. The measurements included:

- Fe, Cu, Co, Au, As, P, and Te

The suites of elements were considered together to determine the prospects for certain sources. The results were then used to create a prospectivity map.

The study showed that the combination of high-resolution datasets and quantitative spatial modelling techniques can be an efficient and accurate way to identify potential gold targets in the Fennoscandian Shield. This approach can be used to support decision making in ongoing exploration projects.