Geophysical Research Abstracts
Vol. 20, EGU2018-5447, 2018
EGU General Assembly 2018

Object-based Image Analysis (OBIA) techniques for integrated lineament detection: top-down and bottom-up methodologies

Christopher Yeomans (1,2), Maarit Middleton (3), Robin Shail (1), Stephen Grebby (4), and Paul Lusty (2)

(1) University of Exeter, Camborne School of Mines, United Kingdom (cmy202@exeter.ac.uk), (2) British Geological Survey, Environmental Science Centre, Keyworth, Nottinghamshire, NG12 5GG, (3) Geological Survey of Finland, P.O. Box 77, FI-96101 Rovaniemi, Finland, (4) University of Nottingham, Nottingham Geospatial Institute, Innovation Park, Nottingham, NG7 2TU

Object-Based Image Analysis (OBIA) has been a powerful technique for classifying remote sensing images for over a decade. OBIA lineament detection has been applied to satellite imagery (Mavrantza & Argialas, 2008), SAR (Marpu et al., 2008) and airborne LiDAR (Rutzinger et al., 2007); nevertheless, these methods remain under-utilised.

Middleton et al. (2015) first demonstrated the use of OBIA for lineament detection using airborne magnetic data over the Enontekiö region, Finland. The method was developed using eCognition software (v.9.3, Trimble, Germany) and used the line extraction tool to produce a lineness raster that was then segmented using the multi-threshold segmentation and chessboard segmentation tools. The workflow is publically available on the eCognition community as the Object-Based Lineament Detection (OBLD) algorithm.

The OBLD algorithm is a top-down OBIA method for extracting lineaments whereby the data are segmented to smaller and smaller objects. We develop the OBLD method further to allow integration of multiple datasets within the workflow and produce a more complete lineament map.

Furthermore, we present an alternative integrated lineament detection method using OBIA that implements bottom-up segmentation. The method applies multi-resolution segmentation to the whole image to create many small objects before merging similar segments until lineaments are identified. These are then refined using a topological boundary analysis.

The bottom-up OBIA method is faster, less computationally intensive and requires less user knowledge. The top-down OBIA method is still highly effective and produces more robust lineaments with longer polyline lengths and more detailed metadata.

Both methods will be demonstrated using airborne geophysics from southwest England. Integrated lineament detection through OBIA methods has yielded the most consistent structural lineament map over SW England to date. The data will provide key information identifying new mineral deposits, geothermal energy targets and prospective areas for novel resources such as lithium brine.