

ENHANCED INTERPRETATION OF GEOSCIENCE DATA USING MULTIVARIATE METHODS AND SPATIAL DATA INTEGRATION

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Geophysical, remote sensing, geochemical, geological and topographic digital data are often used in geological studies. These digital datasets represent a variety of responses that, when effectively analyzed, can be used to characterize and identify various geological processes. Through the application of multivariate statistical methods and the use of specialized visualization environments including Geographical Information Systems and Image Analysis Systems these datasets can be reduced to simple maps and images that highlight geological processes. Large datasets of geochemical data comprised of thousands of samples with as many as 60 elements can be analyzed using multivariate statistical methods which can extract geochemical patterns related to the underlying geology, weathering, alteration and mineralization. The interpretation of these patterns is enhanced by visualizing the results draped over topography using image processing methods. Examples of this approach will be shown from mineral exploration programmes in Indonesia and Mexico. An example of the integration of various areomagnetic signatures, high-resolution radar satellite imagery and digital topography show how the signature of kimberlitic intrusions is significantly enhanced.