Integration of multi-scale and multi-source geo-information for mapping geologic configuration related to mineralization

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From statistical view, various geological surveys can be understood as the results of observation for geological bodies and sample statistics. Information collected by geophysical, geochemical detection and remote sensing satellites represents the different aspects of geological bodies. Because different origins and scales of geoscientific data cause some problems and make them difficult to be integrated and interpreted, Geomatics technology is asked to combine geo-information from multiple sources and at variable scales for monitoring and analyzing natural resource. The requirement is a main challenge of application of Geomatics. Formation of mines and mining is relative complicated process and it always associated with human activities. It not only relates to mineral source supply but also causes environment impact in some times. Geomatics technologies play an important role in mineral exploration and environment protection. Gejiu mineral district, locates in Yunnan Province, western of China, was chosen as a research area to show how Geomatics techniques integrate multi-source geo-information to explain the complex geologic problems in Gejiu area. Gejiu is known for its world-class Tin deposits and Tin production. Geophysical data which include aeromagnetic and ground-based gravity data was used to detect the 3D extension of intrusive bodies. The intrusive bodies mainly control the formation and distribution of ore deposits. ETM data and geochemical data were applied to map

the surface textures and detect the singularities caused by mineralization and surface media. New version of principal component analysis method (PCA) included in the software package of GeoDAS was applied to combine ETM images and other geoscientific data at much lower spatial resolution, such as concentration of geochemical in stream sediments and geophysical data. The result well characterizes the distribution of ore elements, faults and intrusive bodies.