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Mineral Resource Assessment of Porphyry Cu-Mo Deposits in Gobi Desert Landscape of Eastern Tianshan, China

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During the past several decades, mine prospecting is gradually increasing difficulty with less surface and outcrop ore mine. Covered areas covered by glacier, desert, forest, grasslands and wide sea area come into the sight of geologists, government, mining companies slowly (Cameron et al. 2004; Cohen et al., 2010; Goldberg, 1998; Wang, 2005; Xiao et al., 2014). One of the most challenging tasks for covered area mineral prospecting has been the extraction and application of useful-necessary information and prospecting in deeply weathered and transported geographical landscapes in covered areas (Cheng, 2012; Xiao et al., 2014). In order to illustrate the general and efficient procedures for mineral resource assessment in covered area, porphyry Cu-Mo deposit in Gobi desert covered landscape of Eastern Tianshan, China, was taken to as an example and well-studied.

This paper illustrates the mineral resource assessment of porphyry Cu-Mo deposit in Gobi desert covered landscape of Eastern Tianshan, China. Eastern Tianshan contains a number of Paleozoic terrains that amalgamated between the Tarim and Siberian blocks, and experienced a series of complex tectonic evolution events mainly during Palaeozoic accretion and collision, Mesozoic thermal subsidence and Cenozoic trusting and uplift. The types of rocks in the study area can be generally divided into four units based on lithological composition. One type is an igneous and volcanic associated sedimentary rock unit. The second unit is an intermediate-acidic intrusive rock unit. The third unit is a sedimentary–metamorphic rock unit. The fourth unit is gravel and sand-soil regolith, which is the Gobi desert cover layer, composed of Cenozoic sediments.

In the paper, firstly geological conceptual model of porphyry Cu-Mo deposit was established. Secondly, various data processing methods were applied to regional gravity, magnetic, geochemical and remote sensing data for identifying and extracting mineralization associated information: (1) Tilt derivations and the total horizontal derivations and upward continuation were applied to enhance and extract gravity and magnetic data. On the basis of the processing results, concealed tectonics and intrusions were interpreted by means of the establishment of gravity and magnetic interpretation criteria from outcrops district of the study area; (2) Element behaviour was analysed by means of accumulation coefficient analysis of elements in different geological units so as to investigate possible mobility of the elements and determine a set of indicator elements. Singularity mapping technique was employed to enhance and recognize weak geochemical anomaly signals. Principal component analysis was applied for integrating single element geochemical anomalies associated with porphyry copper-molybdenum mineralization. (3) Linear and circular structures were interpreted, while alteration anomalies were extracted by Crosta approach. Finally, there are four high potential Cu-Mo mineralization target areas and three moderate potential Cu-Mo mineralization target areas were delineated by weights-of-evidence method which was employed to integrated the favourable feature layers including tectonics,

strata, intrusions, geochemical anomalies, gravity anomalies, magnetic anomalies, and the alteration anomalies.

References:

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