

GUO Zehua, WANG Lei, HAN Runsheng, WANG Jiasheng, BAI Longan, QIU Wenlong, LIU Fei, CUI Junhao and TAN Wei, 2017. Tectonic Geochemical Characteristics and Ore Prediction in Hongdoushan Copper, Yunxian, Western Yunnan. *Acta Geologica Sinica* (English Edition), 91(supp. 1): 206-207.

Tectonic Geochemical Characteristics and Ore Prediction in Hongdoushan Copper Deposit, Yunxian, Yunnan

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South Lancangjiang metallogenic condition is superior, the volcanic arc metallogenic belt has been praised by geologists, the north district of Guanfang, Wenyu copper prospecting research has made important progress in recent years, the paper study in the Hongdoushan mountain copper deposit (the newly discovered deposits) by tectonic geochemical for the first time, points out the deep prospecting direction, speculated that there may be a porphyry deposit in the deep. The level of 1272m and 1220m were studied by using the method of tectonic geochemistry. Delineated mineralization elements combination anomalies by type R cluster analysis and factor analysis results; The abnormal distribution in the altered rock, controlled by NE-trending F1 fracture and NWW-EW-trending F3 fracture in the mining area, Through fracture to surrounding rock appears anomaly zoning phenomenon of high temperature to low temperature, indicating that the migration of ore-forming fluid direction, orebody occurrence information, provide an important basis for deep prospecting prediction; Engineering verification of anomaly area and deep ore-prospecting target obtained the better prospecting effect.

1 Ore Deposit Geological Feature

South Lancangjiang volcanic arc belongs to 'Sanjiang' tectonic magmatic belt in China, as a part of the global Tethys metallogenic domain, (Mo et al., 1998; Wang et al., 2011) considerde that it is China's potential for ore important metallogenic prospect areas. Zhang (2007); Liu (2009) study on both sides of the distribution of volcanic

rock belt along the Lancangjiang valley. It formed in the long period of geological history, mainly include Proterozoic, Carboniferous, Permian and Triassic volcanic rocks.

Hongdoushan mountain copper deposit is located in the south of the northern section of Lancangjiang volcanic arc, and clamping between the Lincang granite base and the deep fault of Lancangjiang, a subduction collision aggregation area of Lancangjiang ocean plate and Simao massif. The outdoor layer of mining area is Triassic Xiaodingxi group (T_{3x}), intermediate-basic volcanic rock. Regional fracture structure development, nearly NS-trending mainly fracture, (Lancangjiang fracture and Nayuhe fracture), the Lancangjiang fault mutiperiodic activity for a control of sedimentation and magmatism in the area of deep faults, and an important ore-controlling structures. Nayuhe fracture is a second-order faults, parallel to the Lancangjiang fracture. Due to the effect that clamping of Lancangjiang fracture and Nayuhe fracture and possibly existed of concealed rock mass emplacement, made a well-developed fault structure in Hongdoushan mountain copper, ore bodies occur mainly in NE- and NWW-EW-trending fractured alteration belt and the upper plate of the surrounding rock along the fracture alteration belt, in vein, lenticular, in two fault location with enrichment thickening trend. the deep borehole uncovered porphyry veins for NE-trending extend direction.

2 Tectonic Geochemical Characteristics

By means of tectonic ore-controlling regularity of Yunxian county Hongdoushan copper mine, think NE-trending F1 fault and nearly EW-trending F3 fracture

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and concealed alkaline porphyry body control the distribution of the ore deposit, structure and porphyry magma hydrothermal alteration on the migration and enrichment of ore-forming elements and ore-forming physicochemical conditions change plays a very important role. Based on these studies, and the geochemical study of fracture structure (Han, 2005), tectonic geochemical research program has been worked. There are 124 samples, in total, were collected for analyzing tectonic geochemical, 57 pieces from 1272m level, 68 pieces from 1220m level, The determination of trace elements and main elements is completed in Aoshi analysis and test center, Guangzhou, the ME-MS61r and ME-XRF26 method.

Five elements group is obtained by cluster analysis and factor analysis: F1: Cu, Zn, Ag, Mo, Bi, As, Sb; F2: Sn, Al, -Mn, Hf, Nb, Zr, Σ LREE; F3: K, -Na, Mn, Ba, Rb; F4: -Mo, NA, Mg, Fe, Mn, Co, Ni; F5: -W, -HREE, LREE. The first group on behalf of the copper mineralization elements combination; The second group of representative high temperature elements; The third and the fourth group representative alteration element combination; With five significance is unknown.

The level of 1274m and 1220m elements combination anomalies have the following features:

1) In the 1272m and 1220m level, fracture F1 and erosion variation 1 appear in turn by the F2 heat elements and F1 copper mineralization elements combined horizontal zoning rules, reflect the F1 fracture and NWW-trending F3 fracture, control erosion variation, is the main ore structure.

2) The direction of F1 mineralization factor and F2 high temperature element combination factors anomalies axis is consistent with direction of fracture structure and ore body distribution. Abnormal area centrally distribute in the fault zone and its alteration belt distribution on hanging wall.

3) The fault zone and hanging wall that control NE- and NWW-trending orebody appear in turn by the F2 high temperature element combination abnormality and F1 copper mineralization factor abnormality. The long axis direction of abnormality in accord with the strike of the fault, reflect mineralization controlled distinctly by structure, and the metallogenic material mainly comes from deep.

It's obvious that the anomaly characteristics of the above elements combination show the deposits are controlled by tectonic effect. The fault zone and its hanging wall appear high temperature→alteration→low temperature combination anomaly zoning characteristics, indicating the metallogenic fluid migration direction and occurrence of ore bodies. According to the fracture

tectonic geochemical element combination anomalies delineated the target area, proved to be feasible by exploration and has a good prospecting result, serve for the tectonic geochemistry resources exploration provides new ideas and examples.

3 Concealed Ore Prediction

1) Based on the research of tectonic geochemical anomaly characteristics indicate the occurrence and its deep extension of the NE-trending orebody, and in the deep drilling verification.

2) Through the structural ore-controlling regularity and tectonic geochemical research, in 1272m level delineated the NWW- and nearly EW-trending fracture to control the ore body, and predict the occurrence of ore bodies and deep extension, and the deep drilling verification.

3) By means of drilling validation were framed forecast copper resource of more than 50,000 tons, and extend stably to the deep, controlled by tectonic magmatic hydrothermal type ore body has the potential of medium-sized copper mine, combining with geological research found in the deep fault belt concealed alkaline porphyry, deep speculated that there may be a porphyry copper deposit, has a good prospecting perspective.

Acknowledgments

This work was jointly sponsored by National Natural Science Young Foundation Program (Grant No.41202069), Science and Technology Plan Foundation Projects in Yunnan Province (No. 2014FB122), Projects of YM Lab (2011) and Innovation Team of Yunnan Province and KMUST (2008, 2012).

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