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The Discovery of the Cu (Au-Ag) Epithermal Deposit in the Duolong Ore Concentrating Area, Northern Tibet

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1 Introduction

Based on the latest survey and detailed geological records in 2013, as well as some preliminary study about geological features and deposit type of south Tiegelong (Rongna) copper (gold-silver) deposit which is located in Duolong copper (gold) ore concentration area, we believe that Rongna Copper is a typical high sulfidation porphyry-related epithermal deposit.

The Bangong - Nujiang suture zone has become an important belt for exploring porphyry copper-gold deposits in Tibet and even in the whole country. More work is needed to improve theoretical and exploration practice by studying the metallogeny and deposit combinations of the porphyry-epithermal metallogenic system in the Duolong ore district. Qin et al. (2006) proposed there may be epithermal copper (gold) mine in Duolong, but there are no obvious breakthroughs in exploration. This paper aims to roughly determine the type of Rongna copper (gold-silver) deposit, improve the knowledge of Duolong porphyry - epithermal mineralization system and make a breakthrough of theoretical guidance for prospecting.

Epithermal deposits system is generally related to porphyry deposits (Gray et al., 1994; Hedenquist et al., 1998; Einaudi et al., 2002; John et al., 2003; Sillitoe et al., 2003; Chouinard et al., 2005; Richards et al., 2006; Sillitoe, 2010). Sillitoe et al. (2003) separated the epithermal-porphyry copper (gold) mineralization system

into three kinds, including high-sulfidation, medium sulfidation and low sulfidation types. High-sulfidation type relates to andesitic and rhyolitic magma activities. There are alunite + kaolinite alteration assemblages. Silica cap is common. A combination of gold and copper silver minerals includes pyrite, enargite, antimony enargite, spiral-shaped silver sulfide, stibnite, jamesonite copper, digenite (Einaudi et al., 2002). They contain high levels of sulfate and high sulfur sulfate minerals.

2 Geology Background

Rongna is a huge Cu (Au-Ag) deposit. Various types of alunite and dickite occur including typical banded, layered, crusty or massive. Phyllic alteration prevails. The pyrite content is 3% to 35%. Ore minerals include covellite, digenite, enargite, spionkopite, yarrowit, djurleite, anilite, bornite, tetrahedrite and chalcopyrite.

Rongna is located in the western part of Bangong - Nujiang belt, exactly on the southern edge of Qiangtang-Sanjiang suture zone as well as on the northern edge of the Gangdese - Nyainqentanglha plate. The main outcropping strata are: early-middle Jurassic Sewa Group (J_{1-2s}), lower Cretaceous Meiriquicuo Group (K_{1m}) and the Oligocene Cantor Group (E_3k). Sewa Group is flysch or flysch-like sediments which includes gray feldspar quartz mudstone and siltstone. The lower Cretaceous Meiriquicuo Group (K_{1m}) consists of medium-mafic volcanics (land facies) mainly purple andesite dacite, basalt and volcanic breccia. The Oligocene Cantor Group (E_3k) is lacustrine clastic

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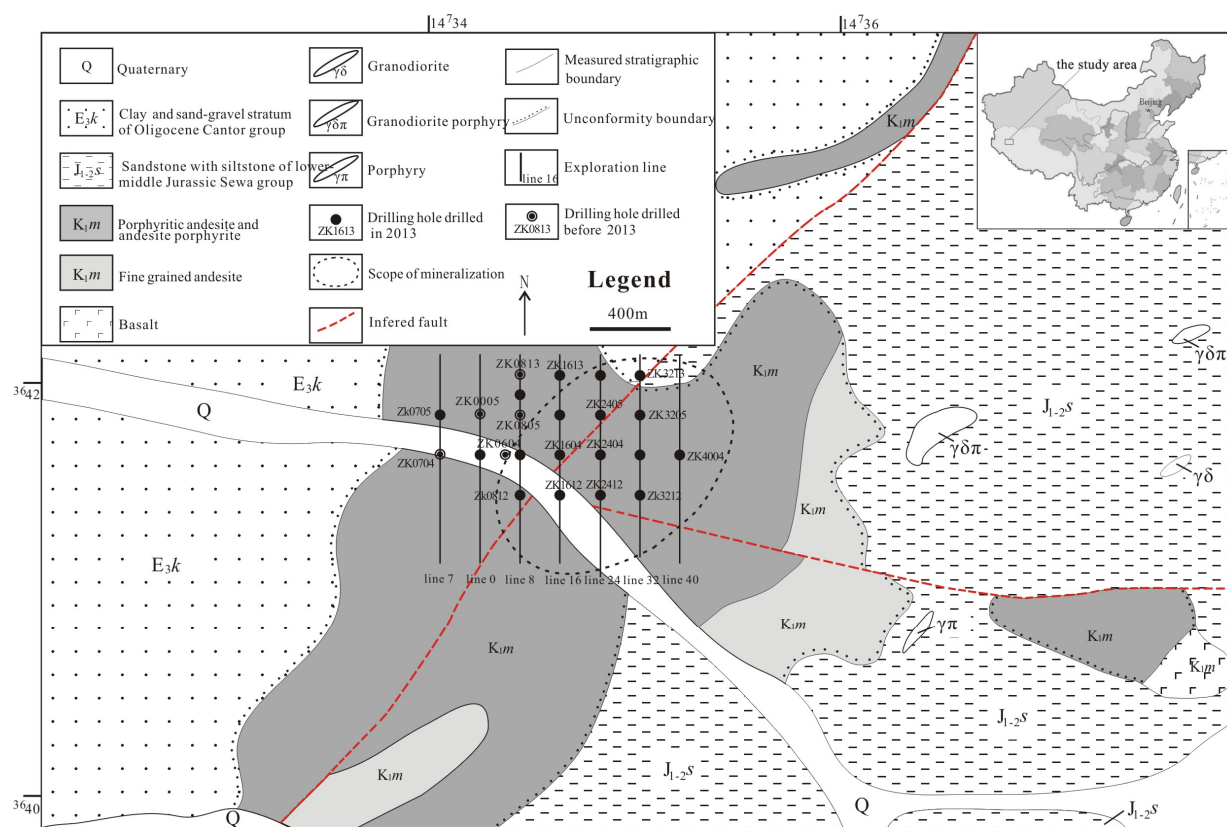


Fig. 1. Brief Geologic map of Rongna copper (gold - silver) deposit.

sediments (Fig. 1). Rongna ore body extends in north-east direction, generally trends to northward. In cross-section the ore body pinches out towards the edge displaying a funnel-shape (Fig. 2). The strike direction and the vertical zonation of the ore bodies are not yet determined. Rongna is expected to be a super-large deposit and its average Cu grade is greater than 0.5% with gold and silver redits. An average grade of associated Au is 0.1 g/t and associated silver is 2 g/t or so.

There mainly are veinlet disseminated ores. Locally, there are some scattered and dense disseminated sulphides. Ore minerals are: covellite, digenite, enargite, bornite, tetrahedrite and chalcopyrite. Interestingly covellite and digenite replace other minerals even at the depth of 1100 m. Whether such kind of covellite and digenite are secondary sulphide occurs as a supergene enrichment zone or formed as hypogene epithermal metasomatism is not known. It is a challenge to traditional secondary enrichment theory and worthy of further study.

3 Conclusions

Comprehensive study has shown that there is likely to be an inferred porphyry copper (gold and silver) ore body

at depth. Rongna is an epithermal deposit. It has brought us a new chapter to finding more epithermal deposits in Tibet which type has not been previously found. The Rongna discovery is important for regional prospecting because it can give extremely meaningful implications for future exploration surveys.

1) Rongna Cu-Au-Ag ore deposit is a typical high sulfidation epithermal deposit.

2) The discovery of this deposit and its great prospecting results has resulted in a breakthrough in Tibet that there are still further typical epithermal deposits to be found in Tibet.

3) The scale of the ore body is huge. The copper sulfides include digenite, enargite, bornite, chalcopyrite and tetrahedrite. Covellite and digenite are developed at depths of more than 1100 meters. Covellite and digenite form in the low temperature hydrothermal mineralization stage, as well as the inference of deep porphyry copper (gold) deposit.

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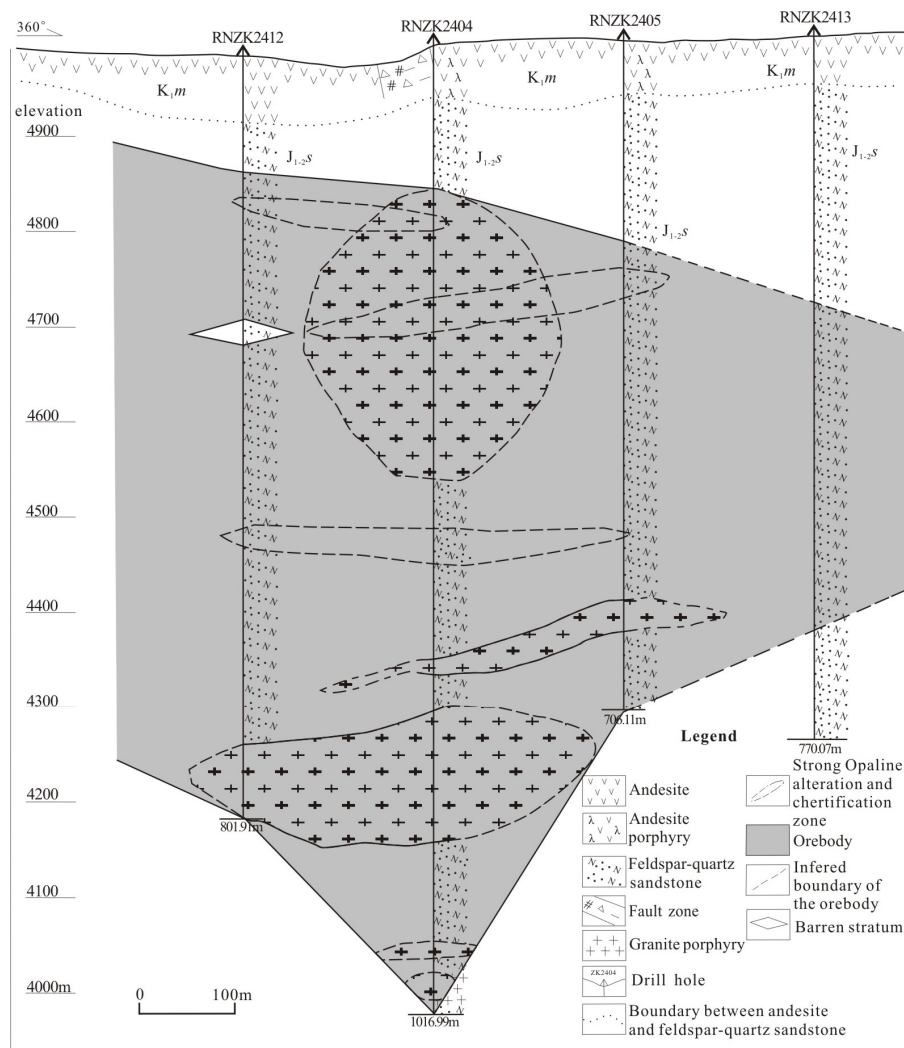


Fig. 2. Line 24 of Rongna copper (gold-silver) deposit.

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