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Geology and Mineralization of the Gold Deposits in Southeastern Guizhou

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1 Introduction

Southeastern Guizhou, located in the southwest of Jiangnan gold metallogenetic belt, is famous for its long history of gold mining with primary gold mineralization richly developed. Despite many years of exploration, mining, and study, there exists uncertainly in determining the actual output due to a lack of accurate statistic data and the actual output are much more than prognostic reserves, for example, for Huaqiao gold deposit, the estimate of undiscovered gold potential is 1,350 kg by the end of 1970s, but the actual output has reached over 10,000 kg (Lu et al., 2012; Ma et al., 2007). Recently, researches have pointed out that these deposits belong to orogenic gold deposits, or turbidite-hosted gold deposits (Tao, 2012; Lu et al., 2012). Hence, this poorly explored area may be expected to have the highest potential for significant undiscovered gold.

2 Regional Setting

The Neoproterrozoic sequence in Southeastern Guizhou is chiefly composed of intermediate-basic volcanic rocks and fine clastic rocks of Qingbaikou System (Wang et al., 2006). This succession is characterized by NE trending folds and faults. EW trending faults are considered to be basement faults and control the distribution of gold deposits (Yu, 1993). Shear zones are widely developed but their relationship towards mineralization is still unclear. Igneous rocks haven't been found in Tianzhu, Jinping and Liping but extensive igneous rocks, which vary from ultrabasics to acid volcanic complexes, are emplaced mainly from Mesoproterozoic to Neoproterozoic in the southern part of Southeastern Guizhou (Wang et al., 2006).

3 Mineralization

Mineralization is hosted in low greenschistfacies metamorphic rocks of Xiajiang Group. Orebodies are mainly quartz veins with a maximum width of ~6 meters, commonly confined to hinge zones of anticlines and their secondary structures. Intermittent quartz and host rock stringers are common in the marginal parts of the quartz veins. Fracture-veining textures indicate syn-mineralization deformation. Gold ores consist of quartz-sulfide veins and stockworks, and less significantly, sulfide disseminations in alteration assemblages.

Four stages of mineralization have been recognized in the area. The first is a minor episode of trace gold with auriferous vein-systems formed. This is then overprinted by a second, more intense mineralization producing arsenopyrite, pyrite and the precipitation of native gold. Visible gold is not seen in the gold-quartz-polymetallic sulfide stage but minor galena, sphalerite and trace amounts of chalcopyrite are present. Mineralization is ended up with quartz-carbonate veins with minor pyrite. Gold are mainly introduced in the second and third stages and occurs as inclusions within, or in interstices between vein quartz and pyrite. Native gold is dominantly medium to coarse grained with the biggest size up to 600μm. Gold grains exist like regular breccia, rhombic, slice, and irregular or rounded shape. Although sulfide minerals are common in the area, they generally constitute <5 vol% of the lode and wall rock. Mineral assemblage indicate that from north to south, sulfide are increasing in quartz veins, in Tianzhu, visible gold are common and polymetallic sulfide minerals are rare, but in Jinping, it is just the opposite. It seems that gold is not proportional to sulfide content.

Visible wallrock alteration in the area tends to be of rather limited extend and is far less apparent when compared with alteration haloes associated with lode gold mineralization in more reactive mafic rocks. Alteration styles include silicification, sericitisation, chlorisation, and carbonatisation. This zone is characterized by fine grain disseminated arsenopyrite, pyrite minerals. Sericite, quartz, carbonate, sulphides and chlorite are common

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alteration minerals in the area.

Quartz veins of each stage contain amount of fluid inclusions. Individual inclusions mostly range from 1 to 10μm in diameter. Three distinct types of inclusions have been identified based on their contents at room temperature: liquid inclusions (type 1), gas-liquid inclusions (type 2), and three-phase CO_2-rich inclusions (type 3). These fluid inclusions have homogenization temperatures between 116℃ and 393℃ and ice-melting temperatures range from -0.5℃ to -15.0℃. Their salinities varies from 0.88 to 18.63 wt% NaCl equivalent. CO_2 and CH_4 contents of fluid inclusions tend to be low with variable CO_2/CH_4 ratios.

4 Ore Genesis

Field evidence indicates a Caledonian structural deformation within the area, which enhanced the NE trending faults and folds and caused regional metamorphism. On the basis of Rb-Sr, Re-Os dating of quartz and arsenopyrite, it is generally agreed that initial gold mineralization in this area occurred during this regional deformation. The source of auriferous fluid is equivocal with igneous, metamorphic and meteoric sources form the evidence of hydrogen and oxygen isotopes (Zhang et al., 1998; Zheng et al., 2010; Lu et al., 2012). Initial gold is supposed to be derived from the sulphidic sediments of Xiajiang Group. Geochemical data indicate values of 0.74 to 108.48 ppb Au (Li et al., 2004; Zhang et al., 1998) in these sulphidic sediments, which could have reacted with fluids derived from the deep. Subsequent deposition of gold from such fluids could have occurred in structurally higher level dilational traps.

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References

Li Yingshu, Qin Dexian, Pu Chuanjie, Chen Aibing, Tan Shucheng and Fan Zhuguo, 2004. Geological and Geochemical features of Au ore deposit in Southeatern Guizhou. Journal of Kunming University of Science and Technology (Science and Technology), 29(3): 5-8 (in Chinese with English abstract).

Lu Huanzhang, Wang Zhonggang and Chen Wenyi, 2012. Turbidite-hosted gold deposits. Beijing: Science Press (in Chinese).

Ma Xiaoming, Shao Wenkuo and Zhang Kai, 2007. Analysis of ore prospects for metamorphic clasolite-type gold deposits in Southeastern Guizhou Province, China. Acta Mineralogica Sinica, 27(3): 498-492 (in Chinese with English abstract).

Tao Ping, 2012. Structural-control model and prospecting direction of gold deposit of the Tianzhu – Jinping – Liping areas, Southeastern Guizhou, China. PhD dissertation, China University of Geosciences, Wuhan (in Chinese with English abstract).

Wang Shangyan, Tao Ping, Dai Chuangu and Kuang Shunda, 2006. Gold depostis in Eastern Guizhou Province of China. Beijing: Geology Press (in Chinese).

Yu Dalong, 1993. A study on regularity of structure control of quartz vein type gold deposits in Eastern Guizhou and a discussion on the prospecting target for large deposits in this area. Geology of Guizhou, 10(4): 308-313 (in Chinese with English abstract).

Zhang Jie, Yu Dalong, Zhang Xianyu and Yan Yongjun, 1998. Petrological, mineralogical and geochemical study of the Moshan – Youmaao gold mineralized zone in Guizhou Province. Geology and Prospecting, 34(2): 30-36 (in Chinese with English abstract).

Zheng Jie, Yu Dalong and Yang Zhongqin, 2010. A study on the trace element geochemical characteristics of pyrite and arsenopyrite in Bake gold deposit, East Guizhou Province, P.R.China. Acta Mineralogical Sinica, 30(1): 104-117 (in Chinese with English abstract).