Geological Evolution and Related Gold Deposits in West Junggar, Xinjiang, China

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1 Introduction

The multi-stage geological evolution and strong continental deformations during the course of its history make the Central Asian Metallogenic Region (CAMR) a unique and complicated large-scale metal province. As a major component of the CAMR, west Junggar located on the south of the Tajin - Tarbahatai - Kujibai - Honguleleng (TTKH) ophiolitic belt and the north of the TBB (Tangbale - Baijiantan - Baikouquan) ophiolitic belt. Ophiolitic mélanges in the TBB belt have been deformed due to various late Palaeozoic geological events and were covered by Devonian - early Carboniferous volcanic-sedimentary basin (Zhu et al, 2013a). Here we describe geological evolution of these ophiolitic belts and the volcanic-sedimentary basin covering on them. This basin was intruded by granitic magma, which related with gold and copper mineralization (Zhu et al, 2013b).

2 Geological Evolution

The early Palaeozoic oceanic floor in west Junggar, represented by Ordovician ophiolitic belts of TTKH and TBB, subducted to the north under the Chingiz-Tarbahatai arc and to the south under Junggar plate, respectively. Rock units in TBB underwent metamorphism at different P-T conditions (Zhu et al, 2014). Gabbro formed at >385Ma, was subducted, underwent metamorphism at c. 342Ma in the subduction zone and was finally exhumed at c. 333Ma (Zhu et al, 2014). Widespread volcano eruption formed volcanic-sedimentary basin at ~320Ma. Post-orogenic intermediate to felsic magma intruded into this basin and controlled porphyry Cu–Au deposits (~310Ma) and hydrothermal gold deposits (Fig. 1).

3 Gold Deposits in Hatu-Sayi Region

Gold mineralization in the Hatu-Baobei region is

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coincident with granitic intrusion, much later than the Early Carboniferous volcanism (c. 320Ma). Granitic magma drives gold-bearing fluid from deep to shallow along the Anqi fault. Subordinate faults in hanging wall of the Anqi fault host most ore-bodies. Gold deposits usually occur at the cross point of fold structure and fault. There are two kinds of ore-bodies: gold-bearing sulfide quartz vein in the shallow part (<400m), and gold-bearing altered tuff and basaltic rocks in deep which extend to >1200m from surface. The Sayi gold deposit is hosted in listvenite related with ophiolite mélange. The distribution of different ore-bodies were controlled by shear zone which developed in ophiolite mélange and formed listvenite. Gold-bearing quartz veins contain native gold, chalcopyrite, pyrite, siderite, fuchsite etc. Pressure decrease from ductile to brittle deformation induced gold deposition in the Sayi region. Fig. 2 shows a Paleo-surface, which was controlled by fault system in the volcanic-sedimentary basin, and different gold deposits cropped out at present surface.

4 Gold Deposits in Baogutu Region

Granodiorite, quartzdiorite and diorite stocks with U-Pb ages of 320-310Ma intruded into Lower Carboniferous volcanic-sedimentary basin in the Baogutu region. Gold mineralization is closely related to these plutons. Magmatic hydrothermal fluid from porphyry flows along contact zone and faults, and formed rare minerals such as native arsenic, native antimony, aurostibite, and paakkonenite in the gold-bearing veins (An and Zhu, 2010; Zheng et al., 2013). Two types of gold mineralization have been recognized: sulfide vein in radial fracture accompanying porphyry bodies (No. X, XI), and gold-bearing quartz vein (No. I, II, III, IV). Hydrothermal ore-forming process could be divided into five stages: pyrite – arsenopyrite, coarse-grained quartz vein, quartz – arsenic – antimony – native gold, late antimony-bearing vein, and calcite vein.

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References