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Geology and Genesis of the Jiawu Gold–antimony Deposit in the Western Qinling-eastern Kunlun Orogen, China

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1 Introduction

The Jiawu gold–antimony deposit, located at the tectonic boundary between the western Qinling and eastern Kunlun orogenic belt on the northern margin of the A'nyemaqen-Bayan Har Orogenic Belt, eastern part of Qinghai Province, western China (Mao et al., 2002; Goldfarb et al., 2014), is classified as a large (>20t Au) gold deposit (Yan et al., 2011). However, little has been published on the Jiawu gold–antimony deposit in the international literature until now. This study focuses on field and petrographic observations of the ore-controlling structures and the basic characteristics of gold mineralization in the deposit. In addition, analysis of geological setting and petrographic observations, combined with available geochronological data, determine the magma and ore sources, and petrogenetic processes involved in the formation of this deposit.

2 Geology of the Ore Deposits

Sedimentary sequence of the Jiawu gold–antimony district consist predominantly of the Middle Triassic Longwuhe Group that occur nearly throughout the district, consist of lithic-feldspathic sandstone, siltstone and carbonaceous slate (Fig. 1). The carbonaceous slate is the host rock. The Qurugou granodiorite occurs as a NW-trending stock with a surface outcrop area of 1 km by 0.4 to 0.6 km in the northwestern part of the ore district. Moreover, a large number of igneous dykes, as NW- and NE-striking sets (Fig. 2), intrude the Longwuhe Group and consist predominantly of diorite porphyry, granodiorite, and granite porphyry. They vary in size and strike and are generally several dozen metres in length and several to several dozen cm wide. Multi-stage faulting and folding occurred simultaneously within the Jiawu ore district, forming a complex structural picture (Fig. 1). Well-developed NW-trending faults in the ore district are a part of regional NW-trending large-scale compressive shear fualt zones. It has been confirmed that NW-trending faults cutcross by EW-trending one. Also folds are well developed within Sedimentary sequence and control most of the gold orebodies, including Xiaolonggou anticline, Qurugou syncline, Wasanggou and Jiawu anticline. A total of 22 gold orebodies are identified within the Jiawu deposit. See detail in Tabel 1.

3 Discussion and Conclusion

There are three main factors controlling ore formation, that is stratum, structure and magma. (1) The sandstone and carbonaceous slate in Longwuhe Group containing Au abundance value of 5 ~ 44.1 × 10^{-9}, is high background

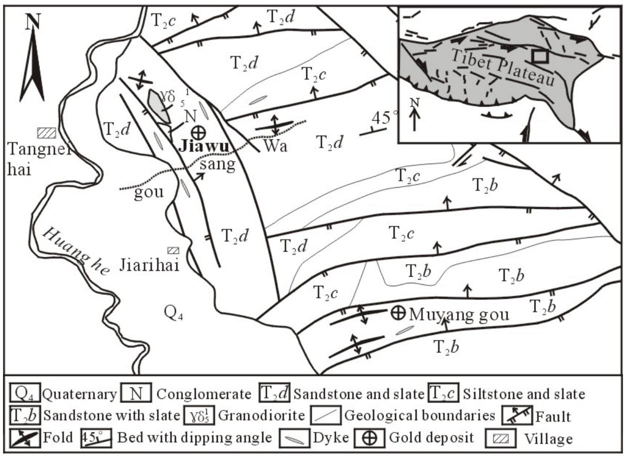

Fig. 1 Geological map of the Jiawu gold district (modified by Yan et al., 2011)

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Table 1 Mineralization veins features in Jiawu gold–antimony deposit

Veins number	Size	Occurrence	Grade (Au)/10^{-6}	Mineral composition		Ore-bearing strata	Ore-bearing structures
				Metallic minerals	Non-metallic mineral		
101	500m×(0.24~1.8)m	210~250°∠40~85°	1.13~105	Pyrite, stibnite, galena	Quartz, feldspar	Sandstone and carbonaceous slate	NW-trending fault fracture zone
102	100m×0.9m	209°∠62°	0.32~1.03	Pyrite, stibnite	Quartz, sericite		
103	160m×(0.8~1.0)m	210°∠46°	0~0.61	Pyrite, stibnite	Quartz, sericite		
104	140m×0.4m	215°∠60°	0.27~0.72	Pyrite, stibnite, galena	Quartz, sericite		
105	230m×(0.8~1.6)m	195°~210°∠43~60°	1.38~2.85	Pyrite, limonite	Feldspar, quartz		
106	180m×(1.6~2.0)m	215°∠45°	1.02~2.34	Pyrite	Quartz, sericite		
202	700m×(0.3~2.0)m	90°~150°∠48~55°	0.09~9.48	Pyrite	Quartz, sericite		
203	760m×(0.3~1.3)m	90°~152°∠40~45°	1.16~59.2	Gold,stibnite, galena	Feldspar, quartz		
401	950m×(2~7)m	120°∠65°	1.66	limonite	Feldspar, quartz		

Data from Li et al. (2010)

value in this region. In addition, the softer carbonaceous slate is easily broken deformation, so lead to ore-rich liquid filling and forming orebodies. (2) The orientation of NW-trending faults consistent with direction of stratum and porphyry dykes. This fault zone is main area for Au mineralization. Therefore, the NW-trending faults provide channels and ore-hosting sites. (3) Gold mineralization is closely related to magmatism in this region. Magma not only provide heat, but also provides a partial mineralization into mineral sources. Preliminary studies suggest that Jiawu gold–antimony deposit belong to epithermal polymetallic type (Liu and Ren, 2005).

Sedimentary sequence with high Au and Sb content formed in Jiawu region at Early-Middle Triassic, and then tectonic movement led to Au preliminary enrich, and provided the material basis for mineralization. Late Indosinian movement, collision of the central orogenic belt was over and went to extension phase (Yuan et al., 2011, Pan et al., 2012), forming granite porphyry dykes along the fault and fracture zone, also the post-magmatic hydrothermal migrated upward and extracted Au and Sb from surrounding rock to the shallow, eventually leading to precipitation and mineralization within the fault zone in Jiawu region.

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