

LI Zhuang, TANG Juxing, WANG Liqiang and MENG Zhan, 2014. The Mineralization and Metallogenic Process of the Orogenic Gold Deposits in Ailaoshan, Yunnan. *Acta Geologica Sinica* (English Edition), 88(supp. 2): 763-764.

The Mineralization and Metallogenic Process of the Orogenic Gold Deposits in Ailaoshan, Yunnan

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1 Introduction

The concept of orogenic gold deposit was firstly proposed in early 1980(Bohlke, 1982), which refers to the vein type gold deposit series that controlled by structure and related to hyperplasia structure in time and space in metamorphic land. (Kerrick et al., 1990; Barley et al., 1992; Groves et al., 1998; Goldfarb, 2001). Ailaoshan metallogenic belt is one of the most important gold belts in southwest China. A great many large or super large polymetallic deposits came to light in this belt, including Jinchang deposit in Mojiang, Lao Wangzhai deposit in Zhenyuan, Changan and Yuanyang. Sanjiang region, as the typical development of the tethys tectonic globally, has experienced complex and integrated evolutionary history (Hsu et al., 1978; Sengor, 1979; Sengor et al., 1984). Under the condition of this tectonic setting, it was realizable to form the Ailaoshan metallogenic belt with intricate mineral elements.

2 Mineralization

To the genesis of orogenic deposits in Ailaoshan gold belt, there are mainly standpoints as follows: (1) Hydrothermal genesis concerned to the ultrabasic rock to acidic rock (Hu et al., 1995); (2) Metamorphic hydrothermal genesis related to turbidite (Shen et al., 1997); (3) The syngenetic deposition (Fang et al., 2001); (4) Simultaneous sedimentation in the late hydrothermal modification (Xie et al., 2004).

Previous studies have showed that orogenic metallogenic system of gold deposits in Ailaoshan probably experienced three stages of thermal events and they are controlled by the strong forces of convergence extrusion from the collision of India to Asia and the dynamic mechanism of early and late conversion. Large-

scale mineralization of gold mine is relevant to the crust-mantle material strong exchange and tectonic deformation in the process of dynamic system transformation (Yang et al., 2010).

Early gold mineralization (61.55~63.09 Ma). This stage of mineralization corresponds to the development of the thrust nappe structure system, which is synchronous with the shear strike-slip faulting structure and controlled by early strong compressive tectonic dynamics system from the collision of India to Asia.

Main gold mineralization (33.76~36.10 Ma). This stage corresponds to the loose period of regional extrusion and development of alkali-rich porphyry and shear strike-slip faulting structure, which is controlled by transformation system of the tectonodynamics arising from the collision of India to Asia. Gold mine large-scale mineralization takes place in the main stage.

Late gold mineralization (26.40~30.80 Ma). This mineralization stage corresponds to lithospheric stretching effect and the location of high potassium magmatic rocks which is generated because of the depleted mantle's decompression melting, and it is controlled by counter-rotating drag of the Indian plate and the combination of oblique subduction back.

3 Ore-forming Process

Ailaoshan metallogenic belt has experienced three major key geological processes, covering hyperplasia orogeny, collision orogeny and superposition compound function. Three periods of gold mineralization mainly occurs in about 62 Ma, 35 Ma and 28 Ma, and these mineralizations are controlled by early strong convergence extrusion of India-Eurasia collision and early-late switched structural dynamics mechanism (Deng et al., 2011).

Early gold metallogenic course corresponding to

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hyperplasia of orogeny mainly occurs in the shallow metamorphic zone. This mineralization process develops typically within the ultrabasic rock along the east Jiujiang-Anding fault. Mineralization types mainly include silicide ultrabasic rock type, metasomatic quartzite type and carbonatization ultrabasic rock type, etc.

The primary gold process mainly forms two mineralization types, including shallow metamorphic volcanic sedimentary clastic rock type and the thin vein quartz diorite rock, which are the most prospecting potential type of deposit in shallow metamorphic area of Ailaoshan. Gold usually appears in form of Au and kuestelite and metal minerals mainly cover tetrahedrite, molybdenite.

Late gold metallogenic process is probably controlled by the SN extensional fault and the secondary extensional fractures that is irregular, small in scale.

4 Conclusion and Discussion

The structures of Ailaoshan have three different styles, among them strike-slip fault is the most characteristic of Ailaoshan tectonic style. Three different kinds of tectonic style jointly control the output state of the orogenic gold deposits in Ailaoshan.

Metallogenic age of orogenic gold deposits in Ailaoshan has focused on three periods: 61.55 ~ 63.09 Ma, 33.76 ~ 36.10 Ma and 33.76 ~ 30.80 Ma (Yang et al., 2010), but the precise age is not known to us until now.

But for the respective time and displacement of strike-slip of the right to left along the Ailaoshan-Red river shear zone has great many controversies. These are the scientific problems needed to be solved in future.

Acknowledgements

This paper is based on the amount of studies of many scholars and the author's precise conclusions. I'd like to give great appreciation to them here.

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