

PANG Baocheng, LI Yuanqiang, YANG Feng, LI Peirong, LV Jiawen and ZHOU Yequan, 2014. A Comprehensive Genetic Model for Carlin-type Gold Deposit in Yunnan-Guizhou-Guangxi Border Area, China. *Acta Geologica Sinica* (English Edition), 88(supp. 2): 778-780.

A Comprehensive Genetic Model for Carlin-type Gold Deposit in Yunnan-Guizhou-Guangxi Border Area, China

PANG Baocheng^{1,2}, LI Yuanqiang², YANG Feng^{1,2}, LI Peirong², LV Jiawen² and ZHOU Yequan²

¹ Guangxi Key Laboratory of Hidden Metallic Ore Deposit Exploration, Guilin University of Technology, Guilin 541004, China

² College of Earth Sciences, Guilin University of Technology, Guilin 541004, China

1 Introduction

Sedimentary rock-hosted Carlin-type gold deposits are geologically distinct and economically significant, with a great exploration potential in China. Yunnan-Guizhou-Guangxi border area (Youjiang basin) of

southwestern China, known as Dian-Qian-Gui 'Gold Triangle', hosts many large gold deposits of this type (Fig.1). However, their origin has been debated for a long time. The proposed models of deposit formation including meteoric water, basinal fluids, deep magmatic fluids, metamorphic fluids (Pang et al., 2014; references

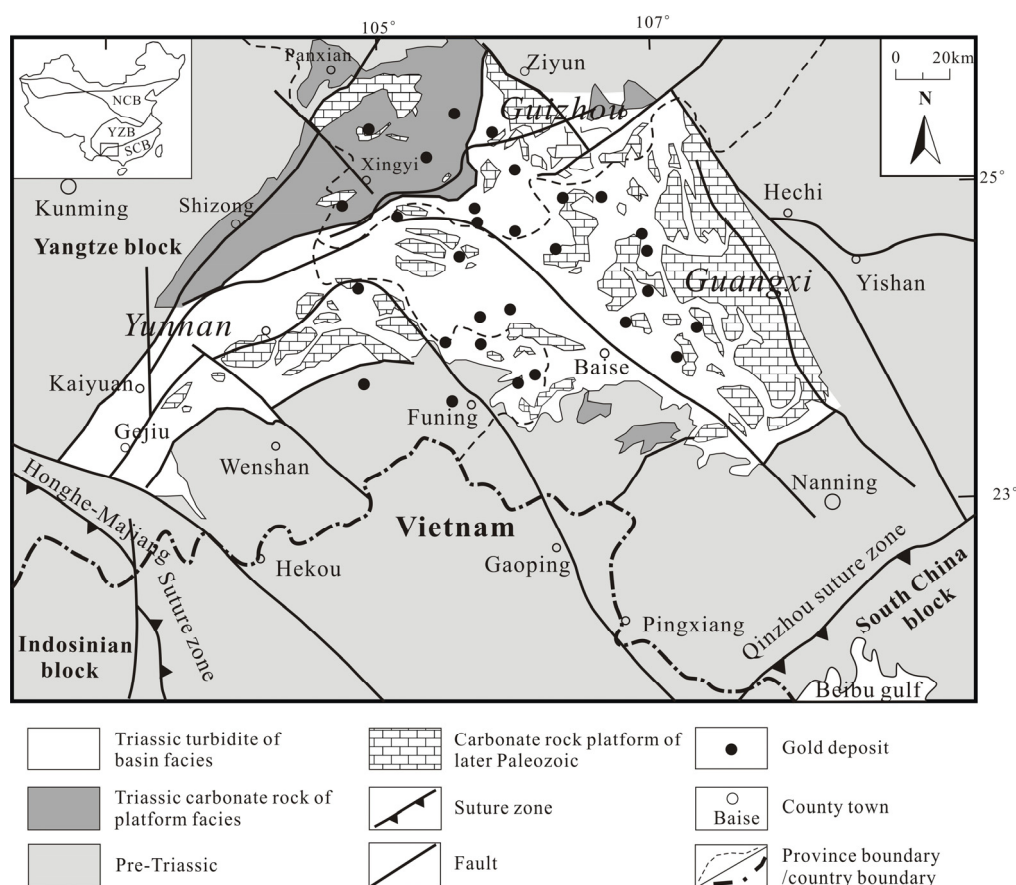


Fig.1. A simplified regional geological map with location of Carlin-type gold deposits in Yunnan-Guizhou-Guangxi "Golden Triangle" region. NCB=North China Block; YZB=Yangzi Block; SCB=South China Block (Modified after Chen et al., 2011 and Du et al., 2009).

* Corresponding author. E-mail: pbc@glut.edu.cn

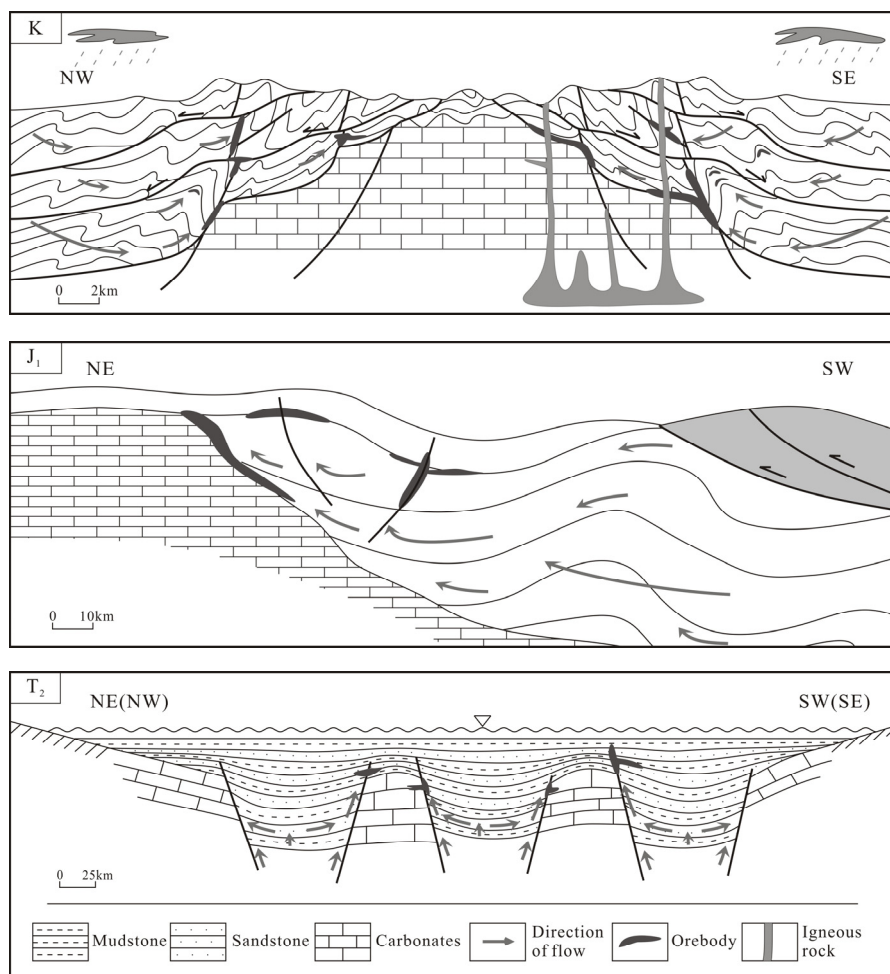


Fig.2. Genetic model of Carlin-type gold deposit in Yunnan-Guizhou-Guangxi border area.

therein). Here we try to establish a comprehensive genetic model.

2 Geological Settings

Youjiang basin is located in the transition zone of Yangtze block, Indosinian block and South China block (Fig.1). Due to the double effects of Circum Pacific tectonic domain and Tethys tectonic domain, Youjiang basin has experienced a long and complicated tectonic evolution. It can be divided into three stages: rift basin of passive continental margin, foreland basin and intracontinental orogenic belt (Pang et al, 2014).

Sedimentary sequence of the basin shows double-layer construction(Zeng et al., 1995). The lower layer is mainly composed of isolated platform carbonates of Devonian to lower Triassic with small amount of siliceous rock, laminated mudstone and tuff. While the upper layer is mainly composed of terrigenous clastic turbidite of middle Triassic with huge thickness. These strata are widely distributed in the basin.

The magmatic(volcanic) activities are frequent during rift stage in the interior and edge of the Youjiang basin all the time except middle-late Carboniferous, mainly in basic volcano rocks. At middle to late Triassic, the lithology of volcano rocks had been changed from basic to medium-acidic(Liu et al., 1993; Kang et al., 2003). Magmatic activities of these periods were thought to bring abundant gold for basin strata.

Indosinian orogenic movement(end of middle Triassic to early Jurassic) made the basin uplifted, strata folded and metamorphosed(Chen et al., 2011). Yanshanian movement (middle Jurassic to Cretaceous) caused strong fault and block disintegration in Youjiang area, and induced acidic magma intrusion forming small stocks, dikes and deep buried igneous rocks(Chen, 2002).

3 Basic Characteristics of Gold Deposit

The geological and geochemical characteristics of Carlin-type gold of the Youjiang Basin (Hu et al., 2002) is quite similar to the Carlin-type gold deposits in the United

States (Cline et al., 2005). The Carlin-type gold deposits of the Youjiang Basin are also mainly hosted in sedimentary rocks, but the epoch span of ore-bearing strata is very wide, including the Cambrian, Devonian, Carboniferous, Lower Permian, Lower Triassic, Middle Triassic and so on, while most of them are hosted in the Middle Triassic. The main ore-bearing rock is argillaceous siltstones, silty mudstone and impure carbonate. And many main ore-bearing rocks of the deposits contain large amounts of carbonaceous (Liu et al. 2002; Gu et al., 2011). The deposits are obviously controlled by the faults and folds (Yang et al., 1994; Chen, 2002). Metallogenic age were between 193-82Ma (Zhang et al., 1993; Hu et al., 2002; Chen et al., 2007).

4 Comprehensive Genetic Model of Gold Deposit

There have been always more debates on the formation of Carlin-type gold deposits internationally. But a few proposed models in recent years have taken the deposits in the context of the long-term evolution of regional crust. For example, Cline et al (2005) compared the key geological features of mining area and five major ore belts of northern Nevada in detail and linked the regional tectonic evolution and mineral deposits based on the accumulated geochemical data for years. Meanwhile, Emsbo et al (2006) linked other types of gold deposits of the northern Nevada together with the formation Carlin-type gold deposits.

Based on regional structural evolution, sedimentary buildup, geochemical background, characteristics of gold deposits, and recent geochemical data of gold deposits, we speculate that the Carlin-type gold deposits in the Youjiang basin may most probably be the result of multi-source fluids activities in multi-period and multi-stage. The formation of gold deposits can be divided into three

stages (Fig. 2): sedimentary diagenetic stage (T_2), orogenic metamorphic stage (J_1), and postorogenic stretch and magmatic activity stage (K).

Acknowledgments

The research is supported by the National Natural Science Foundation of China (41362006), the Guangxi Natural Science Foundation (2013GXNSFAA019275) and the Foundation of Guangxi Key Lab of Hidden Metallic Ore Deposits Exploration (11-031-20).

References

- Chen Maohong, Mao Jingwen, Qu Wengjun, Wu Liuling, Uttley, P.J., Norman, T., Zheng Jianmin and Qin Yunzhong, 2007. Re-Os dating of arsenian pyrites from the Lannigou gold deposit, Zhenfeng, Guizhou Province, and its geological significances. *Geological Review*, 53:371-382 (in Chinese with English abstract).
- Cline, J.S., Hofstra, A.H., Munteau, J.L., Tosdal, R.M., and Hickey, K.A., 2005. Carlin-type gold deposits in Nevada: Critical geologic characteristics and viable models. *Economic Geology 100th Anniversary Volume*, 451-484.
- Emsbo, P., Groves, D.I., Hofstra, A.H., and Bierlein, F.P., 2006. The giant Carlin gold province: a protracted interplay of orogenic, basinal, and hydrothermal processes above a lithospheric boundary. *Mineralium Deposita*, 41:517-525.
- Gu, X.X., Zhang, Y.M., Li, B.H., Dong, S.Y., Xue, C.J., and Fu, S.H., 2011. Hydrocarbon- and ore-bearing basinal fluids: a possible link between gold mineralization and hydrocarbon accumulation in the Youjiang basin, South China. *Mineralium Deposita*, DOI 10.1007/s00126-011-0388-x.
- Hu, R.Z., Su, W.C., Bi, X.W., Tu, G.Z., and Hofstra, A.H., 2002. Geology and geochemistry of Carlin-type gold deposits in China. *Mineralium Deposita*, 37: 378-392.
- Pang, B.C., Liu, X.J., Yang, J.W., Xiao, H., and Fu, W., 2014. Sedimentary tectonic evolution of Youjiang basin and formation of Carlin-type gold deposits, southwestern China, in Yang, J.W.(ed.), Basins: Methods of Formation, Ongoing Developments and Emerging Challenges. *New York: Nova Science Publishers Inc.*, 1-25.