HAN Runsheng, LI Wenchang, QIU Wenlong, REN Tao and WANG Feng, 2014. Typical Geological Features of Rich Zn-Pb-(Ge-Ag) Deposits in Northeastern Yunnan, China. *Acta Geologica Sinica* (English Edition), 88(supp. 2): 160-162.

Typical Geological Features of Rich Zn-Pb-(Ge-Ag) Deposits in Northeastern Yunnan, China

HAN Runsheng[1], LI Wenchang[2], QIU Wenlong[1], REN Tao[1] and WANG Feng[3]

1 Kunming University of Science and Technology; South-West Institute of Geological Survey, Geological Survey Centre for Nonferrous Metals Resources, Kunming 650093
2 Yunnan Bureau of Geological survey, Kunming, 650051
3 Yunnan Chihong Zn & Ge Co., Ltd., Yunnan 655011

1 Introduction

The large clusters of mineral deposits in northeastern Yunnan, located in the southwestern margin of the Yangtze Block, is an important part of Sichuan — Yunnan — Guizhou Zn-Pb Poly-metallic Mineralization Province. The deposit concentration district is surrounded by NE-trending Mile-Shizong fault belt, SN-trending Xiaojiang fault belt and NW-trending Ziyun-Yadu fault belt. Major metallogenic age is late Indo-China which is constrainted by tectonic deformation screening, tectonic stress measuring and isotopes (Han et al, 2007, 2012).

2 Unique Features of Deposits

Detailed geological studies from the super-large-sized Huize_Pb-Zn-(Ge-Ag) deposit and Lemachang Pb-Zn-Ag deposits, large-scale zhaotong, Maozu, Lehong, Jinshachang and Fulechang Pb-Zn deposits show that these deposits have unique geological features which are different from the domestic and foreign known typical MVT-type Pb-Zn deposits as following:

1) The deposits are characterized as high Zn+Pb grade (normally ≥25%, locally>50%). The survey shows that there are rare.

2) The Zn-Pb ore of these deposits have high content of germanium, cadmium, indium, and argentine. For example, the contents of germanium and argentine in the Huize deposit are from 1.49 to 256ppm and 0.576 to 309ppm respectively. Zn, Pb and Ag, Ge, Cd reserves of single ore-body may reach large-scale deposit.

3) The deposits are close genetic relation with thrust-fold structures. And left-hand compresso-shear faults control the ore-bodies in space. Figure 1 show the typical deposits that are controlled by thrust-fold structures. The trending length of ore-bodies is less than deep extent.

4) About four hundred Zn-Pb deposits or occurrences have identified in SYG. Host rocks of the deposit are HTD dolomite or dolomitic limestone with geological ages from Sinian to Permian.

5) These deposits have apparent mineral assemblage from the hanging-wall to the foot-wall with mineral assemblage of marmatite-pyrite–quartz-ferro -domite → sphalerite–galena → pyrite–dolomite-calcite.

6) Unmixing bearing-L_{CO2} fluid inclusion features in 6 kinds of fluid inclusions indicate that CO_2 fluid had generated ebullition in ore-controlling structures. The homogenization temperature and salinity of fluid inclusions for sphalerite and calcite is: (183～221)℃ and (13～18) wt％NaCl; (255～355) ℃ and (1.8～4.0) wt％ NaCl. Ore-forming hydrothermal solution was mainly derived from deep source fluid and metamorphic basement by geochemistry of Sr-Pb、C-H-O、S isotopes(Han et al. 2006).

3 Mineralization Model of Deposits

Leach et al. (2010), Mao et al. (2005) and Liu et al. (2008) proposed that the typical MVT-type deposits mainly formed in the stretch background, and ore-controlling structure is normal faults. However, these deposits in the SYG are controlled by left-hand compresso-shear thrust faults. Thrust faults relate to Tethys closure in the late Indo-China period in the region. All kind of deposits are located in carbonate platform at foreland in the orogenic belt. These geological features are clearly different from known types of Pb-Zn deposits. This paper, which is defined a new genesis type of Pb-Zn deposit as the Huize type (HZT). They formed under

* Corresponding author. E-mail: 554670042@qq.com

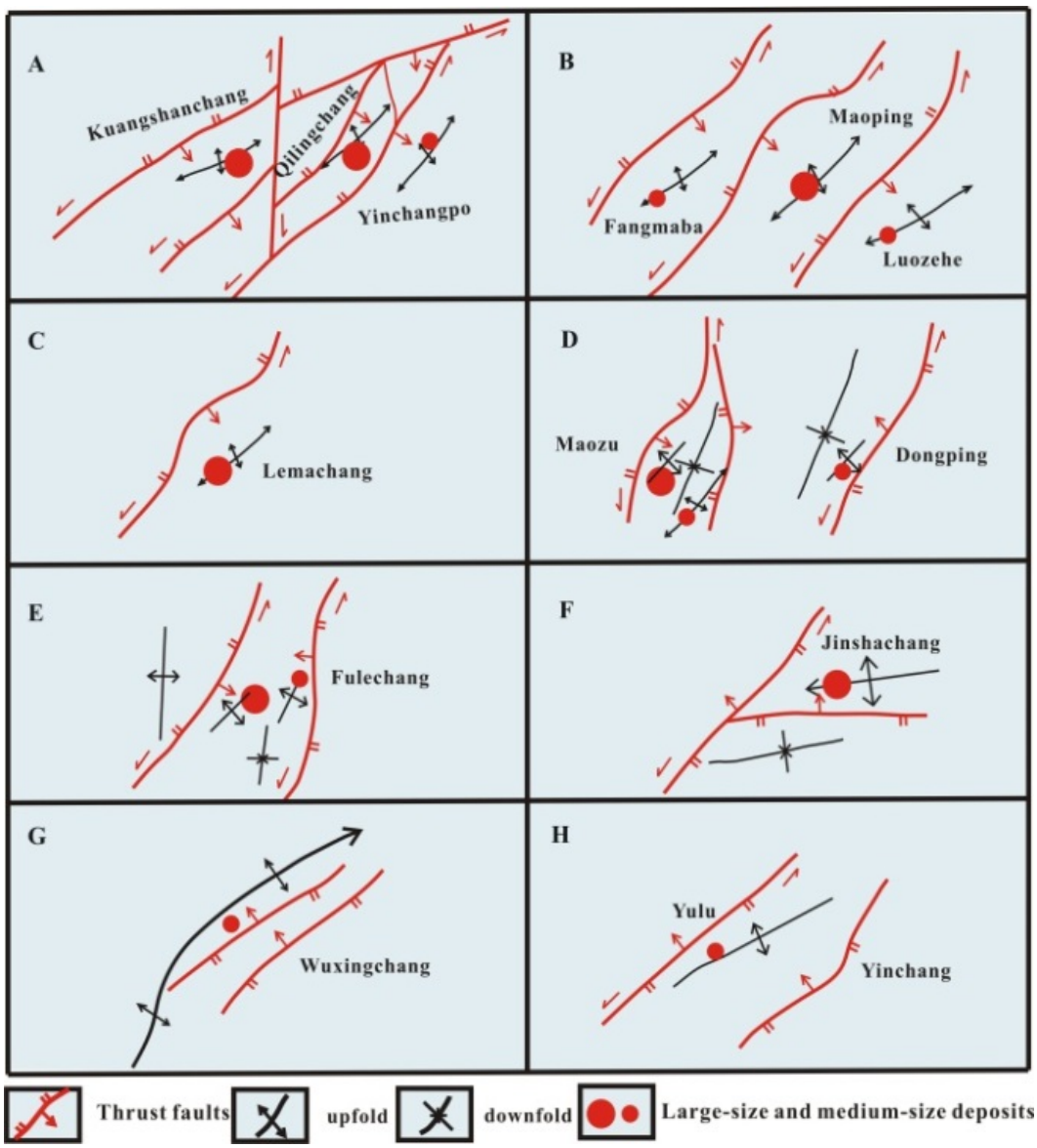

Fig. 1. Thrust-fold structures of main deposits in Northeastern Yunnan.
Major deposits: A. Huize; B. Zhaotong; C. Lemachang; D. Maozu; E. Fulechang; F. inshachang; G. Wuxingchang; H.Yulu

compressive tectonic background, and strictly controlled by thrust-fold structure in the ore-hosted carbonate, and ore-forming rich gas (ie. CO_2) fluid with medium-high temperature and medium-low salinity penetrated to form the deposits.

The metallogenic process roughly experienced three stages: A) the formation of thrust-fold structures and fluid large-scale fluid migration; B) ore-forming fluid penetration, gas-liquid differentiation and the formation of ore-rich fluid; C) rich fluid unloading and tectonic-fluid coupling mineralization. (Fig. 2)

4 Conclusions

1) The special geological features of deposits in the district are different from known types of lead-zinc deposits worldwide.

2) The formation of the HZT-type deposits was related to the late Indosinian orogenic extrusion. Ore-bodies are controlled by left-hand compresso-shear thrust faults. Structure-fluid 'penetration' mineralization model of HZT-type deposits is undoubtedly of great importance in studying SYG Zn-Pb poly-metallic mineralization province, and making new breakthrough in the exploration and evaluation for similar deposits in the world.

Acknowledgements

This article was supported by the NNSF (No. U1133602, 40863002), YNSF (2010CC005), National

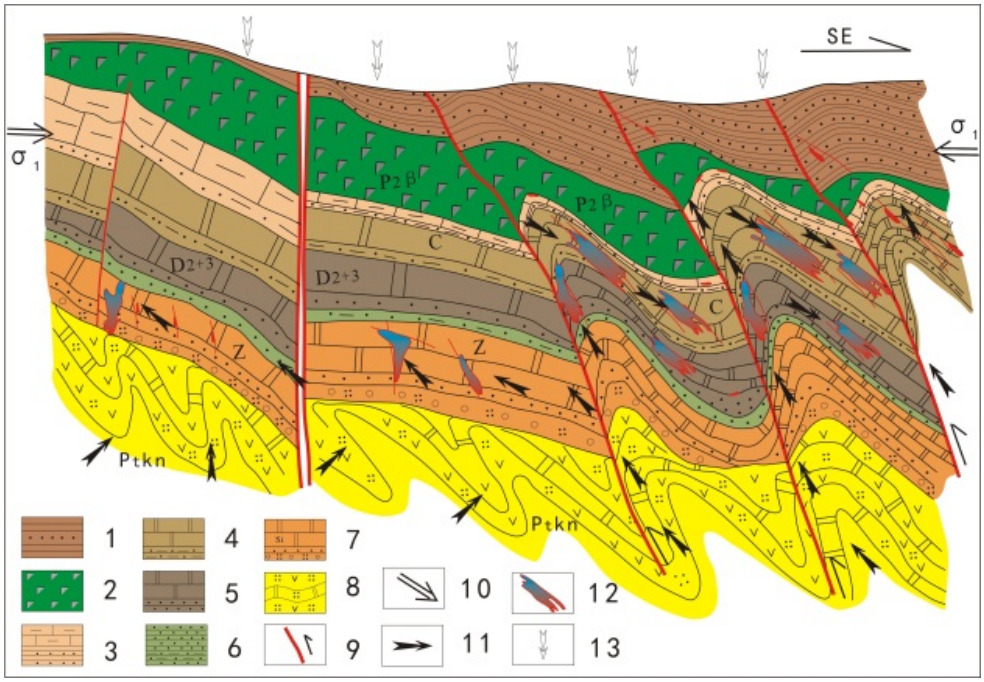

Fig. 2. Mineralizing model of HZT-type deposits in Northeastern Yunnan (Han et al., 2012).
1. Triassic; 2. Upper Permian Emeishan basalt; 3. Lower Permian; 4.Carboniferous; 5.Middle-upper Carboniferous; 6.Cambrian; 7.Sinian; 8.Kunyang Group; 9. thrust fault; 10.directon of major compressive stress; 11.direction of fluid migration; 12. Ore-body in fault zone and mineral zoning; 13. precipitate water.

Crisis Mine Special Project (No. 20089943) and Projects of YMLab and Innovation Team of Yunnan province and KMUST (2010, 2008).

References

Han, R.S., Chen, J., Huang, Z.L., et al., 2006. Dynamics of Tectonic Ore-forming Process and Localization-prognosis of Concealed Orebodies – As Exemplified by the Huize Super-large Zn-Pb-(Ag-Ge) District, Yunnan. China. Beijing: *Science Press*, 128-158 (in Chinese with English abstract).

Han, R.S., Liu, C.Q., Huang, Z.L., et al., 2007. Geological featares and origin of the Huize carbonate-hosted Zn-Pb-(Ag) district, Yunnan. *Ore Geology Reviews*, 31,360-383.

Han, R.S., Hu, Y.Z., Wang, X.K., et al., 2012. Mineralization model of rich Ge-Ag-bearing Zn-Pb polymetallic deposit concentrated district in Northeastern Yunnan, China. *Acta Geological Sinica*, 86(2): 280-294 (in Chinese with English abstract).

Leach, D.L., Bradley, D.C., Huston, D., et al., 2010. Sediment-Hosted Lead-Zinc Deposits in Earth History. *Econornic Geology*, 105(3):593-625.

Liu, Y.C., Hou, Z.Q., Yang, Z.S., et al., 2008. Mississippi valley type (MVT) Zn-Pb deposit: cognition and progress. *Mineral Deposit*, 27(2):253-264. (in Chinese with English abstract).

Mao, J.W., Li X.F., Li, H.M., et al., 2005. Discussion on endogenous metal deposit types, characteristics and ore-forming process in China orogenic belt. *Acta Geological Sinica*, 79(3): 342-372. (in Chinese with English abstract).