CHENG Yongsheng, PENG Cheng, 2014. Geochemical Characteristics and Metallogenic Significance of the Deep Rock in Dachang Tin Ore Field of Guangxi, China. *Acta Geologica Sinica* (English Edition), 88(supp. 2): 1077-1078.

Geochemical Characteristics and Metallogenic Significance of the Deep Rock in Dachang Tin Ore Field of Guangxi, China

CHENG Yongsheng[1, 2, 3], PENG Cheng[1, 2, *]

1 *Key Laboratory of Metallogenic Prediction of Nonferrous Metals, Ministry of Education, Central South University, Changsha 410083, China;*
2 *School of Geosciences and Info-Physics, Central South University, Changsha 410083, China;*
3 *State Key Laboratory of Ore Deposit Geochemistry, Institute of Geochemistry, Chinese Academy of Sciences, Guiyang 550002, China*

1 Geological Background

The Dachang tin-polymetallic ore field in Guangxi is located in the southwest margin of Jiangnan ancient land and North East of Youjiang basin, considered as an important nonferrous metals base in china.

In the ore district, the exposed stratum is mainly the clasolite-carbonate formations of Devonian-Triassic. The intermediate acid intrusive rocks are dominant, which are characterized by small exposed area, including the Longxianggai composite rock mass in middle part of the ore field as well as granite porphyry dykes and dioritic porphyrite in Changpo-Tongkeng. Yet, the Longxianggai composite rock mass is the largest multistage intrusion in Dachang, closely relating to the mineralization, whose emplacement times to effect of mineralization has always been the focus.

The Dachang tin-polymetallic ore deposit, locating in Nandan county of Guangxi, is one of the largest cassiterite-sulfide deposits in China and other countries. The Dachang ore field is rich in mineral resources, characterized by large scale, the concentrated reserves and complex type, including tin, zinc, lead, antimony, copper, tungsten, silver, indium, sulfur and arsenic, etc. The cassiterite sulfide deposit is the most important, followed by the skarn copper-zinc deposit and quartz vein tungsten antimony deposit.

The characteristics of rock and its contained information are very important to discuss the mechanism and genesis of ore deposit. In recent years, Cai et al (2004) thought that in Dachang ore field the different stages of granite formed in the transitional phase from post orogeny to intraplate, and the main tectonic environment of diagenesis is characterized by the relatively stable regional tension that is favorable to mineralization of super large ore deposit. Fan et al (2010) found that the ore zoning is consistent with the diagenetic environment of vein rock which provided the material source, and the quartz diorite porphyrite is characterized with adakitic rock, the underplated basaltic lower crust melting magma involved in the mineralization of polymetallic deposit beside dike.

2 Petrology and Geochemistry

The study of rock geochemistry can provide important information for the interpretation of deposit formation, and has become an effective method to discuss the source of ore-forming material, metallogenic conditions and mineralization environment, nowadays plays a key role in revealing the mineralization process, dynamics mechanism and geodynamic background. Yet, it is insufficient about the study of the tectonic environment and dynamic background for large-scale metallogenesis in Dachang ore district.

The main elements of rocks consist of SiO_2, Al_2O_3, Fe_2O_3, CaO, MgO, Na_2O, K_2O, MnO and P_2O_5, etc, among which the main composition is SiO_2 and Al_2O_3 and followed by CaO, K_2O and Fe_2O_3, etc. The content of SiO_2 ranges from 44.35% to 72.14%, with an average value of 67.34%. The content of Al_2O_3 is 9.94% to 15.28%, averaging 13.71%. There is large range for CaO, ranging from 0.57% to 25.91%, with an average value of 4.87%. The content of K_2O and Fe_2O_3 is 1.34% to 5.78%, 0.89% to 8.47%, averaged value of 4.05% and 2.81%, respectively. In addition, the content of SrO is less than 0.04% (average, 0.02%) and each of Cr_2O_3 content is less than 0.01%.

According to K_2O-Si_2O diagram, calc alkaline rock is

* Corresponding author. E-mail: pc67@163.com

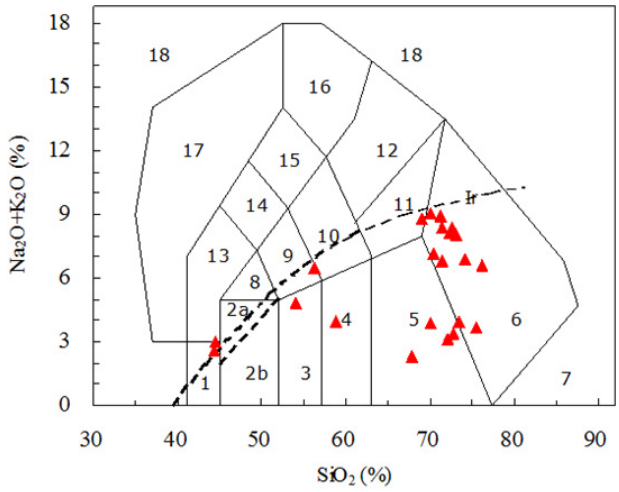

Fig.1 Total alkali silica (TAS) classification of the intrusive rock in the Dachang ore district, Guangxi
Ir-Irvine boundary, top for alkaline, below for subalkaline
1-olivine-gabbro; 2a-alkaline gabbro; 2b-subalkaline gabbro; 3-gabbro diorite; 4-diorite; 5-granodiorite; 6-granite; 7-quartzolite; 8-monzogabbro; 9-monzobiorite; 10-monzonite; 11-quartz monzonite; 12-syenite; 13-foid gabbro; 14-foid monzodiorite; 15-foid monzosyenite; 16-foid syenite; 17-foidolite; 18-tawite/urtite/italite

usually divided into two types of high K and low K type. This study shows that in Dachang area most of the rocks belong to high potassium calc alkaline series.

On the basis of total alkali silica (TAS) classification (Na_2O+K_2O-SiO_2), the main types of rock is granite, followed by granodiorite and tonalite (see Fig. 1).

3 Discussions

Some studies show that most of the high K calc alkaline I type granite rock is granodiorite and tonalite, whose high Na_2O/K_2O ratio indicates it derived from the partial melting of metamorphic volcano rock, differing from the sedimentary environment of S type granite. Liang et al (2011) pointed out that Longxianggai composite rock mass experienced three stages, with clear boundaries between the rocks but without obvious condensation side, and magmatic activity was a continuous pulse process and possibly related to lithospheric extension. Cai et al (2004) believed that in the Dachang ore field the different periods of granite formed in structural transformation stage from post orogeny to intraplate environment, and the dominant tectonic setting is stable regional tension.

High K calc alkaline magmas can be generated from the two main tectonic conditions. The first is the eruption in continental arc area--Andean, for example. Geochemical and isotopic characteristics of calc alkaline granitic magma that formed in this kind of environment show they enrich in the process of the hydrothermal reaction. The further enrichment of incompatible elements can be regarded as related to the thickening continental crust. The second is the post collision environment, similar to the Caledonia, source rock melting with the crust thickening which can lead to the extrusion and metamorphism of lower sedimentary and volcano rock. The extension after thickening will rising the mantle, whose basement will be the mafic magma.

Acknowledgements

This study was supported by National Natural Science Foundation of China (Grant No. 41202051), Hunan Industrial Science and Technology Support Program (Grant No. S2014GK3005), China Postdoctoral Science Foundation (Grant No. 2012M521721) and the Open-End Fund for the Valuable and Precision Instruments of Central South University, China (Grant No. CSUZC2013021).

References

Cai Minghai, Liang Ting, Wu Decheng, and Huang Huimin, 2004. Geochemical characteristics of granites and their tectonic setting of Dachang ore field in Guangxi. Geological Science and Technology Information, 23(2): 57-62 (in Chinese with English abstract).

Fan Senkui, Li Xiudan, Cheng Yongsheng, Chen Chengzhen, and Huang Weihong, 2010. Geochemical features of vein rocks and their significance to structure and mineralization in the Dachang ore district, Guangxi province. Geology and Exploration, 46(5): 828-835 (in Chinese with English abstract).

Liang Ting, Wang Denghong, Hou Kejun, Li Huaqin, Huang Huiming, Cai Minghai, and Wang Dongming, 2011. LA-MC-ICP-MS zircon U-Pb dating of Longxianggai pluton in Dachang of Guangxi and its geological significance. Acta Petrologica Sinica, 27(6): 1624-1636 (in Chinese with English abstract).