Geochronology of Crustal Extension during the Cretaceous-Tertiary in South China

RUI-ZHONG HU[1], GUI-QING XIE[1], DA-CHENG JIA[1], WEN-CHAO SU[1], JIAN-TANG PENG[1], XIAN-WU BI[1], MEI-FU ZHOU[2]

[1] Institute of Geochemistry, Chinese Academy of Sciences, Guiyang 550002, China (hurz@ms.gyig.ac.cn)
[2] Department of Earth Sciences, The University of Hong Kong, Hong Kong, China

South China is made up of the Yangtze Block in the northwest and the Cathaysian Block in the southeast. To the north the late Paleozoic and early Mesozoic Qingling-Dabie orogenic belt lies between the Yangtze Block and the North China Block. To the west, the Yangtze Block is bounded by the Tibetan Plateau. In Cretaceous-Tertiary time, South China experienced episodic crustal extension associated with normal faulting, basin formation, and mantle-derived magmatism represented by mafic dykes and flows.

The Cretaceous-Tertiary geodynamic research on South China has recently gained much attention among geoscientists worldwide. Using K-Ar and Ar-Ar methods, more than 100 samples of the mafic dykes collected from Guangxi, Guizhou, Hunan, Guangdong, Jiangxi, Zhejiang and Fujian Provinces of South China were dated in this work. The dykes mainly include diabases and lampryphyres. They possess the Sr-Nd isotopic characteristics and trace element pattern of mantle-derived rocks. The results show that their ages fall into six groups: 135-140 Ma, 115-120 Ma, 105 Ma, 85-95 Ma, 70-75 Ma and 45-55 Ma. This episodic magmatism is coincident with major periods of crustal extension during the Cretaceous-Tertiary in South China. The results also suggest that the Mesozoic tectonic regime transition in South China, from compression to extension, probably happened in 140 Ma ago.

Geochemistry of three metallogenic types related to Mesozoic continental crust re-melting type granitoids in the Nanling Range, South China

RENMIN HUA, PEIRONG CHEN AND WENLAN ZHANG

State Key Laboratory on Mineral Deposit Research, Nanjing University, China (huarenmin@nju.edu.cn)

Large-scale mineralizations of nonferrous, precious and rare metals took place in Mesozoic Era in the Nanling Range, South China, which were mostly closely related with granitoids of continental crust re-melting origins. Based on the geochemical features of mineral deposits and related granitoids, three metallogenic types are put forward in the present paper,

The first type is related with late-staged small peraluminous intrusions evolved from composite granitic pluton by crystallization fractionation, which resemble typical S-type granites. These small intrusions are commonly called “W-Sn granites” since the relevant mineralizations are mainly W and Sn, together with Bi, Mo, (Nb, Ta). Many large W and Sn deposits can be attributed to this type. It is also the predominant type of the metallogenic system related to granitoids of continental crust re-melting origin in South China.

The second type is related with more high-evolved granite, and hence rich in water, volatile components (e.g. F, B, P) and light alkaline metals (Li, Na), forming so-called “Li-F granite” or “F-rich granite”. It also refers as “rare metal granite” because it is more closely related with mineralizations of rare metals such as Ta, Nb, Li, Rb, Be, Cs than W or Sn. Generally, the granitic rocks of this type is sodium rich whereas the first type potassium rich.

The third type is the granitic volcanic-intrusive complex and relevant metallogeny. The granitic rocks of this type are probably from deeper-sourced and shallower-emplaced magmas and occur as “sub-volcanic phase”. Sometimes the intrusive granitoids are closely accompanied with their volcanic counterparts to form granitic volcanic-intrusive complex. This type is mainly related with some porphyry tin deposits as well as some uranium mineralizations. Some researchers put this group into I-type granitoids, whereas most authors hold that they are of continental crust re-melting origin since they contain Al-rich minerals such as andalusite and/or garnet, and have higher initial ratio of Sr isotope. However, geochemical studies showed that some deeper-sourced fluid did contribute to the mineralization of this type.

Geochemical characteristics of above three metallogenic types are briefly discussed as exemplified by Piaotang W deposit, Dajishan Ta-Nb-W deposit and Yanbei Sn deposit, respectively.