Slab melting and its implications for copper ore mineralization and future exploration

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Adakite was initially named for rocks with clear contributions from partial melting of subducted young oceanic crust. It then soon became a hot topic among geoscientists because of its similarity to Archaean slab melting, which was a major process responsible for the formation of the continental crust, and its close association with large porphyry/epithermal copper deposits. Mesozoic adakites widely distributed in Lower Yangtze River belt, eastern China, were either attributed to partial melting of the lower continental crust [1-2], or slab melting during a ridge subduction [3]. Geochemical modelling shows that melting of subducting oceanic slab would require high pressure at depths of over 50 kilometers. Partial melting of the lower continental crust on the other hand, would require the presence of plagioclase and additional water. These two types of adakites can be discriminated using geochemical index, such as La/Yb and Th/U ratios. Adakite from the Lower Yangtze River belt has geochemical characteristics dramatically different from those from the Dabie Mountains nearby. In addition, nearly all adakites in the Lower Yangtze River belt is closely associated with Cu mineralization, whereas there is no Cu deposits reported in the Dabie Mountains, so far. This can be plausibly interpreted the ridge subduction model: oceanic crust has Cu concentrations >2 times higher than the lower continental crust and the mantle wedge [4-6], 'primitive' adakites resulted from slab melting should contain significantly higher Cu than those from the continental crust and normal arc andesites.

[1] Wang, Q. *et al.* (2007) *GCA* **71**, 2609–2636. [2] Wang, Q. *et al.* (2006) *Lithos* **89**, 424–446. [3] Ling, M. X. *et al.* (2009) *Economic Geol.* **104**, 303–321. [4] Sun, W. D. *et al.* (2008) *GCA* **72**, 3542–3549. [5] Sun, S. S. & McDonough, W. F. (1989) in *Magmatism in the ocean basins.* Vol. **42** *Geological Society Special Publications* (eds A.D. Saunders & M.J. Norry) 313–345 [6] Rudnick, R.L. & Gao, S. (2003) in *Treatise on Geochemistry* Vol. **3**, 1–64.

LA-ICPMS U–Pb zircon geochoronology and Lu–Hf isotope compositions of the Taihua Complex on the southern margin of the North China Craton

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Widely distributed on the southern margin of the North China Craton (NCC), the Taihua Complex extends roughly in an east-west direction and the relatively complete successions are found in Lushan county, Henan province. Like many other Archean terranes, the Taihua Complex can be divided into two major lithological units along the Dangze river, namely gneisses series and supracrustal rocks, respectively. The former is located on the north side of the river and chiefly composed of TTG gneisses and amphibolites; the latter on the south side of the river is mainly supracrustal rock. Coupled with the previous studies, the results obtained by this study show that the Taihua complex was formed in a large time span from Palaeoproterozoic to Neoarchean (Mesoarchean). The TTG gneisses and amphibolites have been dated as Neoarchean (Mesoarchean) age. In NCC, the 2.8-2.7Ga old rocks are developed in several areas including the western Shandong Province, Jiaodong peninsula and Lushan area of Henan province. In addition, 2.8-2.7Ga detrital zircons or xenocryst zircons have been recognized in Huai'an, Fuping, Wutai areas of NCC. All these indicate that the 2.8-2.7Ga rocks may have been well developed much broader than today's outcrops. Zircon Hf and whole rock Nd isotopes show that the 2.8~2.7 Ga tectonothermal event represents an important crustal growth period with minor ancient crust reworked in the NCC. But the formation of supracrustal rocks can be limited to 2.2-2.0Ga, in the Palaeoproterozoic time and not the Archaean, as previously believed. Using the chronological data of aluminium-rich metamorphic rocks (Khondalites series) on the southern margin of the NCC and adjacent areas, it can be suggested that the above areas have been widely developed on the passive continental margin in the Early Proterozoic.