Evolution of Archean continental crust in nucleus of the Yangtze block, south China block

XIAO-FEI QIU[1], WEN-LI LING[2], XIAO-MING LIU[3], SHAN-SONG LU[1] AND HONG-MEI YANG[1]

[1]Isotope Geochemistry Laboratory, Wuhan Center of Geological Survey, Wuhan 430205, P R China (qxf424@qq.com)

[2]Faculty of Earth Sciences, China University of Geosciences, Wuhan 430074, P R China (wlling@cug.edu.cn)

[3]State Key Laboratory of Continental Dynamics, Department of Geology, Northwest University, Xi'an 710069, P R China

It is suggested that the occurrence of TTG gneisses represents a crust transition which from dominantly mafic to significant felsic along geological time, thus a clear understanding of the source and origin of the TTG is important for looking insight into the origin and early evolution of continental crust. Archean TTG rocks are scattered at the Kongling High-grade Metamorphic Terrain in northern South China block. A geochronological and geochemical study is carried out on the Taoyuan granitic gneiss from northwestern part of the KHMT. A U-Pb zircon age of 2994±22 Ma is obtained by this study using LA-ICP-MS method. The Taoyuan gneiss suite is trondhjemitic in composition, and has high SiO_2, Na_2O contents with Na_2O/K_2O ratios greater than unity, and low Ni, Cr, Yb and Y contents. It shows large variable La/Yb and Sr/Y ratios and pronounced depletion in Nb, Ta and Ti on the spiderdiagram. The gneiss suite also displays two-stage Nd model ages close to its crystalline timing with corresponding $\varepsilon_{Nd}(t)$ values of -2.5 to +3.5. It is thus suggested that the Taoyuan gneiss, in fact, is part of the Archean Kongling basement rocks.

Geochemical evidence implies that the TTG rocks may be derived from partial melting of subducted oceanic crust from a garnetiferous amphibolite source with residual assemblage of garnet + amphibole + plagioclase + quartz ± pyroxenes. Our study further indicates that nucleus of the Yangtze block might experience a continental crustal growth during Mesoarchean. We also suggest that the Yangtze block may have its own crustal evolutionary history before Paleoproterozoic.

This study was supported by National Nature Science Foundation of China (No. 41303026)