Age and growth of the Archean Kongling terrain, South China, with emphasis on 3.3 Ga granitoid gneisses

JIE YANG[1,2,3], S. GAO[2,3]*, Z. HU[2], H. YUAN[3], H. GONG[3], M. LI[1,2], G. XIAO[1,2], J. WEI[3]

[1]Graduate School, China University of Geosciences, Wuhan 430074, China (yangjie@263.net)

[2]State Key Laboratory of Geological Processes and Mineral Resources, China University of Geosciences, Wuhan 430074, China (*correspondence: sgao@263.net)

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

Zircon U-Pb ages and Hf isotopic compositions of granodioritic-trondhjemitic gneisses and metasedimentary rocks from the Kongling terrain were analyzed by LA-ICP-MS and LA-MC-ICP-MS. Magmatic zircons from two granodioritic and trondhjemtic gneisses from the northern Kongling terrain yield a major age group in the range of 3.1-3.3Ga. Five oldest igneous zircons from this group give a weighted average $^{206}Pb/^{207}Pb$ age of 3300.8±8.4 (2σ, MSWD=0.15), which is interpreted to represent the age of magmatism. Thus, they represent the oldest known rocks in South China. Igneous zircons in one trondhjemitic gneiss from the southern Kongling terrain yield a weighted average 206Pb/207Pb age of 2981±13Ma (2σ, MSWD=9.7, n=21). The results reinforce that magmatism of the whole Kongling terrain mainly occurred at 2.9Ga. Two quartzites and one metapelite from the southern Kongling terrain give concordant major age groups of 2670±4 Ma, 2684±26Ma and 2911±19Ma.

Two-stage Hf model ages suggest that the majority of the Kongling crust formed between 3.2 and 3.8Ga. Significant magmatism at 3.3 and 2.9Ga may represent mantle additions into the pre-existing older crust.

The metasedimentary rocks show coupled negative Eu and Sr anomalies. The negative Eu anomalies (Eu/Eu*=0.53-0.75) are similar to post-Archean shales. We suggest that in addition to the K-rich granitic and rhyolitic materials, preferential decomposition of plagioclase can also lead to negative Eu anomalies in Archean sedimentary rocks. Therefore, Eu anomaly as indicator of crustal evolution should be used with caution.

Palaeoclimate variation during Pleistocene and Holocene in the Northern Jiangsu Plain, East China: Geochemical and isotopic proxies from the Baoying borehole

JING-HONG YANG[1,2] AND Y. WANG[2]

[1]State Key Laboratory for Mineral Deposits Research, Department of Earth Sciences, Nanjing University, Nanjing 210093, China (yangjh@nju.edu.cn)

[2]The Key Laboratory of Coastal and Island Development, Ministry of Educations, Nanjing University, Nanjing 210093, China

The Baoying borehole was drilled in the Wangzhigang Town of Baoying County (33º14'21"N, 119º22'41''E) in the Northern Jiangsu Basin with recovery of 96.81m of clay and silty sediment samples. Sedimentary facies of the core show a series of environmental changes from coastal bay of a shallow sea upward to a wide alluvial plain during Pleistocene and Holocene time. A comprehensive study of the geomophology, structure, sedimentary facies, minerals, chemical and isotopic analyses, paleomagnetic and paleo-microfossil analyses have indicated a fluvial-marine interaction during the evolution of the plain since 2.58 Ma.

In this study, a number of geochemical proxies have been developed in an effort to extract climatically sensitive data from the sediments in the land-sea interaction zone. The depth profiles of CIA (chemical index of alteration), Fe/Mn, Rb/Sr, TOC/TN, $\delta^{13}C_{TOC}$ and $\delta^{15}N$ in the sediments exhibit climate-controlling patterns which correspond significantly with proxy-climate records of ODP1143 $\delta^{18}O$ curves and Luochuan loess magnetic susceptibility (MS) curves. This is indicative that the sediments of the Baoying borehole have preserved basically the palaeoclimatic records through elemental and isotopic parameters with the same MIS recorded in the benthonic $\delta^{18}O$ records. The combination of above geochemical and isotopic proxies for the Baoying sediments can be used as proxy-climate references for variations in the coastal area. In conclusion, it is clear from multiple lines of evidence that the evolutionary history of the inner part of the Northern Jiangsu Plain is characterized by fluvial-marine interactive events during Pleistocene and Holocene.