The age and reworking of Cathaysia crustal basement

XISHENG XU[1,2], S. Y. O'REILLY[2], W. L. GRIFFIN[2], XIAOLEI WANG[1,2], N. J. PEARSON[2], ZHENYU HE[1]

[1]State Key Laboratory for Mineral Deposits Research, Department of Earth Sciences, Nanjing University, Nanjing 210093, China

[2]GEMOC ARC National Key Centre, Macquarie University, NSW 2109, Australia

U-Pb dating and Hf isotope analysis of detrital zircons have been used to analyse the crustal evolution of the eastern and western parts of the Cathaysia Block in SE China. Zircons from the Oujiang River in eastern Cathaysia indicate that the basement is dominantly Paleoproterozoic (1850-1870 Ma, 2100-2400 Ma) in age with minor Archean components; it was extensively reworked in Jurassic-Cretaceous time (100-155 Ma) to produce the widespread Yanshanian magmatic suite. Both the 1850-1870 Ma event and the Yanshanian magmatism show wide ranges in Hf-isotope composition, consistent with mixing between crustal and juvenile magmas. Marked downstream changes in the relative proportions of zircon age populations emphasize the care required in using detrital zircon data to estimate continental growth rates. Zircons from the North River indicate that the crust of western Cathaysia was generated mainly during Neoproterozoic time, although it contains some Archean (2500-3500 Ma) to Mesoproterozoic components. This crust was strongly reworked during Caledonian (ca 450 Ma), Indosinian (ca 240 Ma) and Early Yanshanian (ca 160 Ma) thermal events; there is little evidence for juvenile crustal growth in any of these events. The distinct patterns of crustal evolution suggest that eastern and western Cathaysia may represent separate microcontinents, accreted to the older Yangtze craton, and transposed by extensive strike-slip faulting along major sutures.

Geochemistry of dissolved rare earth elements in the Xijiang River, China

ZHIFANG XU[1], GUILIN HAN[3] AND YANG TANG[2, 3]

[1]The Institute of Geology and Geophysics, Chinese Academy of Sciences, P.O.Box 9825, Beijing 100029, China (zfxu@mail.iggcas.ac.cn)

[2]The State Key Laboratory of Environmental Geochemistry, Institute of Geochemistry,Chinese Academy of Sciences, Guiyang 550002, China.

[3]Graduate School of Chinese Academy of Sciences, Beijing 100039, China.

Flowing in the south of China, the Xijiang River is the largest tropical and subtropical rivers in Asia. It originates in the Maxiong Mountain on the Yunnan-Guizhou Plateau, drains a large area of typical karst landform especially in its upper-middle reaches in Yunnan, Guizhou and Guangxi Provinces, where is the center of the Southeast Asian Karst Region. This work focuses on the geochemical characteristics of dissolved rare earth elements (REEs) in the rivers draining the karst regions.

Concentrations of dissolved REEs of the mainstream and its tributaries were measured by using a method involving solvent extraction and back-extraction and subsequent measurements on ICP-MS. The rivers have very low dissolved REEs concentrations, range from 24 to 689 ppt, with a mean value of 125 ppt. The pH value, major cation and DOC (dissolved organic carbon) concentrations of the river waters are the most important factor controlling the concentrations of dissolved REEs in the river water. Negative corrections are observed between dissolved REEs concentrations and pH and major cation concentrations, and a positive correction is also observed between dissolved REE concentrations and DOC concentrations.

Most of river samples have heavy REE enriched patterns relative to PAAS (Post Archean Australian Shales), with $(La/Yb)_N$=0.26–0.94, mean value=0.68. The obvious negative correction are observed between $(La/Yb)_N$ ratios and pH value, HCO_3^- and DOC concentrations. Usually, fractionation of REEs occurs during weathering and transport processes. LREE (light rare earth element) were preferentially absorbed the particle, and HREE (heavy rare earth element) preferentially dissolved to solution from rock during weathering process. Moreover, The HREE forms stronger complexes than the LREE with inorganic ions, such as CO_3^{2-} and OH^-. So the enrichments in heavy REE for the Xijiang river waters, which drains a large area of karst landform, are most easily explained by the formation of carbonate and hydroxide complexation in solution. Most of river samples show negative Ce anomalies, and the most pronounced negative Ce anomalies occur in rivers of high pH. So the negative Ce anomaly is strongly pH-dependent in alkaline rivers.

Acknowledgements

This work was funded by the National Natural Science Foundation of China(Grant no: 40503017, 40673010).