Chemical composition of Changjiang river sediments: Climate or lithology control?

B. CHETELAT[1], C-Q. LIU[1], Q. WANG[1] AND G. ZHANG[1]

[1]SKLEG, Institute of Geochemistry, CAS, 46 Guanshui Road, 550002 Guiyang, PR of China

We present major and trace elements data in particulate suspended matter (SPM) collected in the Changjiang main channel and its main tributaries. Suspended sediments are derived from a mafic source related to the Emeishan Large Igneous Province (ELIP) in the Upper Reach and from a more felsic source in the Middle/Lower Reaches. The difference in chemical composition between the two sources has a strong influence on the apparent weathering intensity. Although the apparent loss of soluble elements follows a climatic gradient from the Upper Reach to the Lower Reach, the co-variation of weathering indices with different proxies for igneous differentiation suggests that a lithologic control can not be ruled out. By taking into account the variability in chemical composition of the parent rocks, we show that river suspended sediments from the upper reach may have not experienced less intense chemical weathering than those transported by rivers from the Lower/Middle Reaches characterized by higher runoff and surface temperature. We argue that the relationships observed for different indices of weathering with climate might be an artifact and are partly driven by the change in chemical composition of the sediments parent-rocks.

U-Pb LA-ICPMS dating of common Pb-bearing accessory minerals using VizualAge / Iolite

D.M. CHEW[1]*, J.A. PETRUS[2] AND B.S. KAMBER[1]

[1]Dept. of Geology, Trinity College Dublin, Dublin 2, Ireland (*correspondence: chewd@tcd.ie, kamberbs@tcd.ie)

[2]Department of Earth Sciences, Laurentian University, Sudbury, Canada (japetrus@gmail.com)

Precise and accurate U–Pb LA-ICPMS dating of many U-bearing accessory minerals (e.g. apatite, titantite and rutile) is often compromised by common Pb. We present here a general approach to common Pb correction in U–Pb LA-ICP-MS dating using a modifed version of the VizualAge [1] U-Pb data reduction package for Iolite [2].

The approach was tested on apatite and titantite age standards (for which there are independent constraints on the U-Pb crystallization age) using a Thermo Scientific iCAP-Qc (Q-ICP-MS) coupled to a Photon Machines Analyte Excite 193 nm ArF Excimer laser. A 50 μm spot was used in all experiments. The Durango (31.44 ± 0.18 Ma) and McClure Mountain (523.51 ± 1.47 Ma) apatite standards yielded U-Pb TW concordia intercept ages of 31.97 ± 0.59 Ma (MSWD = 1.09) and 524.5 ± 3.7 Ma (MSWD = 0.72) respectively. The Fish Canyon Tuff (28.201 ± 0.046 Ma) and Khan (522.2 ± 2.2 Ma) titanite standards yielded U-Pb TW concordia intercept ages of 28.78 ± 0.41 Ma (MSWD = 1.4) and 520.9 ± 3.9 Ma (MSWD = 4.2) respectively, demonstrating the suitability of the common Pb correction approach.

The modified version of VizualAge / Iolite first applies a common Pb correction (using either the ^{204}Pb or ^{207}Pb methods) to the user-selected *age standard* integrations and fits session-wide “model” U–Th–Pb fractionation curves to the time-resolved U-Pb standard data. VizualAge / Iolite then applies this downhole fractionation model to the unknowns and sample-standard bracketing (using a user-specified interpolation method) is used to calculate final isotopic ratios and ages. In addition to live concordia diagrams which allow for visualising of data while adjusting integration intervals [1], the modified version of VizualAge incorporates a ^{207}Pb-corrected age channel calculated for a user-specified initial ^{207}Pb/^{206}Pb ratio. All other conventional common Pb correction methods (e.g. the ^{204}Pb method or intercept ages calculated from linear arrays on a concordia or isochron) can be performed offline.

[1] Petrus & Kamber (2012), Geostandards and Geoanalytical Research, 36, 247-270. [2] Paton *et al*. (2011), Journal of Analytical Atomic Spectrometry, 26, 2508-2518.

DOI: 10.1180/minmag.2013.077.5.3