Geophysical Research Abstracts, Vol. 7, 00037, 2005
SRef-ID: 1607-7962/gra/EGU05-A-00037

A reconnaissance study for Fe isotope compositions of 3.8 billion-years-old metasedimentary rocks from Isua, Greenland

K. E. Yamaguchi (1, 2) and T. Komiya (3)

(1) Institute for Research on Earth Evolution (IFREE), Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Japan, (2) NASA Astrobiology Institute, (3) Department of Earth and Planetary Sciences, Tokyo Institute of Technology, Japan (kosei@jamstec.go.jp / Fax: +81-46-867-9775 / Phone: +81-46-867-9743)

We have measured Fe isotope compositions of ∼3.8 Ga old metacarbonate, schist, and banded iron-formations (BIFs) from Isua, Greenland. The δ^{56}Fe values, expressed relative to average igneous rocks, of metacarbonate are –0.34 and –0.44 ‰ (n = 2). It is likely that the original δ^{56}Fe values of carbonate rocks at the time of sedimentation was reset due to carbonate metasomatism, which is known to have affected all supracrustal rocks in Isua (Rose *et al.*, 1996, *Am. J. Sci*. **296**, 1004). Newly formed carbonate and/or dolomite minerals may have incorporated minor amount of Fe^{2+} (as siderite or ankerite) which may be slightly depleted in its $^{56}Fe/^{54}Fe$ ratios (Yamaguchi *et al.*, 2005, *Chem Geol.*, in press). Significant differences in the δ^{56}Fe values exists between black schist (–0.78 ‰, n=4) and light gray schist (+0.06 ‰, n = 5). We suggest that these values reflect not the modified values by carbonate metasomatism or metamorphism but the inherited near-original values at the time of deposition. Such differences may possibly reflect those in the degree of involvement of Fe-reducing bacteria for biogeochemical cycling of Fe in the ancient sediments (e.g., Yamaguchi *et al.*, 2005). The δ^{56}Fe values of BIFs are 0.0 ∼ +0.3 ‰ (n = 6). These values are slightly different from those reported for 3.8 Ga Akilia BIFs by Dauphas *et al.* (2004) [*Science* **306**, 2077]. These generally positive δ^{56}Fe values are in concert with oxidation of ferrous Fe to ferric Fe followed by precipitation to form BIFs; however, oxidation mechanism is currently unconstrained.