

Geochemistry of rare earth element (REE) in weathered crust from the granitic rocks in Sulawesi Island, Indonesia

ADI MAULANA^{1*}, KOTARO YONEZU², AKIRA IMAI³
AND KOICHIRO WATANABE⁴

¹ Faculty of Engineering, Kyushu University, Fukuoka 819-0395, Japan (*correspondence: adi-m@mine.kyushu-u.ac.jp)

² Faculty of Engineering, Kyushu University, Fukuoka 819-0395, Japan (yone@mine.kyushu-u.ac.jp)

³ Faculty of Science, Akita University, Japan (akira@gipc.akita-u.ac.jp)

⁴ Faculty of Engineering, Kyushu University, Fukuoka 819-0395, Japan (wat@mine.kyushu-u.ac.jp)

We report for the first time the geochemistry of rare earth elements (REE) in weathered crusts of I-type and calc-alkaline to high-K (shoshonitic) granitic rocks at Mamasa and Palu region, Sulawesi Island, Indonesia. The weathered crusts can be divided into horizon A (lateritic profile) and B (weathered horizon) in the Mamasa region with the present of horizon C (weathering front) in the Palu region. Quartz, K-feldspar, kaolinite, halloysite and montmorillonite with Ca-amphibole prevail in the weathered crust. The total REE content of the weathered crust are relatively elevated (40 to 75%) compared to the parent rocks, particularly in the lower part of horizon B in Mamasa profile and in horizon C in Palu profile. This suggests that REE-bearing accessory minerals may be resistant against weathering and may remain as residual phase in the weathered crusts. The mass transfer illustration using isocon diagram shows a different transfer trend from Mamasa and Palu weathering profile. The positive Ce anomaly in the horizon A of Mamasa profile indicated that Ce is rapidly precipitated during weathering and retain at the upper soil horizon, suggesting the occurrence of redox-controlled process which leading to the CeO₂ precipitation.

Bioavailability of metals associated with aquatic natural organic matter

PATRICIA A. MAURICE^{1*}, KESHIA KUHN¹,
LISA NEUBAUER², THILO HOFMANN²
AND FRANK VON DER KAMMER²

¹Civil & Environmental Engineering & Earth Sciences, Univ. of Notre Dame, Notre Dame, IN 46556 USA

*corresponding: pmaurice@nd.edu

²Dept. of Environmental Geosciences, Univ. of Vienna, Vienna, Austria

This research focused on the bioavailability of trace metals associated with natural organic matter (NOM) to aerobic bacteria, using abiotic experiments with the siderophore desferrioxamine B (DFOB) and live-culture experiments with aerobic *Pseudomonas mendocina*. Trace metal contents and distributions in reverse osmosis, XAD-8 and XAD-4 isolates from the Suwannee River (SR), were measured prior to and following reaction with DFOB using field flow fractionation (FFF) with in-line UV/vis, fluorescence, and ICP detection. Results showed that Fe is preferentially associated with intermediate to high molecular weight (MW) components at both the native pH of the SR (3.4) and pH 7, Al is fairly uniformly distributed, and Cu is preferentially associated with lower MW components. Reaction of SR XAD-8, XAD-4 and RO samples with excess of the microbial siderophore DFOB removes ~75% of Fe within 1 hour. Al and Cu are also decreased, but not as efficiently. Upon reaction with DFOB, loss of some higher MW components and addition of more low to intermediate MW components suggests that Fe, and perhaps also Al, likely bridges organic components. Live-culture experiments showed that while siderophores are useful for Fe acquisition from NOM by *P. mendocina*, they are not required. Overall, our research shows that metals bound to NOM are likely highly bioavailable, and further emphasize that trace metals need to be considered in any study of aquatic NOM.