

RARE EARTH ELEMENT CYCLING IN THE PORE WATERS OF THE BERING SEA SLOPE (IODP EXP. 323)

Tseren-Ochir Soyol-Erdene^{1,2} and Youngsook Huh^{1,3,}*

¹ *School of Earth and Environmental Sciences, Seoul National University, Seoul 151-747, Korea*

² *Korea Polar Research Institute, Songdo Techno Park, 7-50, Songdo-dong, Yeonsu-gu, Incheon 406-840, Korea*

³ *Research Institute of Oceanography, Seoul National University, Seoul 151-747, Korea*

ABSTRACTS

We studied the diagenetic behavior of rare earth elements in a highly productive passive margin setting of the Bering Sea Slope. Pore water concentrations of fourteen REEs were determined to a depth of ~140 meters below seafloor (mbsf). Site U1345 was drilled during the Integrated Ocean Drilling program (IODP) Expedition 323 at a water depth of 1008 m presently in the center of an oxygen minimum zone. The concentrations of REEs were enriched in the pore water relative to deep seawater indicating that there is significant liberation from sediment during diagenesis. There was a peak at ~ 10 mbsf, which was more pronounced for the HREE, whose depth coincided with those of dissolved iron and manganese and below the sulfate-methane transition zone (~6.3 mbsf). In the upper 1 mbsf, there is a minor peak in HREE. Below ~40 mbsf, the concentration profiles were relatively constant. The positive Ce anomaly was

relatively constant (average shale-normalized $Ce/Ce^*=1.1\pm 0.2$) throughout the depth profile indicating that Ce depletion in seawater is completely regenerated and maintained. HREE-enrichment is observed for the entire 140 mbsf except for the upper ~1 mbsf where there is MREE-bulge. REE release in the shallow depths (upper ~1 m) is attributed to preferential release of LREEs and MREEs during organoclastic reduction of Fe, Mn hydroxides in anoxic sediments. The high HREE concentrations observed at ~10 mbsf seems to be produced by reduction of Fe and Mn minerals this time tied to anaerobic oxidation of methane. $REECO_3^+$ is the most dominant inorganic species throughout the entire depth. However, near the sediment-water interface, REE^{3+} was also significant. Upward diffusion fluxes across the sediment-water interface were between $0.1 \text{ pmol m}^{-2} \text{ y}^{-1}$ (for Tm) and $11 \text{ nmol m}^{-2} \text{ y}^{-1}$ (for Ce).