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Changes in concentrations of ions in pore waters of LV47 and LV50 subsurface sediment cores from offshore Sakhalin

Hirotsugu Minami[1*], Akihiro Hachikubo[1], Satoshi Yamashita[1], Kazuya Tatsumi[1], Tomohiro Moriwaki[1], Hirotoshi Sakagami[1], Nobuo Takahashi[1], Hitoshi Shoji[1], Young, K. Jin[2], Anatoly Obzhirov[3]

[1]Kitami Institute of Technology, [2]Korea Polar Research Institute, [3]V.I. Il'ichev Pac. Ocean. Inst. FEB RAS

The Sakhalin Slope Gas Hydrate Project is an international collaboration effort among scientists from Japan, Korea and Russia to investigate on natural gas hydrates accumulated on a continental slope offshore Sakhalin Island. From July to August of 2009 and June of 2010, field operations of SSGH-09 and SSGH-10 projects were conducted as the 47th and 50th cruises of R/V Akademic M.A. Lavrentyev. Gas hydrate-bearing and -free sediment cores were retrieved using steel gravity- and hydro- corers. The sediment pore water was obtained onboard by using a squeezer designed and constructed at Kitami Institute of Technology. The ionic compositions (chloride, sulfate, hydrogen carbonate, calcium etc.) in sediment pore- and seawater samples were compared to figure out the geochemical characteristics of the cores.

The concentration-depth profiles of sulfate in pore water samples have inverse correlations with those of methane in the pore water. The anaerobic bacterial oxidation of methane is responsible for the phenomena. The depths of sulfate-methane interface (SMI) are 0.4-0.8 mbsf for the gas hydrate-bearing LV47-24HC, LV50-29HC, LV50-31HC and LV50-33HC cores and 0.5-4.0 mbsf for the other gas hydrate-free (by visual observation) cores. The SMI is not observed for the reference LV47-33HC core.

Twenty cores showed the linear depth-profiles of the concentrations of sulfate in the pore waters until SMI whereas ten cores showed the concave up profiles for LV47 and LV50 cores. The possible increase of the methane flux might be thought to form the concave up profiles. The further investigations/discussions will be presented.

Keywords: gas hydrate, pore water, chemical analysis, ions, Sea of Okhotsk