Chemical analyses of pore- / hydrate- water samples from gas hydrate-bearing sediment cores retrieved from Lake Baikal: 2005-2006

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The international cooperative field investigations with the aim of natural gas hydrate studies at Malenky mud volcano (southern basin) and Kukuy K-2 mud volcano (central basin) in Lake Baikal, Eastern Siberia, Russia were conducted in 2005 and 2006. The gas hydrate-bearing sediment cores were retrieved from the bottom of the lake floor by using steel gravity corers. The pore water sampling was conducted onboard by using a squeezer designed and constructed at Kitami Institute of Technology (KIT). The gas hydrate water samples were obtained onboard by the dissociation of the hydrates. In order to clarify the origin and the composition of water involving the accumulation of the shallow (sub bottom) gas hydrates, the chemical analyses of the pore water and the hydrate water samples were carried out at KIT.

The concentrations of dissolved species such as chloride, sulfate, hydrogen carbonate, sodium, potassium, calcium, and magnesium and the isotopic compositions (delta ^{18}O and delta D) - depth distributions were observed for the water samples. It was appeared that the concentrations of sodium, potassium, calcium, magnesium, and chloride in the pore water increased with depth. The delta ^{18}O and delta D values of the hydrate water samples were up to +1.5 (delta ^{18}O) and +8.3 (delta D) per mil heavier than those of the lake bottom water (50 cm above the lake floor). These data suggested that the ascending water enriched with these chemical species and light delta ^{18}O and delta D (up to -1.5 and -8.3 per mil than those of the lake water) is thought to be the main gas hydrate-forming fluid.