

## Sampling method and chemical analyses of gas hydrate waters retrieved from Kukuy K-9 mud volcano in Lake Baikal

MINAMI, Hirotsugu<sup>1\*</sup>, HACHIKUBO, Akihiro<sup>1</sup>, Kazuya Tatsumi<sup>1</sup>, Yusuke Soramoto<sup>1</sup>, Yohei Kawagishi<sup>1</sup>, Hirotohi Sakagami<sup>1</sup>, Satoshi Yamashita<sup>1</sup>, Nobuo Takahashi<sup>1</sup>, Hitoshi Shoji<sup>1</sup>, Marc De Batist<sup>2</sup>, Lieven Naudts<sup>3</sup>, Oleg Khlystov<sup>4</sup>, Tatyana Pogodaeva<sup>4</sup>, Tamara Zemskaya<sup>4</sup>, Mikhail Grachev<sup>4</sup>

<sup>1</sup>Kitami Institute of Technology, <sup>2</sup>Renard Centre Mar. Geol., Univ. Ghent, <sup>3</sup>MUMM, RBINS, Belgium, <sup>4</sup>Limnological Institute, SB RAS, Russia

Lake Baikal, Russia, is one of the most attractive gas hydrate study areas, since the first gas hydrate (GH) in a freshwater lake was retrieved from the sub-bottom depths of 121 and 161 m and later from the subsurface of the lake floor. Many studies to determine the origin of the gases incorporated in and/or bound to GHs have been carried out on samples from this lake [see, e.g., Hachikubo et al [Hachikubo, 2010]]. On the other hand, chemical analyses of water samples from lake- and pore- waters have been carried out to clarify the geochemical characteristics of the GH-bearing sediment cores [see, e.g., Pogodaeva et al [Pogodaeva, 2007]]. The chemical analyses of such samples are important to identify the origin of water molecules contributing to the formation of GHs and to distinguish whether seepage structures and/or mud volcanoes observed at the lake floor are related to the discharge of gases with or without gas-saturated water.

In September of 2010, subsurface GHs were retrieved using steel gravity corers at Kukuy K-9 mud volcano in the central basin of Lake Baikal. GH water samples were obtained, on board, by the sequential and continuous dissociation of a piece of agglomerated/massive GH, in a closed vessel with inert gas, after its retrieval from the bottom of the lake floor, to acquire traces of the original gas hydrate-forming fluid in the GHs.

The purposes of this presentation are (i) to describe the sampling method used to obtain GH water samples without the use of lake or pore waters, (ii) to report the scientific results of the chemical (such as Cl-) and isotopic ( $\delta^{18}\text{O}$  and  $\delta^2\text{D}$ ) analyses of samples from lake- and pore- waters, and (iii) to find traces of the original water involved in the accumulation of subsurface GHs at Kukuy K-9 mud volcano in Lake Baikal.

Keywords: gas hydrate water, pore water, chemical analyses, ionic concentration, stable isotope ratio