

サハリン沖海底堆積物中のガスハイドレート埋没コアの同位体ガスならびに微生物組成解析

Isotopic gas and microbial analyses of gas hydrate-bearing core in subsea floor sediments, offshore Sakhalin

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Gas hydrates (GH) are crystalline water-based solids including hydrocarbons under high pressure and low temperature. Methane as the major gases of GH are considered to generate from organic matters buried under the benthic sediments by theological clacking reactions and / or by methanogenesis. Isotope compositions of methane are considered to record the gas-generating manner, because microbes selectively metabolize ¹²C, in the field of geochemistry. In addition, microbial compositions of the GH sediments have been often studied all over the world. However, combination study by both isotopic gas and microbial diversities analyses is insufficient to understand the gas-generating behavior. In this study, using microbial and isotopic analyses, we examined a unique GH-burying core; obtained in the western Sakhalin slope off Sakhalin Island during Japan-Russia-Korea joint projects (SSGH projects).

The GH-gas confirmed as thermogenic gas on the basis of Barnard plots, and including higher H₂S and ethane than the other cores using principal component analysis of gas compositions. According to DNA-based microbial composition analysis, the Archaea abundance reduced along with the sediment depth. Under 20 cmbsf, MBG-B, MBG-D and Woesearchaeota (DHVEG-6) were dominated in Archaea. No methanogen was detected. Heterotrophic Chloroflexi and Candidate Atribacteria were major bacteria at a depth of 100 to 260 cm. It had been reported that Atribacteria decompose organic matters and generate ethanol and acids, by single cell genomics and metagenomics strategies. Since the low-molecules can be metabolized by methanogens, the Atribacteria-dominated bacteria composition may exhibit the possibility of methanogens, but methanogen was not detected. Low resolution of cloning-based DNA analysis might interrupt to detect methanogen. We, therefore, attempt to perform amplicon sequencing by Illumina the next generation sequencer.