Estimation of shallow gas hydrate formation age by methanol analysis in the gas hydrates

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Natural gas hydrate, an inclusion compound of natural gas in water cages, is found in deep-sea sediments and permafrost region. In eastern margin of Japan Sea, shallow gas hydrates have been found and recovered by piston coring (Matsumoto et al., 2011; Lu et al., 2011). We have an interest on formation age of the shallow gas hydrates. In our previous study, methanol and formaldehyde might be formed by natural radiation and accumulated in the gas hydrates. It indicates that the concentration of these volatile organic compounds is related to the formation age. Previous measurements of methanol in shallow gas hydrates recovered by piston coring showed that it was difficult to discuss the formation age because the gas hydrate samples were recovered from a few meter below the sea floor and the expected amount of methanol formation by natural radiation was too small. In this study, gas hydrate recovered from much deeper region was sampled in 2015 expedition. Methanol in the hydrate together with pore water samples were analyzed by gas chromatography mass spectrometer (GC/MS). The small amount of methanol was detected even in the deeper gas hydrate samples (from ~100 meter below sea floor). The interpretation will be discussed, considering the sedimentation rate. This study was conducted as a part of the shallow methane hydrate exploration project of METI.

Keywords: shallow gas hydrates, formation age, methanol, gas chromatography, natural radiation

