

Diversity of methanogenic and methanotrophic archaea beneath bacteria mats in shallow gas hydrate bearing deep subsurface sediments

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Methane hydrate is ice like lattice composing huge amount of methane. Methane hydrate in Japan sea are known as shallow gas (methane) hydrate. From the isotopic fractionation effect, it is possible to define methane as biogenically (microbially) produced or thermogenically produced. The methanogenic archaea are said to be responsible for the methane production in the deep subsurface sediments. But it is still unclear how strong they are contributing to the production. On the other hands, it is also known that those hydrate bearing areas has specific structures on the subsurface sediments, such as bacteria mats. The formation of bacteria mats in the methane rich area has relationship with methanotrophic archaea (ANMEs), and also reported that these mats has specific community structure of ANMEs.

In order to know the relationship between methane hydrate or specific structures of seafloor and methanogenic or methanotrophic archaea, we need to isolate or to analyze community structure of these archaea. In this study, we used samples from environment assessment cruise. We sampled the sediments by MBARI push corers, where we observed specific structures. We also collected the reference sediments, where no specific structures were observed, for the comparison. The cultivation and community analysis were carried out using the samples previously described. We successfully isolated methanogenic archaea from the sediment. The results of community analysis showed that the sediment beneath bacteria mat has diverse community from the reference sediment.

This study was conducted as a part of the shallow methane hydrate exploration project of METI.