Oral | Symbol M (Multidisciplinary and Interdisciplinary) | M-IS Intersection

[M-IS22_29PM2]Gas hydrates in environmental-resource sciences

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Tue. Apr 29, 2014 4:15 PM - 5:30 PM 213 (2F)
An increasing number of researches focusing on natural gas hydrates have recently been conducted from the environmental and resource scientific viewpoints. This session aims to share and discuss the latest research results to examine the nature and potential of gas hydrate in the past-present-future both in the environmental and resource fields. Because the researches on gas hydrates are interdisciplinary, broad topics will be presented in this session.

5:15 PM - 5:30 PM

[MIS22-P08_PG]Isotopic and microbial compositions of carbonate nodules from sea bottom sediments in the Japan Sea

3-min talk in an oral session
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Keywords:gas hydrate, carbonate nodule, stable isotope, microbes

Carbonate precipitates on sea bottom sediments and shallow core in methane seep areas are often associated with methanogens. Anoxic methane oxidization is a particularly important metabolism for carbonate precipitation in terms of raising local alkalinity and supersaturation. We recovered carbonate nodules from sea bottom sediments from Umitaka Spur, Joetsu Knoll and Akita offshore during an expedition fro gas hydrate in the Japan Sea in August-October 2013. We investigate microbial metabolisms for carbonate precipitation based on textural observation, isotopic measurement, and gene analysis.Many specimens appear grapestone textures consisting of aggregated small nodules, which indicate multiple generation of carbonate precipitation. Aragonite needles are commonly observed on outer margin and in pore spaces in the grapestone. Core part of the nodules are often black color due to concentration of organic substance. Isotopic compositions were measured for sub-samples that were micro-drilled from the section of the nodules. Some of the Umitaka specimens exhibit large variation in carbon isotope, which generally decrease from core to margin. Methanogenesis is only accountable microbial processes for the highest values up to +12 permil. This metabolism can separate organic carbon into 13C-depleted methane and 13C-enriched carbon dioxide species. On the other hand, nodules from Joetsu and Akita are relatively homogenous and very low (-45 to -60 permil) in carbon isotope. This indicate that carbonate carbon in the nodules was largely originated from methane. Gene analysis for an Umitaka specimen extracts many sulfate resucers, but no methanogens. This specimen was calcified by sulfate reduction of organic matter.We would like to thank onboard scientists and crews for their kind support during the expedition. We appreciate British Geological Survey for drilling.