

MIS027-P07

Room:Convention Hall

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Biomarkers analyses of methane hydrate bearing sediments from the eastern Nankai Trough by two dimensional GC

Miki Amo^{1*}, Ryuko Izawa¹, Emiko Shinbo¹, Keiko Hatano¹, Tadaaki Shimada¹

¹JOGMEC

In order to clarify the microbial activities related to methane generation in the eastern Nankai Trough, we performed analyses of biomarkers in the sediment samples obtained from the METI Exploratory Test Wells Tokai-oki to Kumano-nada by using the comprehensive two-dimensional gas chromatography (GC x GC). Previous geochemical studies have shown that the biogenic methane forms methane hydrate (MH) in the eastern Nankai Trough. Methanogenic archaea produces methane which forms a vast quantity of gas hydrate in continental margin accretionary sediments. In this study, we attempted to identify and quantify the biomarker in the sediment cores by GC x GC equipped with qMS and FID.

The sediment samples were collected from Tokai-oki, Daini-Atsumi knoll and Kumano-nada with METI exploratory test wells Tokai-oki to Kumano-nada in 2004. The lipids were extracted by methanol/dichloromethane, and then extract was saponified with 0.5 mol KOH/methanol. The neutral fraction was converted to trimethylsilyl esters (TMS) by BSTFA. The TMS-derivatives were analyzed using a ZOEX KT2006 comprehensive GC x GC equipped with qMS and FID. The carbon content and carbon isotopic ratio of organic matter were determined by the flow-injection method using a Thermo DELTA V mass spectrometer connected with a Flash EA.

The neutral lipids fractions of the core samples from Tokai-oki mainly consist of n-alkanes, acyclic isoprenoids, n-alcohols, sterols and hopanols. 2,6,10,15,19-Pentamethylcosane (PMI), which is the biomarker related to methanogenic archaea, were detected in all samples from Tokai-oki. PMI concentrations increase below Sulfate-Methane Interface (SMI) and below MH bearing zone in the sediment from Tokai-oki.

The neutral lipids compositions in MH bearing zone were comparatively similar between at Tokai-oki and Daini-Atsumi knoll, those at Kumano-nada was different from those at others. It was suggested that the activities of methanogens and the compositions of microbial assembly are different in the Kumano-nada well. Several hopanols, which indicated bacterial activity, such as 17,21-bishomohopanol, 17,21-homohopanol and anhydrobacteriohopanetetrol were detected in all sediment samples.

This study was carried out as a part of the research undertaken by the Research Consortium for Methane Hydrate Researches in Japan (MH21).