

A concept and issues to construct Methane Hydrate System of the eastern Nankai Trough

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In Phase 1 of the Methane Hydrate Exploitation Program in Japan (FY2001-2008), the Research Consortium for Methane Hydrate Resources in Japan (MH21 Research Consortium) has constructed a concept of Methane Hydrate System of the eastern Nankai Trough. Methane Hydrate System consists of methane generation, methane migration, methane hydrate (MH) accumulation and methane discharge from seafloor in a system.

To construct a concept of Methane Hydrate System contributes to raise the precision of MH explorations and resource assessment. Current our exploration targets are methane hydrate concentrated zones which are consisted of turbidite-derived sandy sediments and hydrate crystals in pore spaces of sand grains (pore-filling type structure). Additionally, it is thought that this study contributes to the grasp of the relationships between methane discharge from seafloor and marine environment because methane hydrate concentrated zones exist in shallow depth below seafloor.

The items that are interpreted and analyzed to extract the control factors to construct a concept of Methane Hydrate System of the eastern Nankai Trough are as follows.

- (1) geological and sedimentological interpretations by 2D/3D seismic data
- (2) geological interpretations by logging data acquired in drilling surveys
- (3) geological and geochemical analyses of samples acquired in drilling and seafloor investigation surveys
- (4) experimental studies involving control factors of MH accumulation
- (5) 1D/2D numerical simulations of MH accumulation

As the results, it is determined that there are still many unsolved issues to clarify Methane Hydrate System as listed below.

- (1) methane origin of methane hydrate concentrated zones

By geochemical data such as carbon isotopic data, it is estimated that the origin of methane of methane hydrate concentrated zones is mainly biogenic. However, by the results of 1D/2D numerical simulations and the view of microbial studies so far, it can not explain a huge amount of in-place methane in methane hydrate concentrated zones. More advanced studies are necessary to clarify methane origins in the eastern Nankai Trough.

- (2) occurrences and distributions of MH-bearing layers other than methane hydrate concentrated zones

It is necessary to examine the occurrences and distributions of MH-bearing layers other than methane hydrate concentrated zone in the eastern Nankai Trough.

- (3) relationships between MH-bearing layers and seafloor manifestations related to methane discharge

Considering methane mass balance in a Methane Hydrate System, it is necessary to clarify the relationships between MH-bearing layers and seafloor manifestations related to methane discharge.

- (4) relationships among MH accumulation, sea level changes and geohistory

MH stability is restricted by temperature and pressure. Especially, depth (pressure) changes from seafloor by sea level changes and geohistory such as uplifts, subsidences and sedimentation rates are important control factors for MH accumulation. More advanced studies concerning sea level changes and geohistory are required.

New drilling and seafloor investigation surveys to consider the clarification of Methane Hydrate System are hoped for.