The investigation of lateral continuity of methane hydrate bearing sand by well-to-well correlation in the eastern Nankai Tough

Tetsuya Fujii[1]; Tokujiro Takayama[1]; Tatsuji Kawasaki[1]; Kiyofumi Suzuki[2]; Osamu Takano[3]

[1] JOGMEC; [2] MHRL, AIST; [3] JAPEX Research Center

We have extracted more than 10 methane hydrate (MH) concentrated zones based on the results of the drilling of METI 'Tokai-oki to Kumano-nada' in 2004, and we conducted MH resource assessment[1),2)]. In order to develop the MH, however, we need to produce methane gas from MH bearing layers effectively. On of the most important geological parameters to affect the productivity is the permeability of MH bearing layers. On the other hand, lateral continuity of sand, which could constrain MH dissociation front during the production, is also important. In order to obtain basic information related to sand thickness, lateral continuity and heterogeneity of sand layers, we conducted well-to-well correlation using well data obtained from Tokai-oki (Site A) and Daini-Atsumi knoll (Site C).

MH bearing sediments in both sites consists of turbidite sequence. Thickness of each sand layers are typically 10-40cm. Depositional facies analysis using well log data suggested that depositional environment of these layers are distributary channel to distal lobe in submarine fan system[3),4)]. Seismic facies analysis using 3D seismic data also indicated that proximal lobe is dominate in Site A[5)], while braided channel in submarine canyon is dominate in Site C[6)].

For the correlation, we used natural gamma-ray log, resistivity log, resistivity image (RAB, FMI), density log, lithofacies column created from these log data, and core descriptions which were obtained from LWD, wire-line log and coring. We identified same MH bearing layers by focusing on resistivity peak pattern (width, height, shape, periodism), negative peak of gamma-ray which indicates sandy layers, and characteristic peak of density.

LWD and wire-line log showed good correlation in Site A. Correlation between LWD and coring well at Site A indicated that boundaries between sand and shale are not gradual but sharp. We also good correlation between LWD and coring well at Site C for each sand layers. Correlation between the LWD well and experimental well drilled 40m south-east of the LWD well suggested lateral continuity of sand layers over 40m. We also speculate the sand continuity outside of these wells by considering lateral change of thickness and comparison with seismic data.

This study was performed as a part of the Research Consortium for Methane Hydrate Resources in Japan (MH21).

1) Saeki, T. et al., 2007, Abstract of AGU 2007 Fall Meeting, OS12A-03.
2) Fujii, T. et al., 2007, Abstract of AGU 2007 Fall Meeting, OS12A-02.
3) Takano, O. et al., 2007, Abstract of JGU Meeting 2007, G120-006.
4) Nishimura, M. et al., 2007, Abstract of 2007 JAPT Meeting, 010, June 5-7, p35
5) Kobayashi, T. et al., 2007, Abstract of AGU 2007 Fall Meeting, OS23A-1046.
6) Shimoda, N. et al., 2007, Abstract of AGU 2007 Fall Meeting, OS23A-1050.