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**Origin and Migration of Methane in Gas Hydrate-Bearing Sediments in the Nankai Trough: Implication for Subsurface Occurrence of Natural Gas Hydrate**

The Nankai Trough runs along the Japanese Island, where extensive BSRs (bottom simulating reflectors) have been recognized. High resolution seismic surveys and the Nankai Trough wells drilling conducted by the METI (Ministry of Economy, Trade and Industry) in 1997 and 1999-2000 have revealed the subsurface gas hydrate distribution to a depth of about 290 mbsf. Gas hydrate-bearing sand core samples by using the pressured core system and downhole well log data were successfully obtained, allowing for various laboratory analyses and chemical/physical investigations. The anomalies of chloride contents in pore water, core temperature depression, core observation as well as visible gas hydrates confirmed well-interconnected and highly saturated pore-space hydrates as intergranular pore filling within sand layers dominantly in the depth interval from 205 to 268 mbsf which was within the methane hydrate stability zone. Carbon isotope compositions of CH4/CO2 and hydrocarbon compositions contained in gas hydrate indicate methane is generated by microbial reduction of CO2. The methane/ethane ratios are larger than 3000, and both carbon isotope compositions of CH4 and CO2 become heavier gradually with depths. In deeper depths, the origins of hydrocarbon change from microbial to thermogenic at around 1500mbsf. Shallower gases show lighter carbon isotope compositions, while deeper gases heavier, typically generated by thermal decompsition of kerogen. In Nankai Trough TOCs are evaluated to around 0.5 % in sediments, which may not form much in-situ gas hydrate in pore space. Therefore, it is indicated that migration and accumulation are required for concentration of pore-space hydrate.