

Distribution of methane in deep-sea water at Nankai Trough area

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The vertical distribution of both concentrations and stable carbon isotopic compositions ($\delta^{13}\text{C}$) of methane have been determined for deep-sea water sampled on 17 stations at Nankai Trough area. Within the vertical profiles of the concentrations, distinctive methane enrichment compared with that of typical sea water were sometimes detected at three different depths.

The methane maximum up to 8.8 nmol/kg was observed around 500 m depth on both just above Tenryu II Knoll and western area of the knoll. Both concentration and carbon isotopic ratio of methane suggest methane-rich fluid (or methane itself) seeping from Tenryu II Knoll spread in a horizontal direction accompanying ambient sea water mixing. Besides, we verify that the oxidation of methane is negligible in the area.

Methane enrichments were also found in several stations at 800 m depth. The highest concentration of 4.4 nmol/kg was observed at the station close to Atsumi II Knoll. Methane concentration and carbon isotopic ratio sampled at 800 m depth around Atsumi II Knoll suggest that the methane from Atsumi II Knoll spread in a horizontal direction.

The two-dimensional distribution of methane concentration in bottom water showed clear enrichment on the accretionary wedge than the trench axis, especially western side of Tenryu II Knoll and Kumano basin. This result indicates methane seeping is active on the accretionary wedge probably due to the development of faults in the area.