

Emission of hydrated gas from seafloor to water column in the western Oki Trough

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Gas chimneys, characterized by a chaotic-columnar structure in acoustic image, are developed well on the western slope of the Oki Trough off Tottori. A significant amount of hydrocarbon, mostly methane, is liberated from the marine sediment to overlying water column in this area, the dynamics of hydrocarbon emission in gas-rich environment is a key to understand carbon/methane migration among atmosphere-seawater-sediment. The concentrations of methane dissolved in the seawater over the gas chimney were seasonally determined, which showed significant increases at the water depth of 200~300 m. This observation strongly suggests that the methane hydrates formed at the surface of emitted methane bubble just above the seafloor and ascended, and the hydrates dissolved at the upper boundary of its stability, so that methane was released efficiently to shallow seawater. In addition, the concentrations of methane near the seafloor were relatively low but seemed to vary in response to the tidal pressure change, indicating that the pressure increase enhanced methane emission from gas pocket in shallow sediment. The behavior of gas emission is constrained by the change of physical/chemical environment between seawater and sediment, and the formation/dissolution of hydrate-coated bubble plays a key role in the migration and distribution of methane in methane-rich water column.

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