

Concentration anomalies of pore waters collected from shallow gas hydrate deposits in the eastern margin of the Japan Sea

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Massive gas hydrates have been observed around the gas chimney structures, excess gas accumulation is responsible for the rapid formation of gas hydrates near the seafloor. Although the dissociation of gas hydrates results in the dilution of pore water due to the release of fresh water from the hydrate crystals, rapid formation of gas hydrates can enclose saline pore waters excluded from the crystals. The in situ pore water geochemistry in the subseafloor environments in the gas hydrate area reflects the dynamic history of formation/dissociation of gas hydrates. We have conducted geochemical analyses of pore waters collected from the shallow gas hydrate occurrences along the eastern margin of the Japan Sea during the PS15 expedition in order to show the geochemical models of shallow gas hydrate formation system.

Although concentrations of chloride dissolved in pore waters are close to the seawater of ~560 mM at the sites where no or small amount of gas hydrates accumulates, those at the dense massive gas hydrate sites are often increased; reaching >1400 mM in the highly gas hydrate accumulated intervals. These high chloride intervals locate in shallower depths at the higher methane flux sites. Our results indicate that the pore water geochemistry is often modified in response to the formation dynamics of massive gas hydrates near the seafloor.

This study was conducted as a part of the shallow methane hydrate exploration project of METI.

Keywords: Shallow gas hydrate, Pore water