

Crystallographic properties of gas hydrates off Sakhalin Island (Sea of Okhotsk) using Raman spectroscopy & calorimetry

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Natural gas hydrates have been studied in the gas seep sites off Sakhalin Island, the Sea of Okhotsk. More than ten gas seep sites in the north area of the Lavrentyev seabed Fault (LVF) form gas hydrates in the sea-bottom sediments. In the framework of SSGH (Sakhalin Slope Gas Hydrate) project, hydrate-bearing sediments are also discovered in the south area of LVF, where more than 400 acoustic anomalies exist but the size of seepage structures are relatively small. We obtained samples of natural gas hydrate in the CHAOS project (2003-2006) and the SSGH project (2007-2011) and analyzed their crystallographic properties using a calorimeter and a Raman spectrometer. Their gas composition were mainly methane, suggested the cubic structure I of these crystals. The hydration number, cage occupancies of both large and small cages, and dissociation heat of the sample were almost same as those of pure methane hydrate. Raman spectra showed that hydrogen sulfide were encaged in both large and small cages. The peak ratio of large to small cages were about 2.4 and 3.5 for hydrogen sulfide and methane, respectively.

Keywords: gas hydrate, dissociation heat, cage occupancy, hydration number, Sea of Okhotsk