

A systematic methane plume observation at Umitaka Spur off Joetsu region, eastern Japan Sea

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We develop the new numerical model in the marine environment in order to estimate mass balance in methane seepage system using the existing data of chemical analysis. Thermogenic and/or biogenic methane generated in deep sediments moves up to seafloor, and major part of methane are consumed by microorganisms living in anoxic marine sediments. When the supply of methane is large or rapid, remaining methane escapes from seafloor. After the bubbling from seafloor, the methane bubble jet blows up in the water column due to the buoyancy. Then the dissolution and dispersion process with methane oxidizing occurs in the water column. The behavior of methane bubbles rising from seafloor in a water column has been numerically studied, and the results of test simulation suggest that the behavior of methane plume will be susceptible to current profile among the several factors. In the previous studies, however, there are few cases that methane concentration in the water column and current profile were simultaneously measured in the same area.

In order to obtain the both data and reconstruct our model, the R/V Tansei-maru cruise KT-06-26 including CTD-cast with seawater sampling, ADCP mooring, and multiple coring was carried out at the Umitaka Spur off Joetsu region, eastern Japan Sea. Magnificent methane plumes have been reported at this Spur, using fishery echo sounder. We deployed the mooring system near the methane bubbling spot for ca 58 hours. ADCP mooring system was composed of three ADCP with two 3-D current vector instruments (see Figure). During the measurement, 24 CTD-casts with seawater sampling were conducted around the mooring system, and 4 casts were conducted at the Jouetsu Knoll. Moreover, in order to search the methane plume and enhance the current profile around the methane plume, we carried out 9 line surveys using shipboard PDR and ADCP mounted on the R/V Tansei-maru.

