

## Methanogenesis in Cascadia Margin (IODP#311)

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Many natural gas hydrates include biogenic methane. But some basic points, such as where biogenic methane was produced or how to transmit and accumulate methane gas and form the hydrates, remain unclear. Expedition 311 of Integrated Ocean Drilling Program (IODP) investigated the formation of gas hydrate in the accretionary prism of the Cascadia subduction zone. We participated the Expedition and obtained core samples from 5 drilling sites. We conducted culture experiments and tracer experiments using radioisotope in order to estimate methanogenesis in the region. As a result, we detected some positive signals for indicating methanogenesis in the samples.

In September and October of 2005, we drilled a transect of four sites (U1325, U1326, U1327, and U1329) across the northern Cascadia, along which the Juan de Fuca plate converges to the North American plate. The four transect sites represent different stages in the evolution of gas hydrate across the margin from the earliest occurrence on the westernmost, first-accreted ridge (U1326) to its final stage at the eastward limit of gas-hydrate occurrence on the margin in shallow water (U1326). The fifth site (U1328) was at a nearby cold vent with active fluid and gas flow. We obtained seafloor sediment cores from the five sites and preserved them in refrigerator after sealing them in anaerobic condition. After the Expedition, we conducted culture experiments of the sediments at near in-situ temperature and tracer experiments using  $^{14}\text{C}$  labeled bicarbonate, acetate, and methanol to estimate rate of methane production by microbes.

Results of the culture experiments indicate methane production occurred in the samples from gas hydrate and deeper region. On the other hand, samples from near surface sediments did not show methane production. Especially, at site of U1328, where gas hydrate was observed from surface to 50-m below sediment, culture experiments showed no methane production, but showed some methane production in the deeper region. These results would provide an important clue for constraining formation model for gas hydrate.