

## Geoscientific observations in cold seep sites: an example from the Kuroshima Knoll, off Yaeyama Islands.

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Geoscientific observations and measurements in cold seep sites give us the important data of fluid flow and mass flux in a sub-seafloor. Especially, to understand the effect of gas hydrate to the earth system, we must quantify the methane flux from a sub-seafloor to the ocean. Therefore, we need a long-term monitoring of geological, geochemical, and geophysical parameters, such as fluid flux and composition. In this report, we present the result of various geoscientific measurements using "Dolphin-3K" and "Shinkai 2000" on the top of the Kuroshima Knoll, in which the widespread occurrence of chemosynthetic communities, cold seep carbonates, and fluid of gas hydrate dissociation in origin are found.

Cold seep sites are one of the fluid outlets from a sub-seafloor. Geoscientific observations and measurements in cold seep sites give us the important data of fluid flow and mass flux in a sub-seafloor. Especially, to understand the gas hydrate formation or dissociation and mass flux in an accretionary prism, so-called subduction factory, we need to know the fluid flow and their composition.

Marine gas hydrate is widely distributed in marine sediments, comprising a huge unstable carbon sink, and influences the global environmental change and carbon cycle. To understand the effect of gas hydrate to the earth system, we must quantify the methane flux from a sub-seafloor to the ocean. Therefore, we need a long-term monitoring of geological, geochemical, and geophysical parameters, such as fluid flux and composition.

On the top of the Kuroshima Knoll, 40 km south off Ishigaki Island, the widespread occurrence of chemosynthetic communities and cold seep carbonates such as chimney-type and pavement-type were found. There are several EW trend cracks of fault origin and slip planes along the slope in the northern margin of the top of the knoll. These are in good accordance with the distribution of dead *Calyptogena* colonies and cold seep carbonates. In situ gamma-ray measurement indicates the presence of recently activated fault or landslide.

The carbon and oxygen isotope study of these carbonates shows that the carbonates were formed under the methane seep environment. The chimney-type carbonates have heavy oxygen isotope values (to +8 per mil VPDB). These positive anomalies of oxygen isotope indicate that the fluid is from the gas hydrate dissociation in origin.

In this report, we present the result of various measurements, such as methane concentration, gamma-ray intensity, sub-seafloor temperature, conductivity, water temperature, pressure, and gravity, using "Dolphin-3K" and "Shinkai 2000".