

## Faunal and quantitative studies of benthos around the methane hydrate area, off Naoetsu, Japan Sea.

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A number of pockmarks, mounds, magnificent flares of gas plumes have been observed on the Umitaka Spur and the Joetsu Knoll off Naoetsu in the eastern margin of Japan Sea during cruises of UT-04 (2004), UT-05 (2005) and UT-06 (2006) by R & T/V *Umitaka-maru*. And the deep-tow survey (KY-05-08 in 2005) and dives of ROV *Hyper-Dolphin* (NT05-09 in 2005 and NT06-19 in 2006) have discovered seafloor gas hydrates and benthic communities in the Umitaka Spur and the Joetsu Knoll. We give an account of fauna and density of benthic organisms in those survey areas.

Water depth of survey areas were ca. 900 m in the Umitaka Spur and ca. 1000 m in the Joetsu Knoll. Water temperature was 0.3°C near the bottom. In comparison with water temperature of the other methane seep area, in the present study areas was remarkably low. The bottom around plume site was covered with fine sediments and carbonate crusts, and the 'normal' bottom was covered with thick, soft sediments.

The deep-tow survey and the diving surveys using ROV *Hyper-Dolphin* have revealed the following evidences.

1) Plume sites on the Umitaka Spur and the Joetsu Knoll are characterized by wide distribution of white bacterial mats with abundant sponge colonies. Sponge has not been considered as chemosynthetic benthos, but the observed occurrence suggest close relation with methane seeps and bacteria mats.

2) A characteristic bacteria mat, such as filamentous colony, is distributed within the northern mound on the Umitaka Spur.

3) Some species of mega benthos, such as *Lycodes tanakai* (Pisces), *Allolepis hollandi* (Pisces), *Chinoecetes japonicus* (Crustacea), *Buccinum tenuissimum* (Gastropoda), *Conchocele bisecta* (Bivalvia) and were observed. The most dominant species in the present study area seems to be the red snow crab, *C. japonicus*.

4) Species diversity and density of benthic organisms on the carbonate nodule with bacterial mat zone was clearly higher than the mud bottom.

5) The density of *C. japonicus* counted during the cruise, 541 individuals per 1 km in the northern part of the Umitaka Spur and 1282 individuals per 1 km in the Joetsu Knoll. These results were nearly 10 to 20 times as high as the Toyama Bay.

High density of benthos around plume site strongly suggested that they depend on chemosynthetic colonies. And chemosynthetic benthic communities on the Umitaka Spur and the Joetsu Knoll are quite different from those in the other methane seep area.