

## Acoustical surveys of Methane plumes using the quantitative echo sounder in Japan Sea

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R&T/V Umitaka-maru(Tokyo Univ. of Marine Science and Technology) and R/V Natsushima(JAMSTEC) sailed to the methane seep area on a small ridge in the Naoetsu Basin, in the eastern margin of the Sea of Japan on July 2004 and July 2005 to survey the ocean floor gas hydrate and related acoustic signatures of methane plumes by using a quantitative echo sounder. Detailed bathymetric profiles have revealed a number of mounds, pockmarks and collapse structures within 3km x 4km on the ridge at the water depth of 910m to 980m.

We mapped minutely methane plumes by using a quantitative echo sounder with positioning data from GPS. We also measured averaged echo intensity from the methane plumes and sea bottoms both in every 100m range and every one minute by the echo integrator.

We obtained the following results from the present echo-sounder survey.

- 1) Some of the plumes were observed to show yearly fluctuation in height and width.
- 2) We measured the averaged surface backscattering strength (SS) of the sea bottoms. Averaged SS of sea bottoms tend to show higher values at the area of floating methane bubbles and methane hydrates than at except floating area.
- 3) On the survey in 2005, we checked several methane plumes on echogram in another area on 2004's survey.
- 4) We recovered several fist-sized chunks of methane hydrate by piston coring at the area where we observed methane plumes.
- 5) Averaged SV of each methane plume tend to be related to the water temperature and the water pressure.

As a following up project, we are planning 1) to measure SV of methane bubbles and methane hydrate floating in water columns through experimental studies in a large water tanks, 2) to make a trial calculation of amount of floating methane bubbles and methane hydrates and 3) to study how to sample the acoustical data of methane plumes using the side scanning SONAR, called SEABAT.

