

Acoustical surveys of methane hydrates by using a quantitative echo sounder in Japan sea

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Research and training vessel Umitaka-maru(Tokyo Univ. of Marine Science and Technology) and research vessel Nat-sushima(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,July 2005 and August-September 2006 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 took a picture and a film on methane seep area.

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

- 1) We measured size, amount and rising velocity of methane babbles. We also made clear the relation between bubbles and water depth.
- 2) We showed the relation between bubbles and volume backscattering strength on the echogram of SEABAT.
- 3) On the survey in 2006, we checked several methane plumes on echogram in another area on 2004s and 2005s surveys.
- 4) We recovered several fist-sized chunks of methane hydrate by piston coring at the area where we observed methane plumes.
- 5) Making intervals of ships cruise lines narrow as 0.05 nmi., we could know closely the position of the methane seeping point.
- 6) According to the swath of SEABAT is 120 degree, we could know closely the position of the methane seeping point (figure to the left).

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 study how to sample the acoustical data of methane plumes using the side scanning SONAR, called SEABAT.

