

Micro-topography and shallow sub-bottom structures in the methane area off Joetsu City, Niigata, Japan -DAI-PACK Mapping-

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During the NT07-20 cruise, Natsushima/Hyper-Dolphin(ROV), (Sep.28, 2007 - Oct.16), in Toyama Trough, Japan Sea, micro topography and shallow sub-bottom structure studies using deep-sea acoustic tools, DAI-PACK (Deep-sea Acoustic Imaging Package) for 2 days, in 3 points.

After the arrival to the survey area on Oct.3 morning, wider Box survey in the central part of the Umitaka Spar and traverse survey to NNE direction (HD#754) was performed. Next day 2Box survey in the northern part (HD#755) of the Umitaka Spar and the central part (HD#756) of Joetsu sea knoll was done.

DAI-PACK contains compact sub-bottom profiler StrataBox (U.S.Syquest Co.) and cheap and compact side-scan-sonar Sportsan (Canadian Imaginex Co.), modified for deep sea. The equipment was carried on ROV (Remotely Operated Vehicle), and the ROV run on planned survey lines 40m interval at the height 4 - 5m.

Strong signal of the sending sound masks the sub-bottom profiling record usually reaches about 2m, and the altitude of ROV must be higher than that.

The altitude of side-scan-sonar sensor is usually said to be best at about 20% of the range, meaning 6m for the range of 30m, but for the observation of video camera the limit is 4m.

Though record density is increased if a range is small, survey line interval becomes half and causes low efficiency.

Height 4 - 5m, half side range 30m was decided in this balance.

Mapping of side-scan-sonar record and the parallel sections of sub-bottom profiling record were made for each of the above mentioned 3 box.

The strong reflection area of side-scan-sonar exists at the northern and western parts in the HD#754 Box, central part of Umitaka Spar. The remarkable outflow of methane was confirmed around the southwestern end of this Box.

The sea-bottom record of sub-bottom profiler becomes vague at the point, which may be caused by the passing through just above the outflow of methane.

Circle shaped strong reflection area exists in the central part, and a fault runs in N-S direction just west side of the circle in case of HD#755 Box of northern Umitaka Spar.

The record of sub-bottom profiler indicates strong sea-bottom reflections around the central part of survey lines.

Strong reflection area indicating rough micro topographic features exists in the southeastern part of the mound, and it looks like a cut off about several m in the HD#756 Box, central part of Joetsu sea knoll.

As for the record of the sub-bottom, it is the same as HD#755 Box.

Though the problem of the position precision remains that the 3 observation reports of the same piston core differ each other by more than 10m in the HD#755 Box. Water temperature is low and stable in the case of Japan Sea bottom, and which seems to cause better acoustic positions in comparison with the hydrothermal area, the caldera bottom, and so on.

Surface current and the bottom current seems to be weak, and the movement of ROV is smooth remarkably comparing to the case as a strong current area. There were a few unusual patterns which appeared sometimes in the case of Suiyo sea Mt.(NT03-14 cruise), in spite of the ROV's average speed 0.8 knot, and produced the good records in this cruise.