VIII. DEEP SEA TELEVISION SURVEY

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In order to observe the sea bottom appearance the deepsea television (DTV) was applied. The DTV was manufactured by Hydro Products Co., and is named "Single Wire Deep Submergence Television System". The general feature of DTV was already reported by the writers (Chujo and Kinoshita, 1975). On the present cruise DTV was first used in practical way, though we still had some practical difficulties.

DTV observations were carried out three times. The first observation was done on Station 5 at on the 5th of September, 1975. At this time there was trouble with the hydraulic pump of the winch. The second observation on Station 120 was done on the 9th of September. The third one was done on the 2nd of October and on the lowering stage the video signal extinguished and then ceased to observe. Table VIII-1 shows the data of Station 5 and 120 observation.

As several kinds of measurement about No. 4 winch were done at station 5, it took a long time, moreover the time was lengthened trouble with the hydraulic system during lifting stage. The electric voltages and currents were measured at the stational state after 20 minutes of switching on. DTV used two Thalium-Iodide lamps. The constant current power supplies were applied to two channels. As the first channel is fed to the video pre-amplifier in the console, its current is 30 mA larger than that of the second channel.

DTV pictures were observed by CRT display and recorded by VTR (video tape recorder) simultaneously, and the voice was recorded in the sound track of VTR.

Table VIII-1 DTV observations.

Station	St. 5	St. 120
date	Sept., 5	Sept., 9
begin to lower	12 h 30 m	10 h 25 m
end to lift	23 h 50 m	15 h 25 m
time in water	11 h 10 m	5 h 00 m
begin to observe	15 h 50 m	11 h 58 m
end to observe	16 h 45 m	13 h 00 m
observation time	55 m	1 h 02 m
sea state	fine, calm	fine, calm
wave height	0.2–0.3 m	0.3 m
average heading	165°	21°
average speed	1.9 knot	2.0 knot
time	16 h 05 m	12 h 13 m
Latitude	08°02.994N	08°09.535N
Longitude	166°54.453W	170°25.131W
water depth	5,100 m	5,458 m
cable length	5,185 m	5,694 m
voltage (V)	273 + 169 = 442	273 + 120 = 393
current (mA)	850, 820	840, 810

Remark 1. At Station 5 the hydraulic system went wrong and it took a long time to lift up.
2. At Station 120 the hydraulic system was tested every 1000 m in lowering, therefore it took a little longer time than usual.
3. Two channels of the power supplies are connected in series. The first channel supplies power to the video amplifier of the console, so the current of the 1st channel is 30 mA larger than that of the 2nd one.

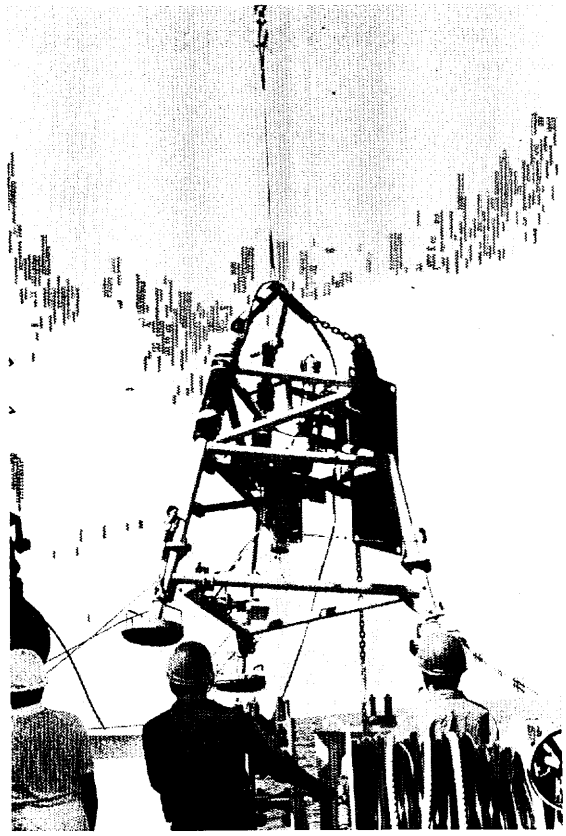

Fig. VIII-1 Lowering of DTV frame.

Observation at St. 5 of the sea bottom materials showed them to be rather coarse, including manganese nodules. The distribution of manganese nodules was sparse with probably a 30–40% coverage with reference to standard patterns. In the pictures the holes of benthic worms were observed. At St. 120 manganese nodules were densely distributed and their coverage reached some 60–70%. They were observed through the whole pass of a one hour observation. The sea bottom current was recognized by the flow of the spray of mud caused by the touching of the DTV frame. The current was not quantitatively measured, but was estimated to be about 50 cm/sec from pictures. Fig. VIII-1 shows the job of lowering.

The pinger was attached on the DTV underwater frame in order to measure its altitude from the sea bottom by ultrasonic. The pinger was model 245HP manufactured by ORE (Ocean Research Equipment Co.). Its frequency was 12 KHz ($\pm$50 Hz) and the pulse width was selected 2.0 m-sec among 0.5, 1.0, 2.0 and 10 m/sec. The repetition rates are 1 and 2 ping per second. When the transmitting surface is downward or upward, the repetition rate is 1 or 2 ping per second respectively. On this case the pinger fixed downward and the rate is 1 ping per second. The acoustic power level is 110 db at 1 yard referred to 0 db for 1 micro-bar. The pinger signal was received by PDR in which the recording pen sweeped 1 second. When PDR used for depth sounding, the pinger was received little

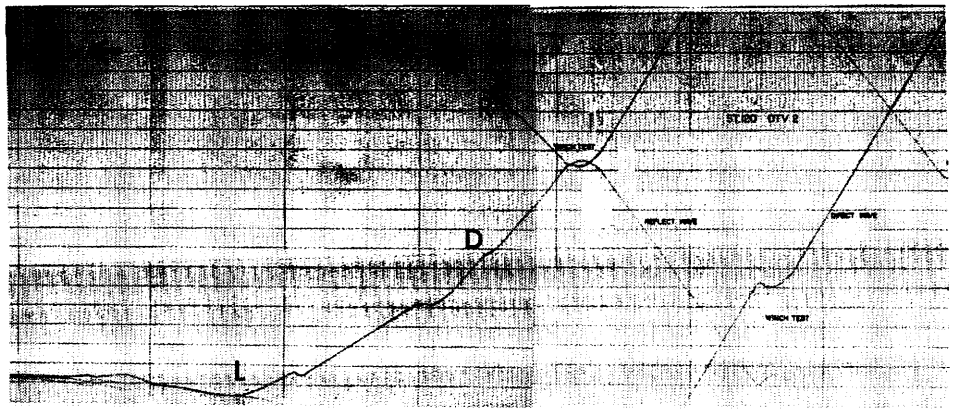

Fig. VIII-2 Pinger record by PDR receiver.
The pinger is mounted on the DTV frame. D is the direct wave, and R is the reflection by the sea bottom. L is the landing on the sea bottom, where R and D meet together.

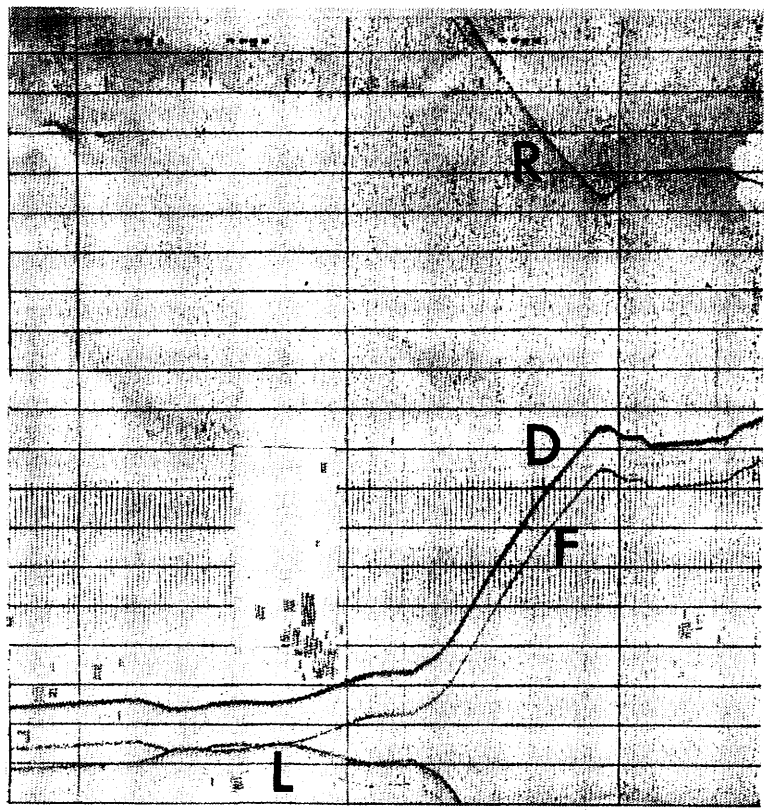

Fig. VIII-3 Pinger record by PDR receiver.
The pinger is mounted on the cable 37.5 m higher place from DTV frame. D is the direct wave, F is the reflection by the DTV frame and R is the reflection by the sea bottom.

noisy. Sometimes the bowthruster used to keep the bow on the right way. In that time the pinger was not received by its noise, because the PDR transducers were mounted very close to the bowthruster.

Fig. VIII-2 shows the record near the sea bottom at station 120. D is the direct wave from the pinger to PDR receiver. R is the reflection of the sea bottom. L is the instant of landing on the bottom where the direct wave D touched with the reflected wave R. On this way R and D have the steps, which is the winch test of every 100 m intervals. At L instant the water depth was 5458 m and cable length is 5694 m.

Fig. VIII-3 shows another pinger record in which the pinger was installed not on the DTV frame but 37.5 m distant place of the cable. When the pinger was installed on the DTV frame, some acoustic and/or electromagnetic noise interfered to DTV picture. Then the pinger is separated 37.5 m which is 50 m/sec. of underwater sound on two-way. On this use the reflection of DTV frame F was observated and the landing is shown by touching R to F. Hereafter the pinger was installed at 37.5 m for DTV operation.

Reference

Chujo, J. and Kinoshita, Y. (1975): Results of the testing of deepsea television and No. 4 Winch. *In* Inoue, E. (ed.), *Cruise Report, Geol. Surv. Japan*, no. 3.