VII. DEEP SEA PHOTOGRAPHY

By Norio Yamakado, Tsuyoshi Usami,
Keiji Handa and Yasumasa Kinoshita

Sea bottom photographing was carried out at St. 118, 123 and 137 by the deep sea camera system for the observation of sea bottom sediments and manganese nodules. The deep sea camera system used in the present investigation was developed by Rikagaku-Kenkyusho (The Institute of Physical and Chemical Research) in 1970, and now it belongs to N.R.I.P.R. (Fig. VII-1). Its details are referable to Matsumoto et al. (1973). Of three observation sites, at the two (St. 118 and 137) many distinct pictures were obtained. One is a picture of the sea floor without manganese nodule, and the another shows abundant nodules of with a maximum cover ratio of about 87%. In the following, the procedures and results of photographing are summarized.

The location, depth of water and photographing condition of three sites are shown in Table VII-1.

St. 118.

The intermittent photographing method was used; that is; the camera system operated

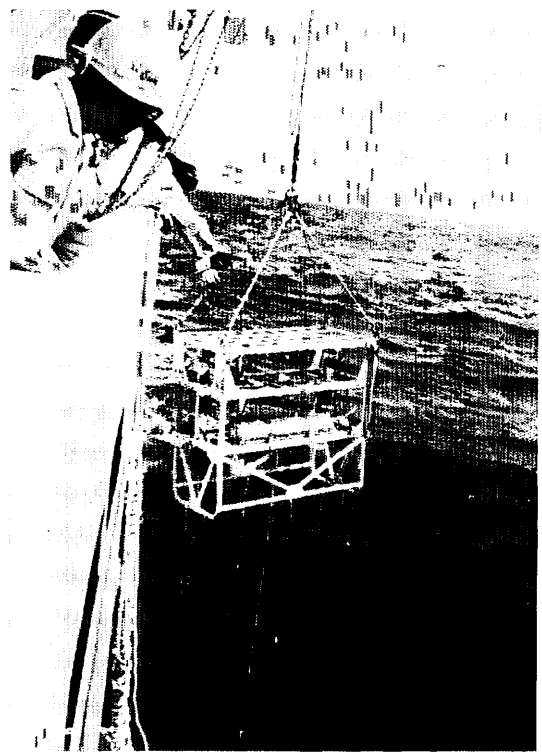

Fig. VII-1 Deep sea camera used.

Table VII-1 Locations of DSC observation and photographing condition.

Station no.	St. 118	St. 123	St. 137
location	06–01.7N 166–57.4W	08–09.4N 170–25.7W	08–10.4N 170–25.2W
depth	4,930 m	5,470 m	5,450 m
photographing condition			
distance	2 m	2 m	2 m
F. stop	8–11	11	8–11
shutter sp.	1/25 sec	1/25 sec	1/25 sec
film	KODAK TRI-X Pan Film, black-and-white, 100 ft roll		
bottoming sw. rope length	2.5 m	2.5 m	2.5 m
photographing method	intermittent	continuous	continuous

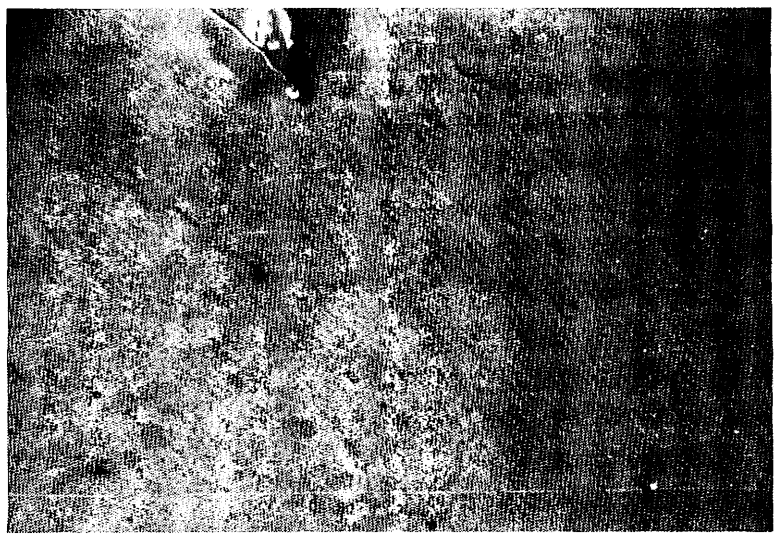

Fig. VII-2 Sea floor picture at St. 118.

only the moment when the weight of the bottoming switch hit the floor. The on-bottoming of the camera system was recognized by the following three ways, i.e., the tension record of the wire rope, the change of interval of sound from the pinger built in to the camera system which changed from 4 to 1 sec at the on-bottoming of the weight, and the record of the pinger attached to the wire rope 37 m above the camera system.

Fig. VII-2 shows a sea bottom picture at St. 118. It is deduced from the sampling results of the close site (St. 117) that the surface sediments of this area are represented by siliceous-calcareous ooze. This picture shows non-accumulation of manganese nodules, but many mounds, holes, tracks, fecal pellets and other evidence of extensive activity of benthic animals in the sediments.

St. 123.

The camera system operated automatically at successive intervals of 10 sec. after the first hit of the weight of the bottoming switch (this was called the continuous photographing method.). However no pictures were taken because of a battery failure and/or bottoming switch trouble.

St. 137.

The camera system was also operated by the continuous photographing method. The recognition of the on-bottoming of the camera system and the winch operation to keep the constant distance between the sea floor and the camera system were made by the

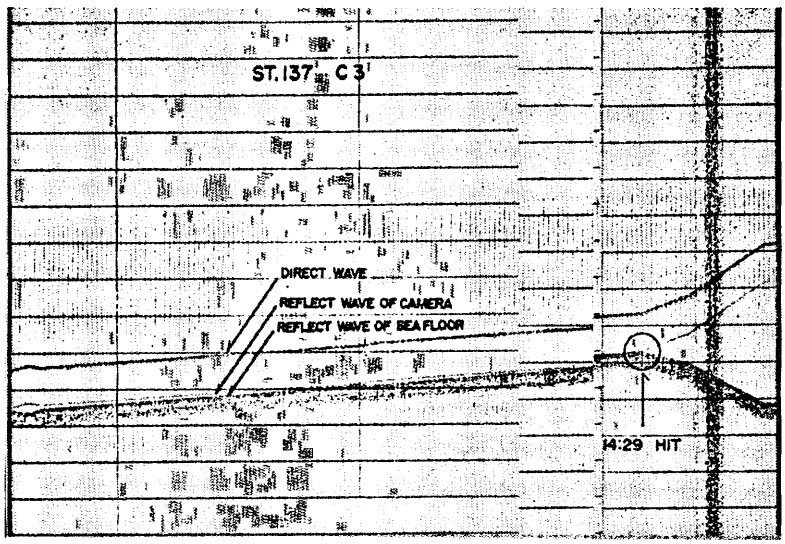

Fig. VII-3 A record of the pinger shown on the PDR receiver.

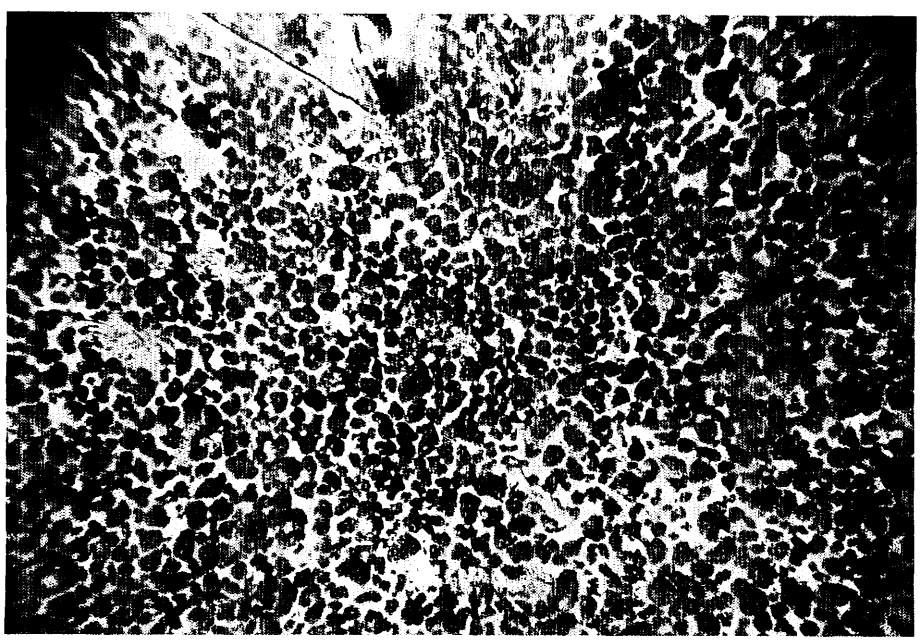

Fig. VII-4 Sea floor picture at St. 137.

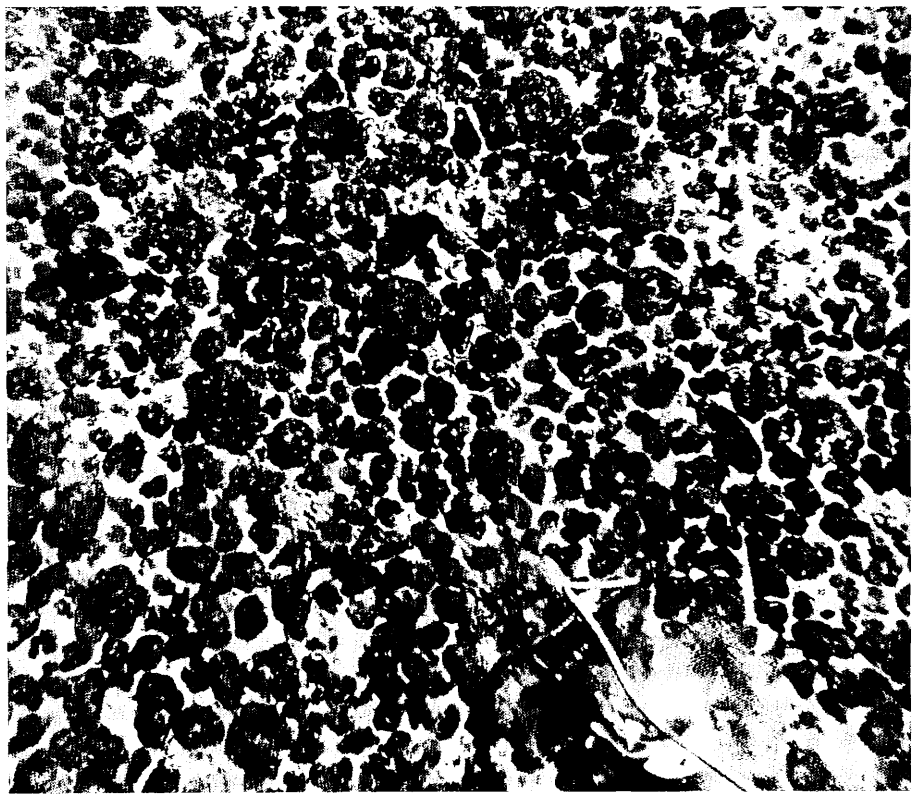

Fig. VII-5 Sea floor picture at St. 137 (enlarged partially).

tension record of the wire rope and the record of the pinger attached to the wire rope 37 m above the camera system. Fig. VII-3 illustrates a record of the pinger indicated on the PDR receiver.

The shoot bottom pictures, it took about 0.2n.m. in distance and about 30 min in time. The pictures numbering 165 in total show that a high concentration and remarkably uniform distribution of manganese nodules, 3–5 cm in diameter, continue through about 0.2n.m. at least, over the sea floor. Also the photographing clarified the mosaic arangement of the nodules (Figs. VII-4, 5).

Also, evident surficial activity of sea-floor animals can be found on and between nodules. The white mounds covering the nodules in a few places probably represent sediments thrown up by some burrowing animals or eroded-out fecal pellets.

The cover ratio of nodules is estimated to be 70–75%, based on a color index map. However, the density slicing observation measured a maximum cover ratio of 86.6% by means of measuring the exposed parts of nodules and also the buried parts beneath the sediments. The result of grab sampling at St. 121 close to this site showed the population density of manganese nodules to be about 19 kg/m^2.

Reference

Matsumoto, S., Handa, K., Tsurusaki, K. and Hirota, T. (1973): Studies on Deep Sea Photography. *Mining and Safty*, vol. 19, p. 537–545. (in Japanese)