

VII. SOME NOTES ON BOTTOM SAMPLING

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Introduction

For the bottom sampling, three methods were mainly used in this GH77-1 cruise: Larger size grab sampler, Okean-70, for taking both surface sediments and nodules, freefall photo grab sampler for obtaining the data of nodule population and nodule samples, and core sampler for getting sediments column at some selected stations. Here are discussed some technical aspects in the operation of these samplers.

Larger size grab sampler, Okean-70

This type sampler was originally made in 1974, based on our own design, but the earlier model had some trouble in triggering mechanism, resulting in its incomplete work and then in failure of sampling. Because even one sampling failure causes great loss of time, three hours or so, in case of the sampling operations at 5,000-6,000 m depth area, it is very important to avoid such troubles. For that reason two improvements were tried. One was modification of the trigger already made in GH76-1 cruise and the other was to devise a method to check if the trigger worked and the jaws closed at the bottom. The modified trigger model worked well. The latter checking method was devised to attach a pinger on the wire rope at the point about 15 m ahead the grab, and to enable us to detect the difference of width of 1 mm order on the PDR record after the closing of the jaws of grab sampler, due to the widening of the distance between the grab and pinger as the length of wire rope between them becomes longer by about 2 m, representing the released part from inside of the sampler (Fig. VII-1).

By establishing this method almost hundred percent of success in the sampling was attained except two failures due to imperfect working of the trigger at the earliest operations of the present cruise.

Freefall (boomerang) type photo grab sampler

We have introduced the freefall sampler, Preussag model, to our survey system since GH76-1 cruise to get accurate data of nodule distribution, using together with the above-said Okean-70 grab sampler. In the present GH77-1 cruise, one shot deep sea camera, also of the Preussag model with 16 mm size Minolta camera was used by attaching it to the sampler, and this enabled us to obtain more accurate data for nodule distribution (Fig. VII-2). The obtained photographs demonstrated enough sharpness for identifying the occurrence of the nodules. Besides, a small cylinder sampler originally designed by the DOMA, Deep Ocean Minerals Association, to obtain even small quantity of the surface sediments and to know qualitatively the sediment type was installed inside the freefall grab (Fig. VII-2).

Core sampler

We have been using piston core sampler with an aluminum core pipe of 85 mm outer diameter and 67 mm inner diameter, vinyl chloride inner tube of 65 mm outer diameter and 61 mm inner diameter, and weight of 400 kg. However, during the period of this cruise the sea condition was almost always rough with prevailing NNE-ENE wind more than the velocity of 10 m/sec, and we were obliged to use the core sampler as the gravity penetration method (at the down speed of 60-80 m/min.).

As a result, we obtained each 2.30-3.80 m length core in five stations. But, in some cases the outer surface of the corer showed full penetration, judging from the adherence of mud at the uppermost part of the corer. This may indicate the chock of the core at 3-4 m length within the core tube due to the frictional resistance. This was left as one problem in the sampling operation to be solved in future survey.

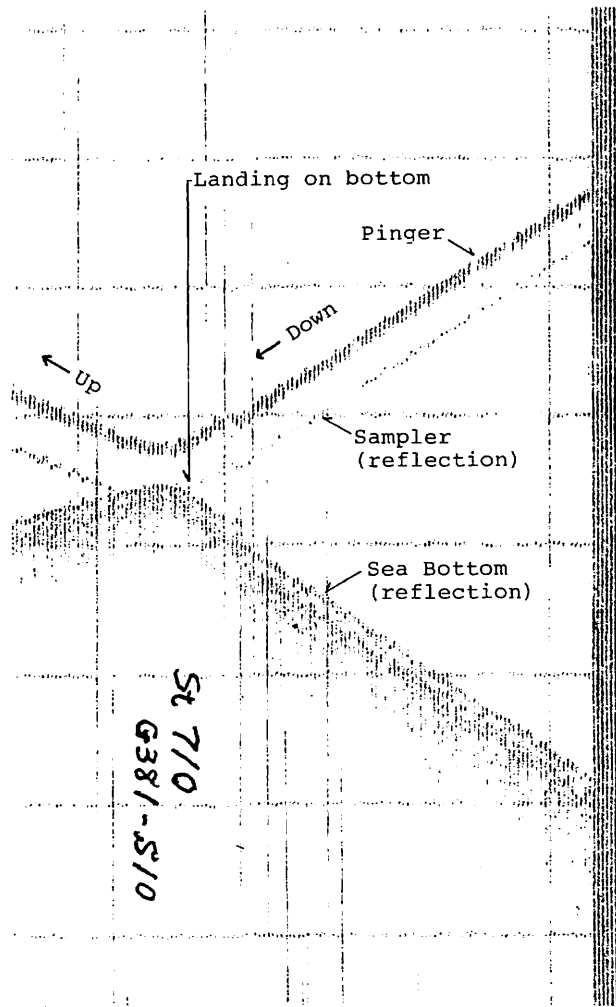


Fig. VII-1 PDR record pattern showing the operational state of the larger size grab, Okean-70, at its landing on the sea bottom detected by a pinger echo. The widening of the distance between the pinger and the grab (in reflection) shows the normal operation of the triggering mechanism.

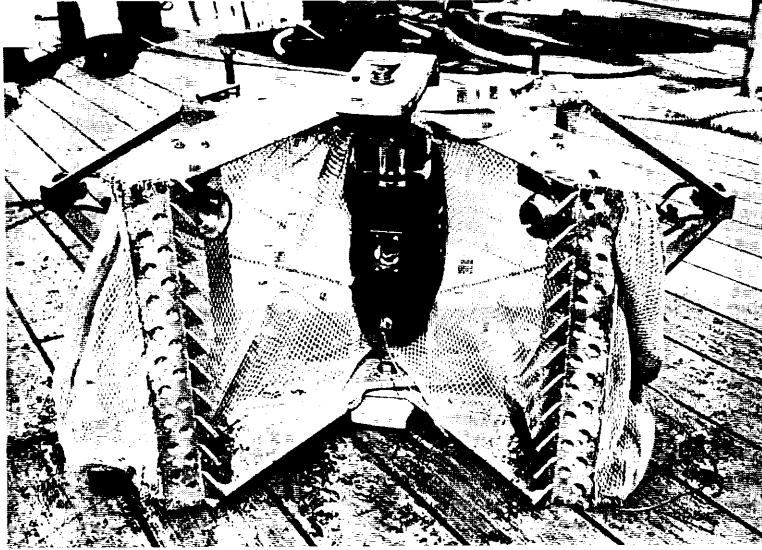


Fig. VII-2 Net grab of a freefall photo grab sampler with attached single shot camera and small cylinder sampler.