

NATIONAL INSTITUTE OF OCEANOGRAPHY
Wormley, Godalming, Surrey.

"Surveyor" CRUISE JUNE 1971
(11th June - 21st June)

N.I.O. CRUISE REPORT No. 39
(Issued June 1971)

Summary of Work Done:

1. Of the three moorings left out by 'Discovery' in early April, two (083 and 085) were recovered. The third mooring No.084, has apparently parted and the release is on the bottom.

2. Two new moorings were laid and left out, Nos.088 and 090. The third proposed new mooring was not laid; it would have involved re-use of the 28" sphere recovered from mooring 085, and it seemed advisable to bring the sphere back to allow it to be examined properly for corrosion.

3. A short-term mooring (No.089) with a deep hydrophone connected to a tape recorder in a surface buoy was laid, a sound source was lowered at various ranges to 30km, and the mooring was recovered.

4. One water sampling station was occupied.

5. No dragging was done for lost moorings, but mooring 075 was re-located by Decca for future reference.

6. One release for a recoverable neutrally buoyant float was tested successfully.

Scientific Participants:

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Narrative of Cruise:

Leaving Barry at 1015 on the 11th June, the E/S fish was streamed and course was set down the Bristol Channel. That afternoon the echo-sounder broke down intermittently and the fish had to be recovered. The fault was traced to the towing cable, the top termination appeared to have stretched and the joints in the four conductors had been forced down into the gland nut, two of them becoming short circuited. About one-third of the armour wires were found to be broken, either by being nipped at the pudding ring clamp or from corrosion. The armour wires had been coated in black grease and perhaps that had a bad effect in excluding oxygen and accelerating corrosion of the stainless steel. Inspection of the lower termination, in the towing arm of the fish, revealed no evidence of corrosion and no black grease. Repairs were completed that evening and the fish was streamed again next morning 12th June. The 100 fm line was crossed at 1600, and at 1930 an attempt was made to interrogate mooring 083 in approximately 1000m depth. No response was obtained from its command pinger, and passage was resumed towards mooring 084. Arriving there at 2135, again no command pinger signal was received, but by then the Decca had become erratic (dusk) and our position was uncertain. Continuing SW into deeper water, an acoustic release was lowered on 4mm wire for test before use in a new mooring. "Surveyor" lies to the wind with engines stopped on station, and in only a force 4 wind made enough leeway to produce a wire angle of 45° during this test.

Returning northward next morning, mooring 085 was located and its release fired at 0635/13th, and by 0807 the mooring was recovered. This was a near-bottom mooring in 2000m using a 28" sphere for deep buoyancy. It had been intended that this should be re-laid, but the amount of corrosion visible after 70 days in the water made it seem

advisable to bring it back for dismantling and more thorough inspection and repair than could be made on board. An attempt was then made to recover mooring 084 nearby, and again nothing was heard from its command pinger. The release pinger came on readily when interrogated, and appeared to go through the firing point but nothing came up. The signal from the release looks as if it is lying on the bottom and not held 10m off, i.e. the mooring has lost its buoyancy. No attempt was made at dragging for it, priority being given to more straightforward jobs, and returning northeastwards another attempt was made at interrogating mooring 083. Again, no response came from the command pinger, but the release pinger could be switched on. This mooring had a ground line and it was important to decide whether or not there was still any buoyancy present before firing the release; once it was fired, the useful part of the mooring would of course be disconnected from the ground line. Looking at the traces obtained from the release pinger on several courses across its position suggested that it was still 10m off the bottom, i.e. the buoyancy was still there, and the release was therefore fired. The mooring came up and was recovered by 1617/13th. A piece of long line with about a dozen hooks had fouled the mooring near the command pinger and perhaps had disturbed it; the Bergen current meter had evidently been hit by something that had forced the recording case 2cm upwards in its clamp. Part of the wire from this mooring had now been in use for 7 months, and the remainder for 5 months; samples were cut from each end of the two long lengths for test and the remainder was thrown away.

Returning then to deep water in the evening of the 13th, two more acoustic releases and a command pinger were tested on the wire to 2000m depth.

Preparations were then made for laying a replacement for mooring 083, in approximately 1000m depth. Laying this new mooring (No.088) started at 1115/14th, and by 1330 the wire was all out and ready for the subsurface buoy to be attached. By then, however, the wind had increased from the force 3-4 of the previous day to a good force 7, with 10ft waves, and it seemed inadvisable to try handling the subsurface sphere (4ft in diameter, 700 lbs wt. in air) for the first time on board "Surveyor" in such conditions. Moreover, we had by then drifted into deeper water, and the vessel was unable to turn head to wind and move back, with the 1000m of mooring wire over the stern. It seemed less likely to cause damage to the mooring if it were left hanging than if we attempted to recover it, so "Surveyor" lay to until 0530/15th when it became possible to turn and start towing the mooring back into position.

At 2-3 knots this took until 1430, when a further delay was caused by a fire breaking out in the lower accommodation. That was soon under control and caused little or no inconvenience for the present cruise, though appreciable damage was done to the compartment concerned and to the food stored there. Returning to the mooring, it was first hauled in so that the top current meter could be inspected, and paid out again. The subsurface sphere recovered from mooring 083, which had been floated forward from the A frame and landed in the well deck, was now transferred aft again and connected to the new mooring wire. After manoeuvring again into a suitable depth, this new mooring (088) was finally released at 1827/15th, 31 hours after starting.

The next task was to lay the temporary mooring with a deep hydrophone and tape recorder, but before doing that the necessary wires were wound on to the storage drums, and a practice lowering was

made to see whether it was feasible to attach the electric cable satisfactorily to the 8mm non-rotating wire.

A lowering was made to 668m with the electric cable taped to the 8mm wire, the change in capacitance was measured and insulation checked, and the cable recovered without any serious trouble due to twisting.

Laying the temporary mooring started at 1132/16th, after testing the hydrophone and preamplifier on the cable and checking the timing of the tape recorder clock. The mooring was laid in 2175m depth in a fairly flat area near a steep slope into deeper water. The hydrophone was at 1825m depth. A current meter frame, with a cable guide round it, was incorporated in the mooring. When the main mooring wire was all paid out with its electric cable attached, the tape recorder package (in a tide gauge sphere) was streamed on 100m of polypropylene line, with another electric cable taped to it. Both this and the mooring wire were connected to a 4ft diameter spherical buoy and the whole mooring was let go at 2055/16th. The 4ft sphere settled at 16m depth; 50m was intended but the actual lengths of non-rotating wire slightly exceeded the nominal values. Fortunately we had good weather, wind force 2-3, whilst laying that mooring. The tape recorder sphere stayed at the surface as intended, and no sooner had it been released, and drifted off a little, than another ship appeared and passed well within half a cable of the surface buoy. It had been intended that a dan buoy should be attached, with a radar reflector, and in fact one was launched, but the combination of dan buoy and tide gauge sphere had just about the same rate of drift as the "Surveyor" and would not go clear of the side. There was too much danger of the 100m line getting tangled if the mooring were released in that state, and it seemed best to remove the dan buoy, after which the tide gauge sphere went away quite readily.

The 5kHz pinger was then lowered on 4mm wire to approximately the same depth as the hydrophone on the mooring (estimated from wire out and wire angle) while the ship drifted away from the mooring position, until the tape recorder should have collected three samples of signals from ranges of 1.7, 3.1 and 5.4km. The pinger was then recovered and course set for deeper water 30km to the south-west.

Decca became reliable again by 0630/17th, and the pinger was lowered so that recordings could be made at each of 3 depths at approx. 30km range and one depth at 20km range. Returning then to the buoy position, the surface sphere was sighted, the release fired at 1522/17th, and recovery completed by 2029. The electric cable taped to the polypropylene line was found to be broken near the 4ft sphere, but that was almost certainly caused during recovery when the sphere had to be dragged round the bows of the "Surveyor" in bringing it to the A-frame for lifting. There was still continuity to the hydrophone preamplifier from the cable end at the top of the mooring wire. In recovery, the electric cable had to be cut in several places to allow twists to be removed, about a dozen joins would be needed to make up most of the original length again.

The cable guide round the current meter frame had disappeared on recovery and had caused a break in the cable; this must have occurred during hauling since the cable was still intact before then. A subsequent check on the timing of the cam operating the tape recorder showed that it had shifted since being laid; it is not known when this shift had occurred.

We then intended to go and re-locate the previously lost mooring 075, but Decca became unreliable; instead, preparations were made for laying the new long-term mooring in 2000m, using much of the same wire as had been used in the temporary mooring 089. When the Decca settled down again early on the 18th, the release pinger of 075 was turned on and its position confirmed, then turned off again. Laying the new 2000m mooring, No.090, started at 1038/18th in a freshening wind. By the time all the wire and instruments were out it was blowing force 6-7. The 4-ft spherical buoy recovered from mooring 089 was floated aft from the well deck to the A-frame for lifting, and promptly took several turns round the mooring wire. Untangling all the buoy lines and attaching it to the mooring took an extra hour, and all was finally let go at 1526/18th.

The forecast promised some improvement in the weather, and it was hoped that some dragging for lost moorings would still be possible in addition to some water bottling and testing an acoustic weight-release. The latter had to be done in deep water, and after checking the command pinger on the new mooring (090) course was set for deep water, over 4000m. On arrival the wind was too strong to allow a wire to be put down to 4000m. Wire angles of up to 60° had been experienced when lowering the 5kHz pinger in somewhat less wind. One weight release unit had been tested then, but for the second one (a pyro release) a deeper test was desirable. We decided to wait in deep water till early next morning in the hope of better weather, but at 0530/19th when the Decca had settled down again there was no improvement. The idea of any deep water bottles or release testing was abandoned, and course was set for mooring 084, apparently on the bottom, to have another look at its release pinger. It was found to be working intermittently and varying its repetition rate, and it was not possible to be certain that it had been finally switched off. Whilst interrogating that lost mooring, one cast of water bottles was worked, with a 50° wire angle, in weather that seemed unsuitable for attempting dragging. Setting off northeastwards, a brief stop was made at mooring 088 to check its command pinger again, and at 1210/19th course was set for returning to Barry.

The E/S fish was recovered at 1600/20th and "Surveyor" entered Barry docks at 1800/20th having had the benefit of a SW'ly gale on the way in.

Summary of mooring work:

- 083 Recovered 13.6.71 (72 days duration)
- 084 Lost (acoustic release apparently on the bottom)
- 085 Recovered 13.6.71. (70 days duration)
- 088 Laid 15.6.71. Lat. 47° 45'·0N, Long. 8° 02'·6W (Decca) in 895m depth. Current meters at 226m and 875m.
- 089 Laid 16.6.71. Recovered 17.6.71. Lat. 47° 26'·9N, Long. 8° 22'·4W (Decca) in 2175m depth.
- 090 Laid 18.6.71. Lat. 47° 32'·1N, Long. 8° 22'·7W (Decca) in 2042m depth. Current meters at 338, 1001 and 2021m.

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J.C. Swallow
20.6.71.