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FRV *Clupea*

Cruise 1306C

REPORT

19 September – 6 October 2006

Personnel

B O'Neill	(19 September – 2 October)
M Burns	(19 September – 2 October)
Alistair McIntosh	(19-27 September 2006)
M Robertson	(27-28 September 2006)
E Armstrong	(19-30 September 2006)
M Breen	(Shore Based)
K Summerbell	(Shore Based)
M Campbell	(Shore Based)
J Mair	(Shore Based)
I Gibb	(Shore Based)
C Hall	(2-6 October 2006)
J Hunter	(2-6 October 2006)
C Stewart	(2-6 October 2006)
R Milne	(2-6 October 2006)

Equipment

Roller clump
Divers towed underwater vehicle (TUV)
5 and 2 tonne load cells
Day grab kit (including table)
Sieve table
Side scan sonar
BT158
Modified Morgere trawl doors
Modified TV sledge

Loading: Fraserburgh
Unloading: Fraserburgh

Objectives

i To measure the immediate physical, ecological and environmental impact of a roller clump over a range of sediment types.

ii To observe performance of modified trawl doors and extend the techniques used in the first objective to trawl gears.

iii To conduct engineering trials on newly developed ship-borne and towed instrumentation and hardware (3 – 6 October).

Outturn day to project: 18 days MF0759

Narrative

During the course of the cruise sidescan sonar and Roxann readings were recorded and grab samples taken along the 20m contour from Sandend Bay to Nairn. A provisional assessment of the grab samples identified sediment types in the range from medium-fine sand to mud. These data were used to identify three sites (a) medium-fine sand (Cullen Bay – Sandend Bay), (b) fine sand (Lossiemouth – Burghead) and (c) mud (Nairn Bay) where the roller clump could be towed at diveable depths. Three or more tows of the roller clump were carried out at each of these sites. In each case divers on the towed underwater vehicle (TUV) recorded the impact and took water samples at five positions in the sediment plume in the wake of the clump. After hauling a pair of divers measured the physical impact of the roller clump using a laser-camera profiler. And subsequently another pair took three core samples inside and three outside the track of the roller clump.

The physical impact of the roller clump varied from a flattening of ripples on medium-fine sand to a 10-15cm trench in soft mud. In all cases the sidescan sonar could detect the path of the roller clump. The marks were very strong for the tows in mud and weaker for the compacted sandy sediments.

The sediment plume samples were filtered, subsampled and stored on board the Clupea. Analysis of the suspended solids, particle size and nutrient will take place on return to the Laboratory. The core samples were sieved over a 0.5mm mesh and stored in formaldehyde on the Clupea. The infaunal community will be quantified by functional type.

When the roller clump work was completed, the clump and benthic samples were off loaded at Buckie and BT158, its sweeps and the modified Morgere trawl doors were taken aboard. Over the next three days divers in the TUV recorded the various components of the trawl. Some adjustments were made to the doors to correct how they fished, although visual observations suggest that they are sitting upright, physical scouring on underside of door and traces from the sidescan sonar indicate that the starboard door and sweeps are making less contact with the seabed than those on the port side. After two tows divers used the laser-camera to profile the impact of the doors, sweeps and groundgear.

A series of 7 tows were carried out on a modified benthic sledge in water depths of about 20m. “Plough-blades” of varying depth and two sizes of deflector plate were attached to the front of the sledge on two extendable arms, the sand-clouds created by the ploughs emulating those typically created by trawl-doors. A small TV-camera platform was towed alongside the benthic sledge to enable real-time observation of the sand-clouds. The camera platform was towed on a separate wire to allow manoeuvring forward and aft of the benthic sledge. Observations were made to determine the combination of plough and deflector that would create a suitable height of sand-cloud for collection on the sledge. A load cell was connected between the towing wire and the benthic sledge to monitor the loads imposed by the ploughs and deflectors.

Two prototype 3-axis load-cells were installed between the door and shoe of a modified Morgere trawl door, such that the impact on the sea-bed could be measured. A data logger attached to the face of the door monitored the comparative loads generated under static and towing conditions. The BT158 trawl was used to ensure that realistic loads were applied to the doors and load-cells.

An Acoustic Release Mechanism to selectively trigger water-sample bottles on the sledge was tested at various ranges behind the ship by releasing elastic cord indicators. The system was found to work at 300m range in 20m of water. All load-cell and data logger results will the analysed in the Laboratory.

Barry O'Neill
14 November 2006