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MRV *Alba na Mara*

Survey 1317A

PROGRAMME

31 July – 9 August 2017

Ports

Loading: Fraserburgh, 28 July 2017
Sailing: Fraserburgh, 31 July 2017
Unloading: Fraserburgh, 9 August 2017

In setting the survey programme and specific objectives, etc the Scientist-in-Charge needs to be aware of the restrictions on working hours and the need to build in adequate rest days and rest breaks as set out in Marine Scotland's Working Time Policy (Lab Notice 34/03). In addition, the Scientist-in-Charge must formally review the risk assessments for the survey with staff on-board before work is commenced.

In the interest of efficient data management it is now mandatory to return the survey report, to I Gibb and the survey summary report (old ROSCOP form) to M Geldart, within four weeks of a survey ending. In the case of the survey summary report a nil return is required, if appropriate.

Personnel

K Summerbell	(SIC)
J Hunter	
S Breimann	(Visitor)

Costs to Project: 10 days – 20119

Equipment:

BIGG sledge (Benthic Interactions with Ground Gear)
Ground gear elements and weights
Rubber matting
Load cells
Sequoia LISST 100X particle size analyser
Aquatec 210TY turbidity meter
Video Cameras and Flashback recorders
Water sampler
Day grab (including table)

Objectives

- To estimate horizontal drag forces (hydrodynamic and geotechnical drag) for a cylindrical object towed on a variety of sea bed types.
- To measure the quantity of sediment remobilised by the cylindrical object towed on a variety of sea bed types.
- To obtain water samples from the sediment plume to examine the relationship between suspended sediment load and nutrient concentration, from a variety of sea bed types.

Protocols:

Equipment will be loaded onto MRV *Alba na Mara* at Fraserburgh on 28 July 2017, where the sledge will be connected with the towing bridle to the central warp. Instrumentation will be prepared ready for attachment to the sledge on the sailing day. *Alba* will leave Fraserburgh on 31 July and steam towards one of the work sites (Figure 1). Nine sediment samples will be taken with the day grab at each work site before commencing sledge sampling. Once sampling is complete at a site, *Alba* will move onto the next work site. *Alba* will return to Fraserburgh on 8 August, and the scientific personnel and equipment will be unloaded on the 9 August.

The BIGG Sledge sampling:

The BIGG sledge was designed to measure the horizontal drag (hydrodynamic and geotechnical drag) of various objects via load cells mounted within the framework. During this survey only one object will be tested (400 mm diameter HDPE cylinder measuring 600 mm in width). This will be mounted onto a 63 mm diameter pole measuring 1376mm in length and attached to the two load cells via brackets. Three different weights will be applied to the test gear at each site (0, 60 and 120 kg) in addition to the standard weight of the test gear frame.

The sledge will have a LISST 100X mounted 1.9 m behind the ground gear and 0.35 m above the seabed. This will enable particle size and quantity to be measured within the sediment plume created by the test gear. An Aquatec 210TY turbidity sensor will also be fitted 0.35 m above the seabed close to the LISST, to allow a comparison of the two method of measuring the plume. A second turbidity sensor will be mounted below this at a height of 0.2 m above the seabed. An acoustically triggered water sampler will be mounted adjacent to the LISST. This will take five water samples in each tow. Four in the plume at heights of 0.2, 0.35, 0.55 and 0.75 m above the seabed and one outside the plume for a control sample approximately 0.75 m above the seabed and inline with the test cylinder. Two video cameras will be mounted on the framework of the sledge, one will be angled to verify the ground gear is in contact with the seabed, and the other will show if the LISST, turbidity meter and water sampler are within the sediment plume.

The sledge will be towed off the central warp, with a wire bridle. A dyneema rope will lift the sledge in and out of the water by the deck winch through a block on the gamma frame. Each tow will last 30-40 min. During the tow the speed will be altered at 10 minute intervals (2.5, 3.0 and 3.5 knots). The water sampling bottles will be triggered in the middle of the three knot speed block. Once the sledge is back aboard, samples will be taken from the water bottles before being reset for the next deployment. The turnaround time between hauls will be approximately 15 minutes. The hauls will be conducted ~150 m apart in parallel so that clean ground and water are sampled. At each site the 400 mm cylinder will be towed three times with each of the three weight categories to obtain replicate samples. Three control runs will also be conducted with no test gear or weights present. Therefore a minimum of 12 hauls will be conducted at each site (additional hauls might be required if the water sampler fails to trigger).

Water Sampling:

Nutrient

After every haul, once the sledge is back onboard, 50 ml syringes will be used to remove 50 ml water samples from each of the five bottles. The syringes will be stored horizontally in a cool box until there is time for filtration in the wet lab. Each syringe will have a sterile 0.2 µm filter attached. Three ~10 ml samples from each syringe will be filtered into separate 15 ml centrifuge tubes. The tubes will then be stored in a freezer (-20^{o}C) until the nutrients can be analysed at the National Oceanography Centre, Southampton.

RNA

For the three hauls with the 120 kg weight applied at each of the six sites, 100 ml will be taken from bottle one (20 cm above seabed in plume) and bottle five (control above test gear) with syringes. In the wet lab a swinnex filter and a sterivex filter will be connected to each syringe. The 100 ml samples will be slowly pushed through the filters. Any excess water will be gently blown out of the filter using an empty syringe. "RNA*later*" will be added to the filter assembly using a 5 ml syringe to stabilize and protect cellular RNA *in situ*. The sample will then be timed for four minutes in order for the sample to be fixed. The RNA*later* will be flushed out of the filters with air. The filter paper from the swinnex holder will be removed and placed into a centrifuge tube using tweezers. The sterivex filter will be sealed with parafilm. They will both be placed in a small plastic bag and stored in a freezer (-20^{o}C) until the RNA can be analysed at the National Oceanography Centre, Southampton.

Sediment

After every haul, once the nutrient and RNA samples have been collected, a 500 ml syringe will be used to mix the sediment in the Niskin bottles by ejecting water from the syringe three times. A ~450 ml sample will then be taken immediately. The samples will be taken to the wet lab where they will be transferred to 500 ml Nalgene bottles. The syringe will have to be opened and any sediment washed out using the sample water itself and a clean 50 ml syringe. The bottles will then be stored in a freezer (-20^{o}C) until they can be analysed at the Marine Lab with the LISST 100x.

Normal contacts will be maintained with the laboratory.

Submitted:
K Summerbell
29 June 2017

Approved:
I Gibb
04 July 2017

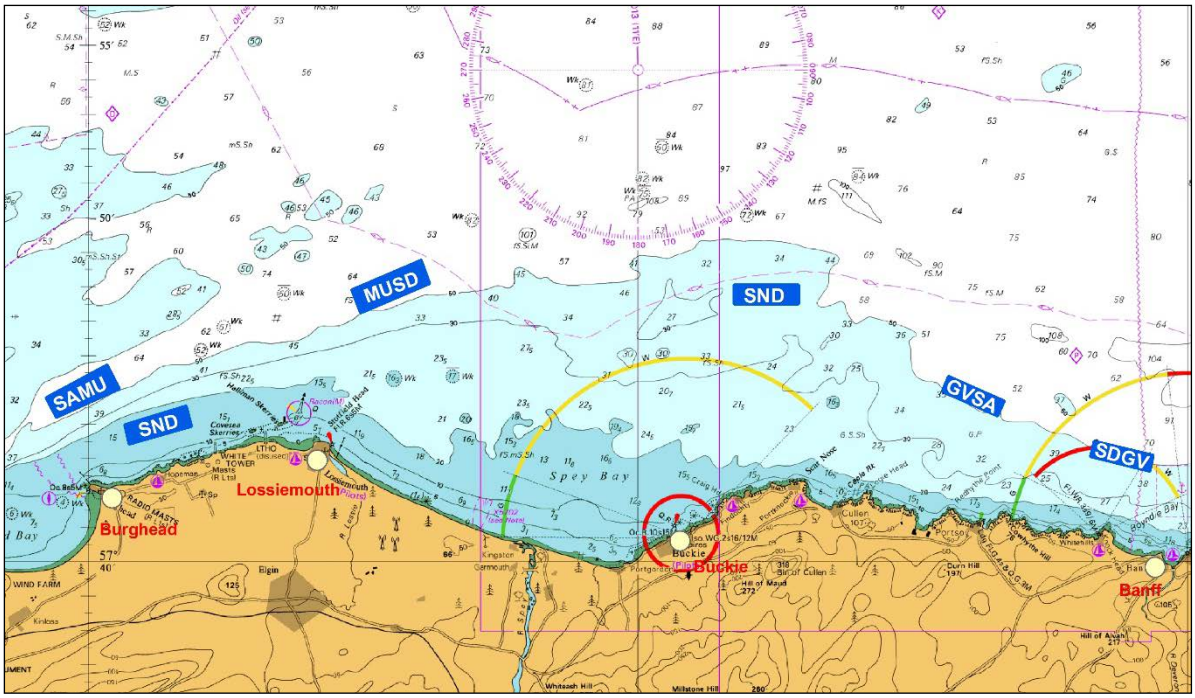

Figure 1: Chart of the Moray Firth indicating the approximate locations of the sampling sites.