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FRV *Alba na Mara*

Cruise 1509A

REPORT

DATES

15-24 September 2009

Personnel

Alba na Mara

K Summerbell (SIC on Alba)	15-24 September
J Hunter	15-24 September
M Breen	14-20 September (joining Alba on 15 September)
M Harding	14-20 September (joining Alba on 15 September)
P MacDonald	15-20 September

Charter Boat, "Solstice" / Shore Based

P Copland (SIC on charter)	14-23 September
E Armstrong	14-23 September
D Parsons (Leeds University)	14-15 September

Diving Support Boat, "Dignity" / Shore based

B O'Neill (Project SIC)	14-20 September
J Mair	14-20 September

Gear

BT158 and modified Morgere doors
Roller clump
Scallop dredge and towing beam
Modified TV sledge for LISST
Day grab
Divers' Towed Underwater Vehicle (TUV)(with "wings", for deploying LISST)
Net drum and towing wire for TUV
Quad of Nitrox
Diving equipment and divers hand held camera
LISST 100X
Scanmar
Load cells

Objectives

- To calibrate readings between a LISST 100X and Reson 7125, from the sediment plumes created behind towed objects on different sediment types.

Procedure

The Diving Team and shore based personnel travelled to Lossiemouth on 14 September. The Diving Team launched the diving support boat *Dignity* and set up a shore base. The charter boat personnel set up and tested the Reson 7125 system onboard MV *Solstice*. *Alba na Mara* left Fraserburgh at 0500 BST on 15 September and arrived near Lossiemouth at 1030. All operations were carried out in inshore waters (20-25m) between Lossiemouth and Burghead until Sunday 20 September.

Alba na Mara and *Solstice* began practicing sampling manoeuvres with the roller clump at 1105. It was evident that the relatively narrow beam angle of the Reson in ~20 m of water meant that *Solstice* needed to be almost directly over the target plume to ensure interference free sampling. It was decided it would not be prudent to have *Solstice* sampling while holding position relative to the gear/plume if divers were operating the TUV (Figure 1a). This would present a number of potential hazards for the divers in the TUV, firstly, the potential for collision with the vessel at the surface; and the prolonged exposure to high frequency noise at relatively close range to the Reson transducer. Therefore only sampling strategy “b” (Figure 1) was attempted directly over the TUV. A total of three tows with the roller clump and one tow with the scallop dredge were completed that day. Meanwhile, the Diving Team conducted work-up dives and practiced emergency procedures.

Diving operations with the TUV and Reson system began on Wednesday 16 September, with sampling on the scallop dredge. The first TUV dive had to be aborted at the surface due to the new rudder's being unbalanced. This was rectified by cutting the leading edge back to near its original size. Two more TUV dives were undertaken and managed to position the LISST 100x in the plume at 5, 10, 20 and 30 m behind the dredge. The plume remained close to the seabed making sampling at 5 and 10 m impractical, and by 30 m was quite diffuse and difficult to locate the centre of the plume. *Solstice* managed to perform six stationary passes over the plume/TUV. However, significant interference from the divers' exhaust bubbles and metal framework of the TUV limited the operation of the Reson system. Two further tows were carried out without the TUV, allowing *Solstice* to conduct more extensive sampling.

On Thursday 17 and Friday 18 September work on the BT158 trawl net was undertaken, focusing on the door plumes. Due to acoustic interference from the divers, the Reson couldn't sample the same plume as the TUV mounted LISST. However, while the LISST sampled the port door plume, the Reson was able to sample the starboard door plume. After the TUV dive was finished and hauled aboard *Alba na Mara*, *Solstice* could then sample the port door plume. The door plume was much larger and more concentrated, enabling the TUV LISST to be positioned at 10, 20, 30 and 50 m behind the door on each dive and occasionally 70 and 90 m depending on available dive time. The TUV could be deployed without having to reshoot the trawl (unlike the clump and dredge); which allowed longer tows, where it was only necessary to haul to the doors for turning. Therefore *Solstice* could conduct Reson sample runs without the TUV present; using strategies: a) at fixed distances b) stationary, c) passing perpendicular to the gear (Figure 1). Ten hauls were conducted with BT158, seven with TUV dives. Load cell measurements were taken either side of the trawl doors on all hauls.

On Saturday 19 and Sunday 20 September work commenced with the roller clump. Alternate hauls of TUV (with LISST) and Reson sampling were conducted to avoid the interference issue. The TUV and Reson sampling positions were at 10, 20, 30, and 50 m behind the clump. Similar to the dredge, the plume produced was low lying at 10 and 20 m. After the first TUV dive the wing that the LISST was mounted on was lowered to aid positioning closer to the seabed and two further TUV dives were conducted. A fourth dive was conducted to directly compare the TUV and sledge mounted LISST sampling methods.

The sledge (housing a LISST 100x) was attached to the clump with 10m chains, the TUV LISST was then positioned 1-2 m in front of the sledge for ~3 min periods. *Solstice* also tried to sample with the sledge attached to the clump, however the metal framework of the sledge caused too much interference.

Diving activities and Reson sampling was completed in the Lossiemouth area by 1100 on Sunday 20 September. M Breen, M Harding and P MacDonald offloaded their personal belongings to *Dignity*, and sailed to Lossiemouth harbour. They then proceeded to take *Dignity* out of the water and travelled back to Aberdeen along with the shore based Diving Team. *Solstice* sailed to Cromarty harbour. *Alba na Mara* sailed to Invergordon Harbour arriving 1545. All diving related equipment (TUV, towing cable, communication cable, Nitrox quad and pumps, and miscellaneous items) and the scallop dredge and beam were offloaded. The spare BT158 trawl, patching material and sediment day grab were then loaded aboard *Alba na Mara*.

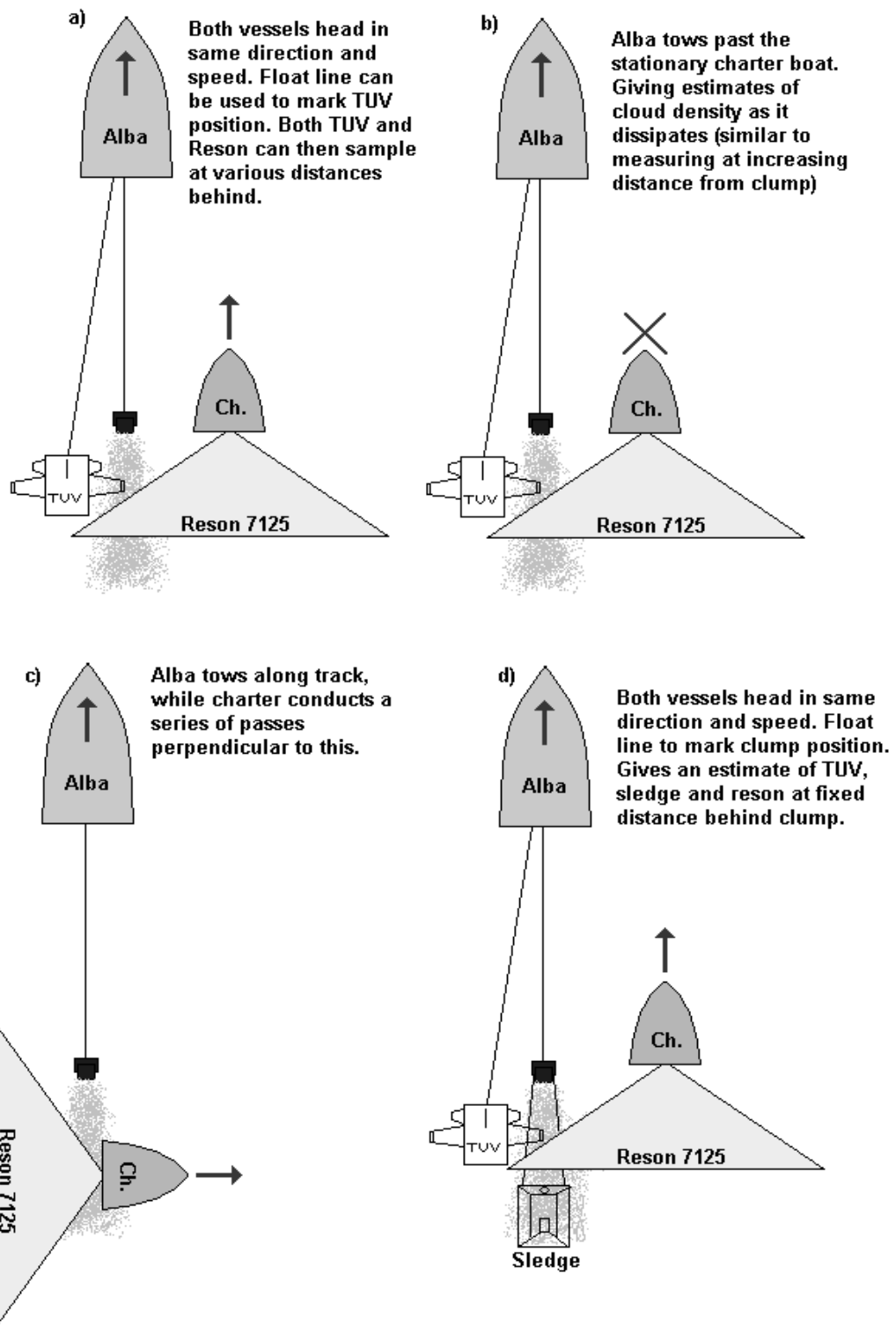
Solstice and *Alba na Mara* sailed to the sampling area near Nairn on the 21 September arriving around 0900. Due to the interference created by the sledge frame, alternate hauls were conducted sampling the plume behind the clump: with the sledge mounted LISST and then the clump alone with Reson. Six hauls with the sledge were conducted, three with chains measuring 10 m, three with chains at 21.6 m. Seven hauls for Reson sampling were conducted, three allowing sampling at 10, 20, 30, 40, 50 m behind clump (four replicates), and four to allow perpendicular passes. Increasing wind speed and wave height made sampling difficult on *Solstice*, which returned to Cromarty at 1445. *Alba na Mara* was less affected by the motion, so proceeded to take 15 grab samples in a 3 x 5 grid over the Nairn sample area.

The strong winds continued overnight and into Tuesday 22 September. *Solstice* sailed over from Cromarty arriving around 0900. Average wind speed was 30-40 kn (W-NW). *Solstice* was unable to work so dodged close to shore near Nairn. Winds peaked at around 70 kn at 1130, but gradually improved, and by 1530 *Solstice* was able to start work. Reson sampled BT158's port door plume, taking four sets of measurements at 10, 20, 30, 40 and 50 m behind the door, and three stationary passes of the plume. Load cells were present on all three hauls. Sampling was finished at 1815 when *Solstice* began the steam to Lossiemouth, where offloading occurred the next day. *Alba na Mara* sailed to Burghead bay to Anchor, arriving 2000.

On Wednesday 23 September, *Alba na Mara* took 15 grab samples in a 3 x 5 grid over the Lossiemouth-Burghead sample area. In addition, two tows with the clump and sledge were undertaken, one with 10m chains and the other with 21.6 m chains. This was completed by 1130 when *Alba na Mara* sailed to Fraserburgh, arriving at 1730.

The *Alba na Mara* was offloaded on Thursday 24 September and all staff and equipment returned to Aberdeen. Analysis of the Reson data will be carried out by Dr Dan Parsons of Leeds University Analysis of the day grab samples will take place at the Laboratory and comparisons will be made between the Reson 7125 data, the TUV LISST 100x data and the Sledge LISST 100x data.

K Summerbell
9 November 2009



Nove

Figure 1: Sampling strategies of charter vessel.