

MINISTRY OF AGRICULTURE, FISHERIES AND FOOD  
FISHERIES LABORATORY, LOWESTOFT, SUFFOLK, UK

1996 RESEARCH VESSEL PROGRAMME

REPORT : RV CIROLANA CRUISE 5b

STAFF:

A J Poole (SIC)	DFR	19/5 - 3/6	B Taylor	DFR	19/5 - 26/5
D C Denoon	DFR	19/5 - 3/6	K S Leonard	DFR	19/5 - 24/5
I T McMeekan	DFR	19/5 - 31/5	J W Read	DFR	24/5 - 31/5
O J Hudson	DFR	19/5 - 26/5	M Smith	DFR	26/5 - 3/6
A K Young	DFR	19/5 - 26/5	N D Pearson	DFR	26/5 - 3/6
B Lovett	DFR	19/5 - 26/5	M Mason	Camb Univ	19/5 - 3/6
R Bonfield	DFR	19/5 - 26/5	N Feates	HR Wallingford	26/5 - 28/5
H S Emerson	DFR	19/5 - 26/5	H Williamson	HR Wallingford	26/5 - 28/5
T A Bailey	DFR	19/5 - 26/5			
J M Rees	DFR	19/5 - 24/5	& 31/5 - 3/6		

Sorry for the delay  
in circulating this  
but I thought I better  
leave it until after the  
de-brief and that has  
still not happened  
AP 21/11/96

DURATION: 19 May - 03 June

LOCALITY: North-east Irish Sea and Race Bank, North Sea

AIMS:

1. To recover, service and redeploy, as necessary, 3 Minipods in the north-east Irish Sea for the duration of two separate anchor stations (AE0135A0).
2. To determine the effect of trawling on the remobilisation of surface sediments, via radiochemical and geochemical sampling of sediment and water (AE0118A).
3. To carry out ultrafiltration experiments to assess sediment / water interface and radiocolloidal behaviour from disturbance of surface sediments by fishing trawls (AE0118A0).
4. To characterise the trawling site through Sidescan sonar and towed video survey (AE0118A).
5. To collect a series of Kaston cores for the purpose of quantifying the budget of artificially occurring radionuclides in the sub-tidal sediments of the Irish Sea (AE0118A0).
6. To recover the Tetrapod, 2 Minipods, Quadrapod, 10 current meters and guard buoys, laid during April 1996, from the north-east Irish Sea (AE0135A0 & AE0127A0).
7. To deploy and recover 5 Minipods (with syringes) and Decca Argos drifters around Area 107 / Race Bank in the Outer Wash to observe, measure and sample sediment plumes from dredgers (AE0711A0).
8. To undertake resuspension studies in the vicinity of the Race Bank dredge site (AE0711A0).

ADDITIONAL AIMS

9. Collect and sub-sample NIOZ cores from Sellafield PLZ for the purposes of adsorption / desorption experiments, and for Southampton University.
10. Collect cores from the Sellafield mud patch for *in-situ* shear stress measurements using the ISIS equipment, being developed by HR Wallingford (AE0227A0).
11. Collect surface water samples along transects: i) from the Solway Firth to Morecambe Bay; and ii) between Dungeness and the Wash (AE0529A0).
12. Collection of day grab samples for grain size analysis at two locations in the vicinity of Race Bank / Area 107.

NARRATIVE (all times are GMT):

RV Cirolana sailed from Barrow at 12:00 on 20th May and proceeded to the north-east Irish Sea where the Quadrapod (deployment Q125) and Minipod 2 (deployment 124), laid during the course of *Ciro 4a/96*, were recovered (Fig.1). A Sidescan sonar survey of a line due to be trawled on 22nd May and 25th May by a beam trawler out of Fleetwood was then undertaken. Problems with the Sidescan's altimeter caused the second leg on this line to be aborted. NIOZ cores for Southampton University and sediment adsorption / desorption experiments were collected close to the Sellafield PLZ (site DMC1; Fig.1). Kaston cores were recovered for Irish Sea radionuclide budget purposes, previously sampled with NIOZ corer during the course of *Ciro 5/95* (sites - B28a, B77a, B84, B43a; Fig.1), until such time as the guide rods on the Kaston corer were bent during a deployment; this damage probably arose as a consequence of a "hard" substrate and the corer coming aboard Cirolana at the start of the cruise with no obvious sign of being maintained subsequent to its last outing. Minipods 1 (deployment 127), 2 (deployment 126) and 4 (deployment 128) with syringes were laid in a line running approximately 150°, i.e. along the line of the tide at low water.

Cirolana went to anchor at 19:00 on 21st May and commenced a 25 hour anchor station (TH50i) at 20:30. CTD profiles, bottom and surface water samples (for Pu, Am, Cs, U and Th radionuclide analysis, salinity and suspended load determination) and NIOZ cores (sub-samples at 0-6cm) were collected. Two 25 litre bottom water samples were also collected for ultrafiltration studies during the course of this anchor station. Strong winds during the morning of 22nd May caused Cirolana to drag her anchor, which was eventually raised at 09:00. The anchor station was completed by dodging on to position and subsequently relaying the anchor at 16:00. The anchor station was completed at 21:30.

The *Stephanie B* (FD78), a small beam trawler out of Fleetwood trawled along a pre-determined trawl line between 07:00 and 08:00, and 09:10 and 10:08 on 22nd May (see charter report on FLA 8759 for more details of this work). She passed within 200 metres of Minipod 2, which lay close to Cirolana.

Minipods 1, 2 and 4 were recovered during the morning of 23rd May and the data and syringes downloaded (Fig.2). Two lines of Sidescan were then shot along the line that had been trawled the previous day. Surface water samples for nutrients and chlorophyll (locations SJM 1-9) were then collected at a series of locations along a transect between the Solway Firth and the northern edge of Morecambe Bay (Fig.1).

A change over of scientists took place at Whitehaven by the ship's Searider during the morning of 24th May, after which the northern three current meters deployed during *Ciro 4a/96* were recovered (locations Q, R, S; Fig.1). Minipods 4, 1 and 2 (deployments 130, 129 and 131 respectively) with re-charged syringes were then relayed. The configuration of these Minipods was the same as that used for the first anchor station (Fig.1). Cirolana laid anchor at 17:00 close to Minipod 2. The second 25 hour anchor station (TH50ii) commenced at 22:30 on 24th May. The sampling regime was identical to that used for the first anchor station with samples being collected hourly, on the half hour.

The *Stephanie B* again trawled along the pre-determined trawl line from south-west to north-east on 25th May. She starting her trawls at 07:00, 10:00 and 14:00, i.e. different states of the tide (see charter report on FLA 8759 for more details of this work), passing close to Cirolana 30 minutes after commencing each trawl leg.

The second anchor station was completed at 22:30 on 25th May.

Minipods 1, 2 and 4 (deployments 129-131), were recovered during the morning of 26th May and a Sidescan sonar survey of the line trawled by the *Stephanie B* the previous day was completed. The Minipod deployed close to the Cumbria coast (M1 - deployment 123) and current meter "T" were recovered during the afternoon of 26th May prior to a change of scientific crew at Whitehaven. Two sets of three NIOZ cores (sites W4 and W10) were then collected for *in-situ* sediment shear stress studies using ISIS an instrument being developed by HR Wallingford. Two further sets of three NIOZ cores were collected from locations W12 and W11 on the morning of 27th May prior to the successful recovery of the remaining two current meters (U, V; Fig.1).

lacement parts for the Kaston corer were successfully fitted during the afternoon of 27th May and four further Kaston cores were collected (sites - B42a, B57a, B52a, B8a). Four further sets of three NIOZ cores were collected for HR Wallingford's purposes during the evening of 27th May (sites - W7 and W6) and the morning of 28th May (sites - TH50 and W9). Further Kaston cores were collected at sites B20a, B72a, B59a, B36a, B60a and B71a. With weather conditions deteriorating it was decided to cease coring at 16:20.

The change over at Whitehaven in Cirolana's Searider was cancelled and the Workington Pilot declined our request to complete the change over on their vessel. In light of Cirolana's ETA at Great Yarmouth on 31st May, it was decided to attempt to put the two HR Wallingford's members of staff ashore at Llandudno; this was later cancelled in light of worsening weather and the ETA at Yarmouth. The change over due to take place at Whitehaven on 28th May eventually took place at Great Yarmouth on 31st May.

With improved weather along the Channel on 30th May, the new Rosette was fitted out and tested (John Read has produced a short report on this). A set of 7 surface water samples was collected for JoNuS II from Dungeness to Great Yarmouth during the evening and morning of 30th - 31st May (SJM 10-16; Fig.2). Cirolana laid anchor off Hopton at 06:55 on 31st May.

An emergency exercise involving the Great Yarmouth Coast Guard, the RAF Air Sea Rescue, the RNLi, the Norfolk and Suffolk Fire Services and the DFR Emergency Response Team then took place. Four scientists left Cirolana aboard the Great Yarmouth Lifeboat. Mr Rees was transferred to Cirolana, from Lowestoft via her Searider.

Cirolana proceeded to the Race Bank during the afternoon of 31st May collecting five surface water samples (sites - SJM 17-21; Fig.3) en route. Five Minipods (deployments - 132-136) were laid in an arc between the dredging Area 107 and Race Bank on the morning of 1st June. Three circuits of CTD dips were then completed (utilising the new rosette which performed well, albeit with a few misfires on the bottles) at the Minipod sites before 7, hourly, CTD dips were completed at site "B" (the site closest to Area 107). Day grab samples of surface sediment were collected at sites "B" and "E" during the morning of 2nd June prior to 2 deployments of the CTD in the wake of a dredger plume and a further 2 in "clean" water for comparison purposes. The 5 Minipods and guard buoys were recovered and Cirolana set for Lowestoft from Race Bank at 17:00. Cirolana docked at Lowestoft at 22:30 on 2nd June.

I would like to take this opportunity to record my thanks to all the crew and officers of Cirolana for their skilful, flexible and co-operative approach to the work on this cruise.

## RESULTS:

1. The Minipods and their guard buoys were successfully recovered. Three Minipods were then deployed and recovered twice during the course of the anchor stations in the Irish Sea. Data from these deployments were successfully transferred to the VAX.
2. Two 25 hour anchor station were completed and preliminary Minipod and CTD data indicate that the beam trawler caused local resuspension of the seabed (Fig.2). A total of 18 sediment samples and 36 water samples were collected for Pu, Am, Cs, natural radionuclide and grain size analysis at the anchor stations.
3. Two large volume (200 litre) ultrafiltration experiments were carried out to determine the labile fraction and colloidal distribution (1 and 30 kD) of Pu(IV), Pu(V) and Am desorbed from suspended sediment. Initial radiochemical separations were carried out on 15 samples on board and assay will be completed on return to the lab.
4. Sidescan sonar but not video tows were completed along the line trawled by the Stephanie B, despite the malfunction of the altimeter on the hired Sidescan Sonar. A total of 7 lines were shot: 2 before trawling and then, 2 and 3 after the first and second trawling exercise, respectively.

5. Kaston cores were collected at 14 sites in the north-east Irish Sea (Fig.1). Of these, 6 (B57a, B59a, B60a, B72a, B77a, B84) produced longer cores than those collected during the course of *Ciro 5/95* and were sub-sampled and returned to the lab for analysis.
6. All 10 of the current meters, and their 6 guard buoys, deployed in the north-east Irish Sea in April (*Ciro 4a/96*; Fig.1) were recovered, as were the Quadrapod, the Tetrapod and 3 further guard buoys. Nine of the 10 current meters yielded data.
7. Five Minipods (each with 4 syringes) and 5 guard buoys but not Decca Argos drifters, were deployed for 26 hours in the area of dredge site Area 107 / Race Bank in the Outer Wash to observe, measure and sample sediment plumes from dredgers.
8. Twenty two CTD dips were completed close to the Minipods, as were a further four in the wake of the dredger. These will aid the sediment resuspension studies in the vicinity of the Race Bank dredge site.

#### ADDITIONAL AIMS

9. Two cores were collected from site DMC1 sub-sampled and stored frozen / chilled pending further analysis in the lab.
10. ISIS was successful used on the muds of the eastern Irish Sea. Of 24 cores collected, 3 could not be used due to worm burrows (which resulted in drainage of water) and 19 good results were obtained. Detailed observations of the cores, shear vane strength measurements and surface samples for dry density and sand content were also collected from the cores. A more detailed data report from this work will be available from Steve Malcolm by the end of July.
11. Surface water samples for chlorophyll, nutrients, salinity and suspended load were collected from the ship's supply from 9 sites along a transect between the Solway Firth and Morecambe Bay; and 12 sites between Dungeness and the Wash. Samples were filtered and preserved pending further analysis in the laboratory.
12. Sediment samples from the Day Grab were collected at locations "B" and "E" on Area 107 and Race Bank (Fig.3), respectively, to help calibrate the Minipod data with respect to the potential movement of sediment from Area 107 to Race Bank as a consequence of dredging operations.

#### SEEN IN DRAFT

Mr D McDarren (Master of *Ciro 5b/96*)

#### INITIALLED:

Dr D S Woodhead

#### DISTRIBUTION:

Basic list +	N D Pearson	R Bonfield
A J Poole (SIC)	A K Young	H S Emerson
J W Read	B Lovett	T A Bailey
J M Rees	D C Denoon	B Taylor
K S Leonard	O Hudson	I T McMeekan
M Smith	N Feates (HR Wallingford)	H Williamson (HR Wallingford)
M Mason (Camb Univ)	S Rowlatt, BoC	A Kenny, BoC
L Murray, BoC	R R Dickson (via FLR 7809)	J Brown (via FLR 7809)
D S Woodhead (via FLR 7809)	P J Kershaw (via FLR 7809)	N Coverdale (BNFL Sellafield)
S J Malcolm (via FLR 7809)	Cumbrian Sea Fisheries Committee	District Fisheries Inspector, Fleetwood
	Eastern Sea Fisheries Committee	District Fisheries Inspector, Lowestoft

Fig1. Stations visited in the Irish Sea during the course of Cirolana 5b/96  
 (Inset - detailed positions of current meter, anchor station location TH50)

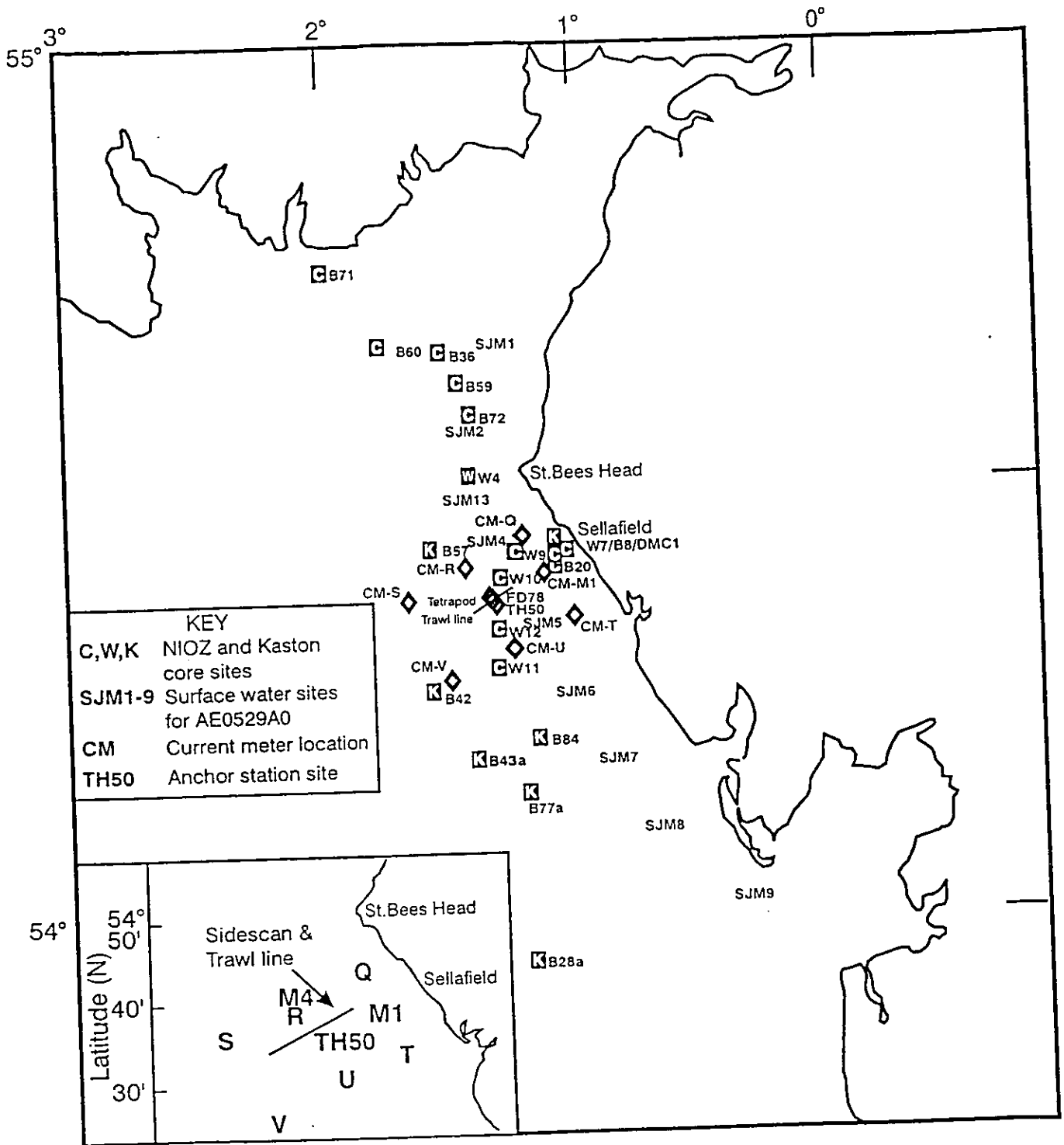


Fig 2 - MOBs data from Minipod 2, sited closest to the trawl line during the course anchor station TH50i (21/5 - 22/5/96), Cirro 5b/96

Deployment 126 (2) - Minipod nearest Trawl - Tetrapod side

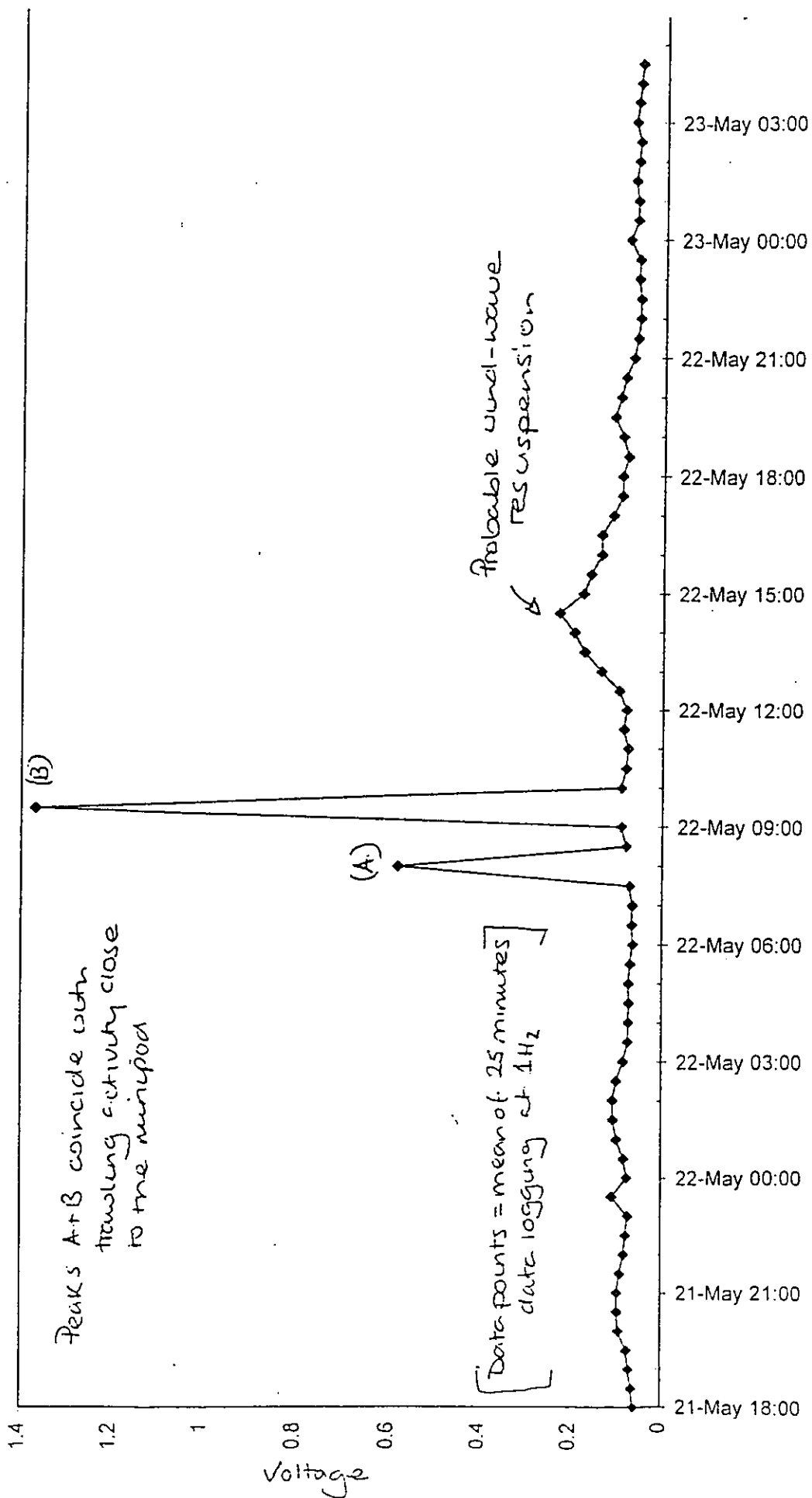


Fig 3. Station visited in the Channel and North Sea during the course of Cirolana 5b/96  
 (Inset - detailed positions of the minipod deployments on the Race Bank Area 107 dredge site)

