

PROVISIONAL CRUISE REPORT

VESSEL: RV Frederick Russell
Cruise No 13/82

CRUISE LOCATION: La Chapelle Bank (SW Approaches) and the Isle of Wight/West Solent

CRUISE PERIOD: 1 - 20 September 1982

PERSONNEL:

A D Heathershaw (Principal Scientist)	1-20 September
J D Humphery	1-20 September
P M Hooper	1-14 September
D J Corns (Mrs)	1-14 September
G P Le Good	14-20 September
P D Thorne	14-20 September
R A Haine	14-20 September
D N Langhorne	14-20 September
A P Salkield	15-19 September
R Powell (RVS)	1-15/19-20 September
P Taylor (RVS)	1-14 September
M Overs (Bristol University)	1-14 September
J Hardisty (Bristol University)	14-20 September
D Hamilton (Bristol University)	17 September
C Hood (MAFF)	15-16 September
Capitaine M de Jaffry (Marine Brest)	3-9 September

OBJECTIVES: La Chapelle Bank 1-14 September 1982

- To carry out echosounding and sidescan sonar observations to determine the size and extent of sandwaves on La Chapelle Bank (Figure 1).
- To deploy recording current meter (RCM) and thermistor chain (TC) moorings on a line across the shelf break.
- To deploy Bristol University remote recording shelf sediment monitor (BLIP).
- To carry out salinity and temperature measurements using CTD, XBT and thermo-salinograph equipment.
- To obtain sediment samples and carry out underwater photography at selected sites.

West Solent 14-20 September 1982

- To deploy recording current meter and Bristol University equipment (BLIP) at a location to the S of the Isle of Wight (Figure 2).
- To carry out boundary layer flow measurements and observations of gravel movement in the West Solent (Figure 2).

The work on La Chapelle Bank and in the West Solent form part of Science vote funded projects S28 and S26 respectively.

PROCEDURE AND
METHODS:

La Chapelle Bank

- a) A total of 22 Aanderaa RCM4 recording current meters were deployed on 4 moorings (RCM1, RCM2, RCM3, RCM4 - see Figure 1) on a line extending about 25 km across the shelf break and ranging in depth from 160 to 500 m. Details of the moorings and their locations are given in Appendix A.
- b) Two Aanderaa 50 m thermistor chain moorings (TC1 and TC2 - see Figure 1) were deployed in 170 m of water on a line approximately 5 km to the west of the current meter moorings.
- c) XBT measurements were carried out prior to deployment of current meter and thermistor chain moorings to determine optimum heights for current meters and thermistor chains relative to the thermocline.
- d) Echosounding was carried out prior to and following deployment of current meters and thermistor chains to determine the overall depths for moorings, and the general bathymetry of the area.
- e) Underwater photography was carried out using a UMEL 35 mm stereo camera pair and sediment samples collected using a Shipek grab and occasionally a Day grab.
- f) Sidescan sonar observations were accomplished using the IOS Taunton EG & G 272 fish (105 kHz) with an RVS 259 winch. No cable depressor was used.
- g) Sea surface temperature and salinity measurements were made, using a Plessey thermo-salinograph, on transects running across the shelf edge.
- h) Trials of an Oceano transponding release were carried out close to the position of RCM3.
- i) Position fixing was carried out with Decca main chain (SW British 1B1MP) and Magnavox 1107 satellite navigation.
- j) Bristol University remote recording sediment monitor (BLIP) was deployed for trials close to RCM3 in 167 m of water.

West Solent

- a) Three Aanderaa RCM4 recording current meters were deployed in about 30 m of water at a location about 7 km S of the Needles, Isle of Wight (Figure 2). Near bed current measurements were required as design data for IOS remote recording equipment.
- b) Boundary layer flow measurements and observations of gravel movement were carried out in the West Solent (Figure 2) using two rigs alternately on ebb or flood stages of the tide. A small rig carried 4 Ott propeller current meters at heights of 10, 22, 46 and 100 cm above the seabed and an RT Labs. SIT underwater camera. The other larger rig carried 6 Ott current meters at heights of 15, 25, 40, 65, 100 and 180 cm above the seabed, 2 electromagnetic flowmeters mounted so as to record 3 components of the turbulent flow (u, v, w) at a height of 32.5 cm above the bed and 2 hydrophones for measuring acoustic noise generated by gravel movement on the seabed (self generated noise - SGN). The RT Labs SIT camera was also used on this rig.

c) Trials were carried out in the West Solent on MAFF sector scanning sonar mounted over the ship's side.

EQUIPMENT
PERFORMANCE:

a) With the exception of the spooler release on current meter mooring RCM1 and a thermistor chain termination on mooring TC1 all current meter and thermistor chain mooring equipment operated satisfactorily. The failure of the spooler on RCM1 led to the loss of the mooring with 5 current meters. The thermistor chain on TC1 was lost as the result of a termination failure (the sub-surface buoy was, however, recovered).

b) Echosounding (PES) equipment operated satisfactorily although it was necessary to operate the MUFAX recorder at a higher than usual gain setting. Additionally, accurate depth information on the slope in the vicinity of canyons or other irregular topography was not possible due to the broad beam (20°) and side lobe effects on the 10 kHz PES. Attempts to detect internal waves with a Raytheon 200 kHz echosounder were not successful.

c) . Sediment sampling equipment was in general satisfactory although, despite repeated attempts, no samples could be obtained with the Day grab. The reasons for this failure were not clear. The majority of samples were recovered using a Shipek grab.

d) Attempts to use a Columbus weight as a depressor for the EG & G sidescan sonar were unsuccessful. No attempt was made to use the EG & G depressor as this may have resulted in damage to the cable. Instead, the sonar fish was streamed on about 600 m of cable to put it within about 50 m of the bed. Some good records were obtained. However, due to height changes on the fish, consistently good high resolution coverage was not possible.

e) A fault on the CTD ESP unit meant that no CTD data could be collected during this cruise. This was despite repeated attempts to correct the fault prior to sailing and during the cruise.

f) Bristol University equipment (BLIP) was successfully deployed close to the position of mooring RCM1. However, repeated attempts to recover the instrument were not successful even though the acoustic release had been successfully fired. The tilt warning on the acoustic release indicated that BLIP was lying at an angle to the bed suggesting that its buoyancy was flooded.

g) Trials with the Oceano transponding acoustic release were successful.

h) The UMEL stereo camera system performance was disappointing. Good stereo pairs could not be obtained due to loss of synchronicity between cameras and between the cameras and the flash unit. Additionally there were problems with the cameras firing prematurely in mid-water.

i) With the exception of the electromagnetic flowmeters (which were subsequently replaced with a spare system) all boundary layer flow measuring equipment operated satisfactorily. Underwater TV worked well although the pan and tilt unit failed due to flooding. Tests with the self-generated noise (SGN) equipment were very successful and will provide a valuable insight into sediment transport processes. Both rigs were operated successfully, the large rig from the stern and the small rig over the side. However,

the sediment trap on the small rig did not recover fully representative gravel samples.

j) Tests on the MAFF sector scanning sonar were of limited success as measurements could only be made in the flat bed gravel area. Planned tests on gravel bedforms were curtailed as a result of damage to the sonar from one of the boundary layer rigs.

k) Position fixing in the La Chapelle Bank area was by Decca Main chain and satellite navigation. However, failure of the ship's EM log meant that frequent manual updates on the ship's speed were required for good DR. This was not always practicable. With the exception of some 'dawn effect' periods, Decca main chain SW British 1B/MP was successfully monitored. Attempts to use the French chain (8B/MP) and Loran C were not successful. For the work in the W Solent Decca trisponder equipment was successfully used as on previous cruises.

SHIP
PERFORMANCE:

The ship provided good accommodation and laboratory facilities. No problems were experienced with handling equipment on deck.

Winch overheating and loss of hydraulic fluid occurred when attempts were made to grapple for the lost current meter mooring on RCM1. About 1100 m of wire and a Giffard grapnel were subsequently lost when the wire became snagged on an obstruction on the seabed.

Despite repairs to the ship's EM log prior to sailing, this unit subsequently failed at sea. EM log data were thus not available for up-dating DR positions from the satellite navigation system.

Similarly to last year, boundary layer flow measuring and TV equipment was operated successfully over the side and from the stern, with the ship riding to a single bow anchor. The bow thruster was used to settle the ship in position at the turn of the tide.

During the first leg of the cruise a French observer was successfully embarked by Helicopter. Apart from the loss of 1 scientist's berth, this operation did not present any major difficulties.

RESULTS:

La Chapelle Bank

Despite the lack of CTD data and the loss of one current meter mooring and one thermistor chain mooring, this cruise has provided a large amount of reliable near-bed, mid-depth and near-surface current meter data. Together with the data from the remaining thermistor chain and the temperature and conductivity sensors on various current meters, this should enable some preliminary assessment to be made of the rates of sediment movement in the La Chapelle Bank area. It should also be possible to examine the role of any coupling between internal waves and sandwaves. In addition good velocity profile data, over almost the total depth, were obtained at RCM3 (Figure 1 and Appendix A).

Sediment samples (a total of 33) obtained in the study area, indicated a high proportion of comminuted shell and other biogenic material. Some of these samples will be large enough to enable settling column analyses and threshold studies to be carried out.

Sidescan and echosounding data will enable the orientation, height and asymmetry of sandwaves to be determined which should lead to an improved understanding of local sediment circulation at the shelf break.

All these data will provide valuable background information for later deployments of remote recording shelf sediment monitors.

West Solent

Current measurements from an area to the S of the Isle of Wight will provide useful estimates of likely gravel movements under tidal currents alone. At a later stage it is hoped to deploy remote recording equipment at the same location to determine the effects of waves and current. The present current meter data will assist with the design of this equipment.

Within the West Solent a large amount of good boundary layer flow and sediment transport data were obtained. Good records were obtained from the SGN probes, the electromagnetic flowmeters and the underwater television system. This information should enable detailed studies to be made of coarse sediment movement in a turbulent tidal boundary layer.

ITINERARY:

- 1.9.82 IOS and Bristol University personnel joined ship in Barry. Loaded scientific equipment.
- 2.9.82 RVS personnel joined ship.
0900 Sailed Barry for La Chapelle Bank.
- 3.9.82 1030 Embarked French observer by helicopter approximately 180 km due W of Brest.
1400 Arrived La Chapelle Bank. Commenced echosounding and XBT measurements.
2215 Carried out tests on acoustic releases.
2250 Continued echosounding overnight.
- 4.9.82 1035 Deployed RCM1
1332 Deployed RCM2
1537 Deployed Selco buoy at RCM3 position.
1840 Deployed RCM3
1905 Continued echosounding overnight.
- 5.9.82 0826 Deployed Selco buoy at RCM4 position.
1009 Deployed RCM4
1316 Deployed TC2
1431 Deployed TC1
1953 Deployed BLIP close to RCM3 position.
Hove to overnight to ride out gale.
- 6.9.82 0845 Returned to La Chapelle Bank.
1325 Attempted to recover BLIP.
1925 Abandoned attempts to recover BLIP.
2000 Continued echosounding overnight.
- 7.9.82 0910 Started sediment sampling and underwater photography.
1900 Continued echosounding overnight.
- 8.9.82 0800 Stopped echosounding and continued sediment sampling.
0945 Recovered TC1 subsurface buoy adrift. Resumed sediment sampling.
1613 Continued underwater photography.
1940 Continued echosounding and started sidescan sonar observations overnight.

- 9.9.82 0800 Stopped echosounding and sidescan sonar survey and proceeded to Brest.
1800 Arrived Brest. Disembarked French observer.
- 10.9.82 1800 Sailed Brest for La Chapelle Bank.
- 11.9.82 0600 On station RCM1 for recovery.
0650 Fired release but mooring did not surface. Switched off pinger and decided to leave for later recovery.
0980 Recovered RCM2
1050 Recovered RCM3
1243 Recovered RCM4
1300 Recovered Selco buoy on RCM4 position.
1408 Recovered TC2 and returned to RCM1 position.
1645 Dragged for RCM1. Snagged mooring and obstruction on bottom.
2020 Abandoned further attempts to recover RCM1 after losing Giffard grapnel and 1100 m of main warp. Resumed echosounding overnight.
- 12.9.82 1049 Deployed RVS test rig with Oceano release close to RCM3 position and commenced tests.
1451 Recovered test rig.
1511 Recovered Selco buoy on RCM3 position.
1624 Continued sediment sampling and underwater photography.
2035 Completed sediment sampling and departed study area for Plymouth.
- 13.9.82 1700 Arrived Plymouth.
- 14.9.82 Unloaded scientific equipment and exchanged scientific personnel. Loaded boundary layer equipment.
1800 Sailed Plymouth for Isle of Wight.
- 15.9.82 0858 Laid current meter mooring S of Isle of Wight.
1050 Anchored Yarmouth Roads - fog bound.
~1300 Embarked IOS and MAFF personnel, MAFF personnel for day only for tests on sector scanning sonar. Set up Decca trisponder units.
1927 Moored ship and anchored in flat bed gravel area.
2120 Completed tests on boundary layer rigs and equipment but abandoned overnight working due to instrument problems.
- 16.9.82 ~1000 MAFF personnel rejoined ship for day only.
1113 Commenced boundary layer flow measurements and gravel movement studies. Continued tests on sector scanning sonar. Carried out boundary layer/gravel observations overnight.
- 17.9.92 Continued boundary layer/gravel studies and tests on sonar.
1100 Bristol University personnel joined ship for day only.
- 18.9.82 Continued boundary layer/gravel measurements.
- 19.9.82 1245 Stopped all measurements and recovered Decca trisponder units.
1325 Weighed anchor and sailed for current meter mooring position S of Isle of Wight.
1745 Recovered RCM1 S of Isle of Wight.
- 20.9.82 0800 Arrived Plymouth. Unloaded scientific equipment.
~1200 IOS, RVS and Bristol University personnel left ship.

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DATE:

10 Nov 1982

APPENDIX A: Details of current meter and thermistor chain moorings.

La Chapelle Bank

	Decca		Lat/Long	
RCM1	G0.97	D46.42	47° 35.05 'N	7° 16.46 'W
RCM2	F23.40	D46.77	47° 38.33 'N	7° 14.84 'W
RCM3	F22.50	D46.80	47° 40.56 'N	7° 13.21 'W
RCM4	F20.03	D47.35	47° 45.51 'N	7° 10.75 'W
TC1	F21.74	E30.50	47° 38.66 'N	7° 18.93 'W
TC2	F20.43	E30.70	47° 41.60 'N	7° 17.12 'W

Isle of Wight

RCM1	I7.00	G76.05	50° 36.15 'N	1° 35.25 'W
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APPENDIX A

Details of heights of current meters and thermistor chains and deployment periods.

La Chapelle Bank

Current Meter/ Thermistor Chain	Station	Depth (m)	Height (m)	Start ⁺	Finish ⁺	Sensors
4374	RCM1	500	450	2350/3.9.82	L	C/T
4775			252	"	L	C/T
5319			10	"	L	T
6276			5	"	L	T
4780			2	"	L	C/T
5916	RCM2	160	122	1220/4.9.82	2005/12.9.82	C/T/P
5910			102	"	"	C/T/P
5911			10	2350/3.9.82	2100/12.9.82	C/T
5908			5	1220/4.9.82	2140/12.9.82	C/T
4777			2	"	2030/12.9.82	C/T
5909	RCM3	167	121	1440/4.9.82	1910/12.9.82	C/T/P
3924			111	"	1830/12.9.82	C/T/P
5317			75	"	1830/12.9.82	C/T
4779			30	"	1805/12.9.82	C/T
5227			10	"	2100/12.9.82	C/T
4373	RCM4	167	5	"	1916/12.9.82	C/T
3308			2	"	1830/12.9.82	T
5915			120	2005/4.9.82	1945/12.9.82	C/T/P
5917			115	"	1915/12.9.82	C/T/P
3257			10	"	1945/12.9.82	C/T
4817			5	"	1830/12.9.82	C/T
3311			2	"	2030/12.9.82	C/T
919/701	TC1	170	80/130		L	T x 11
777/602	TC2	170	90/140		1915/12.9.82	T x 11

APPENDIX A

Isle of Wight

Current Meter	Station	Depth (m)	Height (m)	Start ⁺	Finish ⁺	Sensors
5908	RCM1	30	10	2016/14.9.82	1912/19.9.82	C/T/P
5909			5	2016/14.9.82	1921/19.9.82	C/T/P
5910			2	2036/14.9.82	1921/19.9.82	C/T/P

Notes: + Times of first and last records to nearest minute. These times give approximate record lengths only.

Recording interval was 5 minutes in all cases.

C/T/P denotes conductivity, temperature and pressure sensors respectively.

L denotes instruments that were lost.

FIGURE CAPTIONS

Fig 1 Frederick Russell Cruise 13/82 : Location of recording current meter (RCM) and thermistor chain (TC) moorings on La Chappelle Bank (A) for the period 3/9/82 to 12/9/82. Further details are given in Tables 1 and 2.

Fig 2 Frederick Russell Cruise 13/82 : Location of recording current meter mooring RCM1 south of the Isle of Wight (B) and the location (C) of seabed gravel mobility studies in the West Solent.

RRS Frederick Russell cruise 13/82
1 - 20 September 1982

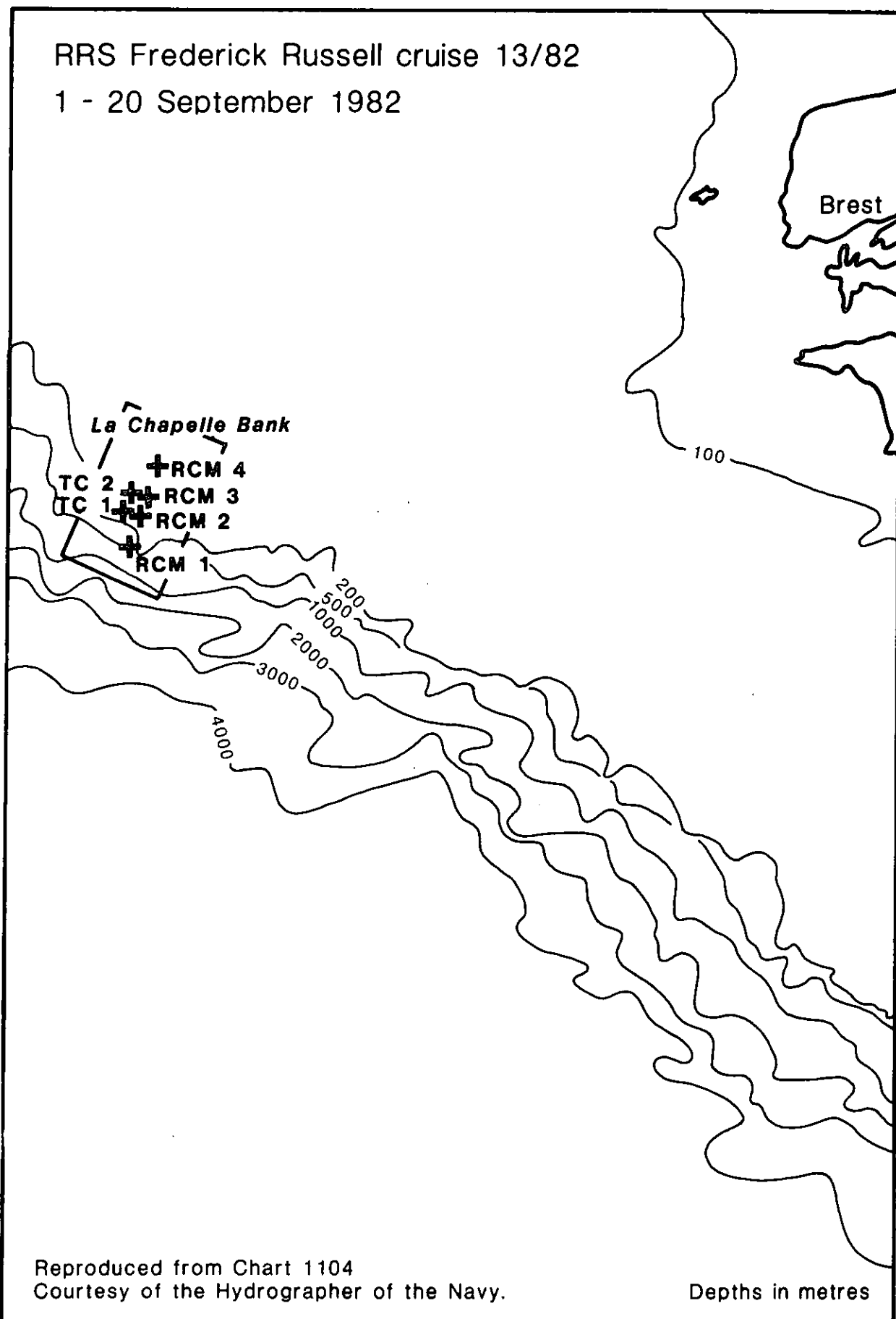
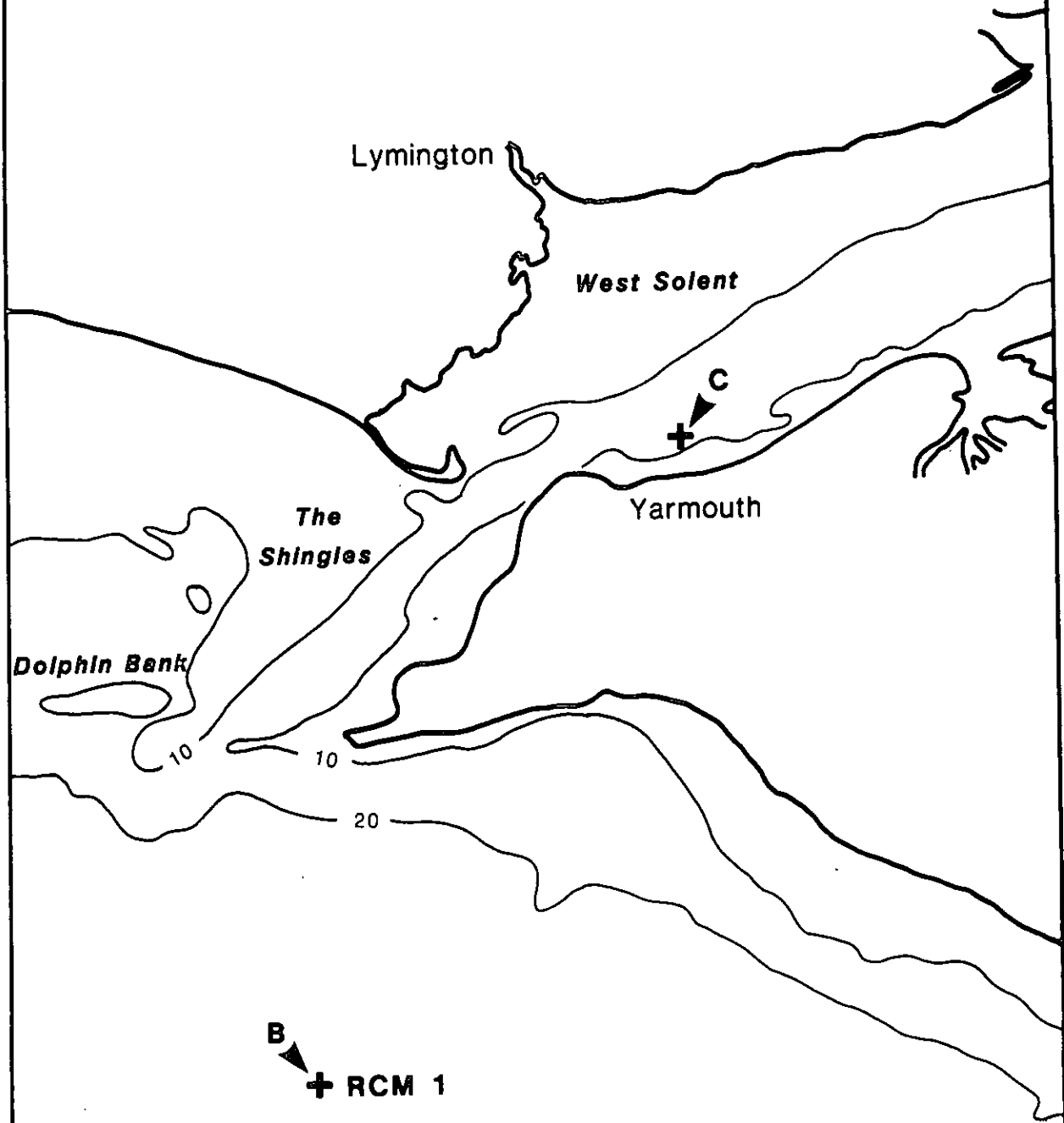


Fig.1

RRS Frederick Russell cruise 13/82
1 - 20 September 1982



Reproduced from Chart 2045
Courtesy of the Hydrographer of the Navy.

Depths in metres

Fig. 2