I.O.S.

CRUISES UNDERTAKEN BY THE
INSTITUTE OF OCEANOGRAPHIC SCIENCES
TAUNTON
1980

REPORT NO 116
1981

NATURAL ENVIRONMENT RESEARCH COUNCIL
INSTITUTE OF OCEANOGRAPHIC SCIENCES

INSTITUTE OF OCEANOGRAPHIC SCIENCES

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Cruise Report No 116

Institute of Oceanographic Sciences
Crossway
Taunton, Somerset

1981

CONTENTS

VESSEL	M.T. REUL NA MAIDNE
OWNER	D.B. MACLEOD, Oiteag na Mara, Bruernish, North Bay, Barra, Outer Hebrides.
CRUISE PERIOD	1900 hrs 10 January 1980 - 0930 hrs 11 January 1980
PERSONNEL	J.D. Humphery — HSO Senior Scientist P.M. Hooper — SO

ITINERARY

Friday 11th January	Started loading equipment 1930 hrs. Sailed 2100 hrs.
Saturday 12th January	Recovered old offshore Waverider No. 67144 at 0115 hrs. Deployed new offshore Waverider No. 67214 at 0205 hrs. Deployed new inshore Waverider No. 67043 at 0252 hrs. Performed echo-sounder run from the inshore site, through the offshore position and onward, between 0252 and 0422 hrs. Arrived back at berth at 0930 hrs.

OBJECTIVES

To deploy two Waverider wave measurement buoys to continue the series of measurements started in February 1976. To remove a Waverider deployed in an incorrect offshore position in March 1979. To gather echo-sounding information such as time and weather permit, but especially on a line between the two Waveriders, and on into deeper water if possible.

PROCEDURE AND METHODS

The old Waverider was retrieved first; there could then be no possibility of radio interference with the new offshore buoy. The Waverider was recovered using the jilson; an attempt was made to recover the sub-surface float, but the mooring rope broke and the float was lost. The new offshore Waverider was then deployed. The buoy was lowered overboard by hand; the rubbercord and rope were then paid out. The sub-surface float was lowered into the water and the riser chain paid out. Care was taken to ensure that the mooring did not tangle. The anchor clumpwas lowered on steel wire rope (specially prepared for the purpose) paid out from the trawl winch. The wire rope was cut and discarded when the anchor weight was on the bottom.

The new inshore Waverider was lowered into the water using the jilson. The rubbercord and buoyant chain were paid out by hand, and the anchor dropped.

At both deployments, the Decca positions, depths and times were noted.

The inshore Waverider position was taken as the first echo-sounding station on a run which passed some 150 m S of the offshore Waverider position, and on a further 3.8 NM. Positions

were noted every purple Decca lane; the echo-sounder chart was marked and the time noted.

EQUIPMENT PERFORMANCE

The Waveriders were energised and sealed on site, and their emissions monitored with a direction-finding receiver. All other IOS equipment was taken to the site ready prepared; the moorings were simply assembled on board. All IOS equipment worked satisfactorily. All equipment on board 'Reul na Maidne' performed very well.

PREPARED BY : J D HUMPHERY

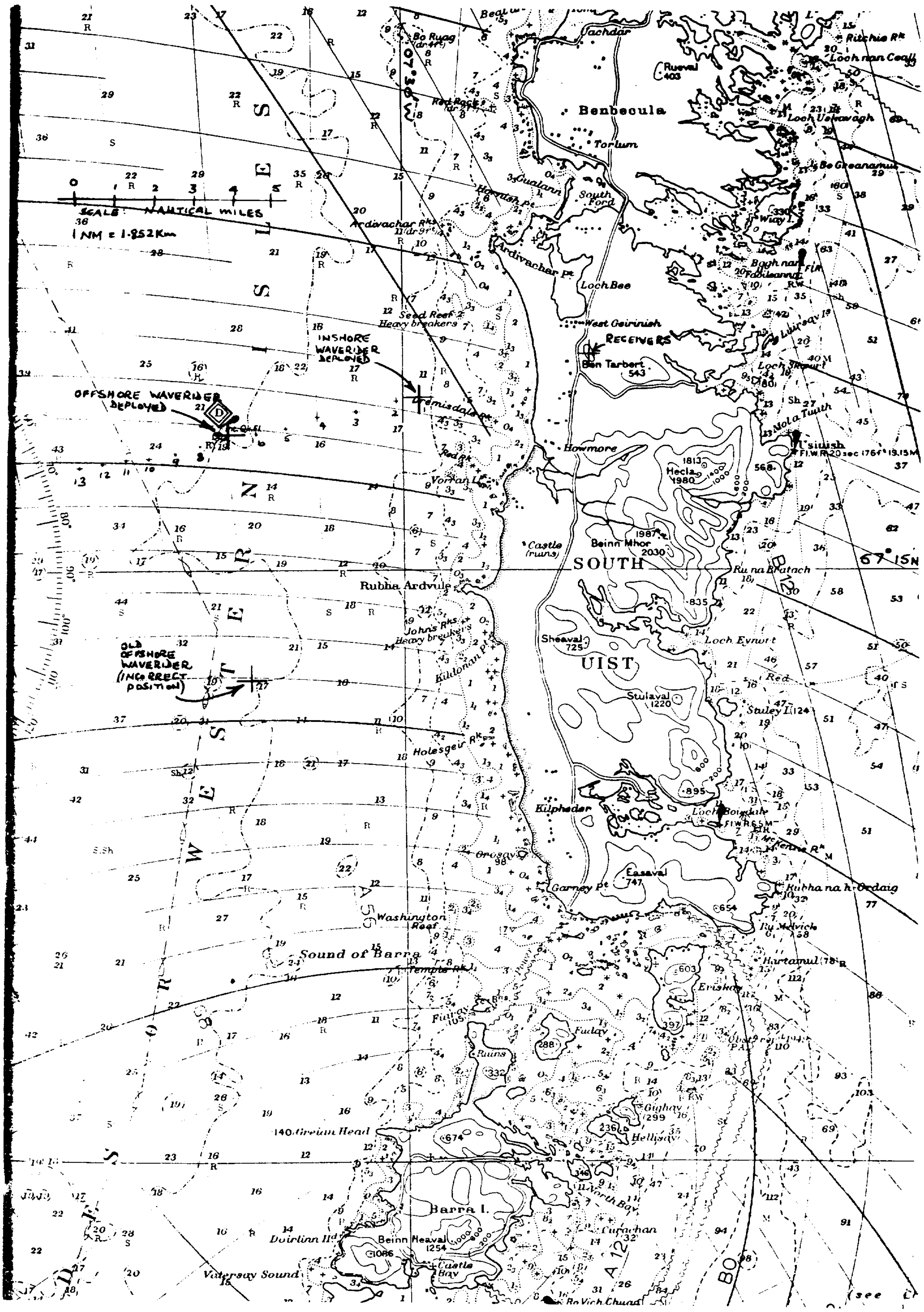
APPROVED BY : A P SALKIELD

DATE : 25-2-80.

STATION LIST

Time GMT	DECCA Green	DECCA Purple	Depth Metres	REMARKS
0115	C 32.8	A 59.3	48.0	Old offshore W/R recovered
0205	D 32.4	A 58.9	46.0	New offshore W/R deployed
0252	-	-	22.0	New inshore W/R deployed
0257	D 37.3	A 53.6	27.4	Alongside inshore W/R started echo-sounder run marked (1) on E/S chart.
0305	D 36.96	A 54.0	27.4	Marked (2)
0317	D 35.02	A 55.0	29.8	Marked (3). Speed increased from 3-4 kt to 5-6 kt.
0325	D 34.62	A 56.0	35.4	Marked (4)
0333	D 33.30	A 57.0	32.4	Marked (5)
0340	D 32.62	A 58.0	43.3	Marked (6)
0347	D 32.24	A 59.0	46.8	Marked (7). Passing approx. 150 m S of offshore W/R.
0354	D 31.63	A 60.0	35.8	Marked (8)
0400	D 31.08	A 61.0	52.5	Marked (9)
0405	D 30.66	A 62.0	58.1	Marked (10)
0411	D 30.27	A 63.0	55.4	Marked (11)
0416	C 47.91	A 64.0	70.6	Marked (12)
0422	C 47.53	A 65.0	73.7	Marked (13)

Note: Depths corrected approx. to mid-tide depths below transducer.
Transducer depth approx. 3 m.



SCALE: NAUTICAL MILES
0 1 2 3 4 5
1 NM = 1.852 Km
INSHORE WAVERIDER DEPLOYED
OFFSHORE WAVERIDER DEPLOYED
OLD OFFSHORE WAVERIDER (INCORRECT POSITION)
RECEIVERS
Benbecula
Torlum
Rueval 403
Loch Uskavagh
Loch nan Ceall
Ritchie Rk
Wiay I.
South Ford
Gualann
Ardivachar Pt
Loch Bee
West Geirinish
Seed Reef
Heavy breakers
Ben Tarbert 543
Loch Skiport
Usinish
Howmore
Hecla 1980
Beinn Mhor 2030
Castle (ruins)
SOUTH
UIST
Rubha Ardvule
Johns Rks
Kildonan Pt
Sheaval 725
Loch Eynort
Stulaval 1220
Stuley I.
Holesgeir Rk
Kilpheder
Loch Boisdale
Garrey Pt
Easaval 747
Rubha na h-Ordaig
Washington Reef
Sound of Barra
Eriskay
Hartamul
Fuday
Gighay
Hellisay
Greian Head
Barra I.
North Bay
Beinn Heaval 1254
Castle Bay
Vatersay Sound
Doirlinn Hd
Curachan
67 15N

VESSEL: MFV 777 'Devonian'

OWNER: J McGuire
5 Swan Court
Dartmouth
Devon

CRUISE PERIOD: 1200 hours 26 February 1980 -
1600 hours 27 February 1980

PERSONNEL: J D Humphery, HSO, Senior Scientist
A J Marks, SSO
E J Moore, HGCD
B M Norman, ASO

ITINERARY: Tuesday 26 February
Started loading equipment approx 1200. Moved Devonian to deepwater berth approx 1500.
Wednesday 27 February
Sailed approx 0900. Deployed Waverider No 6459 at 1050. Searched for toroid and marker buoys on sandwave survey site, without success. Returned to Dartmouth. Offloaded equipment left ship approx 1600.

OBJECTIVES: To deploy a Waverider and mooring on the outer edge of the Skerries bank in Start Bay, South Devon. This is to provide information for the sandwave mobility study which has been going on for some time. To search for toroid and other marker buoys indicating position of sandwave study site. To dive and inspect passive instrumentation on site.

PROCEDURE AND METHODS: Waverider mooring was assembled on deck. All galvanised shackles were greased and moused with galvanised wire; all stainless shackles were moused with nylon. Mooring was flaked out on deck so that it would run out freely without snags. Heavy mooring chain was laid over gunwale in a series of big bights.

When at the correct position a check was made on the water depth; when the correct depth was found, the ship was held against wind and tide. The Waverider was lowered by hand over the side and allowed to float clear on the rubber cord. The anchor was then dropped overboard, followed by the heavy mooring components; the flaked-out rope was then allowed to run free as the mooring dropped clear. A check was made on the position and depth.

Conditions were not good, wind NE 3 - 4 with a short chop causing 'Devonian' to roll somewhat. It was also very cold with poor visibility (approx $\frac{1}{2}$ mile).

A search was made for the toroid which acted as a warning to fishing boats of seabed obstructions on the sandwave study site. Despite a careful search. no sign whatever could be found of the site. As no very accurate position-fixing equipment was carried

on board Devonian, and as conditions were generally poor with no good underwater visibility, no dive was attempted.

EQUIPMENT PERFORMANCE: Waverider and mooring were prepared at IOS(T) before leaving for Dartmouth. Signals from the Waverider monitored onshore later showed that it was working satisfactorily. Equipment on board 'Devonian' worked satisfactorily as far as could be determined (Decca Navigator and echo-sounder).

DEPLOYMENT POSITION: Waverider was laid at 1050 on 27.2.80 in position:

Decca Red 10.2
Purple 56.6
Depth at laying 20m, mid-tide.
Bell buoy bears NE, distant 0.75 miles

Prepared by: J D HUMPHERY

Approved by: A P SALKIELD

Date: 2-4-80

VESSEL: MV British Diver

OWNER: British Sub-Aqua Club (BSAC)

OPERATOR: Plymouth Ocean Projects Ltd
Fort Bovisand Underwater Centre
Fort Bovisand
Plymouth
PL9 0AB
Tel: Plymouth (0752) 42570

CRUISE PERIOD: 1200 on 25.3.80 to 1100 on 27.3.80

PERSONNEL: J D Humphery HSO Senior Scientist/Diver
A J Marks SSO Diver
E J Moore HGCD Diving Officer
B M Norman ASO Trainee Diver
P J Hardcastle SSO Shore Operator

ITINERARY:

25.3.80 Travelled to Plymouth, loaded equipment. Performed training dive in Plymouth Sound.

26.3.80 Proceeded to Eddystone Waverider station, retrieved old Waverider, deployed new Waverider, returned to mooring.

27.3.80 Unloaded equipment, returned to Taunton.

OBJECTIVES: To replace the Waverider buoy on an existing mooring to the South of the Eddystone lighthouse. To recover the old Waverider. To deploy another Waverider in the free-floating mode operating on 29.725 MHz to compare received signal strengths at HMS Cambridge. To perform in-date training dives in preparation for the Blackpool Sands experiment after Easter. To give B M Norman his first salt-water dive.

PROCEDURE AND METHODS:

25.3.80 Arrived at 'British Diver' moorings, Cattewater, Plymouth, at approx 1200. Loaded Waveriders, diving gear and other equipment using IOS(T) inflatable as tender.

Wind was SW 4-5 with sharp chop in Plymouth Sound and fair swell outside. Decided not to attempt Waverider change; instead performed an in-date training dive in Cawsand Bay, using inflatable. Gave BMN his first salt-water dive, but conditions very unsatisfactory with visibility 50cm max. Returned to British Diver.

26.3.80 Day dawned cloudy with light SE breeze. RAF Mountbatten meteorological office forecast light conditions at first, but conditions deteriorating rapidly with SE gale forecast 'by lunch time'. Decided to attempt Waverider exchange; phoned PJH at IOS(T) so that he could drive to HMS Cambridge to set up receivers.

Waveriders were energised on deck as follows:
67144 on 26.990MHz (Eddystone replacement)
67213 on 29.725MHz (Signal strength comparison)
Mooring components for 67144 assembled. Proceeded to site into freshening breeze; on arrival Eddystone wind blowing SE 4-5, sea rising quickly. Divers kitted up when nearing Eddystone.

Used inflatable to take divers and surface marker buoy (SMB) to existing Waverider no 67151. Moored inflatable to 67151, took SMB rope to sub-surface float (SSF), made secure on a short line. Detached Waverider mooring, returned to surface. Took 67151 to 'British Diver' with inflatable, pulled buoy onto deck by hand.

Lowered new Waverider no 67144 into water with new mooring attached. Towed 67144 to SMB (difficult in rising wind/sea). Divers took tail of mooring down SMB line and connected mooring to SSF. SMB line was released, divers returned to inflatable, thence to British Diver. Time 1315 BST.

67213 had been transmitting on 29.725 MHz with a standard 2.06m antenna since 1000 BST. By the time that the Waverider exchange was completed, wind was SE 5-6, and sea was worsening rapidly. Decided to abort the free-floating experiment. Passed message to this effect to PJH via HMS Cambridge Wembury Range radio, and started for Plymouth. Fitted 1.81m aerial to 67123 at 1320 BST. Arrived Cattewater approx 1530 BST, in heavy rain and squalls.

27.3.80 Unloaded equipment and returned to Taunton, arriving approx 1415 BST.

EQUIPMENT
PERFORMANCE: Waveriders were prepared at IOS(T) prior to departure and worked satisfactorily on site. IOS(T) inflatable keel leaked rapidly, allowing boat to flex considerably on site. Outboard motor performed well, despite being swamped several times. VHF radio on British Diver worked well - this was the only instrument used for IOS work.

DEPLOYMENT
POSITION: Waverider number 67144 deployed with roofhatch number L-074 on 26.990MHz at 1240 approx on 26.3.80. Position approx 300m S of Eddystone lighthouse.
Depth (mid-tide) approx 41m.

PREPARED BY: J D HUMPHERY

APPROVED BY: A P SALKIELD

DATE: 23-4-80

VESSEL: R.R.S. John Murray

CRUISE PERIOD: 24 June - 7 July 1980

PERSONNEL:

D N Langhorne	SSO (Senior Scientist)
A P Salkield	SSO (24 - 26 June)
A J Marks	SSO
E J Moore	PTO III
J D Humphery	HSO
P M Hooper	HSO
N Dillon	ASO
B Norman	ASO

ITINERARY:

24 June 1400 Sailed from Barry. On passage.

25 June 0900 Anchored in Falmouth Bay for trials with underwater camera system and comparative trials with IOS(T) (Tecmatic TC 125) and AUWE (low light) underwater T.V. systems.
1815 Sailed for Weymouth Bay.

26 June 0730 Arrived off Weymouth. Landed A Marks to return camera flash unit to UMEL. P Hooper, N Dillon and B Norman joined ship. Collected T.V. lighting system from AUWE Portland.
1030 - 1830 Seismic survey off Adamant Shoal and East Shambles Bank areas (equipment: ORE Pinger, Huntec ED10 Boomer, 500 joules Sparker, EG and G Sonar, Simrad Echosounder. Position fixing by Navigational Decca).
1930 Anchored in Weymouth Bay. Landed A P Salkield. A J Marks rejoined the ship.

27 June 0800 - 1300 Underwater T.V. Sonar and Grab sample evaluation of sediment grain size in areas off Adamant Shoal and Shambles Bank.
1300 Sailed for area 5 miles to South of Anvil Point to evaluate gravel areas.
1945 Anchored off Poole

28 June 0600 Off Dolphin Sands for grab sampling. Attempts abandoned because of sea conditions (Wind force 6 - 7 south-westerly). Proceeded to the West Solent.
0830 - 1250 Seismic survey in West Solent.
1330 - 1515 Grab sampling.
1600 - 2230 Deployed current meter, underwater camera system and T.V.

29 June 0811 Recovered current meter system. Sailed for Dolphin Sands.
0940 - 1300 Seismic survey around Dolphin Sands.
1320 - 1400 Grab sampling
1420 Anchored to South of Bank and deployed current meter, underwater camera and T.V.
2320 Recovered cameras. Sailed for East Solent.

30 June 0750 - 1140 Seismic survey in Nab to Hayling Bay area.
1245 - 1310 Grab sampling.
1340 - 2145 Deployed current meters (U_{100} and mid depth) and camera systems.

1 July 0900 - 1430 Seismic survey in Nab - Selsey Bill area (Wind force 6 North-westerly)
1500 - 1730 On passage to West Solent.
1800 - 2400 Deployed current meters and camera systems in West Solent gravel area.

2 July 0730 Land P M Hooper at Yarmouth.
0820 Recovered current meter.
1037 Deployed current meter on North side of West Solent channel.
1100 - 1630 Grab sampling in West Solent.
1830 Recovered current meter on South side of channel to clear weed.
1920 - 2130 Deployed camera systems.

3 July 0800 Recovered 2 current meters. Sailed for Hayling Bay area.
1120 - 1700 Diving inspection of dredger suction hole in gravel area.
17[illegible]0 Anchored off Bembridge Ledge.

4 July 07[illegible] Sailed from Bembridge Ledge.
0940 - 1740 Seismic and sonar survey between Selsey Bill and off Brighton.
1830 - 2000 Deployed current meters and camera system in dredging area off Brighton.

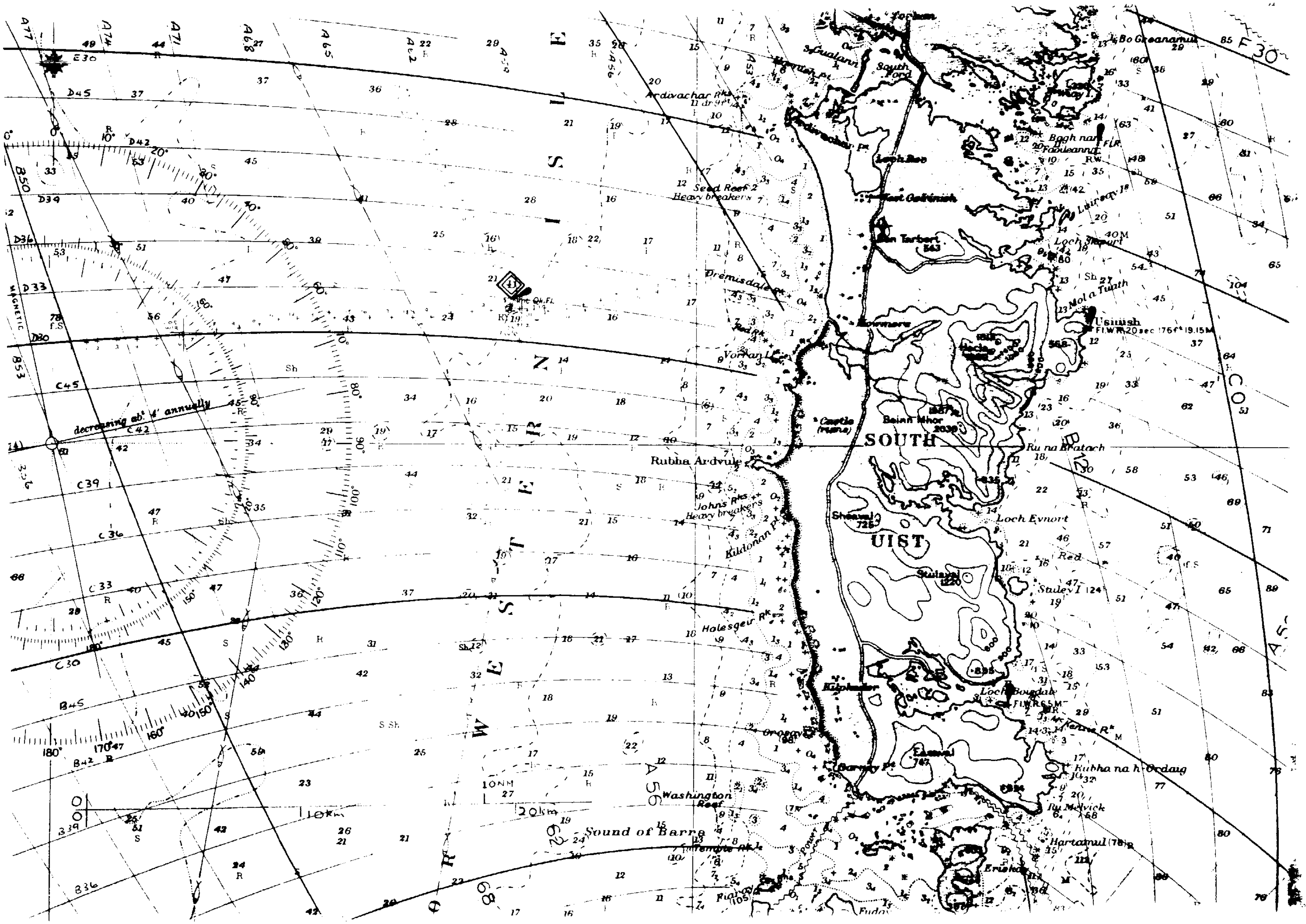
5 July 0800 - 1100 Deployed camera systems in dredging area.
1130 Recovered current meter. Sailed for East Solent.
1500 DNL, EJM, AJM and JDH landed at Portsmouth by contract launch. ND and BN sailed on passage for Barry.

6 July On passage.
2400 Arrived Barry.

OBJECTIVE: To evaluate known gravel areas in the English Channel for their suitability for detailed studies of gravel mobility under tidal flow and surface wave conditions.

PROCEDURE AND METHOD:
a) Bathymetric and seismic surveys to determine the extent and thickness of gravel deposits.
b) Sea bed sampling to determine the sediment grain size and also, ground truth interpretation of sonar records.
c) Underwater T.V., time lapse photography and self-recording current meters to make preliminary studies of gravel mobility and threshold velocities of movement.

EQUIPMENT AND PERFORMANCE:
a) Underwater photography (UMEL Camera system).
During the equipment trials on 25 June the flash unit failed due to ingress of water. The unit was returned to UMEL and a replacement obtained.


SOUTH
UIST
Loch Eynort
Usinish
Washington Reef
Sound of Barra
Rubha Ardvule
Heavy breakers
MAGNETIC
decreasing ab^t 4' annually

START BAY VESSEL: M.F.V. DEVONIAN

CRUISE PERIOD: 2 September 1980 to 20 September 1980

PERSONNEL:

D.N. Langhorne	S.S.O. (Senior Scientist)
E.J. Moore	HGCD/PTO III (Diving Officer and Cruise Leader)
A.J. Marks	S.S.O. (Electronics and Diving Team)
J.D. Humphery	H.S.O. (Senior Diver)
B. Norman	A.S.O. (Diving Team)
P.M. Hooper	H.S.O. (15-18 September)
G.N. Crisp	H.S.O.
R. Reed	Bath University

ITINERARY: M.F.V. Devonian operated on a day running basis from Dartmouth.

2/9/80 2100-2400 Loaded Devonian, launched inflatable set up equipment.

3/9/80 0700-2000 D.N.L. and B.N. ashore in Land Rover to set up trisponder at Strete and Start Point picked up at Start Point 1015. Examined sandwave area with Echo sounder and dropped buoy on suitable sandwave. Divers checked sandwave, installed two Aanderaa current meters, line of 10 Eprom stakes and line of stakes for normal measurement.

4/9/80 0830-2030 Divers put extra air in current meter buoyancy, installed more stakes, measured Eproms and carried out full set stake measurements. Second set measurements at next slack water and 17 sediment samples taken. Shore transits noted.

5/9/80 0830-2100 Two sets slack water stake measurements. Corrosion observed on Eproms, thereafter cleaned on every dive. 1630 B.N. ashore Start Point to collect Land Rover and return to Dartmouth.

6/9/80 0600-2230 Three sets slack water measurements. Took on water Kingswear jetty 2230-2330.

7/9/80 0700-1730 Two sets stake measurements. Search for A.U.W.E. equipment. Carried out Echo sounder run over sandwaves but abandoned due to poor sea conditions.

8/9/80 0730-1930 Two sets measurements measured Eproms before and after moving.

9/9/80 0800-1800 Two sets measurement. Trisponder found to be unserviceable, repaired by replacing Low Voltage card in Master Unit. Trisponder co-ordinates logged for stake positions.

10/9/80 0700-1930 B.N. ashore 0700 to return to Taunton. Two

b) Sub-bottom profiling:
   i) Huntec ED 10 Boomer - poor records due to excessive ship's noise.
   ii) ORE Pinger - reasonable records obtained in surface layers only.
   iii) 500 Joule Sparker - good penetration (up to 60mm) obtained, but with poor resolution.
c) EG and G Sidescan Sonar - good.
d) Underwater T.V.
   i) AUWE system - good
   ii) IOS (T) (TEC 125) - good when no sediment was moving, but it rapidly lost resolution once sediment started to move.
e) Flow measurement: 2 Anderaa self-recording current meters. The instruments proved to be reliable but were inhibited by weed fouling.
f) Sediment sampling - The Shipek grab proved to be effective for sampling gravel.

RESULTS: The existence and potential mobility of gravel was evaluated in the following areas:
Weymouth Bay (Adamant Shoal and Shambles Bank) off Anvil Point, Dolphin Sands, West Solent, Nab to Hayling Island area, Selsey Bill to Brighton area. Comprehensive data was obtained which will be used to select areas for detailed studies of gravel mobility under tide and wave conditions.

PREPARED BY: D N LANGHORNE

APPROVED BY: K R DYER

DATE: 15 JULY 1980

VESSEL: M.T. REUL NA MAIDNE

OWNER: D.B. MACLEOD,
Oiteag na Mara,
Bruernish,
North Bay,
Barra,
Outer Hebrides,
SCOTLAND.

CRUISE PERIOD: 0700 hrs 10 August 1980 - 1200 11 August 1980

PERSONNEL:

J.D. Humphery	H.S.O. Senior Scientist
J.A. Crabb	S.S.O.
B.M. Norman	A.S.O.

ITINERARY: Sunday 10 August

Started loading equipment 0700 BST.
Deployed Super offshore (S.O.S.) Waverider 1344 BST.
Echo Sounder survey to offshore (O.S.) Waverider, 1417 to 1610 BST.
Recovered old offshore (O.S.) Waverider approximately 1630 BST.
Deployed new O.S. Waverider 1705 BST.
Echo Sounder survey to North of O.S. Waverider, 1712 to 1816 BST.
Recovered old inshore (I.S.) Waverider at 2000 BST approximately.
Deployed new I.S. Waverider at 2013 BST.
Echo Sounder survey I.S. Waverider to O.S. Waverider, and to 10 Km South of O.S. Waverider between 2021 and 2210 BST.

Arrived Castlebay 0145 on 11.8.80.

OBJECTIVES: To deploy three Waverider buoys to the West of South Uist; two of them to continue the series of measurements started in 1976, the third being in a new location some 31 km offshore. To perform echo sounder surveys between the three buoy positions, and 10 km to North and South of the offshore location. To recover the old inshore and offshore Waveriders.

PROCEDURE AND METHODS: The equipment was first loaded onto the Notre Dame; however a voltage regulator fault meant that the Decca Navigator and other equipment would not work. The Waverider equipment was thus transferred to the Reul Na Maidne: and departure from Castlebay delayed until 1100 BST approximately. Sailed for super-offshore location via Sound of Vatersay, arrived on site approximately 1330 BST.

An echo sounder survey was performed to ensure that flat bottom conditions prevailed at the proposed site. No bottom irregularities observed. Lowered S.O.S. anchor on 205 m rope mooring; when anchor on bottom, lowered Waverider over stern by hand. Many metres of rope noted on surface. (Note: No current observed).

Steamed to position some 2 N. miles West of S.O.S. position. Commenced echo-sounder run past S.O.S. position, to a point just East of offshore Waverider location. Marked echo-sounder chart with event marker every 5 minutes; noted Decca Navigator positions and time.

On arrival at offshore Waverider location, recovered old Waverider and mooring to just below the sub-surface float. Lowered new Waverider over stern by hand, paid out upper part of mooring. Rolled new sub-surface float over side, paid out riser chain. Ensured that all mooring components were free of kinks etc. Lowered anchor clump to bottom on pre-prepared steel cable from trawl winch; when clump on bottom moved away from mooring andcut cable.

A course due North (Magnetic) was set, and a echo sounder survey performed to a point some 10 km North of the offshore Waverider position, then steamed to inshore Waverider position.

Recovered the old inshore Waverider with some difficultly. The rubbercord was hauled in using the rubber power-block at the stern, but the anchor chain had to be recovered using the jilson and rope stoppers. Recovery took perhaps 45 minutes. Meon anchor was fouled by the chain. There was evidence that someone had tried to recover the mooring; rope was tied to the lower end of the rubbercord.

Lowered the new inshore Waverider over the stern by hand, paid out mooring. Lowered anchor to bottom on rope bight while steaming slowly ahead. Recovered rope.

Set course for offshore Waverider position, performing echo-sounder survey. Passed to Southeast of offshore Waverider and headed due South (magnetic) for approximately 10 km. Finished survey at 2210 BST, headed for Castlebay via Sound of Pabbay, arriving alongside at 0145 on Monday 11 August.

Equipment was off loaded alongside at Castlebay 0845-1200 on 11 August 1980 in moderate rain.

WEATHER: On departure Castlebay weather was dull with moderate visibility; wind ESE force 3, dropping. While at the S.O.S.position wind force 1-2 Southerly, visibility decreasing:at the O.S. position, wind 0-1, visibility 100-200 metres with fog patches. At inshore position,

wind Southerly 0-2 increasing, visibility 400-500 m. During last survey and voyage home, wind Southerly 2-4. Note: warnings of gales "soon" and "imminent" were in operation throughout the cruise period but did not arrive until some 8 hours after our return. Detailed weather forecasts from London Weather Centre and Benbecula were obtained before sailing.

SEA: Although wind and local sea were from South throughout cruise period, a long swell was coming in from approximately WNW (presumably from Atlantic depression moving in (which caused the gales later)). Swell was very low at S.O.S. position and only a little more noticable at the O.S. position. However, between, the end of the Northern survey and the inshore Waverider site, the shoaling bottom produced a marked increase in swell height to 3-4 metres, but still very long, (200-300 m). The swell was noticable throughout the last survey to the offshore Waverider position and to the South.

POSITIONS: The Decca position, depths and times of all Waverider deployments was noted. (Note: Depths have been corrected for mid-tide depths in the position list).

During the surveys, the echo-sounder chart was marked with the event marker every 5 minutes and the Decca positions and time noted.

During the North-South surveys from the offshore Waverider position, course offsets would have been cuased by tidal-currents; these were not corrected because no position plotting was possible during the surveys.

EQUIPMENT PERFORMANCE: Waveriders were energised and sealed on deck, and emissions checked with absorbtion wavemeter. All moorings were simply assembled on deck, all major components having been prepared at IOS (T) prior to departure. All IOS equipment worked satisfactorily. On-board equipment used included Decca Navigator MK 21, Furuno Radar, Furuno Echo Sounder, fish loop. All equipment worked well.

Prepared by: J D Humphery. J D HUMPHERY

Approved by: A P Salkield. A P SALKIELD

Date: 24-9-80.

Waverider Positions on 10 August 1980

Super Offshore (S.O.S.) Waverider

Decca	Green	D	30.10
	Purple	A	73.94
Time	1344 BST		
Depth	97.6 m mid-tide		

Offshore Waverider

Decca	Green	D	32.40
	Purple	A	58.85
Time	1705 BST		
Depth	51.0 m mid-tide		

Inshore Waverider

Decca	Green	D	37.20
	Purple	A	53.60
Time	2013 BST		
Depth	26 m mid-tide		

Low tide approx 1400 BST

High tide approx 2000 BST

Depth of transducer approx 2.5 m

Echo Sounder Survey. West of South Uist, Hebrides, 10 August 1980.

Echo Sounder - Furuno

Decca Navigator MK 21

Station List

Run I S.O.S. to O.S. position

Fix	Time BST	Ships Head, °magnetic	Green	Purple	Comments
1	1417	095	C 47.90	A 79.10	SOL
2	1420	094	C 47.90	A 78.50	
3	1425	096	C 47.95	A 77.45	
4	1430	098	C 47.90	A 76.40	
5	1435	097	C 47.85	A 75.30	
6	1440	093	C 47.98	A 74.18	
-	1442	Super-offshore Waverider passing to port.			
7	1445	093	D 30.14	A 73.20	
8	1450	093	D 30.28	A 72.16	
9	1455	094	D 30.43	A 71.10	
10	1500	096	D 30.62	A 70.05	
11	1505	094	D 30.82	A 69.10	
12	1510	096	D 30.96	A 68.20	
13	1515	098	D 30.97	A 67.26	
14	1520	100	D 30.99	A 66.42	
15	1525	097	D 31.10	A 65.64	
16	1530	100	D 31.14	A 64.78	
17	1535	100	D 31.15	A 63.91	
18	1540	095	D 31.16	A 63.10	
19	1545	095	D 31.37	A 62.32	
20	1550	090	D 31.66	A 61.50	
21	1555	096	D 31.90	A 60.70	
22	1600	097	D 32.16	A 59.96	
23	1605	096	D 32.41	A 59.26	
-	1606	Offshore Waverider passing 70 m to starboard.			
24	1610	102	D 32.48	A 58.48	EOL

Run II O.S. position, due North (magnetic), for 10 km approximately

Fix	Time BST	Ships Head °magnetic	Green	Purple	Comments
25	1712	000	D 32.36	A 58.92	Passing o/s W/R
26	1715	003	D 32.82	A 59.02	
27	1720	005	D 34.00	A 59.23	
28	1725	005	D 35.14	A 59.48	
29	1730	000	D 36.26	A 59.74	
30	1735	000	D 37.42	A 59.96	
31	1740	000	D 38.54	A 60.27	
32	1745	000	D 39.68	A 60.59	
33	1750	000	D 40.82	A 60.88	
34	1755	000	D 41.94	A 61.10	
35	1800	007	D 43.10	A 61.37	
36	1805	003	D 44.28	A 61.63	
37	1810	008	D 45.44	A 61.87	
38	1815	005	D 46.62	A 62.10	
39	1816	002	D 47.00	A 62.16	EOL

Run III Inshore Waverider position to offshore position then 10 km to South (magnetic) of offshore buoy.

Fix	Time BST	Ships Head °magnetic	Green	Purple	Comments
1	2021	Turning to 265	D 37.12	A 53.62	SOL
2	2025	264	D 36.60	A 54.00	
3	2030	262	D 36.00	A 54.34	
4	2035	263	D 35.44	A 54.78	
5	2040	265	D 34.88	A 55.32	
6	2045	258	D 34.30	A 55.82	
7	2050	264	D 33.70	A 56.28	
8	2055	268	D 33.12	A 56.85	
9	2100	280	D 32.72	A 57.40	
10	2105	282	D 32.42	A 58.06	
11	2110	300	D 32.24	A 58.78	
	2111	offshore Waverider passing 100 m to starboard.			
	2112	Changing course to 180° magnetic.			
	2113	Steadied onto new course.			
12	2115	180	D 31.38	A 59.08	
13	2120	182	D 30.02	A 59.14	
14	2125	180	C 46.72	A 59.28	
15	2130	182	C 45.44	A 59.58	
16	2135	180	C 44.16	A 59.84	
17	2140	180	C 42.86	A 59.98	
18	2145	178	C 41.62	A 60.12	
19	2150	180	C 40.40	A 60.46	
20	2155	180	C 39.14	A 60.82	
21	2200	180	C 37.94	A 61.02	
22	2205	180	C 36.68	A 61.24	
23	2210	180	C 35.42	A 61.56	EOL

sets stake measurements, trials with G. Crisp's spar buoy. Trawler seen operating $\frac{1}{4}$ mile E of stake area.

11/9/80 0830-1900 B.N. returned from Taunton. J. Blower, J. Whellock, N. Dillon joined as day visitors. Two sets stake measurements, move Eproms and re-measured.

12/9/80 0800-2000 Contacted D.N.L. to report progress. Very rough day, West Force 9, two sets of measurements, sheltered in Hallsands between slack waters.

13/9/80 0430-2030 Three sets measurements, moved Eproms. Returned to Dartmouth am to replemish petrol supply for outboard compressors and generator.

14/9/80 0800-2045 Attempted repairs to inflatable. Two sets of measurements. Answered a Coastguard distress call to rescue man in small dinghy drifting offshore in strong winds. Completed rescue off Slapton and regained site in time for second set measurements.

15/9/80 0800-2015 D.N.L. and P.H. arrived from Taunton 1030 having replaced trisponder batteries. Equipment set up for box survey. Stake measurements 1230. Trisponder unserviceable on both channels. Changed High and Low Voltage circuit boards and completed one survey line before failing again. Second set measurements 1830. R. Reed (Bath University) joined 2100.

16/9/80 0730-2030 Two sets of measurements. Too rough to attempt survey. Answered a Coastguard call to search for apparently empty dinghy off Slapton but nothing found. Recovered Eproms 1915. Trawler fishing in vicinity.

17/9/80 0630-1900 B.N. ashore 0630 to return to Taunton. Stake measurements 0815. Trisponder unserviceable so took Devonian to Brixham for spares from Decca. Second set measurements 1400 plus set sediment samples. 1500 landed D.N.L., A.M., P.H. at Start Point to check remote. Batteries found unserviceable. D.N.L. and R.R. left 2000.

18/9/80 0730-1800 25 h.p outboard motor failed, changed to 10 h.p. Weather bad, forecast Southerly 8, so removed both current meters, measured stakes, removed spare site marker and trisponder calibration buoy. Divers reported turbulence on sandwave. Returned to harbour for shelter. P.H. returned borrowed trisponder spares to Brixham and recovered trisponder remotes. Sailed again 1400 but returned after look at area. Sea too rough to work, very heavy seas in River Entrance. Unloaded all equipment except basic diving gear. J.H. and P.H. return to Taunton in hired van.

19/9/80 0830-1700 D.N.L. phoned to request extension of charter to obtain post gale data. One set measurements taken, very rough conditions. South 6-7, divers observed gale effects and reported turbulence movement on crest.

20/9/80

0830-1900 One set of measurements, removed stakes, anchor and mooring, removed both current meter frames and sinkers. Unloaded remainder of equipment, E.J.M., A.M. and B.N. returned to Taunton.

OBJECTIVES:

(a) To continue the study of sandwave movement and sediment transport in relation to hydrodynamic conditions.

(b) To test an improved system of self-recording Eprom stakes.

(c) To carry out a box survey of the area surveyed on previous occasions.

(d) To provide assistance and ship time for G. Crisp's trials with spar buoy.

PROCEDURE AND METHODS:

The experiment was almost an exact repeat of that carried out in 1979 and marred by failure of the remote recording stakes. A line of 34 seabed reference stakes was set up crossing the sandwave crest at right angles (see Fig 1). These stakes were measured by divers at slack water to measure the movement of the sandwave over a Neap/Spring/Neap tidal period. Tidal flow was measured using 2 self-recording current meters placed 1 m above the seabed on the sandwave crest.

A line of 10 self-recording stakes was set up parallel to the reference stakes and 2 m North. These were observed and measured daily by divers and individual stakes moved to best advantage to record the changing shape of the sandwave.

G. Crisp's spar buoy was tested in calm water in the lee of Hallsands. Flotation tests were carried out and the inflatable was used to keep station on the buoy while remaining tethered. G. Crisp report attached.

EQUIPMENT PERFORMANCE:

Trisponder:

9/9/80 Low voltage card in Master Unit failed. Replaced with spare.

15/9/80 Low voltage card in Master Unit failed again, a fault on the high voltage card could have caused overloading of the low voltage card: High voltage card replaced from spares; Low voltage card borrowed from remote No 76.

15/9/80 Channel 2 on the D.M.U. only updating in Rapid Mode no update in Normal Mode: Control card replaced from spares.

17/9/80 Remote station failure due to catastrophic cell degeneration in two of the 95 A.H. batteries, survey abandoned. Apart from the above faults the system operated satisfactorily.

Raytheon Echo Sounder: Satisfactory operation. New parts have improved the appearance of the trace.

Radios: No problems except that some batteries may need replacing, and the Westminster requires a new aerial.

Bedform Monitors: Electrolysis problems caused corrosion products to obscure some cells. There were two cell failures due to a dry joint and a poor plug connection, one cell failed mechanically, and one monitor failed after about 5 days because of a component failure. For further information see separate report.

Aanderaa Current Meters: Their operation appeared to be correct although the tapes have not yet been read.

Generator and Diving Compressor: Operation was satisfactory. A pressure gauge on the compressor was damaged due to ship motion.

General Diving Gear: A few minor faults were rectified on site or on return adequate spares were carried.

Inflatable: The towing bridle parted due to rotted and worn fittings. As the fittings are built into the hull a new bridle will have to be rigged such that the strain is taken by the transom. An old repair to the floor opened up causing a leak. Some trouble was experienced with the 25 H.P. outboard; which may have been partially due to spark plugs being damaged by salt water.

One outboard fuel tank developed a leak rendering it unusable.

RESULTS: The cross sectional profile of the sandwave was obtained over a period of 18 days, covering a Neap/Spring/Neap tidal period. The current meters were in operation for 16 days and were inspected for fouling twice each day. The height of each current meter and its distance from the sandwave crest were measured daily. Corrosion on the Eprom stakes was noticed on the second day and was thereafter cleaned on every dive.

Because of the trisponder problem the box survey was not carried out.

Prepared by: E J MOORE

Approved by: K R DYER

Date: 23 Oct 1980

Preliminary Trials of Spar Buoy

Preliminary trials of a small, spar-buoy-mounted, capacitance wire wave staff were conducted in the lee of Start Point as the weather conditions precluded trials over the Skerries.

The instrument, originally designed as a wavetank model, was deployed on a buoyed tether and carried a small echo sounder hydrophone attached to the bottom of the spar. The trial was intended to demonstrate the feasibility of tracking the buoy using an inflatable boat, whilst recording both surface waves with frequencies in excess of 0.05 Hz and a bottom profile.

In practice it was found that the mooring arrangement is not well designed for field use and results in a low frequency instability of the whole buoy. Only a very small change in tension of the mooring causes the buoy to change its altitude in the water which in turn makes the hull of the buoy develop lift as it is towed through the water. As a result the capacitance gauge is eventually lifted clear of the surface on a time scale of the order of 1 minute. It was just possible using a longer mooring (35 m in length) to keep the mooring slack for a few minutes at a time using the inflatable boats outboard motor. The manoeuvers which were necessary to do this necessitated running over the slack mooring line and it is doubtful if this procedure would be adequate during the S.A.R. 580 experiment (especially as these trials need to be conducted in relatively calm water and in a location which was partially sheltered from the wind).

The attached chart shows a section of wave record which was taken during these tests and shows clearly the large excursions of the buoy caused by tension in the mooring. No difficulty was experienced using the wave staff and echo sounder simultaneously.

Diving Officer's Report

Start Bay Cruise M.F.V. Devonian 2/9/80 to 20/9/80

Personnel: Divers: J D Humphery, A J Marks, B Norman
Diving Officer: E J Moore

The Start Bay sandwave survey was geared almost entirely to diving work and slack water measurements of the sandwave profile were to be carried out at a High water slack and a Low water slack every day.

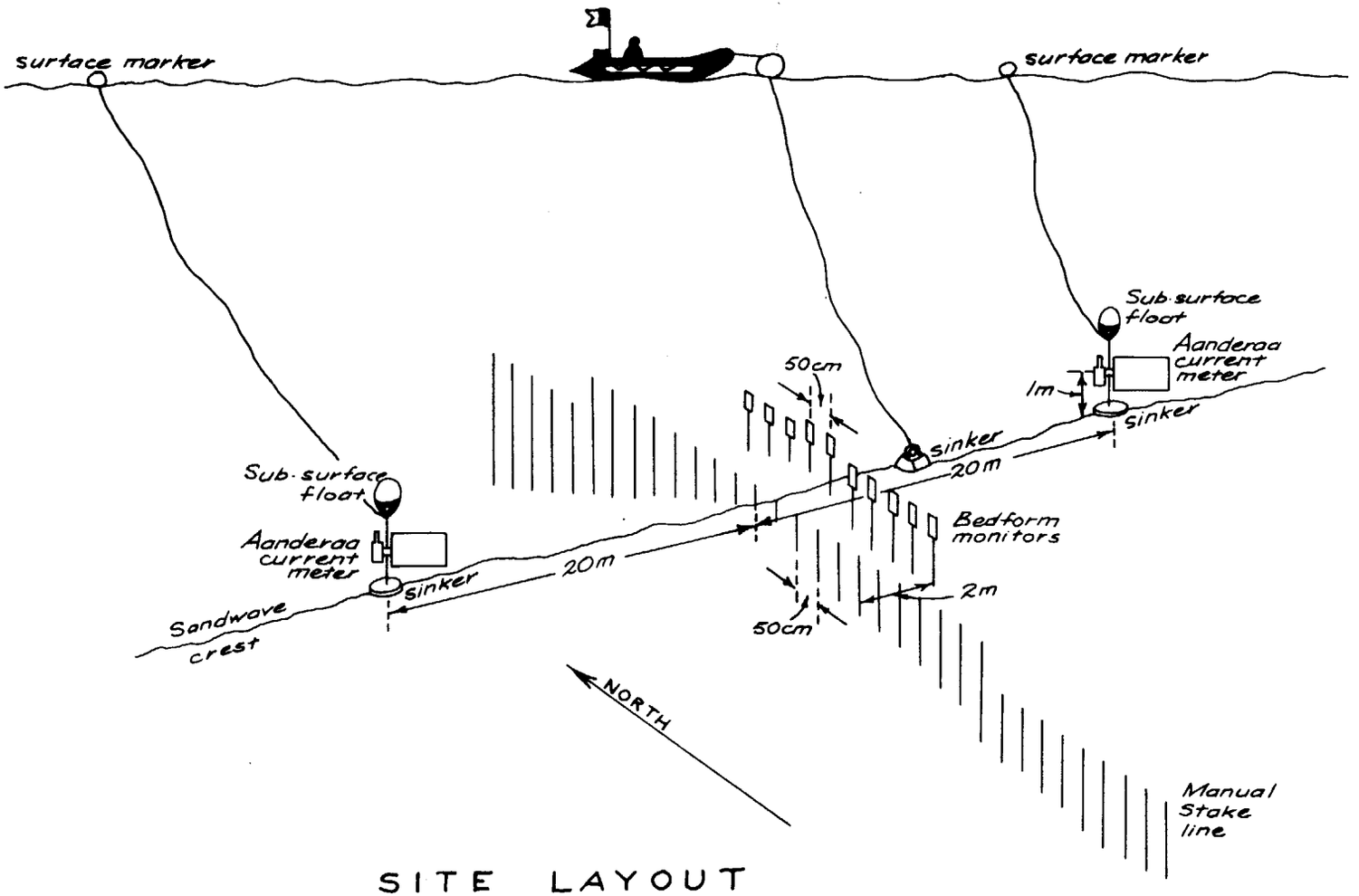
On the first day, 3 September, the divers examined the sandwave selected from echo sounder traces, installed two Aanderaa current meters on the sandwave crest, installed the set of Eprom stakes and a line of 34 stakes to be measured manually.

From that day until the 18 September, two and sometimes three slack water measurements were taken daily, sediment samples were obtained across the profile and the current meters checked for weed. The Eprom cells were cleaned daily and notes made of the number of cells exposed. A daily profile was drawn recording changes to the sandwave and enabling forward planning to Eprom movements.

The survey was extended by three days in order to examine the effect of Southerly gales on the sandwave and this was carried out successfully, only one slack water being missed through the gale.

No diving problems were encountered, the team worked perfectly together and everything went very smoothly. This team work, coupled with total confidence in the back up provided by John McGuire and Devonian enabled measurements to be continued through subsequent bad weather conditions, without the loss of any data.

All equipment and stakes sinkers etc were recovered and the site left completely clear.


surface marker
surface marker
Sub-surface float
Aanderaa current meter
1m
sinker
50cm
sinker
20m
Sub-surface float
Aanderaa current meter
sinker
20m
Bedform monitors
2m
50cm
Sandwave crest
NORTH
Manual Stake line

SITE LAYOUT

VESSEL: MFV 777, 'Devonian'

OWNER: John J McGuire
5 Swan Court
Dartmouth
Devon

Telephone: 080-43-3639

CRUISE PERIOD: 15 October 1980-19 October 1980

PERSONNEL:
J D Humphery - HSO - Senior Scientist
P M Hooper - HSO
G N Crisp - HSO
D C Raeburn - HEO
F Wardle - SO
G P Le Good - SO

ITINERARY:

15/10/80 - Rendezvous with Devonian at Kingswear jetty. Load equipment. Prepare Waverider and mooring; lash all gear securely.

16/10/80 - Standby - gales in English Channel.

17/10/80 - Standby - gales in English Channel.

18/10/80 - Standby - gales in English Channel.

19/10/80 - Sailed 0315 BST. Laid Waverider 0845 BST Rendezvous with Channel Light Vessel (CLV) 0900 BST. G.N.C. and equipment onto Light Vessel. F.W. and G.Le G. joined Devonian. Sailed for Dartmouth, docking 1600 BST approx. Returned to Taunton.

OBJECTIVES: To lay a Waverider buoy ½ N mile ENE of Channel Light Vessel. To recover two scientists from light vessel who had been installing experimental equipment. To place on board light vessel one scientist to carry out experiment.

PROCEDURE AND METHODS:

15/10/80 - Rendezvous with Devonian at Kingswear jetty at 1100 BST. Loaded all equipment on board immediately. Launched inflatable. Moved Devonian to mid-river mooring buoy. Prepared space on after deck for inflatable storage. Energised Waverider for deployment. Flaked out and made up mooring on deck, lashed all in position. Weather forecast gave E6-8 for 16th: postponed sailing until 17th.

16/10/80 - Forecasts E-NE, 6-8. However, during a lull (eye of depression over Cherbourg peninsula) F.W., G.Le G. flew by helicopter to CLV to install equipment. J.H., P.M.H., D.C.R., G.N.C. visited Start Point Lighthouse to monitor signal-strength of Start Bay Waverider.

17/10/80 - Forecasts NE 8-9. Depression moving slowly NE. Met. office suggested 19 October as being earliest that workable conditions would prevail.

18/10/80 - Forecast N 6-8, depression over N Sea. However wind moderating NW 4-6, going W-SW 3-4 later.

19/10/80 - Sailed 0315 after stowing inflatable on after deck. Wind NW 3-4. Arrived CLV 0815.

Deployed Waverider buoy over stern, lowered anchor and chain on a rope bight; when anchor on bottom, pulled bight clear. Checked time, depth, Decca Navigator position, tide, wind. Went alongside CLV. G.N.C. went aboard CLV with equipment. F.W., G.Le G. boarded Devonian. Tide now heading WSW, wind increasing W 5-6, sea state deteriorating rapidly. Checked Waverider position, departed for Dartmouth. Rough trip. Docked Kingswear 1600. Unloaded equipment, moored Devonian to mid-river buoy, recovered inflatable. Returned to Taunton.

EQUIPMENT PERFORMANCE: Waverider was prepared at IOS(T) before departure, and energised at Dartmouth prior to sailing. Waverider and mooring deployed without difficulty. Signal monitored and reported as satisfactory by G.Le G. before he left CLV.

Decca Navigator and Seascribe echo-sounder on board Devonian worked satisfactorily.

POSITIONS: Channel Light Vessel occupies position:

49° 54' 36" N

02° 55' 30" W

Waverider No 67214 laid in Decca Navigator position:

Red	G	20.23
Green	A	39.58
Purple	B	76.02

Estimated position of Waverider relative to light vessel - 600 m ENE.

Depth recorded - 35 fathoms at high tide.
Estimated mean water depth 64.5 m.
Wind W 5-6, sea 1.5-2.0 m, deteriorating rapidly.
Tide pulling W.

Prepared by: John Humphery J D HUMPHERY

Approved by: A.P. Salkield A P SALKIELD

Date: 28-10-80.

VESSEL: Research Launch 'Labrax'

CRUISE PERIOD: 27 October 1980

LOCATION: Southampton Water

PERSONNEL: Dr K R Dyer
Mr E J Moore

OBJECTIVES: To use a high frequency echo sounder to investigate internal waves in Southampton Water to establish whether or not they are caused by lateral seiching, and to estimate their wavelength.

PROCEDURES AND METHODS: A 200 KHz Raytheon echo sounder was set up and tuned to receive maximum backscattering from within the water mass. Salinity and temperature profiles were obtained while the echo sounder was recording, to determine whether the backscattering was correlated with the position of the halochine. This was carried out on several positions across the estuary about half way between Hythe and Fawley. Repetitive traverses across the estuary were also carried out so that temporal and spacial variations of halocline depth could be monitored. Measurements were obtained during the end of the flood tide, over the high water stand and at the beginning of the flood on a spring tide. Position fixing was carried out by horizontal sextant angles from known shore marks.

EQUIPMENT PERFORMANCE: The echo sounder performed well. The sensitivity was set at its maximum and might need more amplification if further studies are carried out. The narrow beam transducer was non functional.

RESULTS: Good results were obtained despite a SW wind gusting Force 9. Variations in backscattering were observed on the echosounder which appear to correlate with the thickness of the less saline surface layer. There was a consistent pattern of thickness variations across the estuary which appeared to slowly change with time.

ITINERARY: 26 October (Evening) KRD and EJM travelled to Southampton in official vehicle.
27 October 0830 loaded equipment onto launch Labrax. Carried out echo sounding traverses.
1700 Returned to Southampton. EJM returned to Taunton with equipment. KRD proceded to meeting at IOS Wormley.

Report prepared by: Keith Dyer K R DYER

Approved by: Keith Dyer K R DYER

Date: 22 December 1980

VESSEL: MFV 777, Devonian

OWNER: John J McGuire
5 Swan Court
Dartmouth
Devon

Tel: Dartmouth (080 43) 3639

CRUISE LOCATION: Channel Light Vessel and Start Bay, Devon

CRUISE PERIOD: 2100 11 November 1980 to 1830 13 November 1980

PERSONNEL:

J D Humphery	HSO Senior Scientist
P M Hooper	HSO
D H Joyce	
G N Crisp	HSO
R Hall	ASO

OBJECTIVES: To recover Waverider from Channel Light Vessel (CLV) location. To recover IOS scientist (R Hall) and wave recording equipment from CLV. To recover Start Bay Waverider, and receiving equipment from Start Point Lighthouse.

PROCEDURE AND METHODS:

11-11-80 2100 Arrived Kingswear, launched inflatable. Loaded Waverider recovery equipment onto Devonian.

12-11-80 Rendezvous with J McGuire at 0600 . Lifted inflatable onto Devonian dinghy stowage. Sailed for CLV station at approximately 0645 . Rendezvous with CLV approximately 1130 . As a relief helicopter flight was imminent, CLV requested immediate transfer of scientist and equipment. Transfer effected in approximately 5 minutes, no trouble. Wind NE 3, some chop, slight swell. Waverider had dragged to point some ½ N mile W of CLV. Went alongside, recovered buoy by hand; recovered mooring by hand, and by using winch and gunwhale roller. Anchor badly fouled by chain but otherwise no problem. Returned to Dartmouth, arriving approximately 1800 . GNC and RH to Taunton.

13-11-80 Sailed 1030 for Start Bay Waverider site. Recovered buoy by hand, and mooring using gunwhale roller and winch. Time 1155 . Anchor fouled but mooring had not dragged. Sailed for Start Point Lighthouse. Used inflatable to collect Waverider receiving equipment from Lighthouse. Time 1255 . Returned to Dartmouth. Alongside Kingswear jetty, unloaded all equipment from Devonian, loaded into van. Devonian to mooring buoy no 5, secured at 1830 .

14-11-80 To Kingswear by inflatable; recovered inflatable onto trailer. Drove to Taunton.

EQUIPMENT PERFORMANCE:

CLV Waverider mooring had dragged approximately 1 N mile W during course of experiment (24 days). This was due to the fouled anchor; the position change should not affect experimental results. Anticipated tidal currents at CLV site were 2.5 kt at spring tides (from Admiralty tidal atlas); maximum currents measured by Braystoke current meters lowered from CLV during course of experiment were approximately 3.2 kt. A standard Datawell mooring for 36 fathoms and 2.5 kt had been used; Waverider had been pulled under at peak flow periods during spring tides; long term Waverider performance would not be affected. However, wave recordings would be affected during periods when buoy was partially pulled under.

Start Bay Waverider anchor had fouled but not dragged. Buoy had been fitted with 1.6 Watt transmitter on 29.725 MHz, and a keying clock (22.5 minutes every 3 hours). Signal output still good at recovery (deployment period - 114 days).
VHF, Decca Navigator, radar and winch gear aboard Devonian worked well.

ITINERARY:

11-11-80	1900	Departed Taunton.
	2100	Arrived Dartmouth. Launched inflatable, loaded equipment onto Devonian.
12-11-80	0600	Rendezvous at quayside.
	0645	Sailed for CLV.
	1130	Arrived at CLV; took on board R Hall and intercomparison experiment equipment.
	1215	Recovered CLV Waverider. Started for Dartmouth.
	1800	Arrived Dartmouth.
13-11-80	1030	Sailed for Start Bay Waverider position.
	1155	Recovered Waverider; headed for Start Point.
	1255	Recovered Waverider receiver; headed for Dartmouth.
	1500	Alongside Kingswear. Unloaded all equipment into van.
	1800	Moved Devonian onto river mooring.
14-11-80	0900	Recovered inflatable; departed for Taunton.
	1230	Arrived Taunton.

POSITIONS:

CLV Waverider recovered from Decca Navigator position:

Red	G	18.8
Green	A	40.1
Purple	B	74.0

Date/Time 12-11-80 at 1215
Water depth: approximately 36 fathoms
Waverider number: 67214

Start Bay Waverider number: 67201

Prepared by: J D Humphery

Approved by: A P Salkield

Date: 5.12.80.