

Scientific Cruise Report

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2. Itinerary:

The ship departed from Plymouth at 0600 h, 18 May, and returned at 0600 h, 27 May. The track and station positions are shown in Figs. 1 and 2. The ship was anchored at Station A1 from 1200 h, 18 May to 2000 h 21 May for sampling work with the 6" pumping system, and off Penzance 1420 - 1900 h, 22 May to exchange personnel and equipment.

3. Scientific programme:

Hydrographic station details, a summary of the plankton sampling and information on the primary production experiments are summarised in Tables 1-3. Throughout the cruise surface (3.5 m) water temperature, salinity, chlorophyll fluorescence, nitrate, nitrite and silicate were measured continuously as well as solar irradiance. A turbidity sensor was used on the second leg to locate coccolithophore populations near the shelf break.

The 6" pumping system was used successfully at Stations A1 (66 hours) and 8 (4 hours) for studying the vertical distribution of the plankton. There were no problems with deployment and recovery of the 70 m of hose, although the work at A1 was curtailed by reduced flow rates due to kinking. The total output was $2.7 \text{ m}^3 \text{ min}^{-1}$, of which $0.2 \text{ m}^3 \text{ min}^{-1}$ was filtered for microzooplankton (80 μm mesh) and the remainder for ichthyoplankton (200 μm mesh). No significant damage to the organisms was observed. At Station A1, 21 consecutive profiles at 3 h intervals for zooplankton, phytoplankton, temperature and nutrient were completed, sampling at 5 m intervals between 55 m and the surface. Comparative WP2 net hauls were made to evaluate the efficiency of the pump. Abundant diatoms, giving chlorophyll concentrations in the range $1.3 - 5.4 \text{ mg m}^{-3}$ at the surface and $5.3 - 12.3 \text{ mg m}^{-3}$ at 30 m, caused considerable contamination of the zooplankton samples. Surface-to-bottom temperature differences were between 0.5° and 1.2° , the variation being due largely to diel changes in surface values.

Due to persistent cloud during May, no useful Coastal Zone Colour Scanner (CZCS) images were available up to 22 May. The working area at the shelf break was therefore chosen on the basis of the 1982 results, and measurements of downwelling and upwelling irradiance made at two lines of stations across the 200 m contour. The coccolithophore, Emiliana huxleyi, was abundant at stations 2, 3, 6 and 7, reaching maximum surface concentrations (5250 cells ml⁻¹ and 19,000 detached coccoliths ml⁻¹) at station 7. By contrast, the highest surface chlorophyll a values (up to 4 mg m⁻³) were observed in slope waters where various small flagellates were dominant, including one species, $\leq 1 \mu\text{m}$ in diameter, at densities $> 10^5 \text{ ml}^{-1}$. Surface to bottom temperature differences ranged from 0.7 - 1.8° on the shelf to 0.4 - 1.1° at the shelf break and on the slope.

The optical measurements at stations 1-8 were made at 2, 6, 10 and 14 m for downwelling irradiance and at 2 and 4 m for upwelling irradiance. The six sensor channels, each with a bandwidth of 20 nm, were centred at 440, 521, 552 and 670 nm (the four visible channels of the CZCS) as well as 379 and 596 nm.† Total seston and yellow substance, as well as plant pigments, were measured at 2 and 10 m. The attenuation coefficients and reflectances at each wavelength will be related to total chlorophyll concentration and abundance of the coccoliths. CZCS images for 28 May (orbit 23182) and 30 May (orbit 23209) show part of the coccolithophore bloom in which the sea truth measurements were made. Also the surface temperature structure for the whole shelf break region is shown very clearly on the NOAA-7 infra-red image for 26 May (orbit 9912).

† This instrument was built in the Dept of Physical Oceanography, U.C.N.W., Menai Bridge.

TABLE 1. HYDROGRAPHIC STATIONS

DATE	TIME (BST, h)	STATION NUMBER	STATION POSITION		WATER DEPTH (m)	SECCHI DISC (m)
			N	W		
18/5 to 22/5	0800 to 1000	A1	50°12.5'	04°40'	58-62	8-11
24/5	0746 - 1105	1	47°48'	07°36'	550	9
24/5	1211 - 1405	2	47°56'	07°29'	165	5
24/5	1443 - 1631	3	48°03'	07°22'	183	6.5
24/5	1739 - 1915	4	48°12'	07°10'	170	7
25/5	0710 - 0900	5	47°58'	08°03'	600	9
25/5	1125 - 1244	6	48°04'	07°55'	188	5
25/5	1327 - 1500	7	48°11'	07°51'	184	3.5 - 4
25/5	1650 - 0025	8	48°29'	07°32'	164	14

TABLE 2. PLANKTON SAMPLES

A. PHYTOPLANKTON:

	Chlorophyll + phaeopigment	Lugols/Formalin	Particulate C/N	Particulate Ca ²⁺
STATION A1	343	93/0	93	0
SHELF BREAK	138	4/101	95	86

B. ZOOPLANKTON:

	6" pump		WP2 Nets	Bongo Nets
	200 μ m	80 μ m		
STATION A1	252	252	6	4
SHELF BREAK	12 (St 8)	0	8	7 + 6

TABLE 3. PRIMARY PRODUCTION EXPERIMENTS

Expt. No.	Date	Station	Sample depths (m)	Experimental Conditions
1	18/5	A1	5	Incubator, 26 irradiance levels
2	19/5	A1	5	<u>In situ</u> at 1,2,5,10,15,30 m + dark controls (3 replicates at each depth)
3	19/5	A1	5	Incubator, 26 irradiance levels
4	20/5	A1	5,30,50	Incubator, 16 irradiance levels for each sampling depth
5	20/5	A1	5,30,50	<u>In situ</u> at 5,30,50 m + dark controls (3 replicates)
6	21/5	A1	5,30,50	Incubator, 16 irradiance values for each sampling depth
7	22/5	A1	5,30,50	Incubator, 23 irradiance values for each sampling depth with replication at higher irradiance
8	24/5	2	2	Incubator, 42 irradiance values
9	25/5	6	2,30	Incubator, 30 irradiance values for each sampling depth. Some filtrate samples collected

FIG. 1

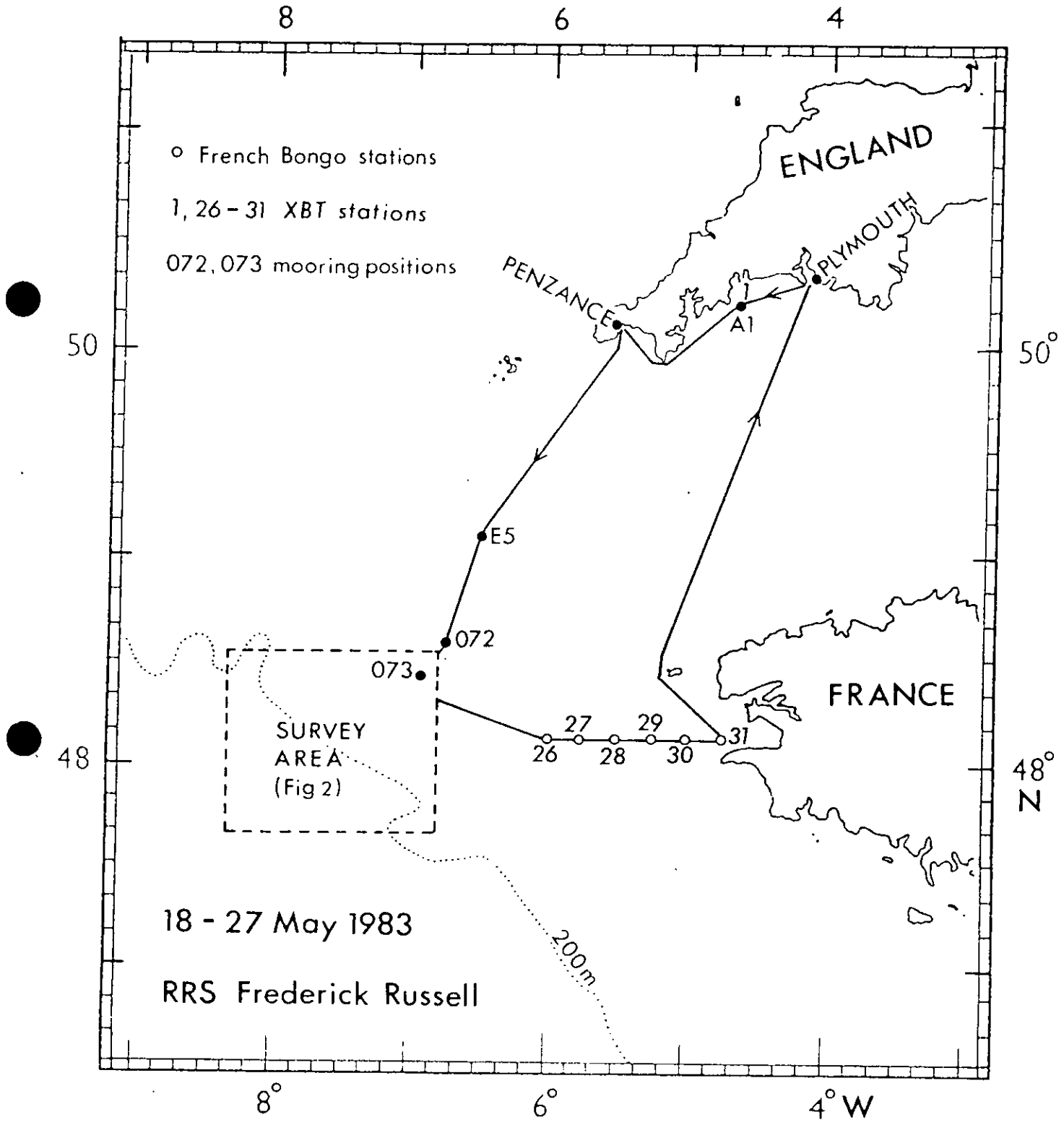


FIG. 2

