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CRUISE REPORT

VESSEL: RRS Frederick Russell 4A/83

CRUISE PERIOD: 6 to ~~15~~⁴ March 1983

PERSONNEL: R D Pingree, IOS/MBA, Senior Scientist
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ITINERARY:

6 March	2034	Departed Plymouth
7 March	0345	Grab sample Lyme Bay
	0448	" " " "
	0930	Deployed 2 Moorings 070, 071 with one current meter each on Shambles Bank. Two grab samples
8 March	1300	Launched drifting buoy No. 151/1819 Secchi Disc Depth (SDD 7m)
	1545	SDD 2 metres
	1755	XBT 1
9 March	0226	XBT 2
	0410	XBT 3
	0855	XBT 4
	1124	Station 1: Salinity-Temperature-Depth Profile (STD) 1.
	1254	Station 2: STD 2, SDD 4m
	1737	Station 3: STD 3, SDD 5m
	1900	Station 4: STD 4
	1952	Station 5: STD 5
	2120	Station 6: STD 6
10 March	0415	Station 7: STD 7
	0549	Station 8: STD 8
	0715	Station 9: STD 9
	0840	Station 10: STD 10
	0907	SDD 16m
	0955	Station 11: STD 11, SDD 12m
	1130	SDD 9m
	1255	Station 12: STD 12
	1400	SDD 3.5m
	1540	SDD 6m
	1650	SDD 9m
	1911	Station 13: STD 13
11 March	0845	SDD 3m
	1030	SDD 3.5m
	1520	SDD 2m
	1633	SDD 3m
12 March	0900	Station 14: STD 14, SDD 2.5m
	1240	Station 15: STD 15, Pumped profile, SDD 9m
	1445	Station 16: STD 16, SDD 8m
	1849	Station 17: STD 17
13 March	1200	SDD 2m
	1430	SDD 3m
	1625	SDD 6m
14 March	1525	Returned to Plymouth.

- OBJECTIVES:
1. To study currents associated with the Shambles Bank.
 2. To investigate features in the English Channel that are apparent in satellite images.
 3. To investigate a possible density front between Dutch coastal waters and the waters of the central Southern Bight.
 4. To determine the role this front or other vertical structure in the waters of the Southern Bight has on phytoplankton development and compare observations with results from the Continuous Plankton Recorder survey.
 5. To quantify the role of turbidity in reducing the availability of light to the phytoplankton of the North Sea.

METHODS: The planned IMER sampling programme for the Southern Bight (see cruise programme VES 1.4) was expanded to cover the whole cruise to back up the MBA objectives and to enable comparisons to be made between turbidity/phytoplankton relationships in the Southern Bight and on the two sides of the English Channel.

Continuous measurements of surface chlorophyll, transparency, turbidity, oxygen, nutrients (silicate, nitrate, nitrite, salinity and temperature) were made while steaming.

Particle size and volume were determined at two hourly intervals with a Coulter Counter. Lugols samples for phytoplankton, 20 litre zooplankton samples filtered through 20 μm nylon netting, Taunton filters for sediment analysis, and filtrations for chlorophyll, CN and seston were also made at 2 hourly intervals.

One pumped profile was determined for the above variables.

Five primary production experiments using standard ^{14}C techniques and on deck incubation were successfully completed for three light levels in the water column. 17 Salinity-Temperature-Depth profiles were measured, 4 XBTs and 20 Secchi Disc depths determined.

EQUIPMENT: Excellent results were obtained from the Sea Tech Transmissometer which was borrowed from MAFF Lowestoft. This instrument and an IMER Partek turbidity meter with a 10 ppm head were placed in an elongate flume which was attached to the ships pumped water supply. The flume which was constructed just prior to the cruise enabled the instruments to be used in continuous mode. The transmissometer operated successfully throughout the cruise indicating a much greater range in water conditions than suggested by any of the other measurements.

A Coulter Counter operated successfully throughout the cruise with only a few minor spillages of mercury. Prior to the cruise the instrument was enclosed in a protective cage and placed on a pallet for easier operation at sea. All components of the IMER and MBA Coulter Counters are now completely interchangeable.

RESULTS:

Marked differences were measured in the suspended load of waters to either side of the English Channel and between the central and coastal areas of the Southern Bight. The transmissometer recorded 80% light transmission in the Bay of Seine and in the central Southern Bight. These measurements were confirmed by the turbidity survey and the seston analyses, which together provided good ground truth data for the interpretation of features seen on CZCS satellite imagery. Phytoplankton production was well established in these areas of cleaner water as bands parallel to the coast with chlorophyll levels at times $>4 \text{ mg m}^{-3}$. Elsewhere chlorophyll levels were low. The pattern of chlorophyll distribution appeared to be related to horizontal gradients in the transparency of the water rather than to any density feature. The axis of minimum turbidity in the Southern Bight was displaced towards the Dutch coast compared to the axis of maximum salinity. Possible causes of this displacement, which clearly has an important effect on the development of phytoplankton in this area, are being investigated.

