Scottish Marine Biological Association

Dunstaffnage Marine Research Laboratory

R.V. G.A. Reay

Cruise 2/86

14 - 25 May 1986

R.V. G.A. REAY, Cruise 2/86

Duration of Cruise: 14th to 25th May 1986

Location: Firth of Lorn, Firth of Clyde, North Channel, Scottish continental shelf 55°45' - 56°10' N and east of 8°30' W.

Staff :

Professor J. Matthews	Principal Scientist
Dr K. Jones	
Miss A. Maxwell	
Mr C. Griffiths	
Mr R. Bowers	
Mr C. Grier	
Dr P. Tett	(University College N.Wales)
Dr E. Hill	" " "
Mr A. Ali	(National of Pakistan)
Mr S. May	(University College N.Wales)
Mr D. Setiapermana	(National of Indonesia)
Mr S. Mayl	(As Charterer's representative on board)

Aims: 1. To deploy current meter moorings along the transect at 56°10' N.

2. To obtain vertical CTD profiles in the Firth of Lorn, Firth of Clyde, North Channel and across the W. Scottish continental shelf augmented by water samples for Caesium analysis in order to chart the distribution and record the characteristics of the main water masses.

3. To obtain measurements of nutrient levels, chlorophyll, and light attenuation and scattering in order to assess the conditions for primary production and the standing stock of phytoplankton.

4. To measure phytoplankton photosynthetic parameters in a light gradient incubator in order to estimate primary production from chlorophyll and optical data.

5. To obtain samples of phytoplankton and zooplankton for analysis of community composition in the main areas and at various depths.

Narrative /

Narrative: The cruise began at 07.00 on 14th May in the approaches to Dunstaffnage with the arrival, on R.V. Calanus, of SMBA personnel and scientific equipment. Heavy gear, comprising the current meter rigs and equipment from RVS and UCNW had been loaded previously. After stowing gear and setting up equipment the first station was taken at 56°27.5'N, 5°31.5'W. There were some problems with the electricity supply which caused delays with the zooplankton pump particularly, and the irradiance meter was not functioning at this stage. The rest of that day and the next were spent sampling stations in the Firth of Lorn, with repeated sampling at station E4, 56°14'N , 6°02'W, at different times of the day.

On 16th May observations and samples at stations were taken along the transect 56°10'N and current meter rigs were deployed at three positions along this line. The weather was fine and the sea calm. That night observations started on a proposed 24 hr station at 56°10'N, 8°30'W, but worsening weather conditions forced curtailment after 9 hours, and the cruise continued throughout 17th May with stations going eastward along 55°45'N.

With continuing moderately heavy seas and poor weather conditions 18th May was spent approaching and in the North Channel, making observations and taking samples along a transect from Torr Head to the Mull of Kintyre, and then across to the Clyde Sea Area towards the Rhinns of Galloway.

The next four days were spent in the Clyde Sea area, the lower Firth of Clyde and Lower Loch Fyne, with an intensive series of stations and observations over a total of 24 hours in the Arran Deep at 55°34'N, 4°59'W, during which time an engineer and an assessor, sent by the owners, visited the ship for inspection of some damaged machinery; this visit did not affect the scientific programme of the cruise. At the same time problems were being experienced with both CTD systems on board and it was decided to call up SMBA and arrange for a CTD system from there to be made available. Some delay was occasioned by sailing to E. Loch Tarbert to collect the instrument, but the opportunity was taken to take stations on the ship's return to Arran Deep in order to minimise the delay. During the period in the Clyde area the irradiance meter was made to function satisfactorily and a visual check was made of SMBA current meter moorings, following a report that one subsurface buoy had been washed up on the foreshore at Turnberry.

After /

After concluding work in the Clyde Sea Area on 21 May and with southwesterly gales blowing and forecast, stations were taken in the North Channel along a transect from Port Patrick to Donaghadee, after which course was set for the transect from Lough Foyle, N. Ireland, to Loch Indaal, Islay. This transect was completed though sea conditions caused some curtailment of zooplankton pumping, after which the ship returned to 56°10'N, 7°15'W to attempt some additional sampling at that station. Sea conditions deteriorated and the forecast gave no promise of improvement, so further work was discontinued after a CTD cast showed that the slight thermal stratification detected earlier had disappeared.

The cruise ended with some repeated sampling at stations in the Firth of Lorn on 24th May, particularly at 56°14'N 6°02'W to complete observations there over a 24-hour period.

The scientific personnel disembarked at 08.30 hrs off Dunstaffnage with a gale blowing and a rough sea. The RV Seol Mara was only able to take off personnel and essential items. The remainder of the equipment remained on board the G.A. Reay until it docked in Dundee on 27 May.

Results Aim 1) The three current meter moorings were successfully deployed except that, in one case, the small floats marking the position of the subsurface buoy became entangled in the mooring and did not remain on the surface. The moorings may be serviced during a cruise in June and will be taken up in August.

Aim 2) 133 CTD casts were made at 93 different stations (see map). The first indications from data obtained on the cruise show low salinity coastal current water extending to ~7°30'W at latitude 56°10'N with thermal stratification developing on the outer shelf. An unusual feature of the section is a zone of mixed water bounded to the east by haline stratified water in the Firth of Lorn and to the west by thermally stratified water on the outer shelf. This feature appears also to be identified with a distinctive minimum in the mineral nutrient concentrations. Caesium samples were taken at eight stations.

Aim 3) Vertical profiles of chlorophyll standing stock of dissolved nitrate + nitrite and silicate were obtained at a total of 99 stations. Some difficulties were experienced with the performance of the autoanalyser and signal logging equipment /

equipment but these were largely resolved during the cruise. Attempts to measure phosphate and ammonium concentrations were generally unsuccessful because of repeated malfunctions of the analytical system.

In general chlorophyll concentrations were less than 1 mg m^{-3} in nearshore well mixed waters and more than 2 mg m^{-3} in stratified waters on the Malin shelf and in the Firth of Clyde. Chlorophyll and nutrient data suggested that the Malin Shelf phytoplankton was in the early stages of the spring increase. The Firth of Clyde may have been experiencing a bloom of smaller algae, subsequent to the main spring bloom. Detailed observations on upwelling and downwelling irradiance were made at one station each in the Firth of Clyde and Lorne.

Aim 4) Shipboard experiments were carried out to determine photosynthetic parameters of phytoplankton assemblages from the Firth of Lorn (E4 surface mixed layer), the outer shelf (FL2, surface mixed layer) and the Firth of Clyde (St 60, surface mixed layer and upper region of thermocline). Additional experiments were carried out to determine the -fractionated phytoplankton biomass distribution at these stations and the proportion of total productivity associated with each size fraction.

Productivity within the Clyde appeared to be higher than elsewhere in the study region. Here size-fractionated chlorophyll measurements suggested that organisms between 1 and 5 μm contributed 77% of the biomass and 28% of the production, whilst organisms >5μm contributed only 17% of the biomass but 64% of the production at saturating irradiances. Elsewhere on the shelf and within the Firth of Lorn the >5μm fraction was most important both in terms of biomass and production.

A series of C-14 experiments using a constant light-incubation technique was carried out at stations 4, 19 and 60. Curves will be fitted to the results in order to estimate photosynthetic parameters, which, combined with light and chlorophyll data, will be used in making a prediction of production in the water column.

Aim 5) 47 water samples were taken from casts at various depths from 7 different stations. Phytoplankton distribution is being studied in relation to hydrography. Analysis of samples is underway.

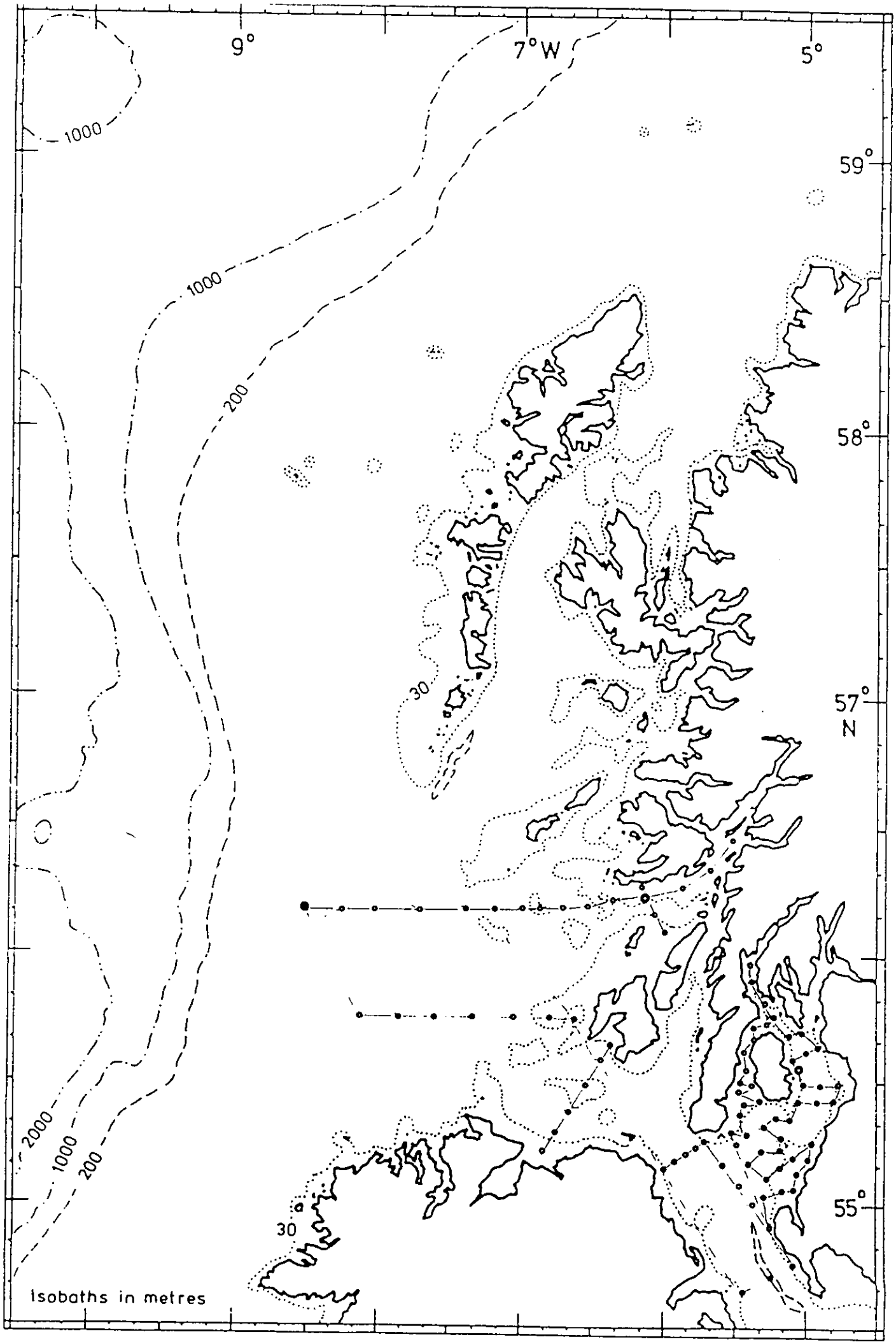
The zooplankton showed marked differences in quantity and species composition between the various areas sampled. The Firth of Clyde provided by far the largest samples, dominated by Calanus, while samples from the North Channel contained predominantly smaller, apparently neritic species; zooplankton was extremely sparse on the shelf and in the Firth of Lorn, with larval forms evident in the latter. Detailed results must await further analysis of the samples.

General comments & Acknowledgements. The 'G.A. Reay' was a satisfactory ship for multidisciplinary work of this nature, particularly in the rough seas we experienced, though there were some inconvenient aspects of the ship's layout. The laboratory was well placed to minimise the effect of the ship's movement, but being two decks below the trawl deck it was awkward to reach and communication with other parts of the ship was difficult. The absence of any display of navigational data in the laboratory was a big disadvantage. In practice, the satellite navigation system installed by RVS was little used and the bridge relied on their own Decca navigation system and on radar inshore. Vibration caused some electronic failures, most of which were, however, repaired during the cruise.

The crew of 14 under the command of Captain A. Barkworth was helpful and co-operative, as indicated in the appended copy of my letter to the owners, J. Marr & Son Offshore Ltd.

J.B.L. Matthews

Principal Scientist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Scottish Marine Biological Association

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Your reference:

Our reference:

28th May 1986

Mr Jimmy Hinds,
J. Marr & Son Offshore Ltd.,
St Andrew's Dock,
Hull,
North Humberside HU3 4PN

Dear Mr Hinds,

I have just come ashore after a 10 day research cruise on board the 'G.A. Reay' off the west coast of Scotland. I wish to express my warm appreciation of the service provided by Captain Barkworth, his officers and crew. The weather was not of the best and many of the operations we wished to carry out were a novel experience for the crew, but everyone was consistently helpful. Their interest in our investigations and knowledge of fisheries were a real encouragement to the scientists on board.

The ship gave us a good chance to continue our work despite quite heavy seas at times, and she was well suited to our needs, though the distance from trawl deck to laboratory and the communications system were not the most convenient. We are well satisfied with the data and material we brought home with us.

Please convey our appreciation and best wishes to Captain Barkworth and his crew.

Yours sincerely,

J.B.L. Matthews
Deputy Director.

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