

MINISTRY OF AGRICULTURE, FISHERIES AND FOOD
FISHERIES LABORATORY, LOWESTOFT, SUFFOLK NR33 OHT, ENGLAND

1993 RESEARCH VESSEL PROGRAMME

REPORT: RV CIROLANA CRUISE 4

STAFF:	Part (a)	Part (b)
	D S Woodhead (SIC)	D S Woodhead (SIC)
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	J A Durance	N Pearson
	N McGregor	J N Aldridge
	D B Sivyer	J M Rees
	J Taylor	M O Green (UC)
	R Upstill-Goddard (PML)	R Hunt (Leicester U)
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DURATION: 8 April-27 April
 (Part a JoNuS 15 8 April-18 April)
 (Part b COSEDS 18 April-27 April)

LOCALITY: Wash, Humber, North Sea, Irish Sea

AIMS:

1. To identify and quantify the fate of river-borne nutrients entering the Wash and Humber estuary, examining nutrient distributions from the river inputs through to the North Sea. (AE00504A)
2. To measure nutrient concentrations along an offshore transect from the Thames to the Tyne. (AE00504A)
3. To measure factors affecting benthic nutrient recycling in sub-tidal sediments in the North Sea. (AE00504A)
4. To take samples over a grid in the southern North Sea to improve knowledge of the seasonal signal in nutrients, particularly phosphate. (AE00503A)
5. To collect sediment samples for studies of *Alexandrium* sp cysts. (Extramural).
6. To recover the current meter moorings deployed on CIRO 2/92 in Morecambe Bay (93G and 93H). (AE0207A0)
7. To recover the Tetrapod deployed on the Barrow-in-Furness dredge spoil site and its associated guard buoys (93 J). (AE0207A0)
8. To reoccupy the TH19 anchor station site at the entrance to Morecambe Bay to compare spring and near neaps tidal resuspension. (AE0207A0)

9. To test the new BASS (Benthic Acoustic Stress Sensor) either on the Tetrapod or mounted on the CTD. (AE0207A0)
10. To trial the new electronics in the Quadrapod (UC) in realistic conditions. (AE0207A0).
11. To survey general sediment types in the entrance to Morecambe Bay with the Day Grab.

NARRATIVE (All times are GMT):

RV CIROLANA departed Lowestoft at 1030h 8 April and made passage for the Wash taking CTD casts and surface water samples for nutrient analysis at stations en route. Deep sediment samples were collected with the NIOZ box-corer for sediment process studies early on 9 April at site A1 together with a CTD cast. The remainder of the day was intended for CTD stations but it became clear that there was a fault on the pressure channel of the FSI instrument leading to an unstable response. There was also a problem with the logging PC in that it reported a serial port error on boot-up; although this could be circumvented to process data collected on the Toshiba lap-top, it could not be used to log raw data. Contact was made with Nick Pearson in Lowestoft and he came out to the ship from King's Lynn on Saturday 10 April with a replacement PC and to help rig-up the Guildline CTD unit - this operated well for the remainder of the cruise. After completing the installation the rest of the day was spent making CTD casts and collecting surface water samples on the Wash grid. Nick Pearson was put ashore at King's Lynn at 1900 h. Approximately one working day had been lost. At 0845 h (highwater) on 11 April RV CIROLANA passed through the Freeman Channel into the Boston Deep. Three CTD casts were made in the northerly part of the Boston Deep (station WG31 was omitted due to the limited room for the ship to manoeuvre between the banks) and the ship anchored at site A3 to make hourly CTD casts until high water at 2100 h permitted passage through the Freeman Channel to leave the Wash. The remainder of the day and the early hours of the 12 April were spent making CTD casts and collecting water samples in the coastal area between the Wash and the mouth of the Humber. Passage up the Humber Estuary to site A4 commenced at 0600 h and surface water samples were collected en route. The ship anchored at site A4 and collected sediment cores for process studies and made a CTD cast. One member of the scientific staff was put ashore. This work was completed by mid-day and the ship left the Humber to continue CTD observations and surface water sampling in the offshore area. Overnight RV CIROLANA steamed north and on 13 April collected sediment samples in the region of the Farne Islands to complete aim 5. CTD casts were made and surface water samples collected on a southerly transect towards the Humber Estuary although this could not be completed due to the requirement to be at the sediment sampling site in the Outer Silver Pit early the following morning. After collecting the sediment samples and making a CTD cast, the remainder of 14 April and all of the 15 April were spent on CTD observations and water sampling on the North Sea grid. Early on 16 April sediment samples were collected at BELS2 for process studies and then CTD observations and water sampling on the North Sea grid occupied the remainder of the available working time until the ship docked at Lowestoft at 0731 h on 18 April to make a change of scientific staff.

RV CIROLANA departed Lowestoft at 1848 h on 18 April and made an uneventful passage to the eastern Irish Sea arriving at the tetrapod site in Morecambe Bay early in the morning of

21 April. The buoys on the primary recovery line of the tetrapod were not visible and numerous attempts to release the emergency line failed. Because of the impossibility of assembling a diving team from DFR staff contact was made with a professional company in Barrow and arrangements made to attach a recovery line to the tetrapod the following day (22 April). The remainder of the 21 April was spent surveying the status of the current meter moorings due for recovery by RV CIROLANA from the Lune Deep. The mooring at station 93G was found to be missing (although a marker buoy was seen to be stranded on a small bank in the northeastern part of the Deep off the Sunderland Shoulder). Because the diving tender was also the vessel originally chartered to recover the inshore current meter moorings on 22 April there was some confusion over the rendezvous point and they were late arriving at the tetrapod station. The divers had no success in locating the tetrapod at either high tide or low tide slack water; equally the attempts to locate the tetrapod with a drag-line from the searider were failures. The reasons for this lack of success became apparent when the diving tender raised its anchor and snagged the tetrapod. From this point, the tetrapod was recovered with remarkably little damage - two bent legs. The loss of a day plus the damage to the tetrapod meant that its redeployment for a 24h anchor station (aim 8) had to be cancelled. On 23 April core samples were collected at 10 stations along the Lune Deep to determine sediment type and at high water (around mid-day) an attempt was made to recover the current meter mooring at station 93H. The marker buoy was successfully recovered but the mooring chain parted at the shackle. Attempts to grapple for the ground wire were unsuccessful due to the strong tidal stream and limited room for manoeuvre at this site close to a bank. At low tide in the evening (1830h) the Quadrapod was deployed to test the electronic systems under realistic conditions. The gear was safely recovered at low tide (0730h) on 24 April together with the three guard buoys. Five cores were taken at the tetrapod site to characterise the sediment and after further, unsuccessful, attempts to grapple for the ground wire at mooring 93H, course was set for the southern North Sea at 1430 h.

RV CIROLANA docked at Lowestoft at 1230 h on 27 April.

RESULTS:

1. The study of nutrient recycling processes in sediment cores collected from two estuarine (A1 and A4) and two off-shore (OSPIT and BELS2) sites was successfully completed including the analysis of nitrate, nitrite, ammonia and phosphate concentrations in seawater aliquots collected during the experiments (aims 1 and 3).
2. The basic JoNuS series of CTD and surface water stations in the southern bight of the North Sea was completed. The nutrient analyses were completed on board and all salinity samples logged to the LSDM system (aim 1).
3. Loss of working time following the problems with the FSI CTD unit meant that the sampling of seawater along an off-shore transect from the Tyne to the Thames could not be completed:- there will be a gap in the data set between Flamborough Head and Spurn Point. Nutrient analyses were completed on all the samples collected (aim 2).
4. Again, lack of time (on either part A or part B) prevented completion of the surface water sampling programme on the grid of stations in the southern North Sea. Only one third of the stations, those in the northern area, were visited (aim 4).

5. Sediment samples were collected at two stations in the vicinity of the Farne Islands for investigations of the prevalence of *Alexandrium* sp. cysts (aim 5).
6. The current meter moorings at stations 93G and 93H were not recovered. 93G was not at the deployed position although a marker buoy was observed stranded on a nearby bank. The mooring chain at station 93H parted after recovery of the marker buoy and all attempts to grapple the ground line were unsuccessful (aim 5).
7. The tetrapod was recovered, albeit in an unconventional manner. Fortunately, there appears to have been no damage to the instrumentation and only minor damage to the frame (aim 7). The data from the 50 day deployment proved to be of high quality. The tetrapod was correctly oriented to the mean flows and recorded a total of 1286 hourly bursts with one adaptive event commencing at 0600 h on 23 March (burst 955) with a significant wave height of 2 m. Fig 1 shows the burst mean pressure during the deployment. The large spring tides (~ 9.6 m range) are evident around burst 650. The significant wave height over the period of the deployment is shown in Fig 2 indicating four events over 1.5 m. These four events are also apparent in the record of suspended load, shown in Fig 3, which has been estimated (with a nominal calibration factor) from the transmissometer data. From these data it is evident that the major spring tides were less effective in resuspending sediment than relatively minor wave events.
8. The loss of time entailed in the eventual recovery of the tetrapod, together with the damage to the frame, meant that the 24 h redeployment and the associated anchor station at site TH19 had to be abandoned (aim 8).
9. The new BASS (Benthic Acoustic Stress Sensor) was not available for testing (aim 9).
10. The Quadrapod was successfully deployed and recovered. Six suspended load samplers were inter-fac-ed with the main logger/controller which was programmed to trigger the samplers in two batches of three around peak tidal flow.
11. Duplicate sediment samples were collected at 6 sites in Morecambe Bay to characterise the sediment type (Aim 11).

D S Woodhead
28 April 1993

INITIALLED: PGS, BC, JH

DISTRIBUTION:

Basic List +
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N Pearson
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