

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

1989 RESEARCH VESSEL PROGRAMME

REPORT: RV CORYSTES: CRUISE 11

STAFF: Part a	K Brander	Part b	S M Rowlatt	
	J Read		N D Pearson	
	S Milligan		K Medler	
	G Haynes		J M Rees	
	R Flatt		R Chapman	
	L Woolner		D Denoon	
	J Casey		D Allington	
			A Young	
			M Green) University
			J Atherton) of Cambridge

Part c	K Brander	Part d	S M Rowlatt	
	S Milligan		N D Pearson	
	G Haynes		K Medler	
	R Flatt		J M Rees	
	J Rees		R Chapman	
	J Nichols		M Green) University
	J Casey		J Atherton) of Cambridge

Left Lowestoft 1100h 4 October
Arrived Lowestoft 1400h 6 November

DURATION: part a 4-11 October
part b: 12-19 October
part c: 20-30 October
part d: 31 October-6 November

LOCALITY: North Sea

AIMS:

Part a

1. To carry out a plankton survey for herring larvae in the area off the north-east coast between the Humber and 56°N.
2. To deploy current meters for the duration of the cruise at up to five sites to the north-east of Scarborough and three sites between the Tyne and Wear.
3. To carry out a closely spaced section of CTD stations across the front for geotrophic modelling.
4. To deploy Argos drifters in the vicinity of the front.

Parts b and d

1. To make measurements of shear stress and current spectra using the NBVR.

2. To collect water and sediment samples for a study of scavenging using U/Th disequilibrium data.
3. To work a series of 25 h anchor stations (CTD and DRCM). Suspended load and particle size measurements will be made over the tidal cycle at 10 m intervals above the sea bed.
4. To examine settling velocity near the sea bed using QUISSET (University of Cambridge).
5. To examine the NBVR site using sidescan sonar.

Part c

1. To follow the vertical and horizontal distribution of herring larvae in the vicinity of the front by sampling with HSTN and LHPR.
2. To deploy Argos buoys at two depths in the area of the herring larvae sampling.
3. To collect samples of herring larvae for studies of growth and mortality.

Part a

NARRATIVE:

RV CORYSTES sailed from Lowestoft at noon on 4 October and steamed to lay the northern group of three current meter moorings off the Tyne on 5 October. One mooring was immediately fouled by a trawler and had to be relaid. Following a CTD profile to determine the stratification of the water column, a current meter mooring was laid at 54 43.0N 0016.5E and the remaining four moorings were located in towards the coast, just N of Scarborough. Ten CTD profiles were then carried out at 1 n.mile intervals in the central part of the line of moorings and the density section was plotted in order to decide on the release location and depth for two Argos buoys. These were released early on 7 October, after which CORYSTES steamed to Scarborough to drop Mr Read and collect Dr Casey.

The plankton grid began off Scarborough, with the intention of relocating the Argos buoys and carrying out a LHPR tow in their vicinity on the evening of 7 October, however conditions had deteriorated by then and worked stopped until the following morning, when the plankton grid was resumed. The grid was completed on the evening of 10 October and the ship steamed to the last position of the Argos buoys, where a LHPR tow was carried out at 0400 h on 11 October, completing the aims for Part a. CORYSTES docked on the Tyne at 1430 h on 11 October.

RESULTS:

1. 46 HSTN tows and one LHPR tow were carried out in the area between 53.5 deg N and 54.7 deg N. Preliminary counts of herring larvae are shown in Fig 1.

2. All eight current meters were deployed, as planned. The positions of the five moorings NE of Scarborough is shown on the 20m density plot in Fig 2.

3. CTD profiles were carried out at the current meter positions and the density section (Fig 3) shows that the current meters straddle the front. Geostrophic flows in the immediate vicinity of the front were calculated from ten closely spaced CTD profiles on 6 October (Fig 4) and show an eddy with a radius of about 8km and velocities of up to >4 cm/sec in the upper part of the water column.

4. 2 Argos buoys, dropped at 20m and 35m, were launched in the centre of the eddy, close to one of the current meter moorings.

Part b

NARRATIVE:

CORYSTES sailed from the Tyne at 0900 h on 12 October and steamed to Marsden Bay where a transect of CTD profiles were measured to determine the position of the Tyne front. On 13 October a transect of five stations was sampled for Thorium measurements in water, suspended matter and sediment to assess scavenging rates.

That evening the Near Bed Velocity Recorder (NBVR) was deployed in Marsden Bay and the following morning a 25h anchor station started. Measurements of Thorium in water, suspended matter and sediment were made over a complete tidal cycle. The anchor station was completed and the NBVR recovered in the morning of 15 October. The rest of the day was spent repeating the CTD transect of 12 October.

On 16 October a large volume water sample was collected to test an ultrafiltration procedure designed to examine the distribution of Thorium in dissolved and particulate phases. A sidescan survey of the Marsden-Blyth region took the rest of the day, being completed in the early evening. On 17 October, Messrs Allington, Denoon and Young were put ashore and Dr Green and Mr Atherton joined the ship.

Further sidescan work was undertaken in the Marsden-Blyth area and on completion of this work in the early afternoon, the NBVR was deployed with guard buoys for collection during the fourth part of the cruise.

The following day a third CTD transect was worked, and a large volume water sample taken for ultrafiltration by J Atherton. CORYSTES then steamed to Lowestoft via the Flamborough Head current meters deployed on part a, docking at 1300 h on 19 October.

Part c

AIMS:

1. To follow the vertical and horizontal distribution of herring larvae in the vicinity of the front by sampling with HSTN and LHPR.
2. To deploy Argos buoys at two depths in the area of the herring larvae sampling.
3. To collect samples of herring larvae for studies of growth and mortality.

NARRATIVE:

RV CORYSTES sailed from Lowestoft at 1400 on 21 October and made passage for current meter position E, off Scarborough. CTD profiles were carried out along the line of the current meters on 22 October and one Argos buoy was launched on each side of the front to mark water mass positions for studies of diel vertical migration of larvae. Between 23 and 25 October a series of LHPR tows was carried out close to these buoys and they were then recovered. A HSTN grid was started on the evening of 25 October, to look at broad scale distribution of herring larvae, for comparison with the distribution on 7-10 October. The grid was interrupted briefly twice on 26 October, first to collect salinity bottles and the remains of one of the Argos buoys launched on 7 October, which had been brought ashore in Scarborough and second to repair the ships stabilised power supply. Weather conditions gradually worsened and only one MIK tow could be carried out on 28 October, with the rest of the day spent running and dodging. The second Argos buoy launched on 7 October ceased transmitting on 25 October, in an area where a number of beam trawlers were working, so no recovery could be attempted. A final series of HSTN tows started at 0400h on 29 October, to look at distribution of larvae across the NE Bank, where they had occurred in stratified water in previous years and to survey the area north of the Tyne. This was completed at 0800 h on 30 October and five further rosette stations were carried out in order to provide detail of the inshore density gradients.

RESULTS:

1. 15 LHPR tows were carried out in mixed and stratified water on either side of the front, in order to look at their diel vertical movements and relate these to the dynamics of the water column. 27 HSTN hauls covered the expected distribution of the main patch of larvae shown in Fig 1, in order to see how it had changed.
2. Two Argos buoys (one of them with a DECCA logger, on loan from UCNW, Menai Bridge) were deployed and recovered during the LHPR series.

3. Samples of herring larvae were collected for birthdate analysis using the MIK net. However, because weather conditions limited the use of this gear, the samples were supplemented with material from the HSTN grid.

4. A line of seven HSTN stations was worked across the NE Bank and further samples were taken in the area north of the Tyne. In view of the prolonged period of strong winds which preceded the section across the NE Bank, the barocline at 40m was surprisingly marked and the geostrophic flow at the nearshore end was $>5\text{cm/sec}$.

Part d

NARRATIVE:

CORYSTES sailed from Shields at 0900 h on 31 October. The NBVR and guard buoys deployed during part b were recovered and a repeat of the Marsden Bay CTD transect (part b) was worked.

On 1 November 3 current meters deployed in the Marsden area during part a, were recovered. A zero offset test on the NBVR was worked during the early afternoon and the rest of the day taken up by a sidescan survey of the Marsden Bay NBVR site.

On 2 November the NBVR site used on CORYSTES 4/88 off Seaham was surveyed using sidescan sonar and grabbing. The NBVR was deployed in Marsden Bay in the afternoon and a CTD anchor station started. This was completed in the morning of 4 November and the NBVR recovered. In the afternoon a grab survey was carried out to identify a potential site for long term deployment of the NBVR during the period January-March 1990.

CORYSTES then steamed to the Flamborough area where five current meter rigs laid in part a were recovered on 5 November.

CORYSTES docked in Lowestoft at 1400 h on 6 November.

RESULTS:

All aims were successfully achieved. In addition sidescan surveys of the Marsden/Blyth and the Seaham areas were undertaken to identify mud patches for future NBVR deployments. These data will be worked up in the laboratory.

A second additional aim to assess Thorium distributions using ultrafiltrations was also carried out.

Detailed analysis of current meter and NBVR data will also require laboratory analysis but some preliminary results are attached to this report.

S M Rowlatt . K Brander
(Scientists-in-Charge)
7 November 1989

SEEN IN DRAFT: M J Willock (Master)
W May (Senior Fishing Mate)

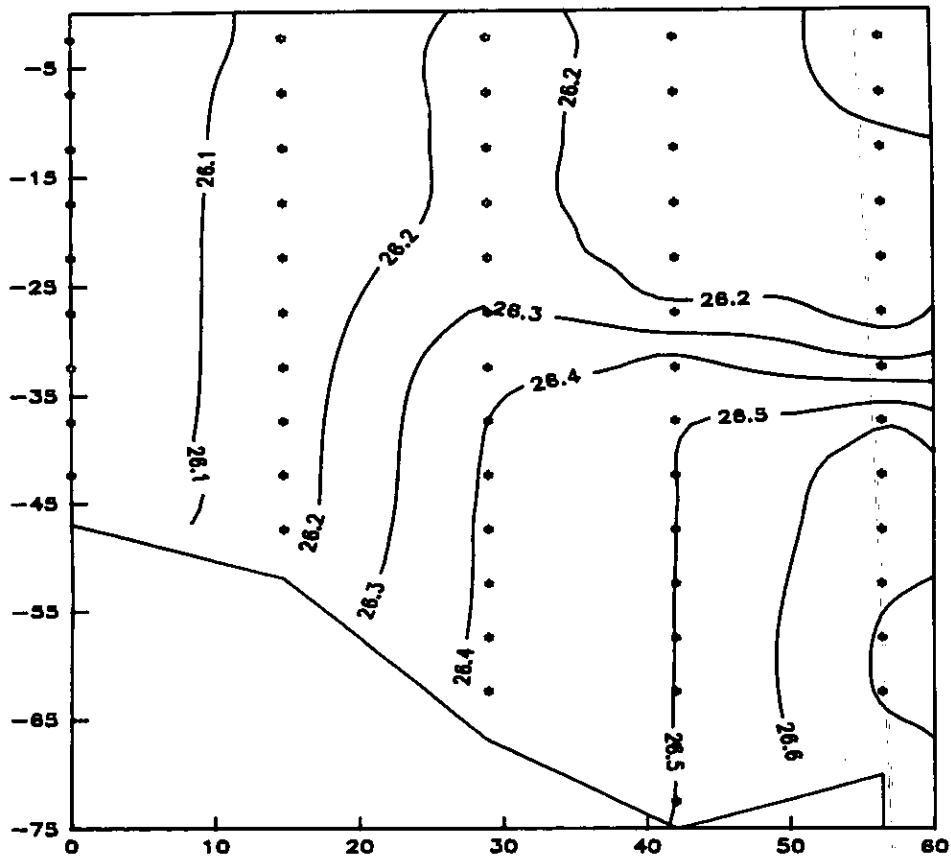
INITIALLED: JGS CEP

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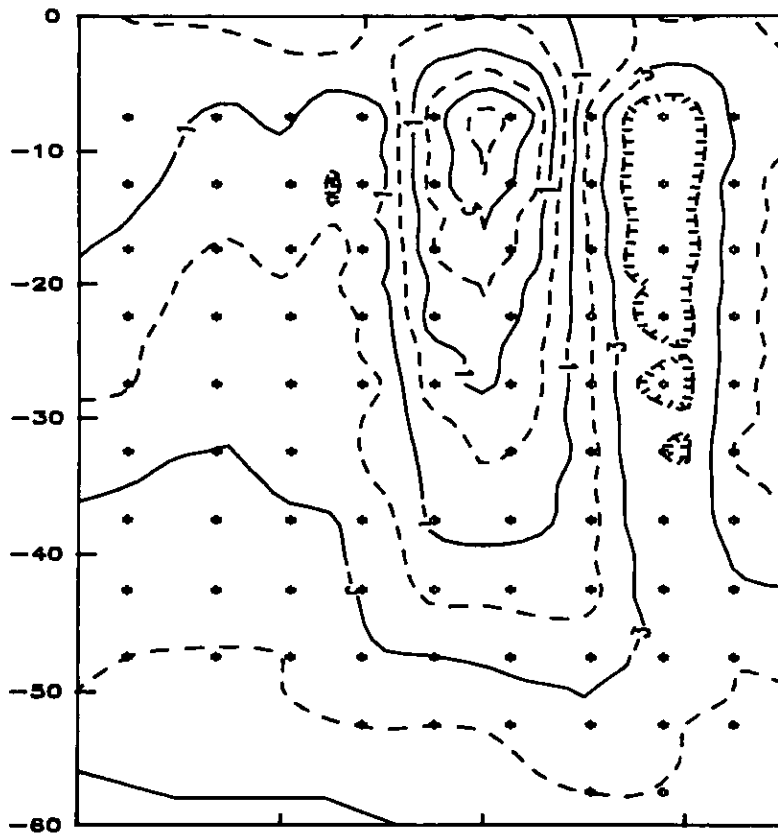
Basic List +

R R Dickson
N McCave, University of Cambridge
C Vincent, UEA
N D Pearson
K Medler
J Read
J M Rees
R Chapman
D Denoon
D Allington
A Young
M Green) University of
J Atherton) Cambridge
K Brander
S Milligan
G Haynes
R Flatt
L Woolner
J Casey
J Nichols

Density section 5-6 October Corystes 11/89



Geostrophic flow (cm/sec) 6 October



Density section across Tyne front
Corystes 11d/89 C/M line

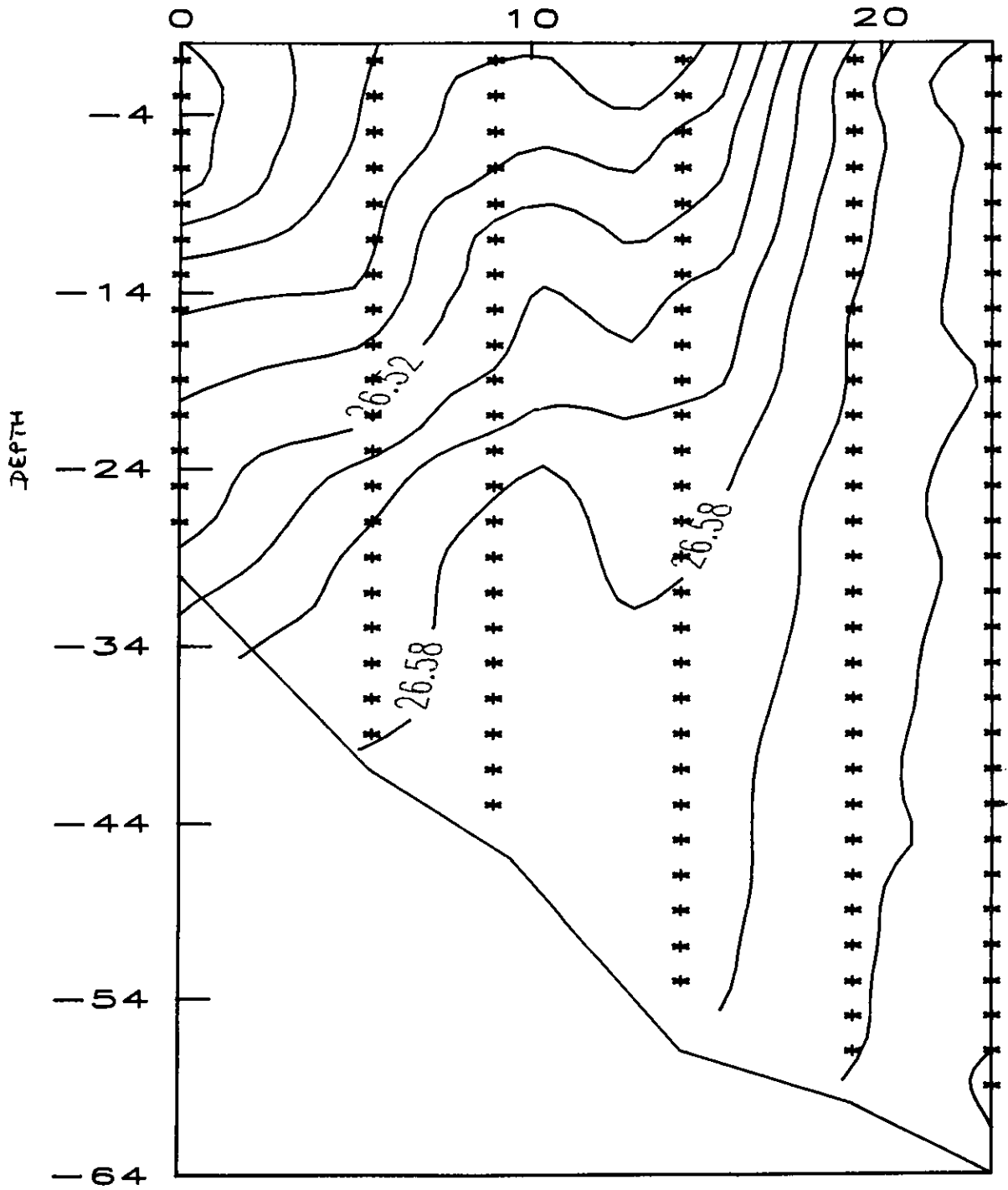
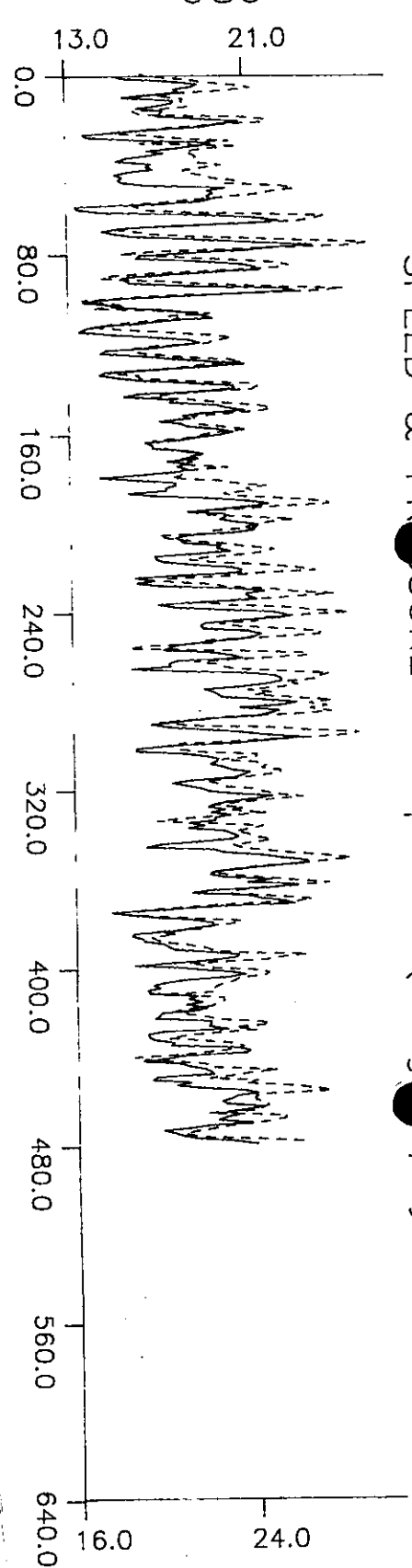


FIG 5

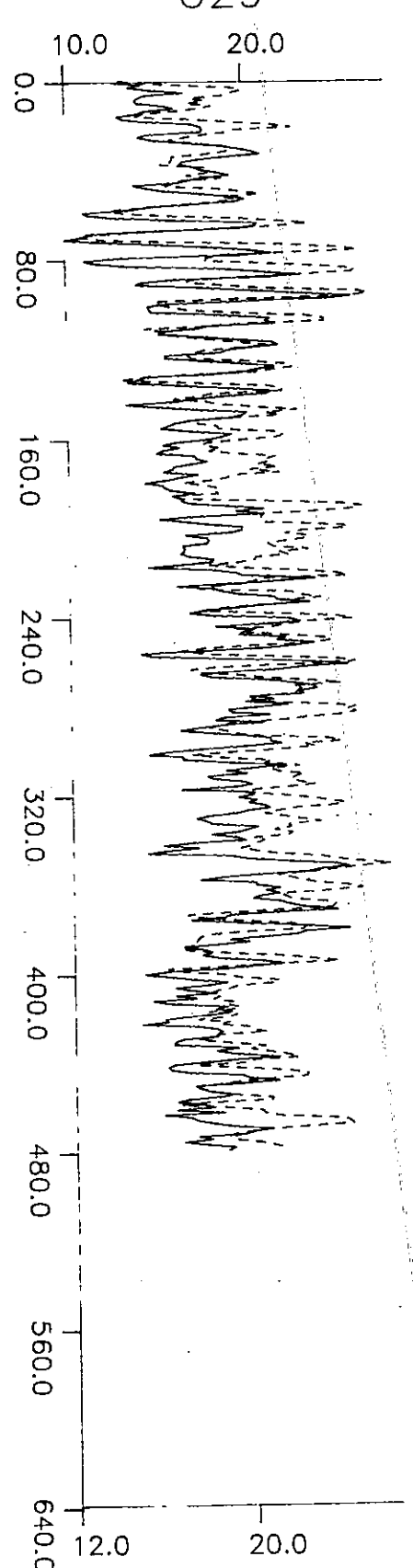
SPEED & PRESSURE - Tape 49 (Long deployment)

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2.131



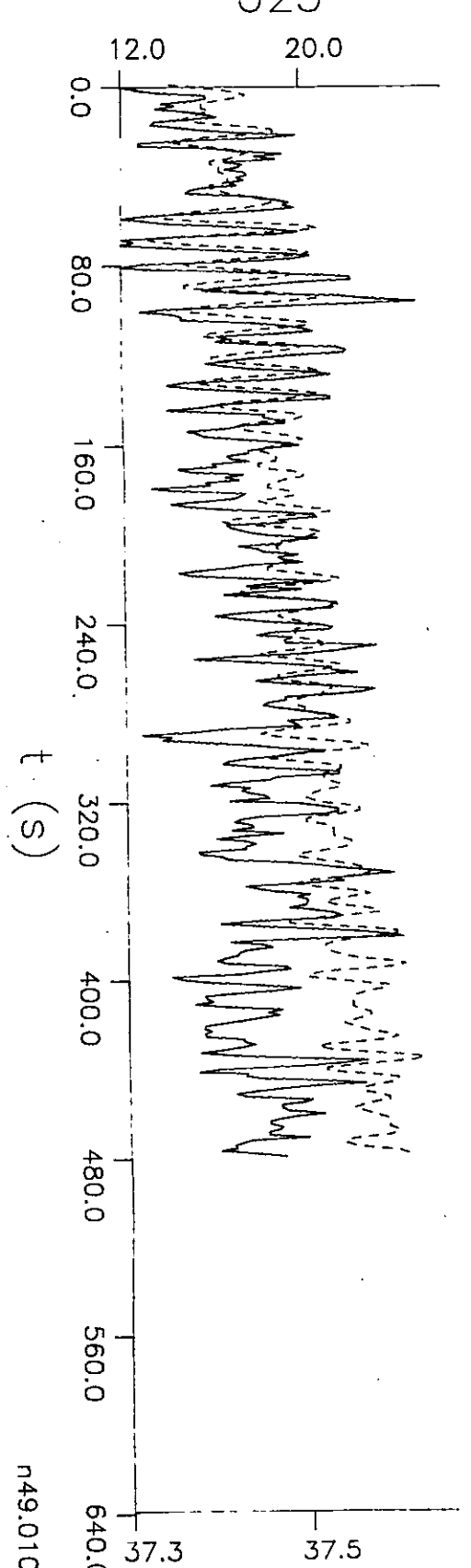
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U118

18.161
2.833



20.191
2.471
U58

17.880
2.460



37.493
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U23

Near bed current speeds and pressure

