

**P6314: Field Oceanography Cruise Report
Monday October 27th, 2008**

**Team 3
Kathryn Denommee
Sheilagh O'Leary
Graig Sutherland**



All photos by: Sheilagh O'Leary

1.0 Objective & Overview

The purpose of the Physics 6314: Field Oceanography cruise aboard the M/V Anne Pierce was to expose students to oceanographic field work. During the week of October 6th to October 10th three groups of students and professors each spent approximately two days aboard the Anne Pierce, as seen in Figure 1. This report outlines the work performed on part two of the cruise by the second group of students who were on board the Anne Pierce from October 7th at 17:00 UTC to October 8th at 18:30 UTC.



Figure 1: The M/V Anne Pierce at Long Pond. (Photo courtesy of S. O'Leary)

The ship cruise was performed in Conception Bay, which is on the Avalon Peninsula in Newfoundland. A map of Conception Bay is shown in Figure 2. The main focus of the cruise was making observations of the oceanographic properties of the Bell Island Tickle, which is the channel located between Bell Island and the main land. The following equipment was used on the cruise:

- CTD
- Multi-beam sonar
- Side scan sonar
- Echo sounder biosonics
- Plankton net
- Sub-bottom sonar
- Secchi disk
- Towed ADCP
- Moored ADCP & Moored thermistors

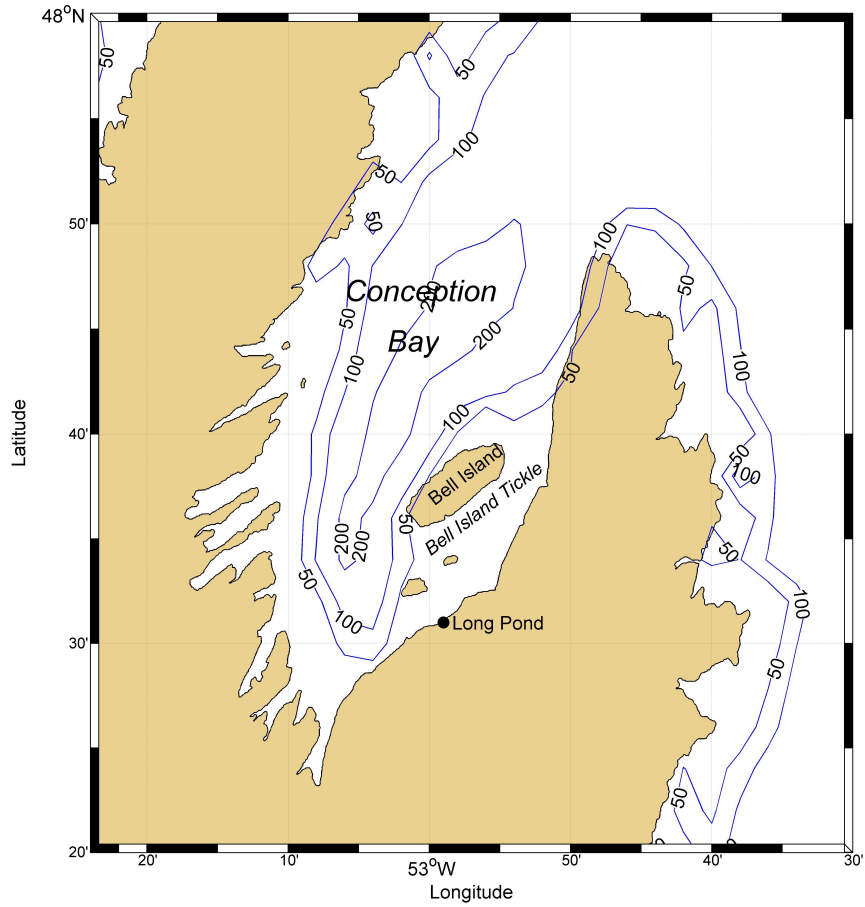


Figure 2: Map of Conception Bay.

The moored ADCP and the moored thermistors were deployed on October 5th in the Bell Island Tickle and were recovered on October 9th.

2.0 Personnel

Below is a list of the personnel and their roles while on board the Anne Pierce during part two of the cruise.

Crew	Professors	Students
Captain Henry	Sam Bentley	Charlie Bishop
Scott Anderson	Jack Foley	Susanne Brandstatter
Bob	Paul Snelgrove	Kathryn Denommee
Gene		Sheilagh O'Leary
Vern		Ashley Robar
		Graig Sutherland

3.0 Ship Track

The ship tracks of part two of the cruise are shown in Figure 3. The CTD4 and CTD6 stations were sampled on October 7th. Stations S1, S2, and S3 were sampled on October 8th. The towed equipment was used between the three stations.

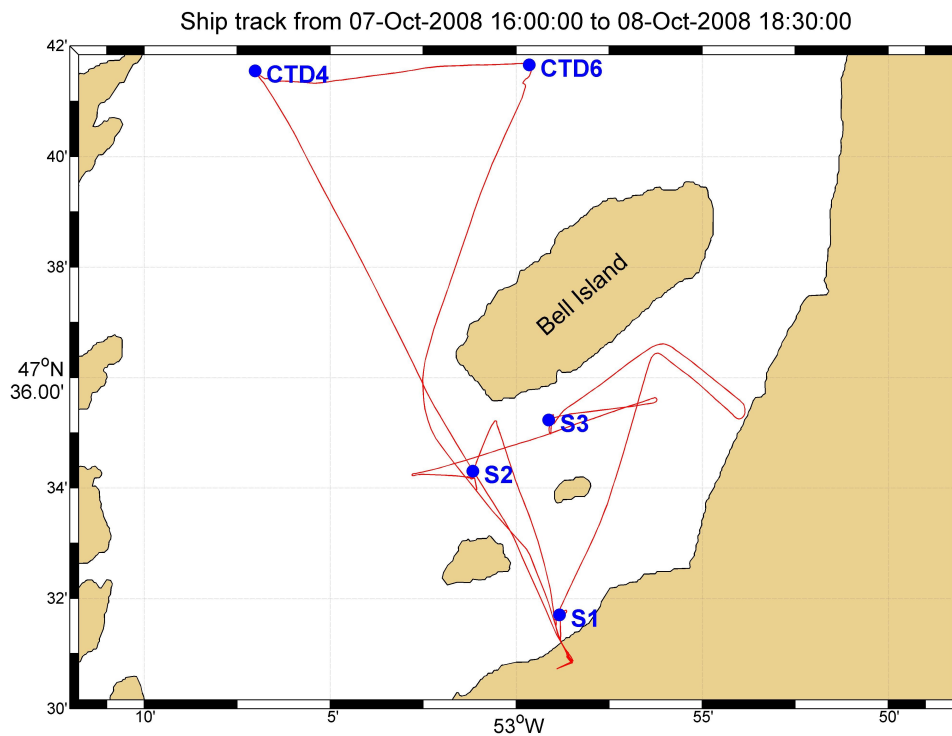


Figure 3: Ship tracks and station locations.

4.0 Sampling Strategy

4.1 Schedule

Part two of the field experiment was conducted in Conception Bay from October 6th until October 7th 2008. After each day of sampling the Anne Pierce docked in Long Pond in Conception Bay and provided accommodations for all personnel and crew members who chose to stay onboard. On October 9th the Anne Pierce recovered the moorings.

4.2 Moorings

The experiment involved deploying bottom-mounted moorings that recorded internally throughout the duration of the experiment. The moorings were a 600 kHz ADCP and thermistor chain and were located in the Bell Island Tickle in Conception Bay (Figure 2). This instrument pairing was deployed in order to gather information about tidal currents and temperature.

4.3 Ship-Based Sampling

Sampling from the Anne Pierce involved towed ADCP, multi-beam sonar, Biosonics echo-sounder, sub-bottom sonar (Chirp), sidescan sonar, and CTD casts. Plankton nets and Secchi disk measurements were also conducted on the cruise at predetermined stations. One sediment grab sample was collected at S1.

The amount and type of data collected from October 6th to October 10th is shown in Table 1. It should be noted that in addition to the data collected on this cruise, glider data collected in 2007 will be used as part of this experiment because weather conditions prevented the deployment of gliders during this cruise.

Table 1: Total data collected.

Class	Instrument	Approximate Amount of Data
Ship Based Sampling	Towed ADCP	13 MB
	Multi-beam sonar	532 MB
	Biosonics echo-sounder	245.2 MB
	Sub-bottom (Chirp) sonar	253 MB
	Side-scan sonar	1.04 GB
	CTD	766 MB
	Plankton Nets	4 samples
	Secchi disk	4 readings
	Bottom-grab	1 sample
Moored Instruments	ADCP & Thermistor Chain	4.53 MB

5.0 Observations

5.1 Towed ADCP

A sample of the towed ADCP data recovered on October 8th is shown in Figure 4. The plots are very noisy and this is likely due to contamination from other instruments that were deployed at the same time as the ADCP. Further analysis may alleviate some of the noise.

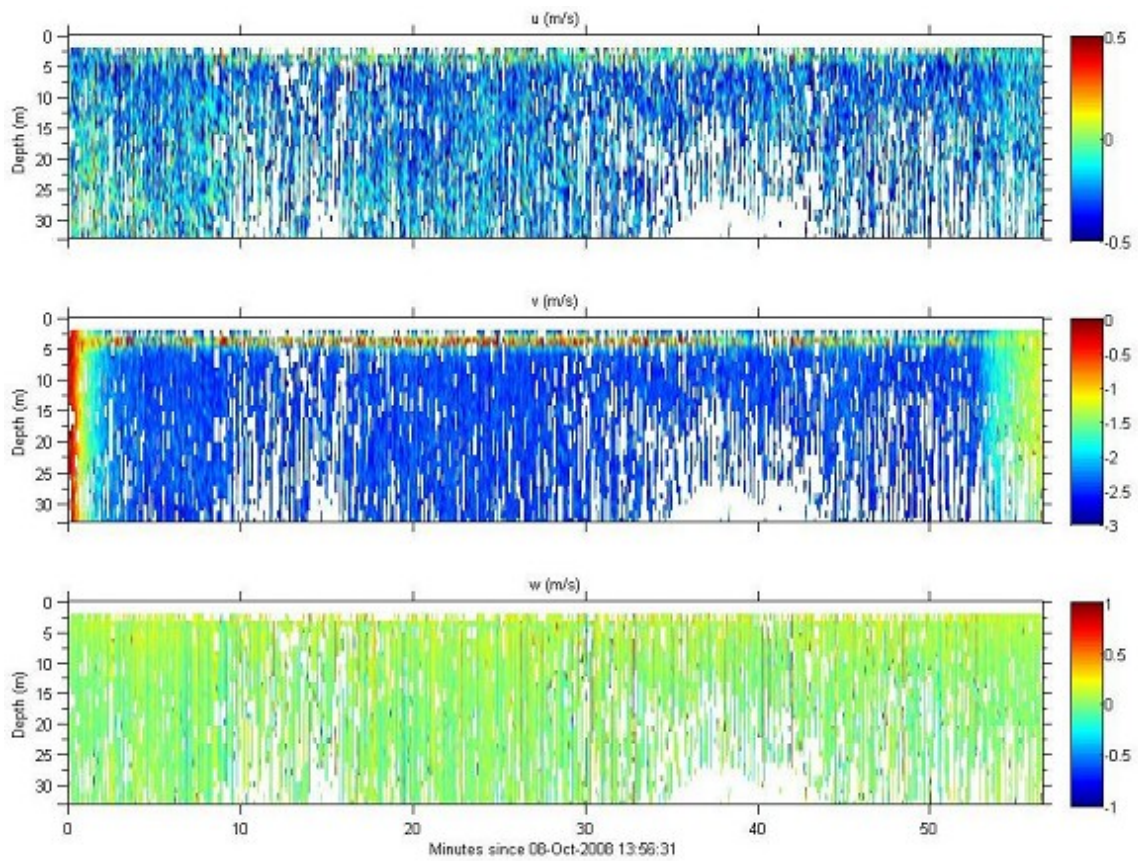


Figure 4: Towed ADCP.

5.2 Multi-beam sonar

A screenshot of multi-beam sonar data being displayed by the DeltaT software is shown in Figure 5. The large image on the right side of the figure shows the topography of the sea bottom.

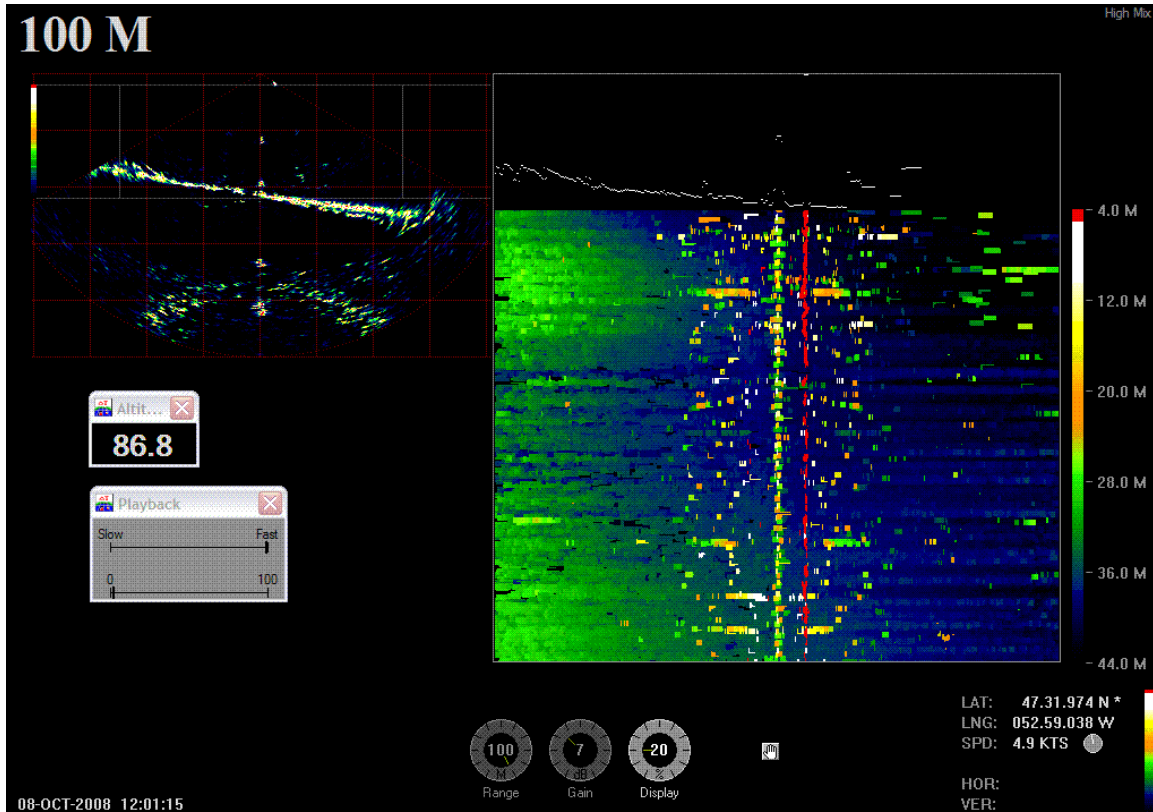


Figure 5: Multi-beam sonar image from Oct. 08, 2008.

5.3 Biosonics echo sounder

The relative backscatter intensity is shown in Figure 6. As with the ADCP results, noise levels are high in the majority of data collected during this cruise.

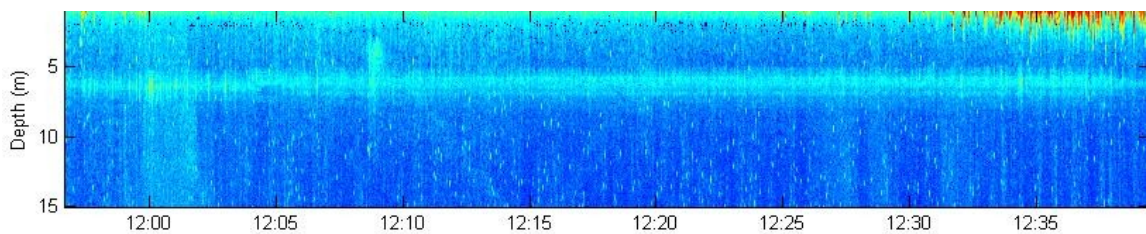


Figure 6: Biosonics echosounder. Time is in UTC from Oct. 08, 2008.

5.4 Sub-bottom sonar

A portion of the sub-bottom data collected is shown in Figure 6. The horizontal axis is position in GPS and the vertical axis is depth in meters, marked at 10 meter intervals.

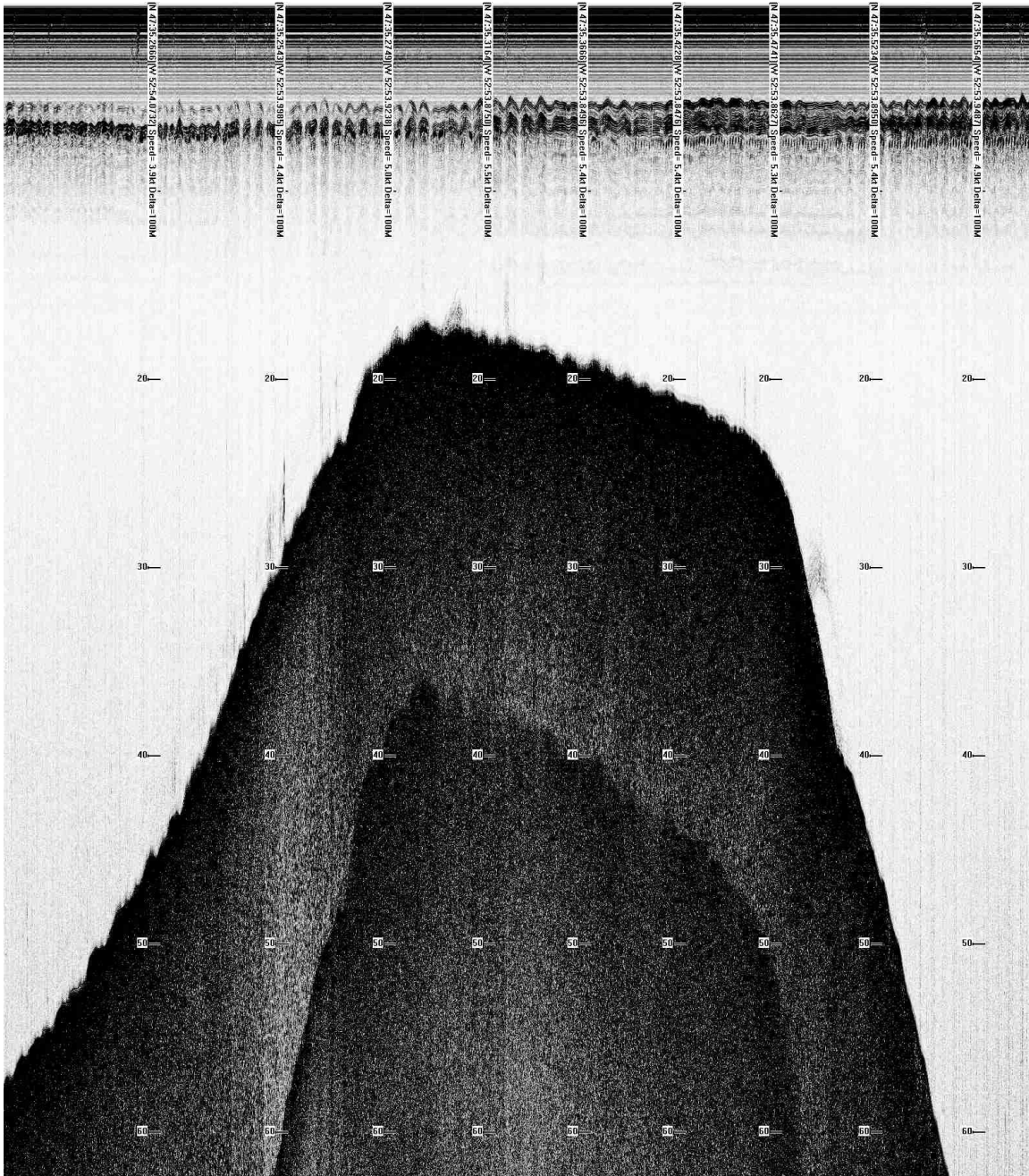


Figure 7: Sub-bottom sonar data sample. Greatest depth shown is 60m.

5.5 Side-scan sonar

A screenshot of results from the side-scan sonar is shown in Figure 8.

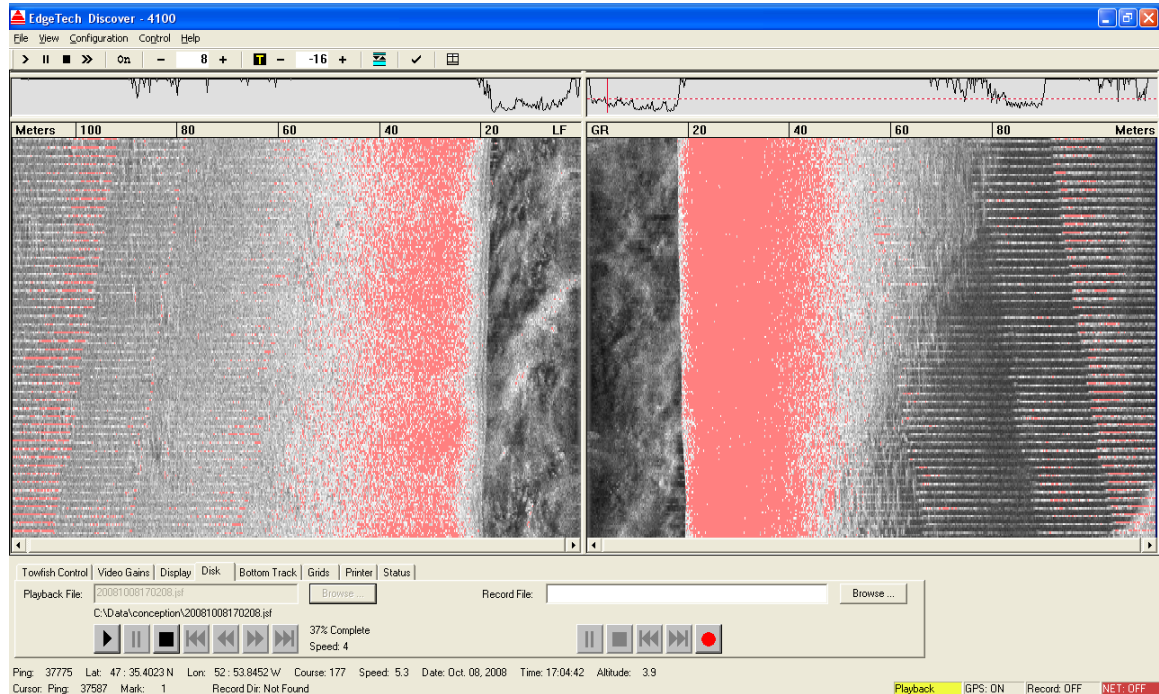


Figure 8: Screenshot of side-scan sonar data taken on 08-Oct-2008.

5.6 Secchi disk

The table below lists the time, location, and results of the Secchi disk measurements taken during part two of the cruise.

Table 2: Secchi disk measurements.

Date	Time (UTC)	Latitude	Longitude	Depth (meters)
7-Oct-08	19:46	47° 41.637' N	52° 59.600' W	10
8-Oct-08	10:56	47° 31.702' N	52° 58.836' W	9
8-Oct-08	13:01	47° 34.186' N	53° 01.229' W	13
8-Oct-08	15:15	47° 35.234' N	52° 59.126' W	10

5.7 Moored ADCP

An example of the moored ADCP data collected is shown in Figure 9.

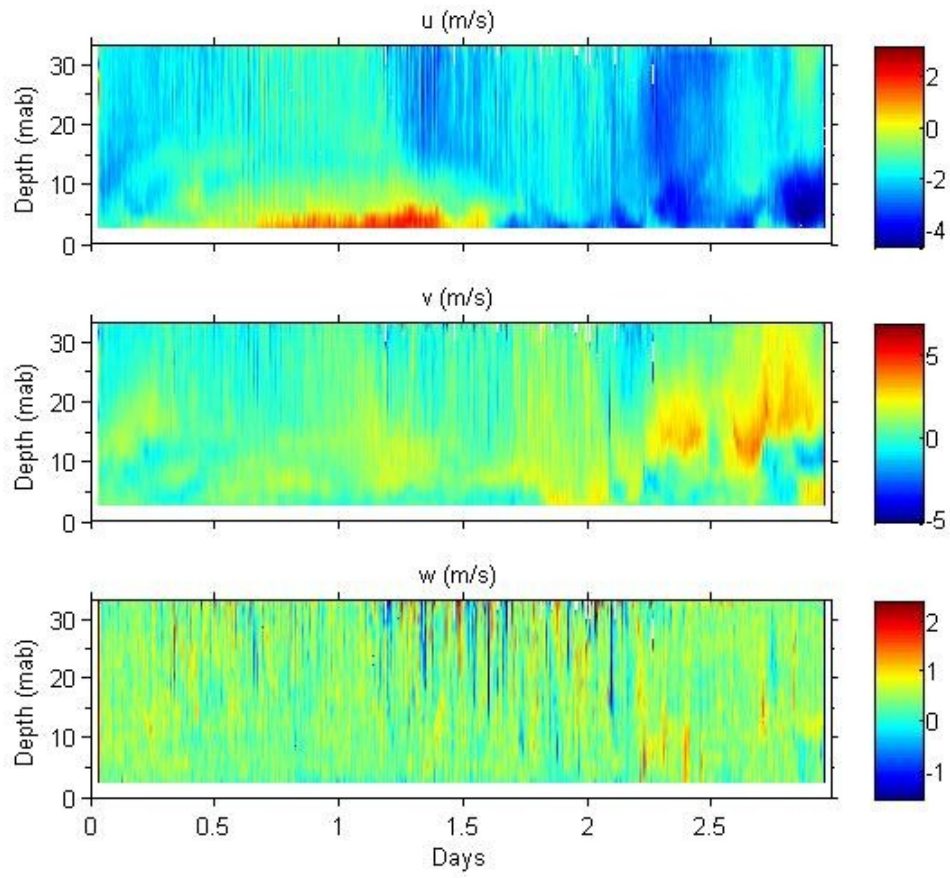


Figure 9: Moored ADCP data sample.

5.8 Moored thermistors

There were ten thermistors deployed at four meter intervals at the mooring site. Temperature was recorded every two minutes. Figure 10 shows the interpolated temperature profiles to one meter depth to show bottom temperature characteristics more clearly. The time axes indicates the date in UTC.

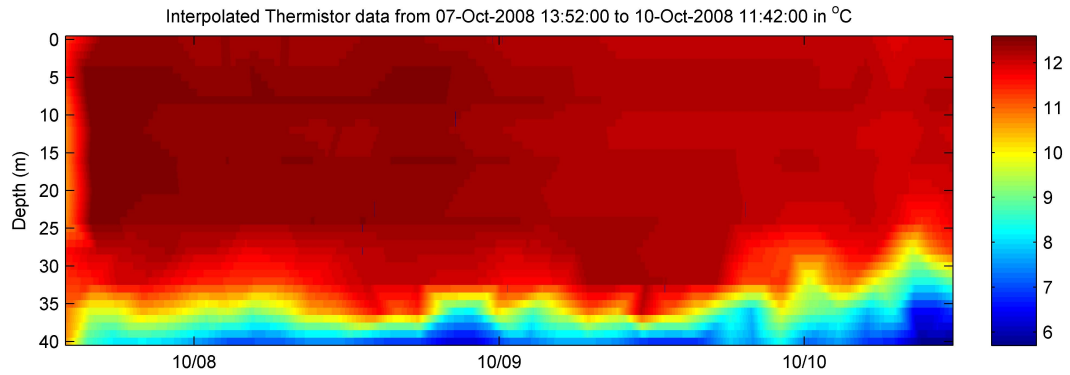


Figure 10: Interpolated Moored Thermistor Chain data.

5.9 CTD

Figure 11 shows a typical profile in the Bell Island Tickle of temperature, salinity, and density. Figure 12 shows an example of profiles taken by the other sensors on the CTD, including dissolved oxygen, fluorescence, backscatterance, and irradiance.

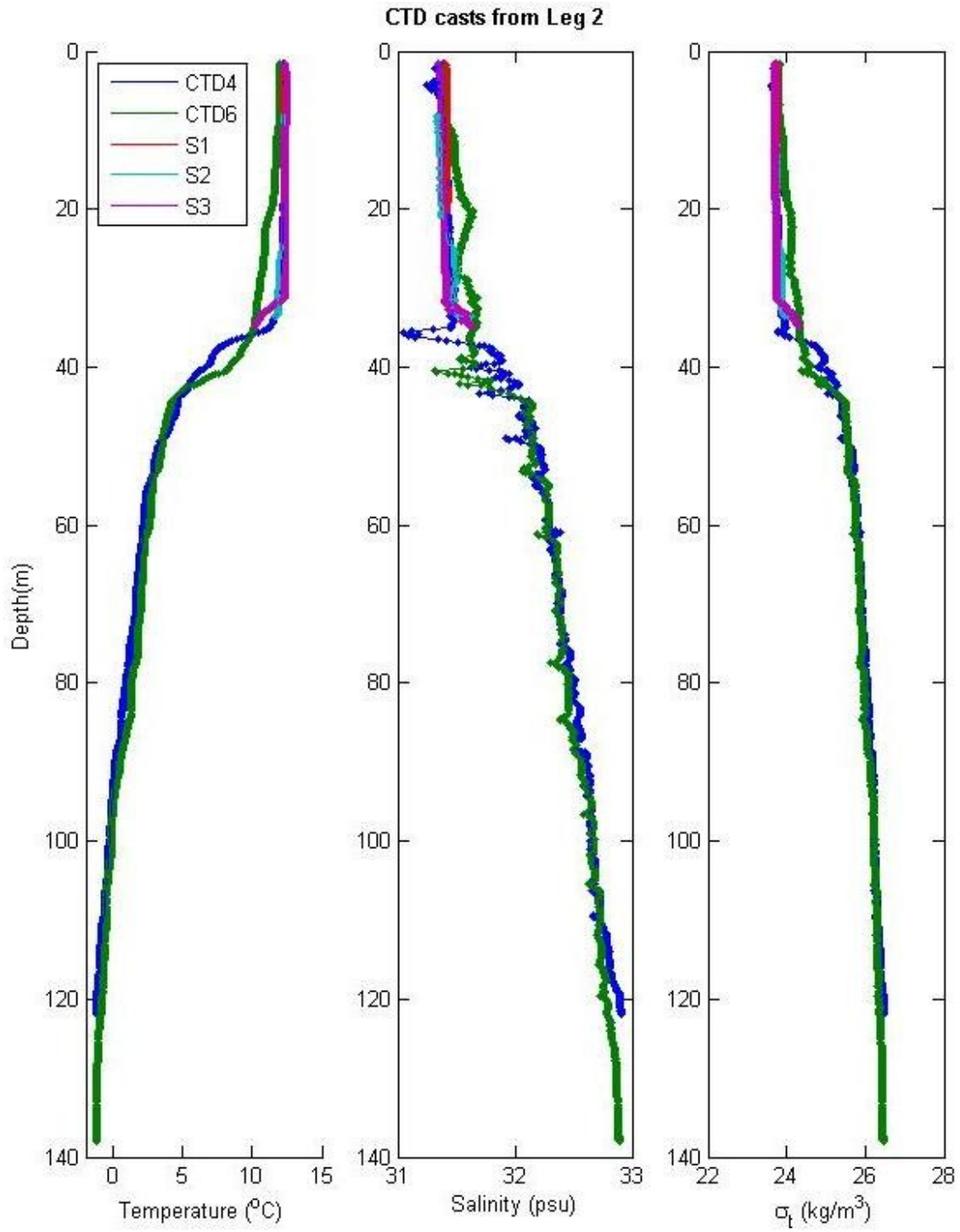


Figure 11: CTD casts.

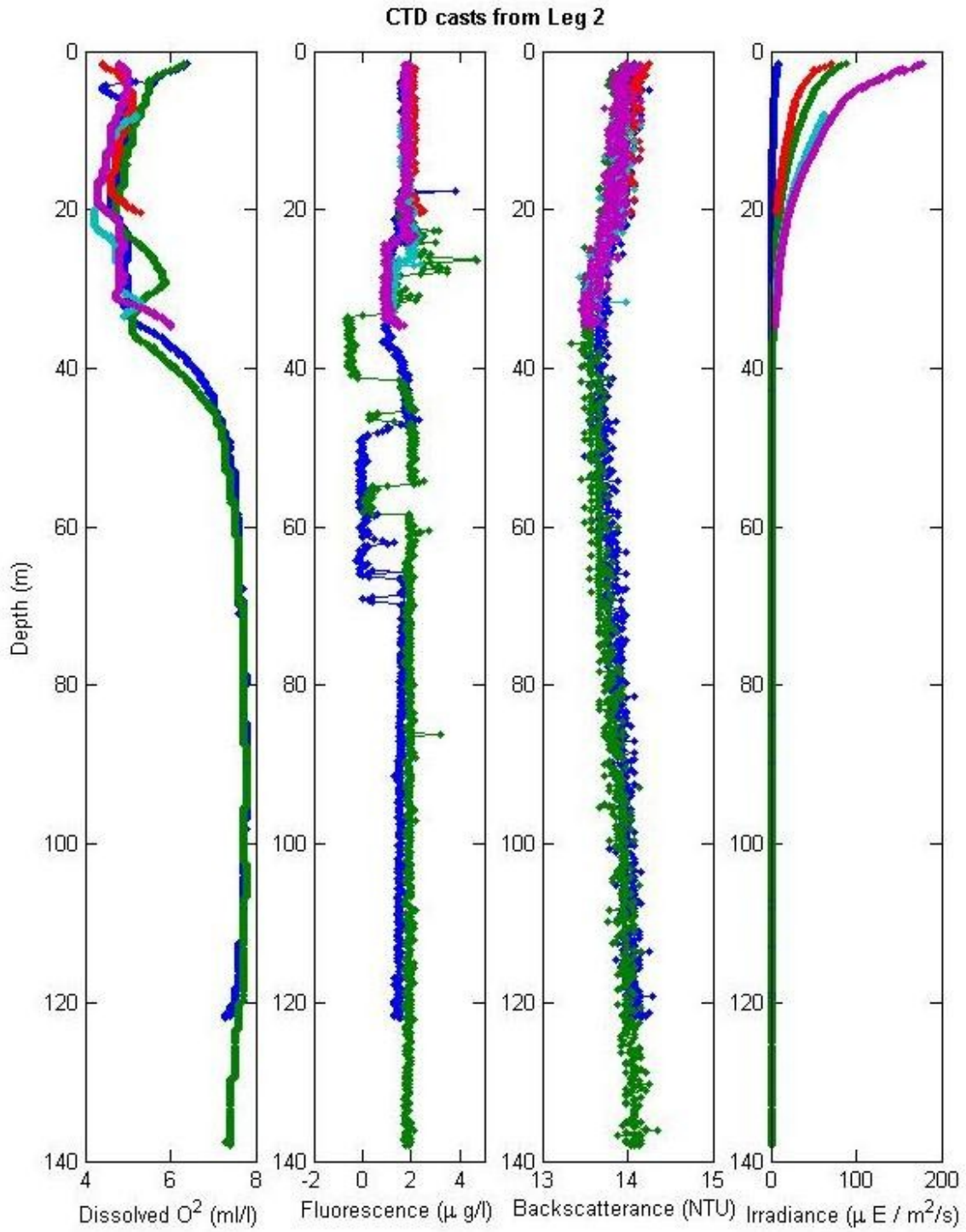


Figure 12: CTD casts.

5.10 Plankton net

Table 3 shows the total plankton counts from all vertical net tows taken during part two of the cruise. COPE indicates copepods, CLAD indicates cladoceran, GASL indicates gastropod larvae, and OTHER indicates all other species found. Split indicates how many times the sample was divided in order to count all specimens. TOTAL indicates the total number of specimens and COUNT is directly proportional to the volume of water filtered

Table 3: Plankton counts from vertical net tows.

Site	Latitude	Longitude	Split	COPE	CLAD	GASL	OTHER	TOTAL	COUNT
CTD4	47°41.555N	53°07.016W	1/128	981	30	251	49	1311	4388
CTD6	47°41.600N	52°59.598W	1/256	152	281	127	44	604	6078
S1	47°31.709N	52°58.858W	1/128	290	59	36	28	413	1059
S2	47°34.709N	53°00.989W	1/128	372	136	120	46	674	6356
S3	47°35.221N	52°59.131W	1/128	141	178	130	56	505	1569

NOTE: Volume Filtered: radius x 0.027 x count (net has a diameter of 1 m). To get final counts of your organisms multiply the number by the split number (ex. Copepod for CT4: 981 x 128 = 125,568 copepods).

6.0 Problems Encountered

- The multi-beam survey was shortened due to a gale warning at approximately 18:30 UTC on October 8th that forced the instruments to be pulled from the water and the Anne Pierce to return to dock.
- Stations S2 and S3 were at too great a depth for the sediment grab to take samples due to insufficient cable.

7.0 Plans for Scientific Analysis

7.1 Geology

Only one successful grab sample was taken on this portion of the cruise. Grain size analysis of this sample will be performed and recorded. The number and types of organisms present in the grab sample will be determined. Using results from the multi-beam survey, the types of seabed in Conception Bay can be determined.

7.2 Biology

The organisms have been identified and counted from all the net tows and the biomass at the different stations can be estimated using the current data.

7.3 Physical Oceanography

Large-scale temperature and salinity characteristics in Conception Bay can be mapped from the CTD survey and compared to results from previous surveys. The moored ADCP data can be used to estimate the tidal currents over the sill between Bell Island and Kelly's Island, and this may be used to determine rates of sedimentation.