Cruise Report

R/V ENDEAVOR Cruise 267 Leg 1 to Georges Bank

22 May - 5 June 1995

Acknowledgements

This report was prepared by Robert Campbell, with inputs from all Principal Investigators. The contributions of Jeff Van Keuren, who maintained the event log, and David Avery, who maintained the cruise log during the cruise were greatly appreciated.

We are grateful for the excellent support provided by Captain Thomas R. Tyler and the crew of the R/V Endeavor. Their hard work and patience with our cruise plan changes allowed us to accomplish all of our goals and objectives.

The US-GLOBEC Georges Bank research project is sponsored by the National Science Foundation and the National Oceanic and Atmospheric Administration. All data in this report are to be considered preliminary.

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Introduction

This was the last of five US-GLOBEC zooplankton process cruises aboard the RV Endeavor during the spring of 1995. The objectives of this leg of the cruise were (1) to measure vital rates, including growth and reproduction, of the target copepod species, *Calanus finmarchicus* and *Pseudocalanus spp.*, (2) to determine small scale plankton distributions using a TRACOR acoustic profiling system (TAPS), (3) to measure the effect of UV radiation on planktonic protozoan survival, and (4) to characterize the UV and visible light regimes at different locations on Georges Bank. At four stations on the bank, in the southwest region, the crest, the northeast peak, and the southern flank, an ARGOS/GPS drifter was deployed and followed for up to 72 hours while vital rate studies were undertaken. At the first drifter station in the southwest region, joint ship operations were conducted with the larval fish process group aboard the RV Seward Johnson. Vital rate measurements were also made at stations located in Georges Basin and the Great South Channel. In addition, a hydro transect was conducted from the bank into slope water.

The cruise track, drifter tracks, and locations of the CTD, MOCNESS, and zooplankton pump casts are shown in Figures 1-5.

Cruise Narrative

22 and 23 May

We left Narragansett on Monday May 22 around noon and headed toward our first station located in the southwest part of the bank. We arrived at the predetermined location of station 1 (41° 00' 68° 00') at 0600 on May 23 and communicated with the Seward Johnson. They were located south of us at 40° 48.6' 68° 03.02'. We moved south to join them. They had deployed 5 drogues with one in a central position and the others located to the northwest, northeast, southeast, and southwest. We discussed the possibility of using their central drogue for our work for joint ship operations. Jim Manning suggested that it would give valuable physics information if we deployed our drogue two miles to the west and Greg Lough added that the water in the region was quite homogeneous and a couple of miles should not matter as long as the bathymetry was the same. So, we deployed our drifter at 40° 50' 68° 08.5', on the same bathymetric line as their central drogue and monitored the position of their central drogue as well as our own with the Gonio box located on the bridge.

At 0920 we deployed an ARGOS/GPS drifter drogued at 15 meters and began science. We made an initial CTD cast followed by a MOCNESS tow, pump cast, and live net tows to collect copepods for experiments. There was a slight hint of some surface warming (about 0.1 °C) in the top 5 meters with the rest of the water column isothermal (8 °C). There was a gradual increase in fluorescence from the surface to 15 meters. We also noticed that the dominant organism (from the chlorophyll a maximum) appeared to be a heterotophic ciliate tentatively identified by Richard Pierce as *Pelatracus sp.*; a very unusual occurrence. The Seward Johnson had reported that hydroids were abundant, however we did not see that many. The net hauls were pretty clean except for large numbers of *Coscinodiscus*. *Calanus finmarchicus* was the dominant copepod, mostly older stages, especially females, but there were also nauplii and young copepodites. *Pseudocalanus spp.*, *Centropages typicus* and *Temora longicornis* were also present.

In the afternoon we made another CTD cast, followed by a pump cast, and then a one hour yo yo with the TRACOR Acoustic Profiling System (TAPS). At night the same set of operations was repeated. Our basic sampling pattern consisted of: a CTD cast, MOCNESS tow, zooplankton pump cast, TAPS yo yo, and zooplankton net tows to collect copepods for experiments in the morning; an optics cast, CTD cast, zooplankton pump cast and TAPS yo yo in the afternoon; and a CTD cast, zooplankton pump cast and TAPS yo yo at night. This basic pattern was followed for the remaining time spent at the first station as well as for all of the other drifter stations occupied during this leg of the cruise.

We had very calm seas and warm air temperatures for our first day. We observed pilot whales and dolphins during the day, and small fish feeding on amphipods that were attracted to the ship's lights after dark.

24 May

On the second day the stratification had become more developed with a 1 °C difference between the surface and bottom layers; the surface had warmed from 8 to 9 °C since yesterday. The fluorescence peak between 10 and 20 meters had also increased. The MOCNESS tow and pump casts found a layer of *Calanus* in the surface (top 15 meters). The live net tows found that nauplii of many species were present: *Calanus*, *Pseudocalanus*, and *Centropages* among them. There appeared to be fewer *Calanus* females compared with yesterday, more C5 and C4.

By 1700 the drifter had moved about 10 miles south west since deployment, along the 60 meter isobath. Where as the Seward Johnson's central drifter had not moved that far. It seemed that we started loosing the signal from the Seward Johnson's drifter early in the morning, but we would still pick it up sporadically. We spoke with Jim Manning and Greg Lough aboard the Seward Johnson in the evening. They reported that their drifters were moving all over the place and had to move about an hour away to pick up their southwest drifter. In addition, Greg reported that they were not finding many larvae and he believed the season was over. They were planning to spend the day, tomorrow, picking up their drifters and then head for WHOI around dinner time.

The wind picked up to 20-25 knots, but the seas were still relatively calm. The stratification had become less intense over the course of the day due to the wind. The fluorescence, however, increased at the chlorophyll a maximum at 15 to 20 meters, and pegged the fluorometer on the 2200 pump cast at 4.5 volts.

25 May

This was the last day at this station. The wind had decreased, but it was foggy and cool most of the day. The fog dissipated after 1300 when the front passed through. At night when we left the station the air temperature was about 11 °C with 10 knot winds.

The drifter continued on it's southwest course along the 60 meter isobath. We had some discussions about whether we should leave the drifter in longer, while we proceeded to the second station, to see if it circulates around the bank. We agreed that it was too chancy, since it might head south and then we would have to chase it down. We also spoke with Jim Manning on the Seward Johnson and he said that it would be interesting, but we should not sacrifice our science. A larger study with more drifters would be needed.

We retrieved the drifter at midnight after the TAPS cast. It was a very smooth retrieval. The drogue was at the proper depth and appeared to be ballasted properly. We could see the orange float being pulled just under the waves as they passed by it. After the drogue was aboard we headed for Station 2 at the crest at 9 knots.

26 May

At 0615 the crest buoy was sighted at 41° 24.47' 67° 32.50'. Jeff Van Keuren took a picture of it and Lynn Harris made a sketch, so it's condition could be assessed by the physical oceanographers. We then proceeded to station 2 (41° 23' 67° 32') and deployed the drifter.

The weather was cooler (9 °C), skies overcast with light rain in the morning. The rain let up in the afternoon, but the temperature remained cool and skies overcast. The winds were light.

The CTD cast showed that the water was well mixed as expected. The sea surface temperature was about 8° C and fluorescence lower than at the previous station.

The live net tows at 1100 revealed that there were very few *Calanus* at this station. *Centropages hamatus* was dominant, *Pseudocalanus* and *Temora* were abundant and *Calanus* rare. The *Calanus* population was mainly composed of C5s, some adults and almost no younger stages. In the pump nets we observed only a few nauplii (*Centropages*, *Temora*, and *Pseudocalanus*), but benthic larvae were common (bivalves and polychaetes). The nets were clogged with *Coscinodiscus* (especially the 150) and sand was found even in surface tows (0 - 15 meters). There were very few hydroids.

A surface net tow with a 20 µm plankton net found a variety of organisms. Diatoms were dominated by *Coscinodiscus*. Several pennate diatoms were also observed. Other phytoplankton of note was *Phaeocystis*, which was common. Dinoflagellates were dominated by *Ceratium*. *C. tripos* was most common but *C. lunula* was also present. Other dinoflagellates observed included *Dinophysis* and *Protoperidinium*. Ciliates were also common. These included many small aloricate choreotrichs, as well as tintinnids. *Stenosemella* and *Tintinnopsis* were the most abundant taxa, but *Parafavella* was also observed. Also present were *Mesodinium rubrum*, some benthic ciliates, and *Pelatracus*, the ciliate that was dominant in the chlorophyll a maximum at station 1. Also of note at this station were abundant rotifers (probably *Synchaeta* sp.).

27 May

It was a sunny, cool day. The winds were down to only 10 knots by evening and the seas were very calm. The air temperature and surface water temperature were 8 and 9 °C respectively.

28 May

It turned out to be a beautiful clear sunny day. The seas were calm with light (5-10 knot) winds out of the Southwest. Temperatures were warmer than yesterday reaching the middle teens (°C).

Another net tow with the 20 μm net found microplankton similar to other net tows at this station. *Coscinodiscus* was the dominant organisms in the tow. Some pennate diatoms and other diatoms were rare. Other phytoplankton of note included colonies of *Phaeocystis*, common, but not overwhelming in abundance. Dinoflagellates were also common. *Ceratium* was still the most abundant dinoflagellate, but *Dinophysis*, *Protoperidinium*, and *Polykrikos* were also observed. Both *Protoperidinium* and *Polykrikos* were pink in color. Metazoans observed included polychaete larvae and rotifers as the most abundant (other than copepods). Several *Oikopleura* were also observed. Ciliates were common. The most common were small, colorless choreotrichs, followed by *Pelatracus*. One *Laboea* was also observed. No tintinnids were observed.

The drifter did not move far from its' original position while following the clockwise tidal circulation pattern. We picked it up at about 2300 and proceeded to the start of the hydro transect. We decided to start the transect early because of the weather forecast. The prediction was for 30 to 35 knot winds and 12 to 15 foot seas for the following day. However, the barometer was still reading 1030 mb at 2330 as it had since late in the afternoon.

29 May

We started the hydro transect (Standard Hydrographic Section A) at 0300 in order to finish it before the weather hit. We completed it approximately 12 hours later without any trouble. The weather deteriorated during the day, but the winds never were above 30 knots nor the seas above 8 to 10 feet during the transect. At station H6 a live net tow to

collect animals for experiments found almost pure *Calanus*. C5s and females were dominant, but all stages were represented.

At station H12, in the slope water at the end of the hydro line, the scheduled MOCNESS tow was canceled due to rough weather. Instead, an opening closing net was used to collect copepods near the bottom. (Special thanks to Endeavor engineer Eric Frazier, who in a pinch, fabricated some messengers for us out of lead, since the standard messengers would not fit on the hydro wire.) The catch was mainly *Calanus* C5s (no other *Calanus* stages present) and some *Metridia*. The *Calanus* were sorted for RNA/DNA and CN analysis.

At the conclusion of the hydro transect we headed back onto the bank before proceeding to station 3 at the NE peak, in order to move back into cooler water so that water baths using surface water to control temperature in experimental incubations could be turned back on. Of note, while in the warm water at station H12, numerous Portuguese Men of War were observed. Also as we steamed north, about 12 dolphins were riding the bow wave of the ship.

30 May

We arrived at station 3 (41° 40' 66° 31') in the Northeast Peak region around 0700 and immediately deployed the drifter. During the deployment the ARGOS antenna was damaged. We retrieved it and deployed the backup drifter without incident.

The weather had cleared, but the seas were still a bit rough from the previous day's weather, so the MOCNESS tow was canceled. However, all other sampling took place as usual.

The CTD cast revealed a well mixed water column. There was slight surface warming (< 0.2 °C) in the top 10 meters, but the rest of the water column was a cool 6.3 °C. The fluorescence was low and salinity about 32.6 ppt.

This station location was upstream of station 1, and was chosen so that comparisons could be made between zooplankton rate processes at upstream and downstream locations. However, very few Calanus were collected in the net tows. There were a few C5s and adults, but no younger stages were present.

31 May

It was a beautiful bright and sunny day with light winds and calm seas. Whales were spotted off the beam during the day. The surface layer continued to warm up (6.9 °C) and deepen (15 m) during the day.

We continued to find very few *Calanus* at this station and this limited the number of zooplankton rate process experiments that could be undertaken. So, after consulting with Ted Durbin by FAX we decided to leave this station early and add on another station at the southern flank mooring at the end of the cruise. This location was chosen for several reasons: first, it was just upstream and along the same isobath as station H6 where *Calanus* was abundant and all stages present, second, it was also located upstream from station 1 which would give an upstream downstream comparison, and third, it was the stratified site chosen for the second leg and this would give us an opportunity to have a longer time series during the development of stratification.

We finished up sampling at this station at 2230, retrieved the drifter, and headed for Georges Basin.

1 June

We arrived at Georges Basin at 0530. It was a beautiful sunny day. The air temperature was about 12.5 °C, there was a light 10 knot breeze from the south, and calm seas. However, the sea surface temperature was about 2 °C warmer (8.8 °C) than the northeast peak. We did not see this on the image that was down loaded the day before.

We started the station with a TAPS yo yo for about 2 hours, followed by a MOCNESS down to 230 meters. *Calanus* C5s were dominant in all nets, some females, and very few younger stages. The largest biomass was found in the 40 - 15 meter net. We then did another TAPS yo yo for about 3 hours, followed by an oblique net haul to the bottom to collect females for egg production measurements. We left the station at 1300 after an optics cast.

We arrived at the southern flank mooring at 1930 and decided to deploy the drifter about 1 mile west of the moorings to avoid entanglement, assuming a southwest drift. The drifter was successfully deployed at 2000. The initial CTD found that the station was

stratified. The surface temperature was about 10 °C with the base of the thermocline about 7.5 C, at 25 m. The fluorescence peak was also found at the base of the thermocline.

The zooplankton net tows (150 µm) found nauplii and copepodites of a variety of copepod species, including: *Temora*, *Pseudocalanus*, *Centropages spp.*, *Oithona*, and *Calanus*. *Calanus* was not numerically dominant, but all stages were present in good numbers.

A net tow with a 20 µm net in the upper 10 - 15 meters was dominated by aloricate ciliates. *Laboea*, *Strombidium*, and *Pelatracus* were observed. No tintinnids were observed, and diatoms were very rare. A few *Ceratium* were the only dinoflagellate observed. There were also many fecal pellets in the sample, probably from the numerous *Calanus* which were obvious in the MOCNESS samples.

2 June

It was a bright sunny day with the air temperature over 20 °C in the afternoon.

The net tows found the same community as the previous day. The MOCNESS samples were relatively clean. Very little phytoplankton was found in the nets.

During the TAPS yo yo (1 hour deployment) we observed the chlorophyll a maximum, located at the base of the thermocline, moving up and down between 25 and 40 m. It appeared that there were internal waves moving the thermocline up and down.

The 20 µm net tow in the upper 5 meters found that *Ceratium* was the dominant dinoflagellate and the dominant phytoplankter. Ciliates were present, but not in great abundance. These included aloricate choreotrichs, *Pelatracus*, and a few tintinnids. Diatoms were rare. There were still many fecal pellets, and many copepods (mostly large *Calanus*) were caught in the 20 µm net, attesting to their abundance at this station.

A sample from a Go Flo bottle at the chlorophyll maximum and filtered through 41 µm mesh found that *Ceratium* was still the dominant dinoflagellate, but *Protoperidinium* was also present. More diatoms were present, especially *Coscinodiscus*, but also a few other species. Ciliates were more abundant here, but same taxa as the surface. Also present here were a few rotifers.

3 June

It was overcast and foggy all day. The air temperature in the morning was about 14 °C and the sea surface temperature was 10.7 °C. The seas were still calm, but we did have a 10 - 15 knot easterly breeze.

The morning MOCNESS tow found the same basic community as the previous day. *Calanus* was present at all depths and it was almost pure *Calanus* in the surface (nice bright red color). The bottom net had a greenish brown color and the middle net was intermediate between the two. Jeff Runge looked at the bottom net and found a lot of decomposing diatoms and empty frustules. It appeared that a lot of the large phytoplankton had settled out here. Also, there were large numbers of *Calanus* eggs in the bottom net. In addition, while sorting *Calanus* from the 150 µm net tow for RNA/DNA and CN analysis a large amount of *Rhizoselenia* was observed.

It was difficult following the drifter in the fog, therefore we recovered it in the evening at 2030 and then finished up the sampling at the station. We departed Station 5 for the Great South Channel at 2300. The Fog was still thick, but we were still able to make about 8 knots.

4 June

We arrived at station 6 (41° 30' 68° 59') on the eastern edge of the Great South Channel at 0730. We made a zooplankton net tow to look for dense concentrations of *Calanus* that could be brought back live to the laboratory for Ann Durbin's mackerel feeding studies. We found high concentrations of *Calanus*, but we proceeded to Station 7 in the center of the channel, knowing that we could return to station 6 to collect *Calanus* if they were not that abundant there.

We arrived on station at 1000 and began our activities. The MOCNESS haul revealed older stage *Calanus* at all depths. The surface sample was raspberry in color, while the deep (140 - 100 meter) sample was orange. The color difference to some extent may have been due to dilution at depth by *Metridia*, but the deeper *Calanus* did appear to have much less pigment. There were more females than C5s down deep. However, the converse was true at the surface. In addition, the nets were very clean; there was almost no phytoplankton. Stephane Plourde also reported that in the Great South Channel almost no

eggs were being produced by *Calanus* females in contrast to the high rates observed on the flank.

The phytoplankton net (20 μm) found that *Ceratium tripos* was the dominant organism in this fraction. Also, there were many fecal pellets. A few diatoms were observed: *Coscinodiscus* and *Chaetoceros*, but these were rare. No rotifers were observed. Ciliates were rare, a few small, colorless ciliates and a few of the tintinnid *Parafavella gigantea.*

Prior to departing the final station we made net hauls to collect live animals. The pump was used to fill eight 32 gallon trash barrels with 5 °C water collected from 80 m. The concentrations of *Calanus* were quite high and so, we were able to collect about 400,000 animals per tow. We diluted two tows into 8 barrels, iced them and headed for WHOI.

In route we encountered dolphins, whales, and several basking sharks on a warm, calm, peaceful evening. We had a beautiful sunset to end a successful cruise.

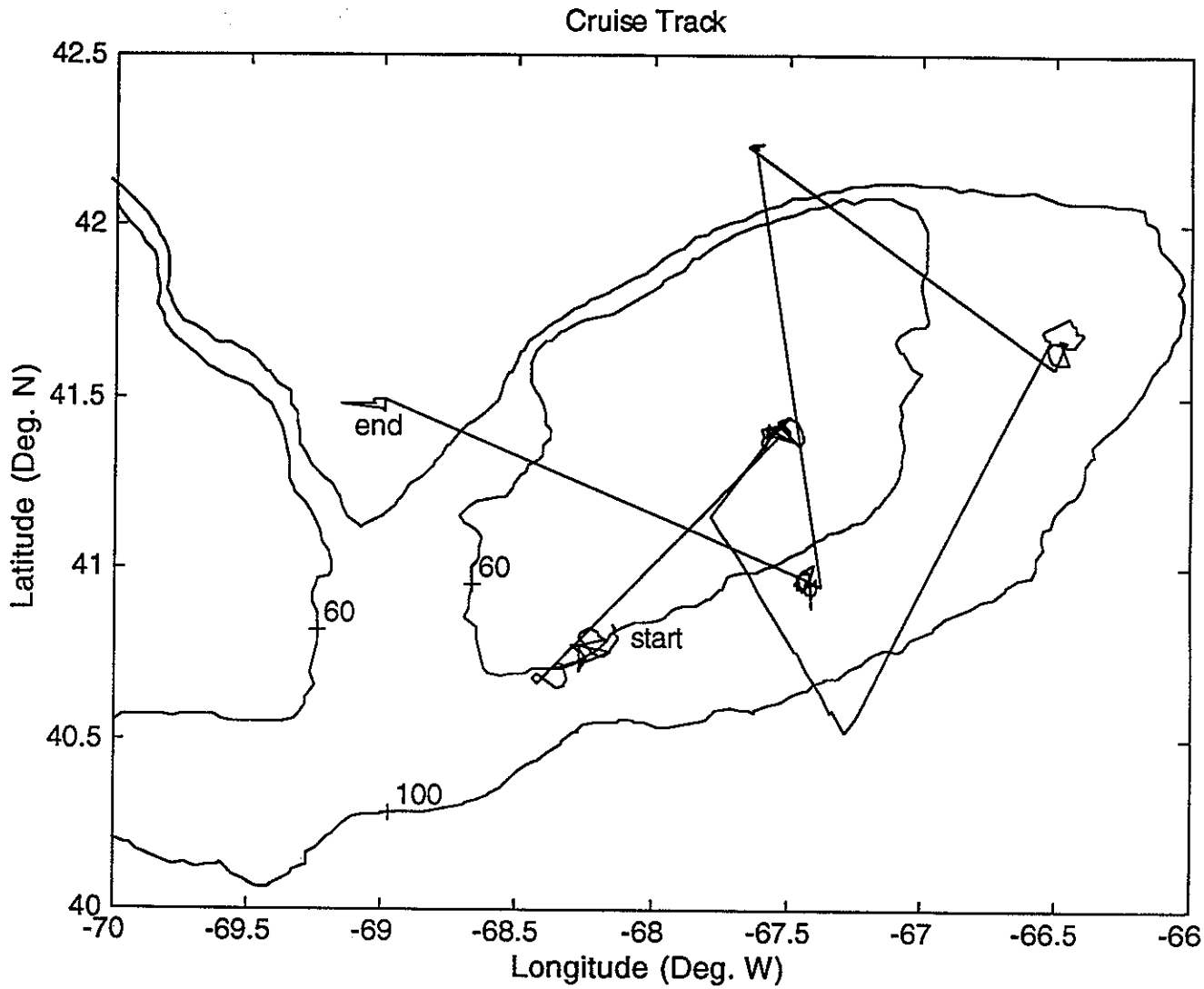

Figure 1. EN267 - Leg 1 cruise track (22 May to 5 June 1995).

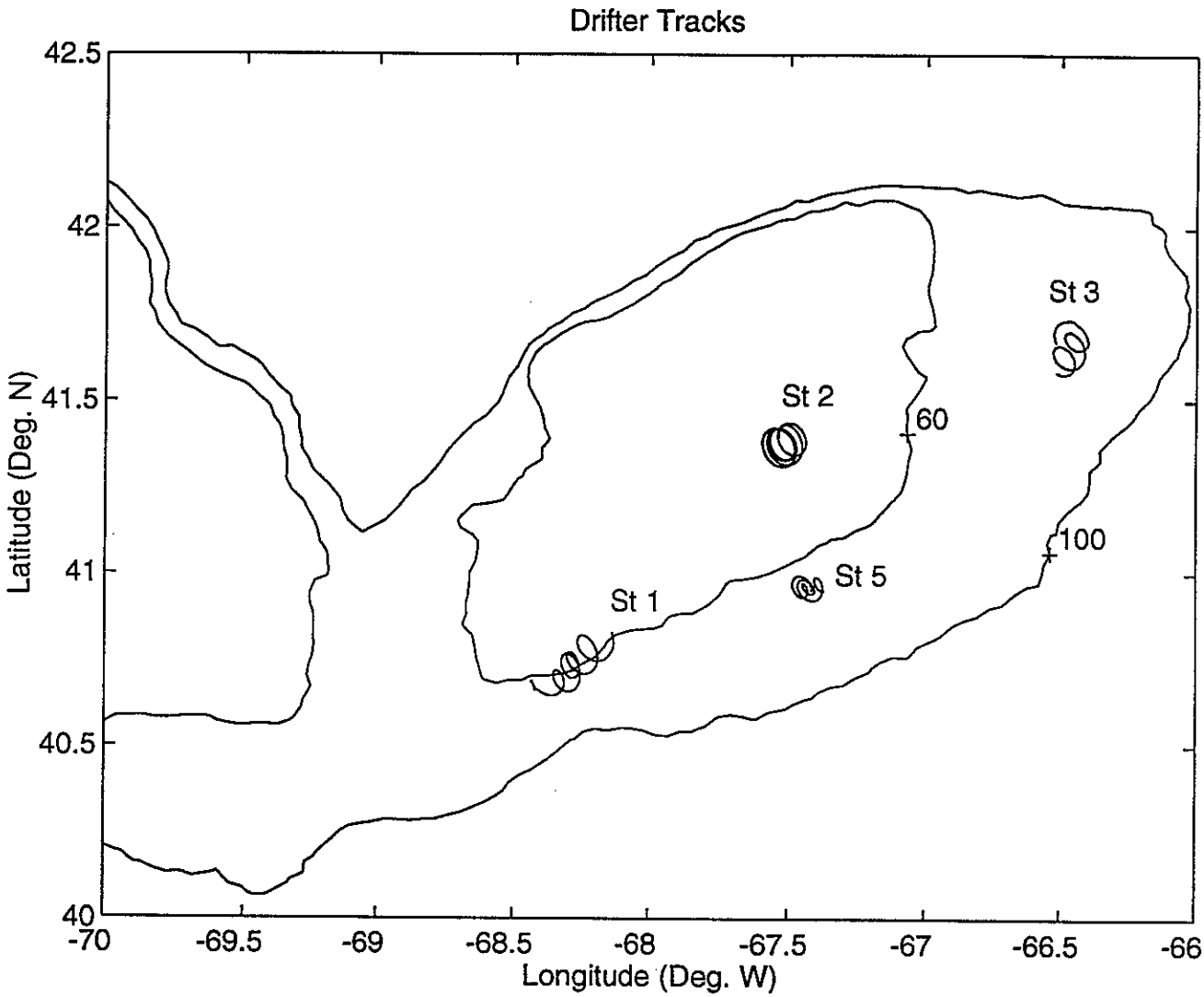

Figure 2. The drifter tracks are shown for each of the 4 drifter stations during EN267 - Leg 1.

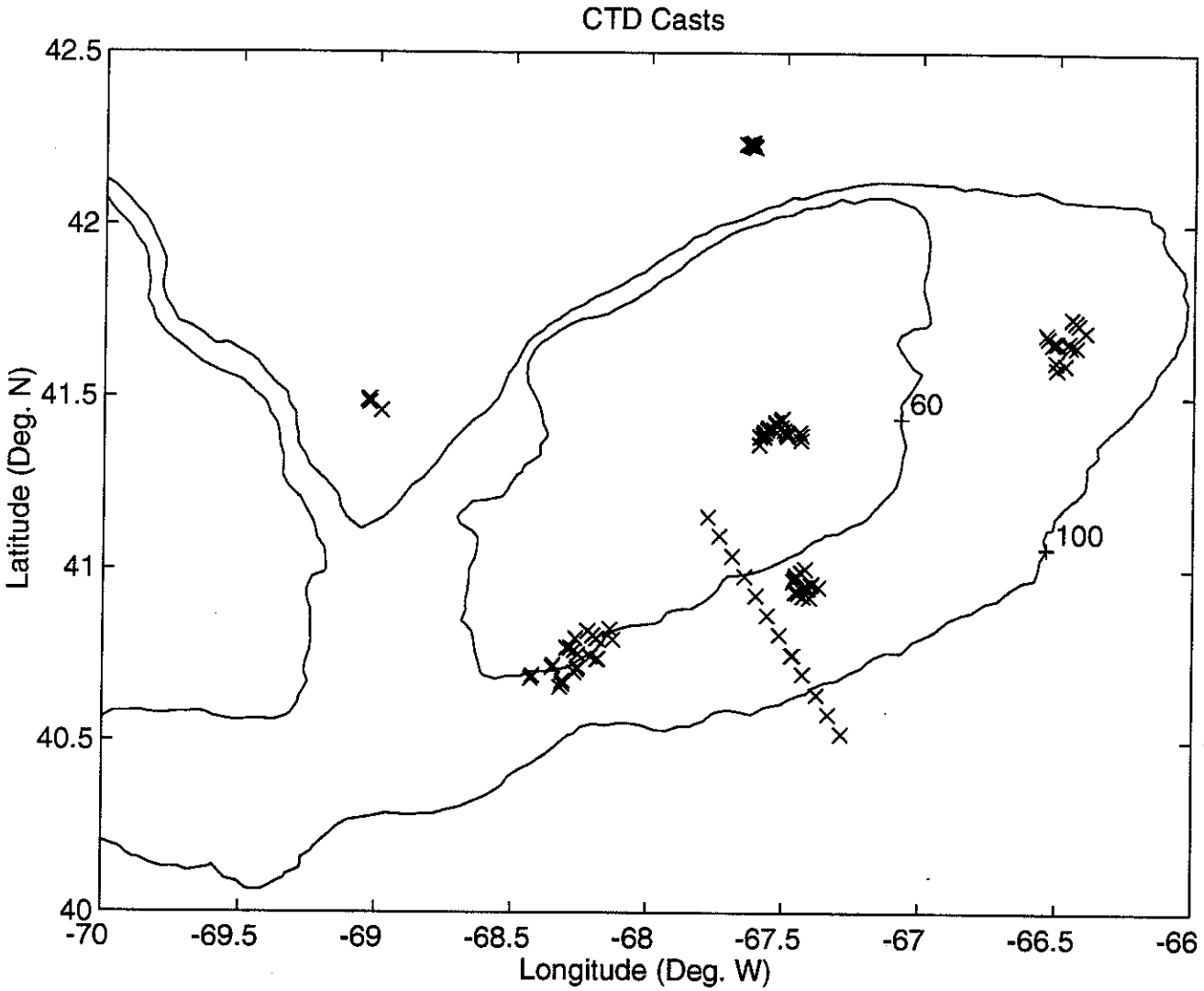

Figure 3. Locations of CTD casts during EN267 - Leg 1.

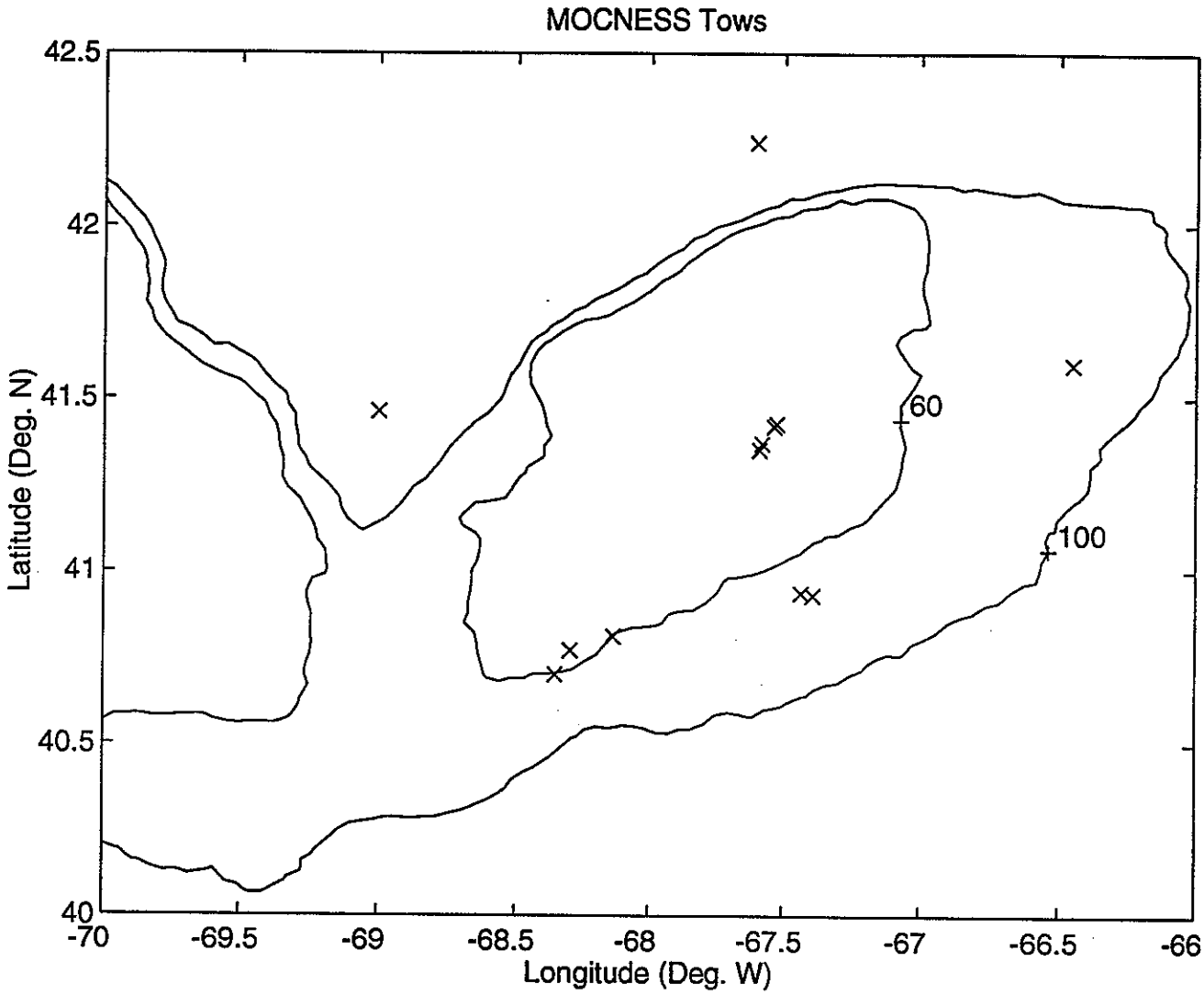

Figure 4. Locations of the MOCNESS (1 M^2) tows during EN267 - Leg 1.

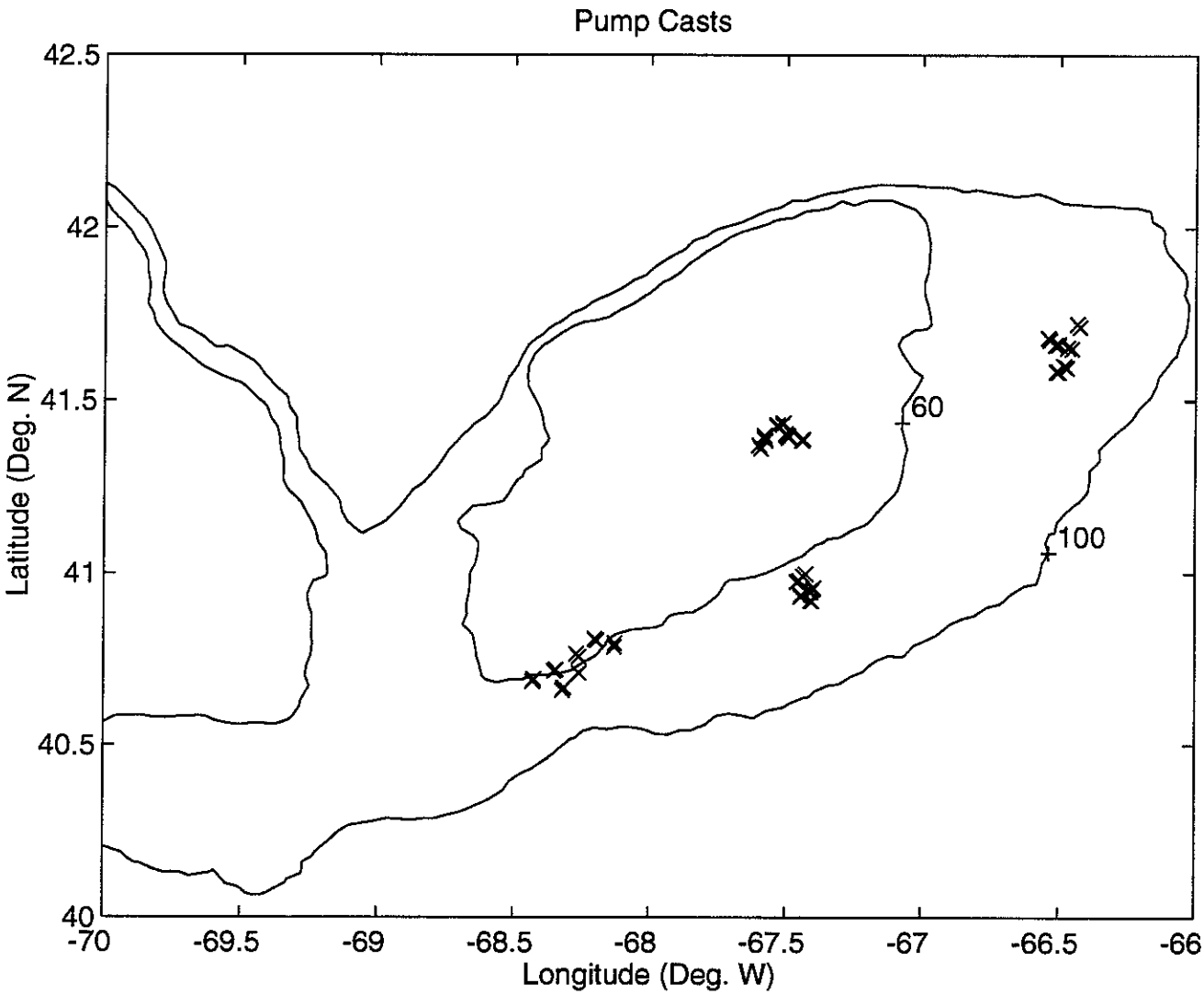

Figure 5. Locations of the zooplankton pump casts during EN267 - Leg 1.

Individual Reports

A. Hydrography (Lyn Harris)

Vertical profiles of temperature, conductivity, and pressure were measured on this cruise with a Neil Brown Mark III CTD and a rosette water sampler mounted with 11 General Oceanics 10 liter GO-FLO sampling bottles. Chlorophyll fluorescence was measured with a SeaTec fluorometer and light transmission was measured with a 25 cm path length SeaTec transmissometer. A Tracor Acoustic Profiling System (TAPS) was attached to the CTD frame to determine the finescale horizontal and vertical distribution of plankton. Shipboard salinity analysis was performed by Bill Fanning on an Autosal salinometer.

Three types of CTD casts were made on the cruise. Although all three types measured temperature, conductivity, pressure, fluorescence, transmission, and TAPS data, each type of cast had its distinct purpose. The first type, a hydrographic cast, collected water samples for use in calibrating the CTD. The second type, a pump cast, was made with a large hose clamped onto the rosette in place of one GO-FLO bottle. The hose reached through the water column from the CTD to the ship's deck where it was attached to a motor which was used to pump water from the CTD's depth to the surface continuously during CTD upcasts. The third type of cast was a yoyo cast where the CTD was continuously cycled from the surface to the bottom to gain better horizontal and temporal resolution for the TAPS data. The different cast types were often combined because of time constraints (i.e. a hydrographic cast could be combined with a pump cast).

Water samples were taken during the CTD casts for five different purposes, four of which used GO-FLO water bottle samples. Bottle samples were taken to calibrate the fluorometer, to collect ciliates for taxonomic work, to collect plankton for an experiment which examined the effect of solar UV on plankton protozoan survival, and to collect copepods and a volume of the water they inhabited for egg production experiments. The fifth purpose included the use of the zooplankton pump to collect copepods which were preserved to be counted after the cruise.

The ship occupied 7 different stations during the cruise plus a cross-bank section (see Figure 6). CTD casts were taken at Stations 1,2, Hydro Line, 3-5, and 7. No casts were taken at Station 6. At Stations 1-5 a drifter was deployed for several days and the ship slowly maneuvered in order to keep the drifter in view. Following the drifter in this way

resulted in slightly different locations for each cast. With few exceptions noted in the CTD log, the casts were made from the surface to approximately 5 m above the bottom. The drift of the ship over sand waves made approaching the bottom somewhat dicey on occasion. Bursts of low transmission from suspended sand at the bottom of the casts show where the CTD or its wake stirred up the bottom.

At Station 1, the Southwest Station, casts 1 and 2 showed a 5-15 m deep surface mixed layer above a weakly stratified interior; both layers consisted of Maine Surface Water. A fluorescence maximum was generally found at the base of the thermocline and a minimum was found at the surface. Casts 3-6 showed a somewhat different structure with a shallow surface mixed layer, a mid layer of minimum temperature and high fluorescence, and a weakly stratified bottom layer containing the salinity maximum. Subsequent casts at Station 1 show warmer saltier water with properties of Maine Bottom Water capped by a surface mixed layer. A fluorescence maximum was found at the base of the thermocline. The casts at this station reached to about 60 m depth.

Station 2 was occupied near the Crest mooring and showed remarkably homogeneous temperature and salinity profiles. The surface to bottom temperature change was only .03 deg C and the temperature change was .005 ppt. The casts at this station reached to about 45 m depth. There was no fluorescence structure at this station.

The Hydro Line cross-bank section consisted of 12 stations (H1 - H12) reaching from the bank (45 m depth) across to the slope (145 m depth). The section showed dramatic changes in hydrography, beginning with stations representative of those at the Crest Station (H1, H2), slowly building a surface mixed layer beginning with Station H3 and a mid-depth temperature minimum and fluorescence maximum by Station H5 which continued through Station H7. The shelfbreak front was indicated in Station H10 by the high temperature and salinity at depth. The front was also evident by the temperature profile at Station H11 which showed a surface temperature increase of 5 deg C over Station H10. The transect ended with Station H12 showing Upper Slope Water (16.4 deg C, 35.6 ppt) overlying Warm/Western Slope Water (13.3 deg C, 35.7 ppt). The fluorescence was low and uniform at Station H1, gradually changed to have a maximum at the base of the thermocline by Station H7, and then dropped dramatically after Station H7 to become very flat at Station H8. A fluorescence maximum developed at the base of the mixed layer by Station H11 and a mid-depth fluorescence maximum was found at Station H12.

Station 3, the Northeast Station, was mostly well mixed with slight surface warming. It showed a surface fluorescence minimum that rose to a constant value from the base of the thermocline to the bottom. The casts at this station reached to about 80 m. Fewer casts were taken at this station than originally planned as the ship left the station early due to a lack of copepods at the site.

Station 4 was occupied in Georges Basin at a depth of 225 m. This station showed Maine Surface Water overlying Maine Intermediate Water. At the bottom was a warm, salty, homogeneous layer showing the influence of Atlantic waters with temperature of 8.60 deg C and salinity of 35.03 ppt. This station contained a fluorescence maximum at the base of the pycnocline.

Station 5 was occupied on the South Flank of Georges Bank. Casts at this station were about 75 m deep and showed Maine Surface Water capped by a 10-20 m deep warm fresh surface layer. The fluorescence
showed a minimum at the surface which rose to a value that was constant between the base of the thermocline and the bottom.

No casts were taken at Station 6 at the edge of the Great South Channel.

Station 7, in the Great South Channel had a warm fresh mixed layer with properties of Maine Surface Water above a layer of Maine Intermediate Water which contained a temperature minimum. From 100 m depth to the bottom at 145 m depth was a homogeneous layer of Maine Bottom Water with a temperature of 5.28 deg C and salinity of 33.08 ppt. A fluorescence maximum was found at the transition between the surface and intermediate waters.

In summary, the hydrography showed mixed layers at the surface and bottom due to wind and tidal mixing. Except at the shallowest stations where mixing was too intense, surface warming caused a stratification with warm, lighter water found near the surface. In the stratified waters, the fluorescence generally showed a maximum at the base of the thermocline. Along the southern edge of the bank the cross-bank section showed the shelf/slope front dividing the cooler, low salinity bank waters from the warmer, more saline slope water. High salinity water was also found at depth in Georges Basin.

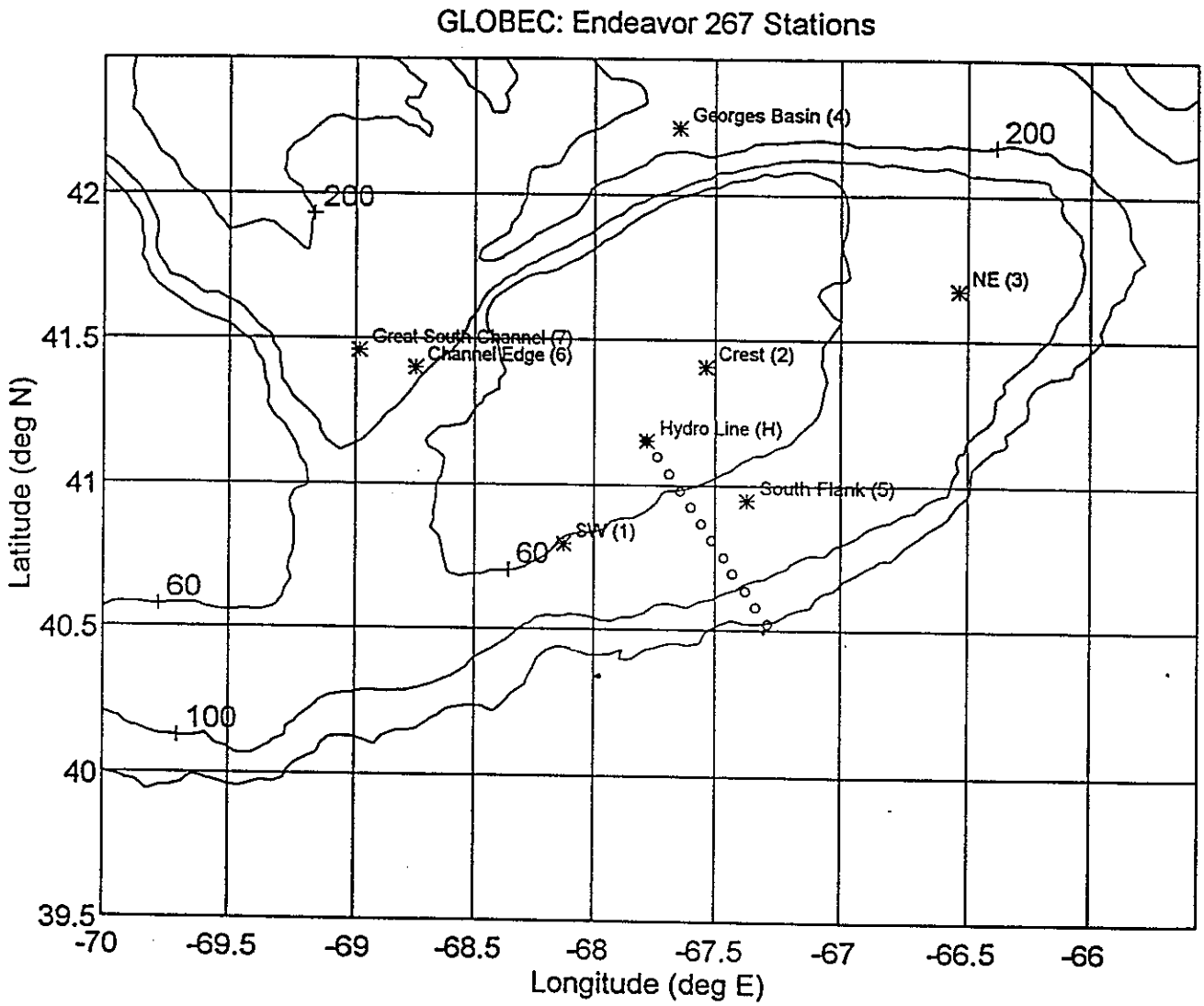

Figure 6. Station locations during EN267 - Leg 1.

B. Egg production of the dominant copepod species on Georges Bank J.A. Runge and S. Plourde)

Copepod egg production rates were measured at the four drifter stations, as well as at Sta. A6 along the hydro line and Sta. 07 in the Great South Channel. Egg laying of *Calanus finmarchicus* and egg extrusion rates of *Pseudocalanus* spp. were observed at each station. Egg production of *Centropages typicus, C. hamatus* and *Temora longicornis* were observed where these species made up a significant proportion of the total female population.

Although conditions, in terms of extent of stratification and phytoplankton composition, were clearly different between the southern flank, bank and northeast flank drifter sites, Calanus egg production rates were consistently high at all stations, except for the Great South Channel station. Mean station rates ranged between 55 and and 70 eggs female^{-1} d^{-1}, which is equivalent to 6.5-8.5% of female body wt. This implies that females were able to sustain high, near maximal egg production rates regardless of the particular environmental conditions. At the Great South Channel Station, egg laying rates were zero. At this point, we attribute this result to life history differences between the Great South Channel and Georges Banks populations rather than to extensive food limitation.

Incubations for assessment of hatching success of the eggs were conducted. These samples have been preserved for later analysis. In general, however, the majority of eggs laid appeared to be viable, with the exception of the second day of drifter Sta. 05, when a substantial proportion of the eggs appeared to be developing abnormally.

Incubations for *Pseudocalanus* egg extrusion rates and Centropages and *Temora* egg laying rates were preserved for later analysis. Pump samples will be analyzed for the *Pseudocalanus* egg ratio. Pump and MOCNESS samples taken at the drifter stations will be analyzed for female copepod abundance, so that the rate of daily input of eggs into the water column at each station can be estimated.

C. Zooplankton Abundance, Physiological Condition, and Growth Rates (E. Durbin, A. Durbin, R. Campbell, D. Avery, and R. Pierce)

Objectives:

(1) To determine the abundance and stage composition of the target zooplankton species (*Calanus finmarchicus* and *Pseudocalanus spp.*) at the proposed drifter locations on Georges Bank and at several off-bank stations.

(2) To determine the size (length, carbon, and nitrogen) and condition (condition factor and RNA/DNA ratio) of *Calanus finmarchicus* over different regions of the bank.

(3) To correlate growth and development rates of *Calanus finmarchicus* copepodite stages and egg production rates of adult females with RNA/DNA ratios in ship board incubations, and compare these results with the RNA/DNA ratios of field collected copepods to estimate growth rate in the field.

(4) To determine if growth and development rates of *Calanus finmarchicus* copepodite stages are food limited on Georges Bank.

(5) To estimate the development rates of the naupliar stages of the target copepod species at the drifter locations in ship board incubations.

Zooplankton were collected twice each day at the drifter locations. A zooplankton pump equipped with 50 μm mesh nets, that quantitatively retains all of the nauplii of the target copepod species, was used as our primary sampling tool, and sampled the following depth intervals: bottom-40m, 40-15m, and 15m-surface. In addition, a 1 m^2 MOCNESS equipped with 150 μm mesh nets, and towed over the same depth intervals as the pump, was also used to sample the larger zooplankton and rarer species that might not be quantitatively sampled by the pump. A brief description of the relative abundances of the major zooplankton taxa, including copepod species and life history stages, found at each station was given in the cruise narrative.

At the drifter stations, as well as at several other locations on and off the bank, *Calanus finmarchicus* N5 through adult were routinely collected with live net hauls (150 and 335 μm) for size (length, carbon, and nitrogen) and condition (condition factor and RNA/DNA ratio) measurements. Copepods, under anesthetic (MS222), were sorted from

the net haul using a dissecting microscope, their images recorded with a video system for later length measurements, and then placed in either a tin boat and dried over desiccant for carbon and nitrogen analysis or put into cryotubes and frozen in liquid nitrogen for RNA/DNA determinations.

Experiments were conducted on board ship to determine the relationships between RNA/DNA ratio and growth, and RNA/DNA ratio and development rate of *Calanus finmarchicus* copepodites, and whether growth and/or development rate were food limited. These experiments will be used to estimate growth and development rates from the RNA/DNA ratios of the field collected copepods. Copepodites of a specific stage were sorted (unanesthetized) from a live net tow under a dissecting microscope, incubated in 8 l polycarbonate bottles filled with ambient surface water or ambient water enriched with phytoplankton cultures (*Tetraselmis sp.* and *Heterocapsa triquetra*) and placed in a water bath (temperature controlled with circulating chilled sea water). Measurements were taken for initial size and condition, and final measurements of size and condition (noting any molting that had occurred) were made after a two day incubation.

In addition, development rates of *Calanus* and *Pseudocalanus* naupliar stages were determined in 100 liter mesocosms. Artificial cohorts were created by sieving a 150 µm net sample through a 200 µm sieve. The artificial cohort (150 to 200 µm) was then added to the mesocosms (20 copepods / liter) that had been filled by a diaphragm pump with 100 µm filtered water pumped from the chlorophyll maximum layer. The mesocosms were temperature controlled with circulating chilled sea water. The mesocosms were sampled once a day for three days with a 150 µm sieve towed from the bottom to the surface of the tanks. The samples were preserved in 4% formaldehyde for later enumeration and stage determination for calculation of development rates.

D. Acoustic measurements of small scale plankton distributions (Toni Chute and Jack Green)

Objective:

Description of the vertical and horizontal distribution of planktonic organisms associated with water column structure .

A TRACOR Acoustic Profiling System (TAPS) with four concentrically focused hydrophones operating at 265, 420, 1100 and 3300 kHz was attached to the CTD cage and deployed on all casts. The instrument records backscattering from insonified targets in a .1m3 volume centered at approximately 1.5m from the hydrophones. TAPS was lowered in a profiling mode making "simultaneous" measurements at each frequency at rate of approximately once every .8 second. The TAPS internally records temperature, depth and acoustic return at a rate of one observation every 5 seconds with each observation representing the mean return of 6 pings per transducer. Deployment and retrieval was at 4-20m/min resulting in 3-18 measurements of volume backscattering per meter of descent/ascent. The TAPS was used in three modes during the cruise, on standard hydrocasts (n=28)deployed at 20m/min; on pump casts (n=30) deployed at 20m/min and retrieved at 4m/min and in a yoyo mode with the ship drifting while the TAPS was raised and lowered at 10m/min for an hour(n=30). In the case of the latter, depending on depth and current, 4-6 down and up profiles were taken with the vessel drifting over a distance of .7-1.5 NM.

Preliminary analysis of data on board provided information on the size range and abundance and biomass with depth of organisms in the size range of P*seudocalanus, Centropages and Calanus*. In general, acoustic profiles from stations 1,2 and 3 showed uniform distributions of a low biomass through the water column. In contrast organisms from station 4 and 5 were distributed above the thermocline in a relatively narrow depth band and broadly below. TAPS casts in the Great South Channel indicated a dense distribution from 10 to 40 m and another near bottom at 100 to 125m. Further analysis of yoyo casts will be conducted to characterize horizontal distributions.

E. Characterization of ultra-violet and visible light regimes on Georges Bank (Jeff Van Keuren)

The overall objective of this study is to characterize the ultra-violet (UV) and visible light regimes encountered by organisms living on Georges Bank throughout the critical early development period of the key species, cod and haddock larvae, and Calanus finmarchicus. My primary objective on EN267 was to extend the time series of GLOBEC Process cruise continuous surface measurements and underwater profiles of downwelling irradiance data (ultra-violet, PAR).

During Leg I of this cruise (May 22 - June 5), light profiles of four narrow band UV channels (308nm, 320nm, 340nm, 380nm) as well as broad-band PAR (400-700nm) were taken at the four time-series stations visited (Stratified Site, Crest Site, Northeast Peak Site, South Flank Site) as well as at GLOBEC mooring site "ST-1", hydroline station "H-12" and a Great South Channel site. Surface irradiance values for each of these five wavebands were also continuously logged throughout this leg of the cruise using masthead-mounted deck sensors. These daytime surface irradiance measurements were complimented by broad-band twilight/nocturnal light records generated by a logging PMT-based system as well as observations of existing cloud conditions.

During Leg II of this cruise (June 9 - June 21), surface irradiance values for PAR were continuously logged using a masthead-mounted deck sensor. These daytime surface irradiance measurements were complimented by broad-band twilight/nocturnal light records generated by a logging PMT-based system as well as observations of existing cloud conditions. The UV measurement system was unavailable for the second leg of this cruise. All data analyses will be conducted post-cruise due to work schedule time constraints. The UV component of this work is being done in conjunction with Dr Al Hanson, GSO, URI.

F. Solar Ultra-violet (UV) Radiation and Planktonic Protozoan Survival (Elena Martin, Dian Gifford, Jeff Van Keuren, A.K. Hanson)

During EN267 (first leg) four UV exclusion experiments with water from stations 1, 2, 3 and 4 (CTD casts 7, 30, 65 and 81) were performed to determine the effect of ambient solar UV radiation on planktonic protozoan survival. At station 1, under stratified conditions, the survival of protozoans collected from the chlorophyll maximum was compared to those from near surface waters. Within each two day experiment 105um filtered water was incubated in polyethylene bags in flowing seawater and exposed to three conditions: Full sun; -UV-B (280-320nm), mylar filtered sunlight; and -UV (320-380nm), polycarbonate filtered sunlight. Initial (t=0) and final (t=2 days) were preserved in Acid Lugols for later analysis of protozoan abundance. Chlorophyll, nutrients and .8um filter epiflouresence slides were also collected and prepared at the beginning and end of each experiment. UV-B (313nm) radiation was recorded within the incubator in all experiments using an IL 1700 radiometer. In addition, a bag toxicity experiment was performed to determine whether exposing polyethylene bags to UV results in water toxic to protozoans.

Personnel List

Scientific

Name	Title	Organization
Robert Campbell	Co-Chief Scientist	University of Rhode Island
Jeff Van Keuren	Co-Chief Scientist	University of Rhode Island
Lyn Harris	Scientist	Woods Hole Oceanographic Institution
Jeff Runge	Scientist	Institute Maurice Lamontaigne
Stephane Plourde	Scientist	Institute Maurice Lamontaigne
David Avery	Scientist	University of Rhode Island
Richard Pierce	Scientist	University of Rhode Island
Toni Chute	Scientist	National Marine Fisheries Service
Jack Green	Scientist	National Marine Fisheries Service
Elena Martin	Scientist	University of Rhode Island
William Fanning	Marine Technician	University of Rhode Island
Thomas Orvash	Marine Technician	University of Rhode Island

Endeavor Officers and Crew

Name	Title
Thomas Tyler	Captain
Everett McMunn	Chief Mate
Stephen Vetra	Second Mate
Jack Buss	Boat-Swain
Glen Prouty	Able-Seaman
Bijan Emami	Able-Seaman
Michael Guimond	Able-Seaman
James Cobleigh	Chief Engineer
Timothy Varney	Assistant Engineer
Eric Frazier	Assistant Engineer
Daniel Butler	Steward/Cook
Brian Miller	Cook/Messman

Appendix 1: Cruise Plan and Schedule

GENERAL PLAN

22 May	1000	Depart Narragansett
23 May	0400	Arrive St 1 (Southern Flank - 41' 00" 68' 00")
24 May		St 1
25 May		St 1
26 May	0000	Depart St 1
	0600	Arrive St 2 (Crest - 41' 23" 67' 32")
27 May		St 2
28 May		St 2
29 May	0000	Depart St 2
	0500	Start Hydroline
	2000	End Hydroline
30 May	0600	Arrive St 3 (NE Peak - 41' 40" 66' 31")
31 May	2230	Depart St 3
1 June	0530	Arrive St 4 (Georges Basin - 42' 14" 67' 39")
	1200	Depart St 4
	2000	Arrive St 5 (Southern Flank - 40' 58" 67' 19")
2 June		St 5
3 June	2400	Depart St 5
4 June	0800	Arrive St 6 (41' 24" 67' 45")
	0930	Arrive St 7 (GSC - 41' 28" 68' 58")
	1700	Depart St 7
5 June	0930	Arrive WHOI

CRUISE SCHEDULE

22 May 1995
- 1000 Depart Narragansett

23 May 1995
- 0600 Arrive on Station - Communicate with Seward Johnson, deploy drifter
- 0800 CTD (water collection - Elena)
  MOCNESS
  Zooplankton pump
- 1100 Zooplankton nets
- 1200 Optics
- 1300 CTD (full hydro)
  Zooplankton pump
  TAPS (1 hr yo yo)
- 1800 Water collection (CTD or Diaphragm pump or Buckets)
- 2100 CTD
- 2200 Zooplankton pump
  TAPS (1 hr yo yo)

24 May 1995
- 0800 MOCNESS
  Zooplankton pump
  TAPS (1 hr yo yo)
  Diaphragm pump (fill mesocosms)
- 1100 Zooplankton nets
- 1200 Optics
- 1300 CTD (full hydro)
  Zooplankton pump
  TAPS (1 hr yo yo)
- 2130 Zooplankton net
- 2200 CTD
  Zooplankton pump
  TAPS (1 hr yo yo)

25 May 1995
- 0800 MOCNESS
  Zooplankton pump
  TAPS (1 hr yo yo)
- 1100 Zooplankton nets
- 1200 Optics
- 1300 CTD (full hydro)
  Zooplankton pump
  TAPS (1 hr yo yo)
- 2200 CTD
- 2300 Zooplankton pump
  TAPS (1 hr yo yo)
  Depart for Crest Station (41' 23" 67' 32") to arrive by 0700

26 May 1995
- 0700 Deploy Drifter
- 0800 CTD (water collection - Elena)
  MOCNESS

Zooplankton pump
TAPS (1 hr yo yo)
1100 Zooplankton nets
1200 Optics
1300 CTD (full hydro)
Zooplankton pump
TAPS (1 hr yo yo)
1800 Water collection (CTD or Diaphragm pump or Buckets)
2100 CTD
2200 Zooplankton pump
TAPS (1 hr yo yo)

27 May 1995
0800 MOCNESS
Zooplankton pump
TAPS (1 hr yo yo)
Diaphragm pump (fill mesocosms)
1100 Zooplankton nets
1200 Optics
1300 CTD (full hydro)
Zooplankton pump
TAPS (1 hr yo yo)
2130 Zooplankton net
2200 CTD
Zooplankton pump
TAPS (1 hr yo yo)

28 May 1995
0800 MOCNESS
Zooplankton pump
TAPS (1 hr yo yo)
1100 Zooplankton nets
1200 Optics
1300 CTD (full hydro)
Zooplankton pump
TAPS (1 hr yo yo)
2200 Zooplankton pump
TAPS (1 hr yo yo)
Retrieve drifter
Steam to start of hydro line

29 May 1995
0500 Start hydro line
1900 End hydro line - steam to St. 3

30 May 1995
0700 Arrive NE Peak (41' 40" 66' 31")
0730 Deploy Drifter
0800 CTD (water collection - Elena)
MOCNESS
Zooplankton pump
TAPS (1 hr yo yo)
1100 Zooplankton nets
1200 Optics

1300 CTD (full hydro)
Zooplankton pump
TAPS (1 hr yo yo)
1800 Water collection (CTD or Diaphragm pump or Buckets)
2000 CTD
2100 Zooplankton pump
TAPS (1 hr yo yo)

31 May 1995
0800 MOCNESS
Zooplankton pump
TAPS (1 hr yo yo)
1100 Zooplankton nets
1200 Optics
1300 CTD (full hydro)
Zooplankton pump
TAPS (1 hr yo yo)
2030 Zooplankton net
Zooplankton pump
Retrieve drifter
2230 Depart St 3

1 June 1995
0530 Arrive St 4 (Georges Basin - 42' 14" 67' 39")
TAPS (1 hr yo yo)
MOCNESS
1000 TAPS (1 hr yo yo)
1100 Zooplankton nets
Optics
1200 Depart St 4
1930 Arrive St 5 (Southern Flank - 40' 58" 67' 19")
Deploy drifter
Net tows
Diaphragm pump
Zooplankton pump
TAPS (1hr yo yo)

2 June 1995
0800 MOCNESS
Zooplankton pump
TAPS (1 hr yo yo)
1100 Zooplankton nets
1200 Optics
1300 CTD (full hydro)
Zooplankton pump
TAPS (1 hr yo yo)
1800 Water collection (CTD or Diaphragm pump or Buckets)
2100 Zooplankton pump
TAPS (1 hr yo yo)

3 June 1995
0800 MOCNESS
Zooplankton pump
TAPS (1 hr yo yo)

1100 Zooplankton nets
1200 Optics
1300 CTD (full hydro)
Zooplankton pump
TAPS (1 hr yo yo)
2100 Zooplankton net
Zooplankton pump
TAPS (1 hr yo yo)

4 June 1995
0800 Arrive St 6 (41' 24" 67' 45")
Net tow
0930 Arrive St 7 (GSC - 41' 28" 68' 58")
Net tow
CTD
MOCNESS
Optics
TAPS (2 hr yo yo)
Zooplankton pump
Net tows to collect animals (2 tows)
1700 Depart

5 June 1995
0930 Arrive WHOI

Appendix 2: Event Log

Key To Instruments Used:

NB-CTD/TAPS	Neal Brown CTD with TAPS attached - single cast
CTD/TAPS-(yoyo)	Neal Brown CTD with TAPS attached -yoyo sampling mode
DFT	Drifter-(water mass following)
MOC1	1 m^2 MOCNESS
ZPP/CTD/TAPS	Zooplankton Pump on CTD, TAPS attached
ZPN	Zooplankton Net Tow
DPP	Diaphragm Pump
PPN	Phytoplankton Net Tow
PAR/UV	PAR/UV Light Profile

Event Log

Event#	Instrument	Cast#	Sta#	Local Mth	Local Day	Local hhmm	GMT Day	GMT hhmm	s/e	Lat	Lon	Water Depth	Cast Depth	PI	Region
EN14395.001	DFT	1	1	5	23	916	23	1316	s	4049.96	-6808.48	63	10	Durbin	Process
EN14395.002	PPN	1	1	5	23	925	23	1325	s	4049.00	-6808.00	50	4	Durbin	Process
EN14395.003	NB-CTD/TAPS	1	1	5	23	926	23	1326	s	4049.55	-6808.30	62	56	Durbin	Process
	NB-CTD/TAPS	1	1	5	23	944	23	1344	e	4049.21	-6808.21			Durbin	Process
EN14395.004	MOC1	1	1	5	23	1021	23	1421	s	4048.60	-6808.10	61	55	Durbin	Process
	MOC1	1	1	5	23	1031	23	1431	e	4048.65	-6808.48			Durbin	Process
EN14395.005	ZPP/CTD/TAPS	2	1	5	23	1106	23	1506	s	4047.71	-6807.65	63	56	Durbin	Process
	ZPP/CTD/TAPS	2	1	5	23	1128	23	1528	e	4047.11	-6807.76			Durbin	Process
EN14395.006	ZPN	1	1	5	23	1215	23	1615	s	4045.41	-6809.36	60	55	Runge	Process
EN14395.007	ZPN	2	1	5	23	1230	23	1630	s	4045.41	-6809.36	60	55	Runge	Process
EN14395.008	PAR/UV	1	1	5	23	1302	23	1702	s	4045.38	-6809.36	69	40	Van Keuren	Process
	PAR/UV	1	1	5	23	1315	23	1715	e	4045.38	-6809.36			Van Keuren	Process
EN14395.009	CTD/TAPS-(yoyo)	3	1	5	23	1419	23	1819	s	4044.36	-6810.94	69	64	Green	Process
	CTD/TAPS-(yoyo)	3	1	5	23	1435	23	1835	e	4044.30	-6811.17			Green	Process
EN14395.010	CTD/TAPS-(yoyo)	4	1	5	23	1436	23	1836	s	4044.30	-6811.17	70	64	Green	Process
	CTD/TAPS-(yoyo)	4	1	5	23	1446	23	1846	e	4044.25	-6811.72			Green	Process
EN14395.011	NB-CTD/TAPS	5	1	5	23	1512	23	1912	s	4044.75	-6812.57	67	62	Durbin	Process
	NB-CTD/TAPS	5	1	5	23	1532	23	1932	e	4044.88	-6813.15			Durbin	Process
EN14395.012	NB-CTD/TAPS	6	1	5	23	1813	23	2213	s	4047.93	-6815.91	49	48	Durbin	Process
	NB-CTD/TAPS	6	1	5	23	1830	23	2230	e	4048.38	-6815.80			Durbin	Process
EN14395.013	NB-CTD/TAPS	7	1	5	23	2112	24	112	s	4049.25	-6813.21	53	48	Durbin	Process
	NB-CTD/TAPS	7	1	5	23	2126	24	126	e	4049.11	-6812.93			Durbin	Process
EN14395.014	ZPP/CTD/TAPS	8	1	5	23	2158	24	158	s	4048.47	-6812.08	53	48	Durbin	Process
	ZPP/CTD/TAPS	8	1	5	23	2215	24	215	e	4048.21	-6811.64			Durbin	Process
EN14395.015	CTD/TAPS-(yoyo)	9	1	5	23	2235	24	235	s	4047.89	-6811.21	53	51	Green	Process
	CTD/TAPS-(yoyo)	9	1	5	23	2306	24	306	e	4047.15	-6810.47			Green	Process
EN14495.001	MOC1	2	1	5	24	812	24	1212	s	4046.20	-6817.90	59	54	Durbin	Process
	MOC1	2	1	5	24	822	24	1222	e	4045.90	-6817.90	59		Durbin	Process
EN14495.002	NB-CTD/TAPS	10	1	5	24	850	24	1250	s	4046.31	-6817.82	60	55	Durbin	Process
EN14495.003	PPN	2	1	5	24	900	24	1300	s	4046.00	-6817.00	55	10	Durbin	Process
	NB-CTD/TAPS	10	1	5	24	911	24	1311	e	4046.45	-6817.31			Durbin	Process
EN14495.004	CTD/TAPS-(yoyo)	11	1	5	24	926	24	1326	s	4046.36	-6817.08	59	54	Green	Process
	CTD/TAPS-(yoyo)	11	1	5	24	1012	24	1412	e	4046.25	-6815.88			Green	Process
EN14495.005	DPP	1	1	5	24	1102	24	1502	s	4045.28	-6816.36	60	15	Durbin	Process
	DPP	1	1	5	24	1111	24	1511	e	4045.20	-6816.00			Durbin	Process
EN14495.006	ZPN	3	1	5	24	1115	24	1515	s	4046.35	-6817.80	55	50	Runge	Process
EN14495.007	ZPN	4	1	5	24	1130	24	1530	s	4046.35	-6817.80	55	50	Durbin	Process
EN14495.008	ZPN	5	1	5	24	1145	24	1545	s	4046.35	-6817.80	55	10	Durbin	Process
EN14495.009	ZPN	6	1	5	24	1150	24	1550	s	4046.35	-6817.80	55	10	Durbin	Process
EN14495.010	ZPN	7	1	5	24	1155	24	1555	s	4046.35	-6817.80	55	10	Durbin	Process
EN14495.011	PAR/UV	2	1	5	24	1211	24	1611	s	4045.38	-6809.36	67	40	Van Keuren	Process
	PAR/UV	2	1	5	24	1220	24	1620	e	4045.38	-6809.36			Van Keuren	Process
EN14495.012	NB-CTD/TAPS	12	1	5	24	1304	24	1704	s	4042.95	-6815.38	67	65	Durbin	Process
	NB-CTD/TAPS	12	1	5	24	1316	24	1716	e	4042.86	-6815.21			Durbin	Process
EN14495.013	ZPP/CTD/TAPS	13	1	5	24	1334	24	1734	s	4042.53	-6815.58	69	64	Durbin	Process
	ZPP/CTD/TAPS	13	1	5	24	1354	24	1754	e	4042.50	-6815.50			Durbin	Process
EN14495.014	CTD/TAPS-(yoyo)	14	1	5	24	1414	24	1814	s	4041.97	-6816.09	70	65	Green	Process
	CTD/TAPS-(yoyo)	14	1	5	24	1505	24	1905	e	4042.16	-6815.89			Green	Process
EN14495.015	ZPP/CTD/TAPS	15	1	5	24	2012	25	12	s	4045.86	-6816.18	60	55	Durbin	Process
	ZPP/CTD/TAPS	15	1	5	24	2031	25	31	e	4045.36	-6815.58			Durbin	Process
EN14495.016	CTD/TAPS-(yoyo)	16	1	5	24	2245	25	245	s	4045.12	-6815.36	63	60	Green	Process
	CTD/TAPS-(yoyo)	16	1	5	24	2325	25	325	e	4043.83	-6814.72			Green	Process
EN14595.001	MOC1	3	1	5	25	812	25	1212	s	4042.00	-6821.30	63	57.5	Durbin	Process
	MOC1	3	1	5	25	826	25	1226	e	4042.20	-6821.90	63		Durbin	Process
EN14595.002	ZPP/CTD/TAPS	17	1	5	25	850	25	1250	s	4042.90	-6821.04	61	57	Durbin	Process
	ZPP/CTD/TAPS	17	1	5	25	908	25	1308	e	4043.06	-6820.71			Durbin	Process
EN14595.003	CTD/TAPS-(yoyo)	18	1	5	25	927	25	1327	s	4043.24	-6820.87	61	56	Green	Process
	CTD/TAPS-(yoyo)	18	1	5	25	1007	25	1407	e	4043.21	-6819.97			Green	Process
EN14595.004	ZPN	8	1	5	25	1105	25	1505	s	4042.41	-6819.36	63	62	Runge	Process
EN14595.005	PPN	3	1	5	25	1115	25	1515	s	4042.41	-6819.36	63	20	Durbin	Process
EN14595.006	PAR/UV	3	1	5	25	1124	25	1524	s	4042.36	-6819.39	72	40	Van Keuren	Process
	PAR/UV	3	1	5	25	1139	25	1539	e	4042.10	-6819.20			Van Keuren	Process
EN14595.007	NB-CTD/TAPS	19	1	5	25	1318	25	1718	s	4040.50	-6818.80	72	67	Durbin	Process
	NB-CTD/TAPS	19	1	5	25	1336	25	1736	e	4040.10	-6818.84			Durbin	Process
EN14595.008	ZPP/CTD/TAPS	20	1	5	25	1352	25	1752	s	4039.90	-6818.93	73	68	Durbin	Process
	ZPP/CTD/TAPS	20	1	5	25	1414	25	1814	e	4039.50	-6819.23			Durbin	Process
EN14595.009	CTD/TAPS-(yoyo)	21	1	5	25	1425	25	1825	s	4039.40	-6819.32	74	70	Green	Process
	CTD/TAPS-(yoyo)	21	1	5	25	1524	25	1924	e	4038.96	-6820.79			Green	Process
EN14595.010	ZPP/CTD/TAPS	22	1	5	25	2209	26	209	s	4041.43	-6825.56	64	59	Durbin	Process
	ZPP/CTD/TAPS	22	1	5	25	2243	26	243	e	4041.07	-6825.75			Durbin	Process
EN14595.011	CTD/TAPS-(yoyo)	23	1	5	25	2258	26	258	s	4040.98	-6825.83	65	60	Green	Process
	CTD/TAPS-(yoyo)	23	1	5	25	2337	26	337	e	4040.60	-6826.17			Green	Process
	DFT	1	1	5	25	2359	26	359	e	4039.66	-6825.25	60		Durbin	Process

Event Log

Event#	Instrument	Cast#	Sta#	Local Mth	Day	Local hhmm	GMT Day	GMT hhmm	s/e	Lat	Lon	Water Depth	Cast Depth	PI	Region
EN14695.001	DFT	2	2	5	26	712	26	1112	s	4123.20	-6731.90	31	10	Durbin	Process
EN14695.002	NB-CTD/TAPS	24	2	5	26	812	26	1212	s	4124.42	-6732.34	42	37	Durbin	Process
	NB-CTD/TAPS	24	2	5	26	817	26	1217	e	4124.70	-6732.35			Durbin	Process
EN14695.003	MOC1	4	2	5	26	836	26	1236	s	4125.10	-6732.03	43	29.9	Durbin	Process
	MOC1	4	2	5	26	845	26	1245	e	4125.50	-6731.01			Durbin	Process
EN14695.004	MOC1	5	2	5	26	907	26	1307	s	4125.50	-6731.50	37	27	Durbin	Process
	MOC1	5	2	5	26	920	26	1320	e	4125.69	-6732.21	35		Durbin	Process
EN14695.005	ZPP/CTD/TAPS	25	2	5	26	948	26	1348	s	4125.91	-6730.75	40	35	Durbin	Process
	ZPP/CTD/TAPS	25	2	5	26	1002	26	1402	e	4126.14	-6730.57			Durbin	Process
EN14695.006	CTD/TAPS-(yoyo)	26	2	5	26	1013	26	1413	s	4126.21	-6730.51	45	40	Green	Process
	CTD/TAPS-(yoyo)	26	2	5	26	1047	26	1447	e	4126.38	-6729.94			Green	Process
EN14695.007	ZPN	9	2	5	26	1100	26	1500	s	4125.69	-6727.98	40	25	Runge	Process
EN14695.008	ZPN	10	2	5	26	1110	26	1510	s	4125.69	-6727.98	40	25	Durbin	Process
EN14695.009	PAR/UV	4	2	5	26	1216	26	1616	s	4124.88	-6727.34	32	27	Van Keuren	Process
	PAR/UV	4	2	5	26	1227	26	1627	e	4124.88	-6727.34			Van Keuren	Process
EN14695.010	NB-CTD/TAPS	27	2	5	26	1311	26	1711	s	4123.93	-6726.62	45	40	Durbin	Process
	NB-CTD/TAPS	27	2	5	26	1321	26	1721	e	4123.58	-6726.66			Durbin	Process
EN14695.011	ZPP/CTD/TAPS	28	2	5	26	1335	26	1735	s	4123.30	-6726.28	45	40	Durbin	Process
	ZPP/CTD/TAPS	28	2	5	26	1347	26	1747	e	4123.07	-6726.38			Durbin	Process
EN14695.012	CTD/TAPS-(yoyo)	29	2	5	26	1403	26	1803	s	4122.51	-6726.36	41	40	Green	Process
	CTD/TAPS-(yoyo)	29	2	5	26	1455	26	1855	e	4121.53	-6727.42			Green	Process
EN14695.013	NB-CTD/TAPS	30	2	5	26	2100	27	100	s	4125.28	-6731.94	45	40	Durbin	Process
	NB-CTD/TAPS	30	2	5	26	2121	27	121	e	4125.44	-6731.96			Durbin	Process
EN14695.014	ZPP/CTD/TAPS	31	2	5	26	2139	27	139	s	4125.62	-6731.95	44	38	Durbin	Process
	ZPP/CTD/TAPS	31	2	5	26	2155	27	155	e	4125.77	-6731.89			Durbin	Process
EN14695.015	CTD/TAPS-(yoyo)	32	2	5	26	2220	27	220	s	4126.00	-6730.65	42	38	Green	Process
	CTD/TAPS-(yoyo)	32	2	5	26	2252	27	252	e	4126.52	-6729.58			Green	Process
EN14795.001	MOC1	6	2	5	27	814	27	1214	s	4122.06	-6734.76	42	32	Durbin	Process
	MOC1	6	2	5	27	820	27	1220	e	4122.74	-6734.75			Durbin	Process
EN14795.002	ZPP/CTD/TAPS	33	2	5	27	837	27	1237	s	4123.10	-6734.51	42	37.5	Durbin	Process
	ZPP/CTD/TAPS	33	2	5	27	851	27	1251	e	4123.43	-6734.68			Durbin	Process
EN14795.003	CTD/TAPS-(yoyo)	34	2	5	27	907	27	1307	s	4123.87	-6734.29	43	38	Green	Process
	CTD/TAPS-(yoyo)	34	2	5	27	946	27	1346	e	4124.55	-6734.30			Green	Process
EN14795.004	DPP	2	2	5	27	1006	27	1406	s	4124.70	-6733.62	41	10	Durbin	Process
	DPP	2	2	5	27	1019	27	1419	e	4124.80	-6733.50	41		Durbin	Process
EN14795.005	ZPN	11	2	5	27	1100	27	1500	s	4125.34	-6730.96	45	25	Durbin	Process
EN14795.006	ZPN	12	2	5	27	1115	27	1515	s	4125.34	-6730.96	45	25	Runge	Process
EN14795.007	ZPN	13	2	5	27	1130	27	1530	s	4125.34	-6730.96	45	25	Durbin	Process
EN14795.008	ZPN	14	2	5	27	1145	27	1545	s	4125.34	-6730.96	45	25	Durbin	Process
EN14795.009	ZPN	15	2	5	27	1200	27	1600	s	4125.34	-6730.96	45	25	Durbin	Process
EN14795.010	PAR/UV	5	2	5	27	1217	27	1617	s	4125.33	-6730.77	41	35	Van Keuren	Process
	PAR/UV	5	2	5	27	1227	27	1627	e	4125.33	-6730.77			Van Keuren	Process
EN14795.011	ZPP/CTD/TAPS	35	2	5	27	1300	27	1700	s	4123.93	-6729.49	41	32	Durbin	Process
	ZPP/CTD/TAPS	35	2	5	27	1325	27	1725	e	4123.59	-6729.42			Durbin	Process
EN14795.012	CTD/TAPS-(yoyo)	36	2	5	27	1335	27	1735	s	4123.25	-6729.36	42	38	Green	Process
	CTD/TAPS-(yoyo)	36	2	5	27	1422	27	1822	e	4122.55	-6729.69			Green	Process
EN14795.013	ZPN	16	2	5	27	2130	27	2530	s	4124.30	-6733.80	40	35	Durbin	Process
EN14795.014	NB-CTD/TAPS	37	2	5	27	2201	28	201	s	4124.34	-6733.85	45	37	Durbin	Process
	NB-CTD/TAPS	37	2	5	27	2217	28	217	e	4124.60	-6733.70			Durbin	Process
EN14795.015	CTD/TAPS-(yoyo)	38	2	5	27	2236	28	236	s	4124.72	-6733.58	42	38	Green	Process
	CTD/TAPS-(yoyo)	38	2	5	27	2316	28	316	e	4124.93	-6732.94			Green	Process
EN14895.001	MOC1	7	2	5	28	811	28	1211	s	4120.96	-6735.33	42	34.6	Durbin	Process
	MOC1	7	2	5	28	818	28	1218	e	4121.42	-6735.11			Durbin	Process
EN14895.002	ZPP/CTD/TAPS	39	2	5	28	840	28	1240	s	4121.70	-6735.53	42	35	Durbin	Process
	ZPP/CTD/TAPS	39	2	5	28	850	28	1250	e	4122.23	-6735.91			Durbin	Process
EN14895.003	CTD/TAPS-(yoyo)	40	2	5	28	907	28	1307	s	4123.08	-6735.39	43	36	Green	Process
	CTD/TAPS-(yoyo)	40	2	5	28	945	28	1345	e	4124.17	-6735.58			Green	Process
EN14895.004	ZPN	17	2	5	28	1100	28	1500	s	4124.86	-6733.71	40	30	Durbin	Process
EN14895.005	ZPN	18	2	5	28	1115	28	1515	s	4124.86	-6733.71	40	25	Durbin	Process
EN14895.006	PAR/UV	6	2	5	28	1208	28	1608	s	4124.91	-6732.40	42	38	Van Keuren	Process
	PAR/UV	6	2	5	28	1223	28	1623	e	4124.91	-6732.40			Van Keuren	Process
EN14895.007	NB-CTD/TAPS	41	2	5	28	1315	28	1715	s	4124.74	-6730.71	42	33	Durbin	Process
	NB-CTD/TAPS	41	2	5	28	1324	28	1724	e	4124.57	-6730.44			Durbin	Process
EN14895.008	ZPP/CTD/TAPS	42	2	5	28	1344	28	1744	s	4124.25	-6730.07	40	35	Durbin	Process
	ZPP/CTD/TAPS	42	2	5	28	1356	28	1756	e	4123.92	-6729.77			Durbin	Process
EN14895.009	CTD/TAPS-(yoyo)	43	2	5	28	1407	28	1807	s	4123.73	-6729.62	41	37	Green	Process
	CTD/TAPS-(yoyo)	43	2	5	28	1504	28	1904	e	4122.30	-6729.04			Green	Process
EN14895.010	ZPP/CTD/TAPS	44	2	5	28	2110	29	110	s	4123.44	-6734.72	42	37	Durbin	Process
	ZPP/CTD/TAPS	44	2	5	28	2123	29	123	e	4123.91	-6734.72			Durbin	Process
EN14895.011	CTD/TAPS-(yoyo)	45	2	5	28	2143	29	143	s	4123.96	-6734.60	39	38	Green	Process
	CTD/TAPS-(yoyo)	45	2	5	28	2223	29	223	e	4125.02	-6734.13			Green	Process
	DFT	2	2	5	28	2244	29	244	e	4122.51	-6734.13			Durbin	Process

Event Log

Event#	Instrument	Cast#	Sta#	Local Mth	Day	Local hhmm	GMT Day	GMT hhmm	s/e	Lat	Lon	Water Depth	Cast Depth	PI	Region
EN14995.001	NB-CTD/TAPS	46	H-1	5	29	310	29	710	s	4109.09	-6746.87	45	38	Durbin	Process
	NB-CTD/TAPS	46	H-1	5	29	317	29	717	e	4108.90	-6746.83			Durbin	Process
EN14995.002	NB-CTD/TAPS	47	H-2	5	29	346	29	746	s	4105.77	-6744.27	44	39	Durbin	Process
	NB-CTD/TAPS	47	H-2	5	29	353	29	753	e	4105.63	-6744.30			Durbin	Process
EN14995.003	NB-CTD/TAPS	48	H-3	5	29	426	29	826	s	4102.29	-6741.39	60	55	Durbin	Process
	NB-CTD/TAPS	48	H-3	5	29	435	29	835	e	4102.14	-6741.42			Durbin	Process
EN14995.004	NB-CTD/TAPS	49	H-4	5	29	508	29	908	s	4058.78	-6738.62	67	63	Durbin	Process
	NB-CTD/TAPS	49	H-4	5	29	518	29	918	e	4058.67	-6738.72			Durbin	Process
EN14995.005	NB-CTD/TAPS	50	H-5	5	29	605	29	1005	s	4055.43	-6736.07	73	68	Durbin	Process
	NB-CTD/TAPS	50	H-5	5	29	616	29	1016	e	4055.45	-6736.28			Durbin	Process
EN14995.006	NB-CTD/TAPS	51	H-6	5	29	651	29	1051	s	4052.00	-6733.51	79	69	Durbin	Process
	NB-CTD/TAPS	51	H-6	5	29	704	29	1104	e	4052.00	-6733.53			Durbin	Process
EN14995.007	ZPN	19	H-6	5	29	710	29	1110	s	4051.93	-6733.43	79	60	Runge	Process
EN14995.008	ZPN	20	H-6	5	29	720	29	1120	s	4051.93	-6733.43	79	60	Durbin	Process
EN14995.009	PAR/UV	7	H-6	5	29	742	29	1142	s	4052.00	-6733.50	79	45	Van Keuren	Process
	PAR/UV	7	H-6	5	29	755	29	1155	e	4052.20	-6733.40			Van Keuren	Process
EN14995.010	NB-CTD/TAPS	52	H-7	5	29	1007	29	1407	s	4048.61	-6730.82	85	78	Durbin	Process
	NB-CTD/TAPS	52	H-7	5	29	1022	29	1422	e	4048.62	-6730.71			Durbin	Process
EN14995.011	NB-CTD/TAPS	53	H-8	5	29	1111	29	1511	s	4045.08	-6728.04	91	Abort	Durbin	Process
	NB-CTD/TAPS	53	H-8	5	29	1123	29	1523	e	4045.05	-6727.90			Durbin	Process
EN14995.012	NB-CTD/TAPS	54	H-8	5	29	1130	29	1530	s	4045.05	-6727.84	91	84	Durbin	Process
	NB-CTD/TAPS	54	H-8	5	29	1141	29	1541	e	4045.09	-6727.72			Durbin	Process
EN14995.013	NB-CTD/TAPS	55	H-9	5	29	1218	29	1618	s	4041.75	-6725.63	97	90	Durbin	Process
	NB-CTD/TAPS	55	H-9	5	29	1231	29	1631	e	4041.96	-6725.59			Durbin	Process
EN14995.014	NB-CTD/TAPS	56	H-10	5	29	1323	29	1723	s	4038.12	-6722.52	97	89	Durbin	Process
	NB-CTD/TAPS	56	H-10	5	29	1339	29	1739	e	4038.12	-6722.43			Durbin	Process
EN14995.015	NB-CTD/TAPS	57	H-11	5	29	1414	29	1814	s	4034.72	-6719.98	119	110	Durbin	Process
	NB-CTD/TAPS	57	H-11	5	29	1433	29	1833	e	4034.82	-6719.47			Durbin	Process
EN14995.016	NB-CTD/TAPS	58	H-12	5	29	1520	29	1920	s	4031.30	-6717.16	143	135	Durbin	Process
	NB-CTD/TAPS	58	H-12	5	29	1538	29	1938	e	4031.55	-6716.59			Durbin	Process
EN14995.017	PAR/UV	8	H-12	5	29	1605	29	2005	s	4031.80	-6716.00	143	45	Van Keuren	Process
	PAR/UV	8	H-12	5	29	1618	29	2018	e	4031.80	-6716.00			Van Keuren	Process
EN14995.018	PPN	4	H-12	5	29	1800	29	2200	s	4033.52	-6714.23		5	Durbin	Process
EN15095.001	DFT	3	3	5	30	740	30	1140	s	4139.90	-6631.10	79	10	Durbin	Process
	DFT	3	3	5	30	822	30	1222	e	4139.90	-6631.10	79		Durbin	Process
EN15095.002	DFT	4	3	5	30	946	30	1346	s	4140.00	-6631.03	79	10	Durbin	Process
EN15095.003	ZPP/CTD/TAPS	59	3	5	30	1026	30	1426	s	4140.47	-6632.15	75	68	Durbin	Process
EN15095.004	PPN	5	3	5	30	1030	30	1430	s	4141.02	-6632.54		4	Durbin	Process
	ZPP/CTD/TAPS	59	3	5	30	1043	30	1443	e	4140.86	-6632.44			Durbin	Process
EN15095.005	CTD/TAPS-(yoyo)	60	3	5	30	1059	30	1459	s	4141.04	-6632.55	75	69	Green	Process
	CTD/TAPS-(yoyo)	60	3	5	30	1147	30	1547	e	4141.56	-6632.70			Green	Process
EN15095.006	ZPN	21	3	5	30	1230	30	1630	s	4142.02	-6632.40	75	65	Runge	Process
EN15095.007	ZPN	22	3	5	30	1255	30	1655	s	4142.02	-6632.40	75	65	Durbin	Process
EN15095.008	PAR/UV	9	3	5	30	1324	30	1724	s	4141.95	-6632.37	79	40	Van Keuren	Process
	PAR/UV	9	3	5	30	1333	30	1733	e	4141.95	-6632.37			Van Keuren	Process
EN15095.009	NB-CTD/TAPS	61	3	5	30	1444	30	1844	s	4143.80	-6626.98	79	72	Durbin	Process
	NB-CTD/TAPS	61	3	5	30	1456	30	1856	e	4143.57	-6626.36			Durbin	Process
EN15095.010	ZPP/CTD/TAPS	62	3	5	30	1511	30	1911	s	4143.28	-6626.12	79	69	Durbin	Process
	ZPP/CTD/TAPS	62	3	5	30	1530	30	1930	e	4142.73	-6625.57			Durbin	Process
EN15095.011	CTD/TAPS-(yoyo)	63	3	5	30	1547	30	1947	s	4142.81	-6625.50	79	73	Green	Process
	CTD/TAPS-(yoyo)	63	3	5	30	1634	30	2034	e	4141.28	-6625.23			Green	Process
EN15095.012	NB-CTD/TAPS	64	3	5	30	1659	30	2059	s	4141.48	-6624.07	86	15	Durbin	Process
	NB-CTD/TAPS	64	3	5	30	1707	30	2107	e	4141.15	-6623.89			Durbin	Process
EN15095.013	NB-CTD/TAPS	65	3	5	30	2036	31	36	s	4138.88	-6626.00	84	77	Durbin	Process
	NB-CTD/TAPS	65	3	5	30	2050	31	50	e	4138.91	-6626.57			Durbin	Process
EN15095.014	ZPP/CTD/TAPS	66	3	5	30	2115	31	115	s	4139.01	-6627.32	84	77	Durbin	Process
	ZPP/CTD/TAPS	66	3	5	30	2137	31	137	e	4139.17	-6628.22			Durbin	Process
EN15095.015	CTD/TAPS-(yoyo)	67	3	5	30	2201	31	201	s	4139.64	-6627.67	86	76	Green	Process
	CTD/TAPS-(yoyo)	67	3	5	30	2250	31	250	e	4140.35	-6628.84			Green	Process
EN15195.001	MCC1	8	3	5	31	816	31	1216	s	4135.87	-6627.09	87	76	Durbin	Process
	MCC1	8	3	5	31	824	31	1224	e	4135.92	-6628.47			Durbin	Process
EN15195.002	ZPP/CTD/TAPS	68	3	5	31	857	31	1257	s	4135.75	-6628.46	87	80	Durbin	Process
	ZPP/CTD/TAPS	68	3	5	31	928	31	1328	e	4135.98	-6629.09			Durbin	Process
EN15195.003	CTD/TAPS-(yoyo)	69	3	5	31	950	31	1350	s	4136.24	-6630.49	86	78	Green	Process
	CTD/TAPS-(yoyo)	69	3	5	31	1042	31	1442	e	4137.03	-6631.23			Green	Process
EN15195.004	PAR/UV	10	3	5	31	1220	31	1620	s	4138.88	-6631.59	85	40	Van Keuren	Process
	PAR/UV	10	3	5	31	1235	31	1635	e	4138.88	-6631.59			Van Keuren	Process
EN15195.005	NB-CTD/TAPS	70	3	5	31	1301	31	1701	s	4139.38	-6631.24	85	71	Durbin	Process
	NB-CTD/TAPS	70	3	5	31	1322	31	1722	e	4139.62	-6630.73			Durbin	Process
EN15195.006	ZPP/CTD/TAPS	71	3	5	31	1340	31	1740	s	4139.61	-6630.88	77	70	Durbin	Process
	ZPP/CTD/TAPS	71	3	5	31	1400	31	1800	e	4139.75	-6630.25			Durbin	Process
EN15195.007	CTD/TAPS-(yoyo)	72	3	5	31	1418	31	1818	s	4139.60	-6630.27	79	72	Green	Process
	CTD/TAPS-(yoyo)	72	3	5	31	1520	31	1920	e	4139.37	-6627.99			Green	Process

Event Log

Event#	Instrument	Cast#	Sta#	Local Mth	Day	Local hhmm	GMT Day	GMT hhmm	s/e	Lat	Lon	Water Depth	Cast Depth	PI	Region
EN15195.008	ZPP/CTD/TAPS	73	3	5	31	2115	1	115	s	4134.99	-6630.23	85	78	Durbin	Process
	ZPP/CTD/TAPS	73	3	5	31	2138	1	138	e	4135.05	-6630.68			Durbin	Process
	DFT	4	3	5	31	2204	1	204	e	4135.11	-6631.16	85		Durbin	Process
EN15295.001	CTD/TAPS-(yoyo)	74	4	6	1	535	1	935	s	4214.00	-6738.90	225	200	Green	Process
	CTD/TAPS-(yoyo)	74	4	6	1	628	1	1028	e	4214.13	-6738.04			Green	Process
EN15295.002	CTD/TAPS-(yoyo)	75	4	6	1	628	1	1028	s	4214.13	-6738.04	233	215	Green	Process
EN15295.003	CTD/TAPS-(yoyo)	76	4	6	1	658	1	1058	s	4214.28	-6737.44	230	220	Green	Process
	CTD/TAPS-(yoyo)	75	4	6	1	658	1	1058	e	4214.28	-6737.44			Green	Process
	CTD/TAPS-(yoyo)	76	4	6	1	728	1	1128	e	4214.38	-6736.80			Green	Process
EN15295.004	MOC1	9	4	6	1	806	1	1206	s	4214.40	-6736.05	238	226	Durbin	Process
	MOC1	9	4	6	1	844	1	1244	e	4213.99	-6737.61	227		Durbin	Process
	CTD/TAPS-(yoyo)	77	4	6	1	903	1	1303	e	4213.73	-6737.83			Green	Process
EN15295.005	PPN	6	4	6	1	915	1	1315	s	4213.76	-6737.96	230	15	Durbin	Process
EN15295.006	CTD/TAPS-(yoyo)	77	4	6	1	941	1	1341	s	4213.85	-6738.33	225	210	Green	Process
EN15295.007	CTD/TAPS-(yoyo)	78	4	6	1	941	1	1341	s	4213.73	-6737.83	225	215	Green	Process
EN15295.008	CTD/TAPS-(yoyo)	79	4	6	1	1019	1	1419	s	4213.65	-6737.41	225	220	Green	Process
	CTD/TAPS-(yoyo)	78	4	6	1	1019	1	1419	e	4213.65	-6737.41			Green	Process
	CTD/TAPS-(yoyo)	79	4	6	1	1107	1	1507	e	4213.57	-6737.04			Green	Process
EN15295.009	CTD/TAPS-(yoyo)	80	4	6	1	1107	1	1507	s	4213.57	-6737.04	225	220	Green	Process
	CTD/TAPS-(yoyo)	80	4	6	1	1144	1	1544	e	4213.44	-6736.97			Green	Process
EN15295.010	CTD/TAPS-(yoyo)	81	4	6	1	1151	1	1551	s	4213.44	-6736.97	225	25	Green	Process
	CTD/TAPS-(yoyo)	81	4	6	1	1204	1	1604	e	4213.38	-6737.00			Green	Process
EN15295.011	ZPN	23	4	6	1	1213	1	1613	s	4213.76	-6737.96	230	200	Runge	Process
EN15295.012	PAR/UV	11	4	6	1	1246	1	1646	s	4213.24	-6737.23	225	45	Van Keuren	Process
	PAR/UV	11	4	6	1	1257	1	1657	e	4213.24	-6737.23			Van Keuren	Process
EN15295.013	DFT	5	5	6	1	2009	2	9	s	4056.97	-6722.09	78	10	Durbin	Process
EN15295.014	NB-CTD/TAPS	82	5	6	1	2020	2	20	s	4056.88	-6722.17	80	72	Durbin	Process
	NB-CTD/TAPS	82	5	6	1	2035	2	35	e	4056.85	-6722.13			Durbin	Process
EN15295.015	DPP	3	5	6	1	2122	1	2522	s	4056.81	-6722.82	78	25	Durbin	Process
	DPP	3	5	6	1	2136	1	2536	e	4056.88	-6722.46	78		Durbin	Process
EN15295.016	ZPP/CTD/TAPS	83	5	6	1	2158	2	158	s	4057.26	-6723.91	78	71	Durbin	Process
	ZPP/CTD/TAPS	83	5	6	1	2224	2	224	e	4057.46	-6723.83			Durbin	Process
EN15295.017	CTD/TAPS-(yoyo)	84	5	6	1	2235	2	235	s	4057.49	-6723.79	78	71	Green	Process
	CTD/TAPS-(yoyo)	84	5	6	1	2338	2	338	e	4058.00	-6723.34			Green	Process
EN15395.001	MOC1	10	5	6	2	811	2	1211	s	4055.74	-6723.54	79	70	Durbin	Process
	MOC1	10	5	6	2	824	2	1224	e	4055.25	-6724.21	79		Durbin	Process
EN15395.002	ZPP/CTD/TAPS	85	5	6	2	843	2	1243	s	4055.16	-6724.21	81	75	Durbin	Process
EN15395.003	PPN	7	5	6	2	845	2	1245	s	4055.17	-6724.41		5	Durbin	Process
	ZPP/CTD/TAPS	85	5	6	2	918	2	1318	e	4055.20	-6724.50			Durbin	Process
EN15395.004	CTD/TAPS-(yoyo)	86	5	6	2	934	2	1334	s	4055.35	-6725.62	79	72	Green	Process
	CTD/TAPS-(yoyo)	86	5	6	2	1050	2	1450	e	4056.06	-6725.95			Green	Process
EN15395.005	ZPN	24	5	6	2	1115	2	1515	s	4057.22	-6727.47	80	60	Runge	Process
EN15395.006	ZPN	25	5	6	2	1130	2	1530	s	4057.22	-6727.47	80	60	Durbin	Process
EN15395.007	PAR/UV	12	5	6	2	1142	2	1542	s	4056.20	-6726.44	73	45	Van Keuren	Process
	PAR/UV	12	5	6	2	1155	2	1555	e	4056.36	-6726.40			Van Keuren	Process
EN15395.008	NB-CTD/TAPS	87	5	6	2	1300	2	1700	s	4057.95	-6727.83	73	68	Durbin	Process
	NB-CTD/TAPS	87	5	6	2	1314	2	1714	e	4058.20	-6727.46			Durbin	Process
EN15395.009	ZPP/CTD/TAPS	88	5	6	2	1356	2	1756	s	4058.47	-6727.57	73	68	Durbin	Process
	ZPP/CTD/TAPS	88	5	6	2	1422	2	1822	e	4058.66	-6727.03			Durbin	Process
EN15395.010	CTD/TAPS-(yoyo)	89	5	6	2	1440	2	1840	s	4059.00	-6727.25	72	68	Green	Process
	CTD/TAPS-(yoyo)	89	5	6	2	1600	2	2000	e	4059.11	-6725.02			Green	Process
EN15395.011	DPP	4	5	6	2	1809	2	2209	s	4052.90	-6724.30	79	25	Durbin	Process
	DPP	4	5	6	2	1818	2	2218	e	4052.90	-6724.30	79		Durbin	Process
EN15395.012	ZPP/CTD/TAPS	90	5	6	2	2116	3	116	s	4056.79	-6724.46	77	72	Durbin	Process
	ZPP/CTD/TAPS	90	5	6	2	2137	3	137	e	4056.87	-6724.34			Durbin	Process
EN15395.013	CTD/TAPS-(yoyo)	91	5	6	2	2155	3	155	s	4056.94	-6725.43	77	71	Green	Process
	CTD/TAPS-(yoyo)	91	5	6	2	2307	3	307	e	4058.03	-6725.36			Green	Process
EN15495.001	MOC1	11	5	6	3	830	3	1230	s	4056.18	-6726.10	76	69	Durbin	Process
	MOC1	11	5	6	3	837	3	1237	e	4056.78	-6725.56	76		Durbin	Process
EN15495.002	ZPP/CTD/TAPS	92	5	6	3	849	3	1249	s	4055.89	-6726.69	77	70	Durbin	Process
	ZPP/CTD/TAPS	92	5	6	3	913	3	1313	e	4056.18	-6726.61			Durbin	Process
EN15495.003	CTD/TAPS-(yoyo)	93	5	6	3	939	3	1339	s	4056.05	-6727.49	77	70	Green	Process
	CTD/TAPS-(yoyo)	93	5	6	3	1048	3	1448	e	4057.35	-6727.24			Green	Process
EN15495.004	ZPN	26	5	6	3	1115	3	1515	s	4057.04	-6728.27	75	60	Runge	Process
EN15495.005	ZPN	27	5	6	3	1130	3	1530	s	4057.04	-6728.27	75	60	Durbin	Process
EN15495.006	PAR/UV	13	5	6	3	1149	3	1549	s	4057.10	-6728.20	73	45	Van Keuren	Process
	PAR/UV	13	5	6	3	1159	3	1559	e	4057.10	-6728.20			Van Keuren	Process
EN15495.007	NB-CTD/TAPS	94	5	6	3	1313	3	1713	s	4058.58	-6727.11	73	68	Durbin	Process
	NB-CTD/TAPS	94	5	6	3	1331	3	1731	e	4059.06	-6726.67			Durbin	Process
EN15495.008	ZPP/CTD/TAPS	95	5	6	3	1355	3	1755	s	4059.49	-6726.10	72	66	Durbin	Process
	ZPP/CTD/TAPS	95	5	6	3	1419	3	1819	e	4059.86	-6725.56			Durbin	Process
EN15495.009	CTD/TAPS-(yoyo)	96	5	6	3	1437	3	1837	s	4100.07	-6725.23	71	66	Green	Process

Event Log

Event#	Instrument	Cast#	Sta#	Local Mth	Local Day	Local hhmm	GMT Day	GMT hhmm	s/e	Lat	Lon	Water Depth	Cast Depth	PI	Region
	CTD/TAPS-(yoyo)	96	5	6	3	1525	3	1925	e	4100.64	-6723.75			Green	Process
	DFT	5	5	6	3	2019	4	19	e	4056.93	-6725.05	77		Durbin	Process
EN15495.010	ZPP/CTD/TAPS	97	5	6	3	2122	4	122	s	4056.75	-6724.73	76	72	Durbin	Process
	ZPP/CTD/TAPS	97	5	6	3	2127	4	127	e	4056.77	-6724.71			Durbin	Process
EN15495.011	ZPP/CTD/TAPS	98	5	6	3	2135	4	135	s	4056.80	-6724.68	76	72	Durbin	Process
	ZPP/CTD/TAPS	98	5	6	3	2148	4	148	e	4056.86	-6724.67			Durbin	Process
EN15495.012	CTD/TAPS-(yoyo)	99	5	6	3	2200	4	200	s	4056.92	-6724.68	76	71	Green	Process
	CTD/TAPS-(yoyo)	99	5	6	3	2258	4	258	e	4057.43	-6724.72			Green	Process
EN15595.001	ZPN	28	6	6	4	730	4	1130	s	4129.52	-6859.03	148	120	Runge	Process
EN15595.002	NB-CTD/TAPS	100	7	6	4	1026	4	1426	s	4127.53	-6859.13	153	150	Durbin	Process
	NB-CTD/TAPS	100	7	6	4	1053	4	1453	e	4127.38	-6859.61			Durbin	Process
EN15595.003	MOC1	12	7	6	4	1109	4	1509	s	4127.65	-6859.98	154	146	Durbin	Process
	MOC1	12	7	6	4	1143	4	1543	e	4128.66	-6908.84	155		Durbin	Process
EN15595.004	PAR/UV	14	7	6	4	1201	4	1601	s	4128.81	-6901.18	153	45	Van Keuren	Process
	PAR/UV	14	7	6	4	1210	4	1610	e	4128.81	-6901.18			Van Keuren	Process
EN15595.005	CTD/TAPS-(yoyo)	101	7	6	4	1235	4	1635	s	4128.99	-6901.75	152	146	Green	Process
	CTD/TAPS-(yoyo)	101	7	6	4	1329	4	1729	e	4129.38	-6902.09			Green	Process
EN15595.006	CTD/TAPS-(yoyo)	102	7	6	4	1330	4	1730	s	4129.38	-6902.09	150	145	Green	Process
	CTD/TAPS-(yoyo)	102	7	6	4	1425	4	1825	e	4129.62	-6901.92			Green	Process
EN15595.007	NB-CTD/TAPS	103	7	6	4	1449	4	1849	s	4129.64	-6901.79	149	75	Durbin	Process
	NB-CTD/TAPS	103	7	6	4	1520	4	1920	e	4129.66	-6901.58			Durbin	Process
EN15595.008	ZPN	29	7	6	4	1530	4	1930	s	4129.52	-6859.03	148	50	Durbin	Process
EN15595.009	ZPN	30	7	6	4	1545	4	1945	s	4129.52	-6859.03	148	50	Durbin	Process
EN15595.010	ZPN	31	7	6	4	1600	4	2000	s	4129.52	-6859.03	148	50	Durbin	Process