

*Oceanography Branch CTD Data Report
Field Test of the In Situ Ichthyoplankton and Imaging
System (ISIS) & Northeast Shelf Ecosystem Monitoring
Late Autumn Survey – DE 08-10*

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DATE: 22 October to 11 November 2008

5 May 2009

CRUISE RESULTS
NOAA Fisheries Research Vessel DELAWARE II
Cruise No. DE 08-10
Field Test of the In Situ Ichthyoplankton and Imaging System (ISIIS)
& Northeast Shelf Ecosystem Monitoring Late Autumn Survey

CRUISE PERIOD AND AREA

The cruise period was from 22 October to 11 November 2008 and was divided into two parts. Part I was devoted to testing the In Situ Ichthyoplankton and Imaging System (ISIIS), while part II was the standard Late Autumn Survey of the Ecosystem Monitoring Program.

The NOAA fisheries research vessel *DELAWARE II* sampled at a total of 136 stations. Fourteen of these stations took place on Part I, providing “ground truth” samples for two transects of optical images made with the ISIIS array. Part I took place in the Southern New England area. Part II of the cruise sampled at 122 stations. Of these, 33 were located in the Gulf of Maine (GOM), 29 were on Georges Bank, 30 were in the Southern New England (SNE) area and 30 in the Mid-Atlantic Bight (MAB). The Gulf of Maine (GOM) stations included 5 fixed stations: the Wilkinson, Jordan and Georges basins, a liquefied natural gas (LNG) terminal east of Boston Harbor and the Northeast Channel (Figure 1).

OBJECTIVES

The primary objective of Part I of the cruise was to field test and evaluate the ISIIS imaging system (Figure 2).

The primary objective of Part II of the cruise was to assess changing biological and physical properties which influence the sustainable productivity of the living marine resources of the northeast continental shelf ecosystem. Key parameters measured for the Ecosystem Monitoring Program included ichthyoplankton and zooplankton composition, abundance and distribution, plus water column temperature and salinity. Near-surface along-track chlorophyll-*a* fluorescence, water temperature and salinity were measured while underway with the vessel’s flow-through sampling system. Secondary objectives of this cruise included the following:

- Vertical CTD casts to within 5 meters of the bottom in Gulf of Maine deep basin areas and the Northeast Channel to provide hydrographic data detailing the incursion of Labrador Current water into this region.
- Sampling at the site of a liquefied natural gas (LNG) terminal east of Boston Harbor, to collect environmental data.
- Collection of zooplankton for the Census of Marine Zooplankton Project (formerly called the Zooplankton Genome Project) based at University of Connecticut, Avery Point.

- Note presence and volume of *Calanus finmarchicus* in samples upon return of cruise to shore.
- Collection of phytoplankton samples from the ship's flow-through seawater system for nitrogen isotope ratio analysis.

METHODS

The survey consisted of 136 stations at which the vessel stopped to lower instruments over the side (Figure 1). The stations from Part I of the cruise (1-14) were selected to provide samples for a check on the images collected from the two transects made with the In Situ Ichthyoplankton Imaging System (ISIIS). This advanced imaging system is designed to be towed behind the vessel at a speed of 5 knots and can be configured to look at small abundant zooplankton or larger meso-zooplanktors such as fish larvae. It also photographs larger volumes of water than earlier systems and provides photographs of the organisms in a nearly undisturbed state. This large amount of data is transmitted through a faired fiber optic cable to a computer aboard the research vessel. Two ISIIS transects were made on the first part of the cruise. The ISIIS was undulated through the water column, down to within 8-10 meters of the bottom in the test area located southeast of Block Island as noted in Figure 1.

The stations from part II of the cruise (15-136) were at randomly stratified locations except for 5 fixed-position stations in the GOM visited on all Ecosystem Monitoring cruises: Wilkinson Basin, Georges Basin, Jordan Basin, a Liquefied Natural Gas (LNG) terminal site east of Boston and the Northeast Channel. Plankton and hydrographic sampling was conducted at all stations by making double oblique tows using the 61-cm bongo sampler and a Seabird CTD. The tows were made to approximately 5 m above the bottom, or to a maximum depth of 200 m. All plankton tows were conducted at a ship speed of 1.5 – 2.0 knots. Plankton sampling gear consisted of a 61-cm diameter aluminum bongo frame with two 335-micron nylon mesh nets. At the randomly designated zoogen stations a 20-cm diameter PVC bongo frame fitted with paired 165-micron nylon mesh nets was put on the towing wire one half meter above the Seabird CTD with a wire stop (Figure 2.). A bell-shaped 45-kg lead weight was attached by an 80-cm length of 3/8-inch diameter chain below the aluminum bongo frame to depress the sampler. The flat bottomed configuration of the depressor weight made for safer deployment and retrieval of the sampling gear when the boat was rolling in rough seas. A digital flowmeter was suspended within the mouth of each sampler to determine the amount of water filtered by each net. No flowmeters were used in the 20-cm bongos. The plankton sampling gear was deployed off the starboard stern quarter of the vessel using an A-frame and a Sea-Mac winch which was placed on the aft deck specifically for this operation. After retrieval, the bongo frames were carried into a covered work area on the port side of the aft deck and placed on tables for wash down of the nets to obtain the plankton samples. This work space allowed for much easier removal of the samples, particularly during inclement weather. The 61-cm bongo plankton samples were preserved in a 5% solution of formalin in seawater. The Census of Marine Zooplankton samples from the 20-cm diameter bongos were preserved in 95% ethanol, which was changed once at 24 hours after the initial preservation. Tow depth was monitored in real time with a Seabird CTD profiler. The Seabird CTD profiler was hard-wired to the conductive towing cable, providing simultaneous depth, temperature, and salinity for each plankton tow. A CTD cast to within 5 m of the bottom was made in the Wilkinson and Georges basins to provide hydrographic data from below the 200 m limit set for bongo tows.

Continuous monitoring of the seawater salinity, temperature and chlorophyll-*a* level, from a depth of 3.7 meters along the entire cruise track was done by means of a thermosalinograph, and a flow-through fluorometer hooked up to the ship's flow-through seawater system. The Scientific Computer System (SCS) recorded the output from both the thermosalinograph, and the fluorometer at 10-second intervals.

The data records were given a time-date stamp by the GPS unit.

Samples for Seabird CTD salinity data calibration were obtained twice a day using a 1.7 liter Niskin bottle taking a water sample from 25 or more meters depth in an isohaline portion of the water column. Calibration of the CTD salinities and chlorophyll-*a* from the surface flow-through system was undertaken twice daily while the ship was underway. Sample analysis for these calibrations followed the protocol outlined in the Ecosystem Monitoring Program Operations Manual.

Census of Marine Zooplankton samples were collected using the 20-cm diameter bongos described above at 5 randomly designated stations in the Mid-Atlantic Bight and Southern New England, at 6 random stations on Georges Bank and 7 random stations in the Gulf of Maine.

Nitrogen isotope samples were collected from 16 stations along the entire cruise track by filtering 600 – 1000 ml of seawater from the discharge of the ship's flow-through seawater system. The seawater was filtered through 25 mm diameter Whatman glass fiber filters (GFF) and the filters were subsequently frozen for analysis ashore.

Presence and volume of *Calanus finmarchicus* was noted in the samples after completion of the cruise by measuring the settled height of the samples in mm, and then converting it to ccs by using the algorithm: volume = (-26.43) + (6.19)(sample height). From "A Method for Rapid Assessment of Plankton Volumes from Settled Height Measurements of Zooplankton Samples" Prezioso and Kane (in prep).

RESULTS

A summary of routine survey activities is presented in Table 1. Areal coverage for the cruise is shown in Figure 1. The *DELAWARE II* sailed on Part I of the cruise on Thursday, 23 October 2008. Two parallel transects were made southeast of Block Island along with 14 bongo-ctd tows to provide ground-truth samples for the ISIIS images. The *DELAWARE II* returned to the NMFS dock on Friday, 24 October where the ISIIS was unloaded and preparations were made for Part II of the cruise. The Ecosystem Monitoring portion of the cruise commenced at 1515 hours EDT on Monday, 27 October 2008. The vessel sailed under windy conditions and proceeded to sample inshore stations until Tuesday morning 28 October, when the weather deteriorated to the point that a tow was aborted at Station 21 due to unsafe operating conditions. The vessel headed for Long Island and anchored in Fort Pond Bay, until rising winds and seas caused the vessel to drag anchor and forced a move to a more sheltered anchorage, where it remained until the evening of 29 October. After leaving the anchorage and steaming slowly to the aborted station, work resumed the following day, on 30 October. From this point on, the *DELAWARE II* continued working steadily, completing the Southern New England and Mid-Atlantic Bight areas, then proceeding on to Georges Bank on 4 November. An approaching storm forced a change in plan at this point. The vessel turned north and west, sampling the western and northern inshore stations of the Gulf of Maine, instead of continuing to head eastward across Georges where the storm system brought unworkable conditions. By the time the vessel looped back towards the Northeast Channel and the northeast peak of Georges Bank, the storm had moved out of the area and conditions were workable. Two stations in the northern Gulf of Maine near the Bay of Fundy were dropped in the interest of saving time and completing the remaining stations in the cruise plan. After completing the eastern part of Georges Bank the *DELAWARE II* picked up the remaining Gulf of Maine stations in the southwest corner of that region. Operations were completed on the 10 November 2009. The vessel returned to Woods Hole via Great Round Shoal Channel and docked in Woods Hole at the NMFS pier on 11 November 2008.

DISPOSITION OF SAMPLES AND DATA

All samples and data, except for the zooplankton genetics samples, and the Seabird CTD data, were delivered to the Ecosystem Monitoring Group of the NEFSC, Narragansett, RI, for quality control processing and further analysis. Nancy Copley of the Woods Hole Oceanographic Institute took the Census of Marine Zooplankton samples from the vessel. The Ecosystems Monitoring Group in Narragansett retained copies of the CTD logs. The nitrogen isotope samples were delivered to the EPA laboratory in Narragansett, RI.

SCIENTIFIC PERSONNEL

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Table 1. STATION OPERATION REPORT FOR CRUISE DE0810

CAST	STA.	Date(GMT)		TIME(GMT)		LAT	LONG	DEPTH	OPERATION
		mm	dd	yy	hr min			m	
									B=bongo W=water Z=zoogen V=vertical cast (CTD only) CO=Calanus observed / vol N=nitrogen isotope
1	1	10	23	2008	16 58	4100.1	7113.1	50	B
2	2	10	23	2008	17 28	4057.3	7114.4	50	B
3	3	10	23	2008	18 2	4054.4	7115.9	56	B
4	4	10	23	2008	18 36	4051.5	7117.2	56	B
5	5	10	23	2008	19 6	4048.6	7118.6	61	B
6	6	10	23	2008	19 33	4045.9	7119.9	60	B
7	7	10	23	2008	20 2	4043.1	7121.4	60	B
8	8	10	23	2008	20 31	4040.2	7122.7	59	B
9	9	10	24	2008	3 29	4057.1	7111.8	51	B
10	10	10	24	2008	4 0	4054.2	7113.2	53	B
11	11	10	24	2008	4 33	4051.4	7114.4	55	B
12	12	10	24	2008	5 7	4048.7	7115.7	60	B
13	13	10	24	2008	5 41	4045.7	7117.1	60	B
14	14	10	24	2008	6 15	4042.9	7118.6	59	B
15	15	10	27	2008	22 41	4111.2	7114.4	50	B, N1
16	16	10	28	2008	1 27	4103.9	7042.9	47	B
17	17	10	28	2008	1 56	4101.5	7044.2	48	B
18	18	10	28	2008	6 32	4056.3	7142.8	56	B
19	19	10	28	2008	7 49	4056.3	7158.6	29	B
20	20	10	28	2008	9 48	4038.9	7154.8	52	B
21	21	10	28	2008	11 35	4028.8	7156.7	65	B
22	22	10	30	2008	7 42	4028.8	7156.8	64	B
23	23	10	30	2008	8 39	4033.6	7204.8	55	B
24	24	10	30	2008	9 47	4031.4	7216.8	54	B
25	25	10	30	2008	12 27	4028.7	7248.2	45	B
26	26	10	30	2008	13 41	4036.1	7254.6	32	B
27	27	10	30	2008	14 50	4028.9	7302.7	31	B, Z1
28	28	10	30	2008	17 45	4011.2	7330.8	38	B, N2
29	29	10	30	2008	20 24	4001.3	7300.8	49	W1
30	29	10	30	2008	20 31	4001.2	7300.8	49	B
31	30	10	31	2008	0 15	3956.3	7348.2	28	B
32	31	10	31	2008	3 38	3931.1	7320.7	35	W2
33	31	10	31	2008	3 46	3930.9	7320.7	35	B
34	32	10	31	2008	4 39	3923.6	7316.8	55	B
35	33	10	31	2008	7 12	3908.6	7311.7	85	B
36	34	10	31	2008	10 22	3841.2	7310.8	123	B
37	35	10	31	2008	11 7	3836.2	7310.8	750	B
38	36	10	31	2008	14 34	3821.4	7344.5	100	B, Z2, N3
39	37	10	31	2008	20 9	3733.8	7418.7	227	W3
40	37	10	31	2008	20 15	3733.7	7418.7	227	B, Z3

Table 1. (cont.) STATION OPERATION REPORT FOR CRUISE DE0810

CAST	STA.	Date(GMT)		TIME(GMT)			LAT	LONG	DEPTH	OPERATION
		mm	dd	yy	hr	min			m	
										B=bongo W=water Z=zoogen V=vertical cast (CTD only) CO=Calanus observed/vol N=nitrogen isotope
41	38	10	31	2008	21	34	3731.2	7430.7	68	B
42	39	11	1	2008	0	48	3708.9	7458.4	42	B
43	40	11	1	2008	3	1	3648.9	7458.7	38	W4
44	40	11	1	2008	3	7	3648.9	7458.5	38	B
45	41	11	1	2008	4	57	3633.7	7448.8	49	B, N4
46	42	11	1	2008	7	30	3608.8	7450.8	91	B
47	43	11	1	2008	8	53	3611.1	7504.5	36	B, Z4
48	44	11	1	2008	10	42	3621.2	7520.8	35	B
49	45	11	1	2008	12	15	3633.6	7528.7	25	B
50	46	11	1	2008	13	24	3638.8	7518.6	27	B, Z5
51	47	11	1	2008	17	4	3708.7	7542.8	15	B, N5
52	48	11	1	2008	18	4	3713.8	7534.6	21	B
53	49	11	1	2008	20	22	3733.7	7522.7	17	W5
54	49	11	1	2008	20	26	3733.7	7522.6	18	B
55	50	11	2	2008	0	21	3803.8	7450.8	28	B
56	51	11	2	2008	3	2	3823.6	7430.7	38	W6
57	51	11	2	2008	3	7	3823.6	7430.6	38	B
58	52	11	2	2008	5	2	3836.3	7444.8	24	B, N6
59	53	11	2	2008	8	20	3838.8	7403.3	50	B, Z6
60	54	11	2	2008	10	32	3851	7343.4	48	B
61	55	11	2	2008	13	43	3906	7418.2	24	B
62	56	11	2	2008	15	17	3918.1	7424.3	14	B
63	57	11	2	2008	19	50	3926.2	7339.1	37	W7
64	57	11	2	2008	19	55	3926.2	7339.2	37	B
65	58	11	3	2008	0	10	3926.3	7251.2	72	B
66	59	11	3	2008	0	42	3926.3	7247.3	70	B
67	60	11	3	2008	4	18	3933.7	7208.8	150	W8, N7
71	60	11	3	2008	11	6	3934.3	7209.5	149	V
72	60	11	3	2008	11	17	3934.4	7209.5	149	B
73	61	11	3	2008	14	34	4006	7208.6	71	B, Z7
74	62	11	3	2008	15	30	4011.3	7200.5	66	B
75	63	11	3	2008	18	48	4016.4	7118.8	89	B, Z8, N8
76	64	11	3	2008	21	58	4006.3	7040.8	126	W9
77	64	11	3	2008	22	4	4006.4	7040.9	127	B
78	65	11	4	2008	1	19	4003.8	7001.5	148	W10
79	65	11	4	2008	1	23	4003.8	7001.4	148	B
80	66	11	4	2008	3	17	4011.2	7016.4	107	B

Table 1. (cont.) STATION OPERATION REPORT FOR CRUISE DE0810

CAST	STA.	Date (GMT)		TIME (GMT)		LAT	LONG	DEPTH	m	OPERATION B=bongo W=water Z=zoogen V=vertical cast (CTD only) CO=Calanus observed / vol N=nitrogen isotope
		mm	dd	yy	hr min					
81	67	11	4	2008	5 24	4021.3	7038.8	92		B
82	68	11	4	2008	7 4	4031.2	7024.9	65		B
83	69	11	4	2008	7 59	4036.2	7019	58		B, Z9
84	70	11	4	2008	9 32	4048.4	7030.3	52		B
85	71	11	4	2008	11 29	4046.2	7005.7	38		B, Z10
86	72	11	4	2008	14 7	4029.1	6939.1	68		B
88	74	11	4	2008	17 20	4014.2	6911	95		B
89	75	11	4	2008	19 43	4006.5	6844.9	202		W11
90	75	11	4	2008	19 49	4006.6	6844.7	177		B
91	76	11	4	2008	23 11	4035.9	6826.8	74		B
92	77	11	5	2008	1 2	4050.9	6823	48		W12
93	77	11	5	2008	1 8	4050.8	6823	53		B
94	78	11	5	2008	4 23	4028.8	6754.8	119		B
95	79	11	5	2008	6 2	4043	6751.1	74		B
96	80	11	5	2008	8 33	4108.6	6746.9	42		B, Z11
97	81	11	5	2008	9 55	4111.1	6802.1	45		B
98	82	11	5	2008	10 49	4118.5	6800.8	38		B
99	83	11	5	2008	12 7	4126.1	6803.3	42		B, Z12
100	84	11	5	2008	14 35	4145.8	6814.5	72		B, Z13
101	85	11	5	2008	17 34	4141.3	6852.8	163		B, CO/221cc, Z14, N9
102	86	11	5	2008	21 11	4133.9	6936.1	48		W13
103	86	11	5	2008	21 15	4133.9	6936.2	48		B
104	87	11	5	2008	22 43	4143.6	6925.1	161		W14
105	87	11	5	2008	22 48	4143.6	6925.1	161		B, CO/159cc
106	88	11	6	2008	3 4	4218.6	6950.5	223		B, CO/295cc
107	88	11	6	2008	3 27	4219.2	6950.6	223		V
108	89	11	6	2008	7 2	4225	7037.1	83		B, Z15, N10
109	90	11	6	2008	8 42	4238.7	7030.8	81		B
110	91	11	6	2008	9 50	4248.6	7032.8	112		B, CO/221cc
111	92	11	6	2008	12 24	4306	7013.4	146		B, CO/283cc, N11
112	93	11	6	2008	15 12	4313.7	6943.2	117		B
113	94	11	6	2008	16 57	4318.8	6925	169		B, CO/295cc
114	95	11	6	2008	20 19	4323.8	6847.3	104		W15
115	95	11	6	2008	20 25	4323.8	6847.4	108		B
116	96	11	6	2008	23 52	4350.7	6827.2	125		W16, N12
117	96	11	6	2008	23 59	4350.7	6827.4	131		B
118	97	11	7	2008	2 16	4333.6	6816.8	194		B, CO/518cc
119	98	11	7	2008	3 52	4326.3	6804.6	207		B, CO/382cc
120	99	11	7	2008	6 36	4311.2	6828.6	199		B, CO/704cc

Table 1. (cont.) STATION OPERATION REPORT FOR CRUISE DE0810

CAST	STA.	Date(GMT)		TIME(GMT)			LAT	LONG	DEPTH	OPERATION
		mm	dd	yy	hr	min				
									m	B=bongo W=water Z=zoogen V=vertical cast (CTD only) CO=Calanus observed / vol N=nitrogen isotope
121	100	11	7	2008	8	3	4308.9	6813.2	196	B, CO/252cc, Z16
122	101	11	7	2008	10	1	4259.1	6757.1	176	B
123	102	11	7	2008	13	5	4323.5	6742.2	249	B, CO/357cc, Z17, N13
124	102	11	7	2008	13	30	4324	6742	251	V
125	103	11	7	2008	16	51	4308.9	6704.9	186	B, CO/265cc
127	104	11	7	2008	18	19	4301.5	6710.7	211	V
128	104	11	7	2008	18	34	4301.7	6710.6	225	B, CO/333cc, Z18
129	105	11	7	2008	21	8	4243.9	6726.1	206	W17
130	105	11	7	2008	21	14	4243.9	6726	208	B, CO/105cc
131	106	11	7	2008	22	39	4234.2	6721	285	V
132	106	11	7	2008	22	56	4233.9	6720.8	285	B, CO/159cc
133	107	11	8	2008	0	57	4225.3	6700.7	364	B
134	107	11	8	2008	1	18	4225.3	6700	365	W18
135	108	11	8	2008	3	43	4203.8	6656.7	63	B
136	109	11	8	2008	6	42	4228.7	6644.9	310	V
137	109	11	8	2008	7	1	4228.9	6644.8	307	B
138	110	11	8	2008	10	9	4213.9	6618.8	216	B
139	111	11	8	2008	12	48	4213.2	6546.7	221	B, N14
140	111	11	8	2008	13	12	4212.9	6546.2	221	V
141	112	11	8	2008	14	40	4206.6	6558.1	224	B
142	112	11	8	2008	15	6	4206	6558	216	V
143	113	11	8	2008	16	18	4158.9	6547.2	237	B
144	113	11	8	2008	16	49	4158.7	6546.8	239	V
145	114	11	8	2008	20	17	4143.9	6630.3	76	W19
146	114	11	8	2008	20	22	4143.9	6630.4	76	B
147	115	11	8	2008	22	19	4133.8	6650.6	71	W20
148	115	11	8	2008	22	24	4133.9	6650.6	71	B
149	116	11	9	2008	0	10	4136.5	6710.6	56	B
150	117	11	9	2008	1	8	4131.4	6716.6	51	B
151	118	11	9	2008	1	57	4128.8	6707.2	55	B
152	119	11	9	2008	2	21	4128.7	6703.4	64	B
153	120	11	9	2008	3	13	4123.9	6655.1	68	B
154	121	11	9	2008	4	18	4121.2	6706.5	60	B
155	122	11	9	2008	4	54	4118.8	6701	65	B
156	123	11	9	2008	7	54	4106.5	6627.4	117	B, Z19
157	124	11	9	2008	10	30	4048.6	6650.8	104	B
158	125	11	9	2008	13	16	4041.4	6722.4	96	B, Z20
159	126	11	9	2008	14	47	4053.3	6724.4	81	B
160	127	11	9	2008	16	22	4106.1	6718.8	62	B, Z21

Table 1. (cont.) STATION OPERATION REPORT FOR CRUISE DE0810

CAST	STA.	Date(GMT)		TIME(GMT)		LAT	LONG	DEPTH	OPERATION
		mm	dd	yy	hr min				
								m	B=bongo W=water Z=zoogen V=vertical cast (CTD only) CO=Calanus observed / vol N=nitrogen isotope
161	128	11	9	2008	19 26	4128.7	6744.8	33	W21, N15
162	128	11	9	2008	19 34	4128.7	6744.9	37	B
163	129	11	9	2008	21 5	4143.6	6749.3	31	W22
164	129	11	9	2008	21 11	4143.7	6749.3	31	B
165	130	11	9	2008	22 0	4151.2	6750.8	42	B, N16
166	131	11	9	2008	23 2	4156.2	6800.6	167	B
167	132	11	10	2008	2 32	4216.5	6832.5	177	B, CO/159cc
168	133	11	10	2008	5 14	4236.1	6850.7	161	B, CO/190cc
169	134	11	10	2008	9 0	4230.1	6939.8	244	V
170	134	11	10	2008	9 14	4230.2	6939.6	243	B, CO/283cc, Z22
171	135	11	10	2008	11 42	4218.9	6913	229	V
172	135	11	10	2008	11 56	4218.9	6912.7	227	B, CO/221cc, Z23
173	136	11	10	2008	18 26	4109.6	6910.9	83	B

Table 1. (cont.) STATION OPERATION REPORT FOR CRUISE DE0810

TOTALS:	Bongo Casts	=	136
	Bongo 6B3Z Samples	=	134
	Bongo 6B3I Samples	=	135
	Water Samples	=	22
	Vertical Casts	=	15
	CTD Casts	=	173
	CMarZ* samples	=	23
	Nitrogen isotope samples	=	16
	<u>Calanus</u> observations	=	19

*Census of Marine Zooplankton (formerly Zoogen)

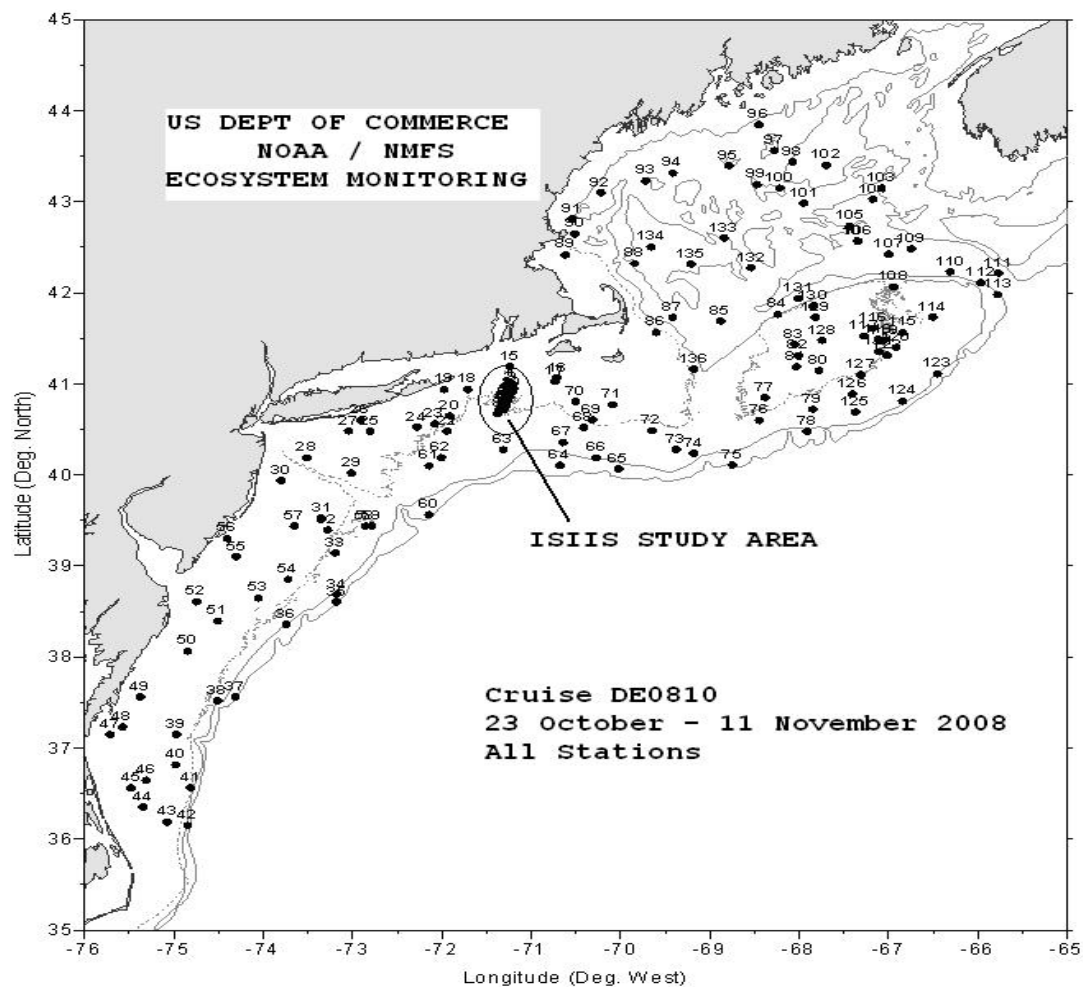


Figure 1. Station locations numbered consecutively for Late Autumn Ecosystem Monitoring Cruise DE 08-10, 29 October - 16 November 2007.

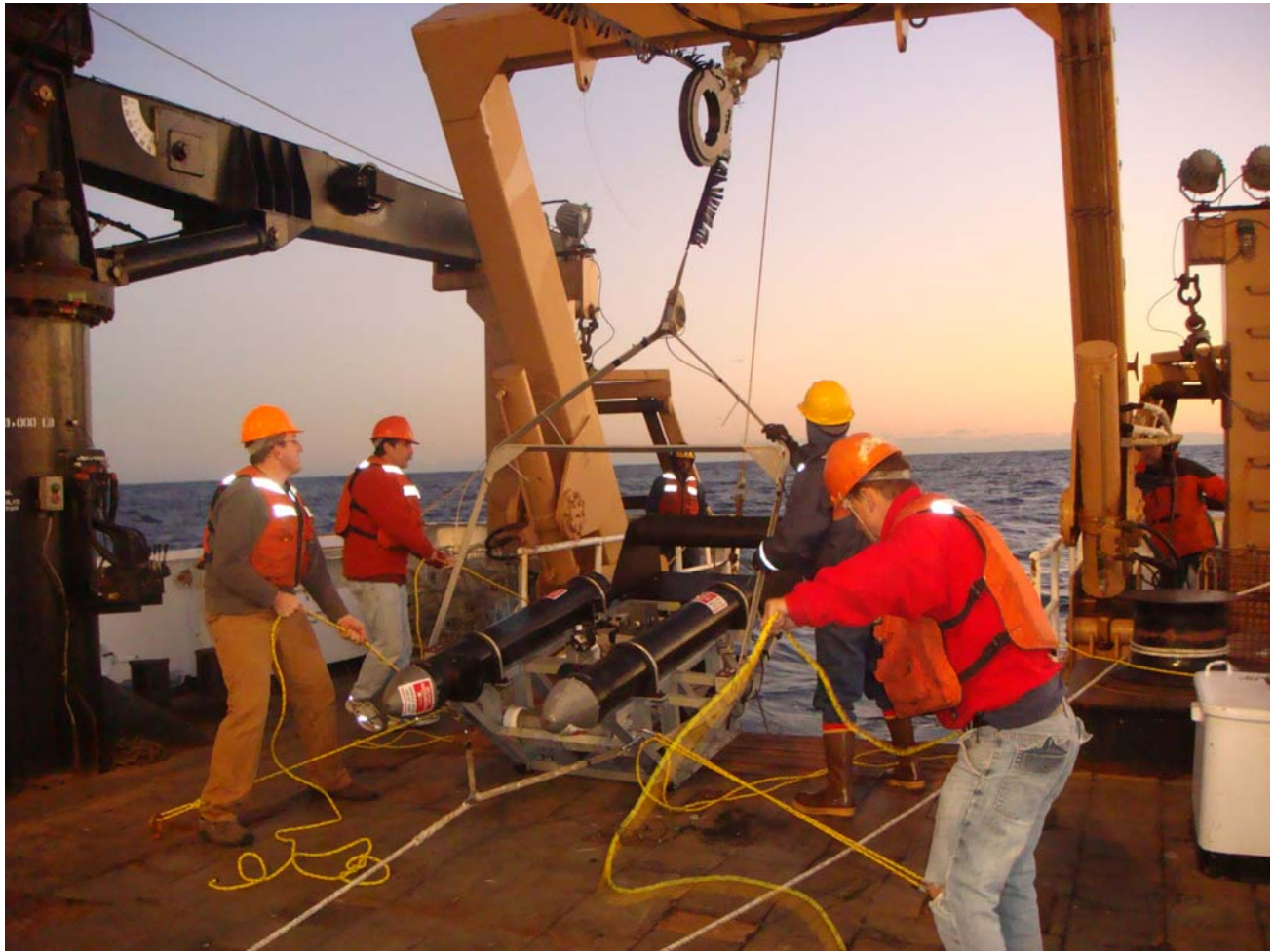


Figure 2. Deployment of ISIIS during Part I DE0810 Ecosystem Monitoring Cruise.