

CRUISE REPORT

OCEANUS 95

April 23 - May 6, 1981

Bradford Butman
U.S. Geological Survey
Woods Hole, Massachusetts 02543

Vessel: OCEANUS

Cruise No: OC95

Dates of Operation: 1330 April 23 - 1000 May 6, 1981

Area of Operations: Georges Bank, Lydonia Canyon (fig. 1)

Objectives: The objectives of the OCEANUS cruise were to:

- 1) Recover 16 subsurface current moorings (4 with bottom instrument packages) and 3 tripod systems (see fig. 2).
- 2) Recover 5 surface buoys (stations M, Q, Z, fig. 1).
- 3) Deploy 2 tripods and 4 current moorings (fig. 2).
- 4) Drag for lost current mooring (station Q).
- 5) Conduct detailed hydrographic and suspended-sediment sampling in and around Lydonia Canyon.
- 6) Obtain surface grab samples at stations A, K, Q, and LCA.

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Equipment: Northstar Loran-C 6000
Gifft echo-sounder
XBT
Neil Brown Instrument Systems CTD and rosette sampler
AMF acoustic command system
Van Veen grab
Mooring hardware and recovery equipment

Navigation: All latitude-longitude were computed from Northstar 6000 Loran-C, using stations W and Y and chip 5101.

Narrative:

April 23 1330 Depart Woods Hole. Steam to station LCA (fig. 2).

April 24 0530 Grab samples west of Lydonia Canyon.
0704 Arrive LCA. Start chemistry and biology grabs.
0834 Prepare to recover tripod.
1010 Tripod (mooring 204) on deck.
1140 Current mooring (mooring 207) on deck.
1255 Continue grab samples.
1415 Grab samples complete.
1445 CTD complete.
1515 Underway to station LCL.
1620 Arrive station LCL. No surface buoys on station.
Range to tripod (mooring 205).
1715 Tripod release. No float on surface.
2050 Start CTD transect.

April 25 0030 CTD's complete. Ready to start bathymetry.
0150 Start bathymetry around LCC and LCD.
0340 End bathymetry.
0415 Grab samples.
0800 Arrive station LCL. No tripod float on surface.
Assume float or rope canister fouled; system must be recovered
by dragging.
Postpone dragging for later in cruise.
1000 Recover subsurface mooring at LCL (218). Underway to station
LCD.
1130 Arrive station LCD. Range to determine position.
Mooring moved down canyon.
1315 Mooring 210 retrieved. Underway to LCC. Range to mooring.
Mooring moved up canyon onto shelf.
Release released but no float on surface.
1530 Start grappling for LCC.
1650 Float surfaced.
1725 Mooring 209 on deck. (A piece of 5/8" polypro line was wrapped
around release which prevented mooring from surfacing).
Underway to LCM.
1745 Arrive LCM. Both surface buoys on station. Range
to moorings.
1920 Mooring 219 on deck.
2225 Start CTD transect.

April 26 0230 Start EDT. Finish CTD transect.
0330 Start bathymetric survey around LCF and LCG.
0500 Complete bathymetry. Underway to LCM.
0600 Start dragging for tripod (mooring 203).
0730 Tripod on deck.
1000 Recover surface buoy V.
1113 Recover surface buoy R. Underway to LCL.
1235 Arrive station LCL. Prepare to launch surface buoys.
Transpond to tripod (205). No reply.
1435 Deploy surface buoy R.
1540 Deploy surface buoy V.
1700 Deploy tripod at LCL between new surface buoys.

Slip line parted and tripod fell to bottom last 25 m.
Upright and disabled.

1815 Start dragging for tripod. No success.

2100 Conduct transpond search in 4 nmi square around mooring site to determine if mooring dragged off station.

April 27 0100 Complete search for mooring 205. No reply. Start XBT transect.
0800 Recover mooring at LCG (213).
1020 Recover mooring at LCN (220).
1130 Recover mooring at LCF (212).
1400 Recover mooring at LCH (214). (Mooring released when sent release command at station LCF. Floats on surface.)
1630 Underway to LCO.
1745 Mooring LCO (222) on deck. Underway to LCL.
1845 Still no tripod float on surface. Beautiful weather. Underway to LCK.
2045 Recover mooring 217 at LCK.
2230 Underway to Mobil Block 312 for grab samples.

April 28 0030 Arrive Mobil Block 312. Start grab sampling.
0540 Complete grabs (two sites, 7 grabs/sites).
0630 At LCB. Start ranges.
0930 Mooring at LCB (208) retrieved. Underway to LCA.
1215 Set tripod at LCA (224).
1610 Set subsurface mooring at LCA (225).
1700 Range and disable moorings. Underway to LCH.
2020 Release mooring 221 at LCH.
2100 Mooring 221 on deck. Underway to Mobil Lease Block 312.

April 29 0052 Arrive Mobil Lease Block 312.
0540 Complete grab samples of 2 sites (7 grabs/site).
0630 Arrive LCB. Setup mooring.
1128 Anchor away for mooring 226. Range to mooring and disable.
1200 Underway to LCJ.
1425 Release mooring 216.
1545 Recover mooring 216. Underway to LCI.
1745 Mooring 215 (LCI) on deck. Weather too rough to recover surface buoy or for grabs. Deck secure.
Underway to sand-wave study area to recover buoys.

April 30 0845 Prepare to recover buoys.
0935 Surface buoy I on deck and secure.
1030 Surface buoy D on deck and secure. Underway to LCE (last subsurface mooring to recover).
1545 Arrive LCE, start ranges.
1600 Attempt to release mooring 211. Release will not release.
1830 Underway to LCI.
1930 Arrive LCI.
2015 Surface buoy (mooring 2151) on deck. Did not reset surface buoy. Chain extremely worn.
2230 Underway to GBA and GBK to conduct grab samples.

May 1 0130 Arrive GBA commence grabs.
0325 Arrive GBK commence grabs.
0615 Complete grabs. Underway to LCA. XBT transect.

1030 Arrive LCE. Attempt to release mooring 214. No success.
Start dragging.

1500 Cut wire and subsurface float on surface. Upper two instruments
recovered; one current meter and deep tripod still left.
Continued dragging.

2320 Terminate dragging, no success. Moved mooring several times;
now at base of wall.

May 2 0430 Complete grab samples.
0800 Start dragging of LCC for tripod 205. Many passes.
2110 Tripod on deck (finally!)
2330 Arrive LCM for CTD transect.

May 3 0115 CTD problems. XBT transect from LCM to LCK.
0410 Finish CTD transect.
0700 At LCI. Setup to deploy mooring 227.
1148 Deploy mooring 227. Underway to LCE.
1400 Rig to continue dragging at LCE. Seas too rough; instrumentation
would probably be damaged during recovery. Fix CTD slip rings.
2100 Start CTD transect. Removed CTD from rosette to allow work in
rough weather. (No nutrient or suspended sediment sample
possible.)

May 4 1100 Complete CTD transect (stas. 39-53).
1245 Arrive LCE. Continue dragging. No success. Trawl wire parted.
1915 Arrive LCA. Tripod float (mooring 223) on surface! Accidentally
released by attempts to release mooring of LCE.
2010 Recover subsurface mooring (suspected sponges may have left in
rotor at launch).
2152 Redeploy subsurface mooring.
2225 Recover tripod 223.

May 5 0016 Redeploy tripod 223.
0040 Start CTD transect (sta. 54-73).
0930 Terminate CTD. Head for LCE.
1200 Deploy mooring 228 at LCE.
1230 Range and disable. Continue CTD's.
1520 Complete CTD and XBT transect.

May 6 0130 Arrive GBQ. Start grab samples.
0340 Complete grab samples. Recover surface buoy G. Underway to
Woods Hole.
1000 Arrive Woods Hole.

Cruise summary and highlights

All current moorings, tripods, and surface buoys were recovered as planned, except the surface mooring at LCL and the subsurface mooring of LCE. Three (of 3) shallow tripods, 3 (of 4) deep tripods, 18 (of 21) sediment traps and 32 (of 34) VACMs were recovered. Preliminary indications are that the data return from the instruments and sediment traps was good. A minimum of nutrient and suspended sediment profiling was conducted due to time spent dragging for the two tripods and the mooring at LCE.

A mooring with 1 current meter and two sediment traps was deployed at LCE to obtain information where the mooring was not recovered.

Tabulated information:

Days at sea: 14

Moorings recovered: 18

Moorings deployed: 6

Surface buoys recovered: 6

CTD stations: 27

XBT stations: 41

Grab samples: 72

Bathymetric surveys: 25 April 0150-0340 Site C, D
26 April 0300-0500 Site F, G

OCEANUS 95 - MOORINGS RECOVERED

<u>No.</u>	<u>Sta.</u>	<u>Type*</u>	<u>Date</u>	<u>Comments</u>
203	LCM	T	4/26/81	Recovered by dragging.
204	LCA	T	4/24/81	
205	LCL	T	5/02/81	Recovered by dragging.
207	LCA	SS	4/24/81	
208	LCB	SS/DT	4/28/81	
209	LCC	SS	4/25/81	Moved west into canyon axis.
210	LCD	SS	4/23/81	Moved west onto shelf.
211	LCE	SS/DT	3/01/81	Release failure. Recovered upper 2 current meters by dragging. DT and 1 VACM not recovered.
212	LCF	SS	4/27/81	
213	LCG	SS	4/27/81	
214	LCH	SS/DT	4/27/81	Released prematurely when released LCF.
215	LCI	S	4/30/81	Chain extremely worn.
215	LCI	SS/DT	4/29/81	
216	LCJ	SS	4/29/81	
217	LCK	SS	4/27/81	
218	LCL	S		Lost. Surface buoy missing.
218	LCL	SS	4/25/81	
219	LCM	SS	4/25/81	
220	LCN	SS	4/27/81	
221	LCH	DT	4/28/81	
222	LCO	SS	4/27/81	Pressure mooring only.

*T = Tripod
 SS = Subsurface
 S = Surface
 DT = Deep Tripod

OCEANUS 95 - MOORINGS DEPLOYED

<u>No.</u>	<u>Sta.</u>	<u>Type</u>	<u>Date</u>	<u>Inst.*</u>
223	LCA	T	3/08/81	
224	LCL	T	4/26/81	
225	LCA	SS	4/04/81	1V, 2ST
226	LCB	SS	4/29/81	3V, 2ST
227	LCI	SS	5/03/81	3V, 2ST
228	LCE	SS	5/03/81	1V, 2ST

*V = VACM
ST = Sediment trap

OCEANUS 95 - GRAB SAMPLES

<u>Date</u>	<u>Station</u>	<u>Location</u>	<u>Depth</u> (m)	<u>Latitude</u> (N.)	<u>Longitude</u> (W.)
4/24/81	OC95-1	LC	98	40°32.70'	67°48.80'
	OC95-2	LC	103	40°33.39'	67°47.24'
	OC95-3A	LC	103	40°34.02'	67°45.39'
	OC95-3B	LC	103	40°34.11'	67°45.24'
	OC95-3C	LCA		40°34.03'	67°45.32'
	OC95-3D	LCA	101	40°34.05'	67°45.37'
	OC95-3E	LCA	100	40°34.10'	67°45.33'
	OC95-3F	LCA	100	40°34.07'	67°45.44'
	OC95-3G	LCA	100	40°34.19'	67°45.37'
	OC95-3H	LCA	100	40°34.09'	67°45.37'
4/25/81	OC95-4	LC	145	40°26.42'	67°41.25'
	OC95-5	LC	162	40°27.09'	67°38.10'
	OC95-6	LC	139	40°28.79'	67°32.52'
	OC95-7	LC	140	40°29.52'	67°38.36'
4/27/81	OC95-8	LCO	555	40°26.73'	67°39.73'
4/28/81	OC95-9A	LB312	80	40°39.35'	67°45.23'
	OC95-9B	LB312	80	40°39.31'	67°45.27'
	OC95-9C	LB312	80	40°39.31'	67°45.29'
	OC95-9D	LB312	80	40°39.32'	67°45.34'
	OC95-9E	LB312	80	40°39.34'	67°45.33'
	OC95-9F	LB312	80	40°39.26'	67°45.17'
	OC95-9G	LB312	80	40°39.28'	67°45.30'
	OC95-9H	LB312	80	40°39.29'	67°45.17'
	OC95-10A	LB312	80	40°38.74'	67°46.96'
	OC95-10B	LB312	80	40°38.78'	67°46.86'
	OC95-10C	LB312	80	40°38.75'	67°46.92'
	OC95-10D	LB312	80	40°38.65'	67°47.07'
	OC95-10E	LB312	80	40°38.76'	67°47.00'
	OC95-10F	LB312	80	40°38.70'	67°46.89'
	OC95-10G	LB312	80	40°38.75'	67°46.82'
	OC95-10H	LB312	80	40°38.77'	67°46.74'
4/29/81	OC95-11A	LB312	84	40°38.34'	67°48.95'
	OC95-11B	LB312	84	40°38.33'	67°48.94'
	OC95-11C	LB312	84	40°38.30'	67°48.96'
	OC95-11D	LB312	84	40°38.29'	67°48.97'
	OC95-11E	LB312	84	40°38.27'	67°48.99'
	OC95-11F	LB312	84	40°38.38'	67°48.87'
	OC95-11G	LB312	84	40°38.41'	67°48.97'
	OC95-11H	LB312	84	40°38.40'	67°48.91'
	OC95-12A	LB312	84	40°37.44'	67°48.65'
	OC95-12B	LB312	84	40°37.39'	67°48.49'
	OC95-12C	LB312	84	40°37.41'	67°48.64'
	OC95-12D	LB312	84	40°37.42'	67°48.32'
	OC95-12E	LB312	84	40°37.41'	67°48.63'
	OC95-12F	LB312	84	40°37.42'	67°48.62'
	OC95-12G	LB312	84	40°37.40'	67°48.54'
	OC95-12H	LB312	84	40°37.36'	67°48.60'
	OC95-12I	LB312	84	40°37.44'	67°48.56'

5/01/81	OC95-13A	GBA	86	40°51.00′	67°24.41′
	OC95-13B	GBA	86	40°51.02′	67°24.44′
	OC95-13C	GBA	86	40°51.00′	67°24.44′
	OC95-13D	GBA	86	40°51.03′	67°24.38′
	OC95-13E	GBA	86	40°51.04′	67°24.34′
	OC95-13F	GBA	86	40°51.07′	67°24.44′
	OC95-13G	GBA	86	40°51.02′	67°24.35′
	OC95-13H	GBA	86	40°50.97′	67°24.41′
	OC95-14A	GBK	64	41°02.54′	67°34.57′
	OC95-14B	GBK	64	41°02.50′	67°34.40′
	OC95-14C	GBK	64	41°02.45′	67°34.42′
	OC95-14D	GBK	64	41°02.51′	67°34.42′
	OC95-14E	GBK	64	41°02.49′	67°34.40′
	OC95-14F	GBK	64	41°02.50′	67°34.42′
	OC95-14G	GBK	64	41°02.52′	67°34.45′
	OC95-14H	GBK	64	41°02.46′	67°34.40′
5/02/81	OC95-15	LC	261	40°22.83′	67°32.95′
	OC95-16	LC	177	40°24.32′	67°33.71′
	OC95-17	LC	160	40°25.55′	67°34.50′
	OC95-18	LC	142	40°30.01′	67°36.06′
5/06/81	OC95-19A	GBQ	67	40°29.62′	70°12.23′
	OC95-19B	GBQ	67	40°29.60′	70°12.30′
	OC95-19C	GBQ	67	40°29.52′	70°12.34′
	OC95-19D	GBQ	67	40°29.47′	70°12.40′
	OC95-19E	GBQ	67	40°29.43′	70°12.44′
	OC95-19F	GBQ	67	40°29.49′	70°12.48′
	OC95-19G	GBQ	67	40°29.50′	70°12.60′
	OC95-19H	GBQ	67	40°29.48′	70°12.67′
	OC95-19I	GBQ	67	40°29.46′	70°12.76′
	OC95-19J	GBQ	65	40°29.57′	70°12.49′

54	5/05/81	0140	120	40°29.73'	67°48.27'	X		X
55	5/05/81	0208	133	40°27.46'	67°48.40'		X	X
56	5/05/81	0225	153	40°25.78'	67°48.15'	X		X
57	5/05/81	0246	153	40°24.04'	67°47.82'		X	X
58	5/05/81	0305	165	40°22.04'	67°47.83'	X		X
59	5/05/81	0334	257	40°19.61'	67°47.16'		X	X
60	5/05/81	0403	535	40°16.31'	67°47.04'	X		X
61	5/05/81	0445	~850	40°14.81'	67°46.60'		X	X
62	5/05/81	0504	~1,120	40°13.40'	67°46.71'	X		X
63	5/05/81	0654	1,780	40°13.93'	67°37.54'	X		X
64	5/05/81	0831		40°16.44'	67°38.58'		X	X
65	5/05/81	0851	1,030	40°17.70'	67°39.63'	X		X
66	5/05/81	1235	600	40°25.10'	67°40.02'		X	X
67	5/05/81	1258	275	40°22.68'	67°38.27'		X	X
68	5/05/81	1311	220	40°22.74'	67°36.56'	X		X
69	5/05/81	1355	475	40°21.94'	67°38.93'	X		X
70	5/05/81	1426	695	40°21.22'	67°41.27'	X		X
71	5/05/81	1507	190	40°22.25'	67°42.93'	X		X
72	5/05/81	1524	140	40°23.09'	67°43.98'		X	X
73	5/05/81	1530	150	40°24.01'	67°44.88'		X	X

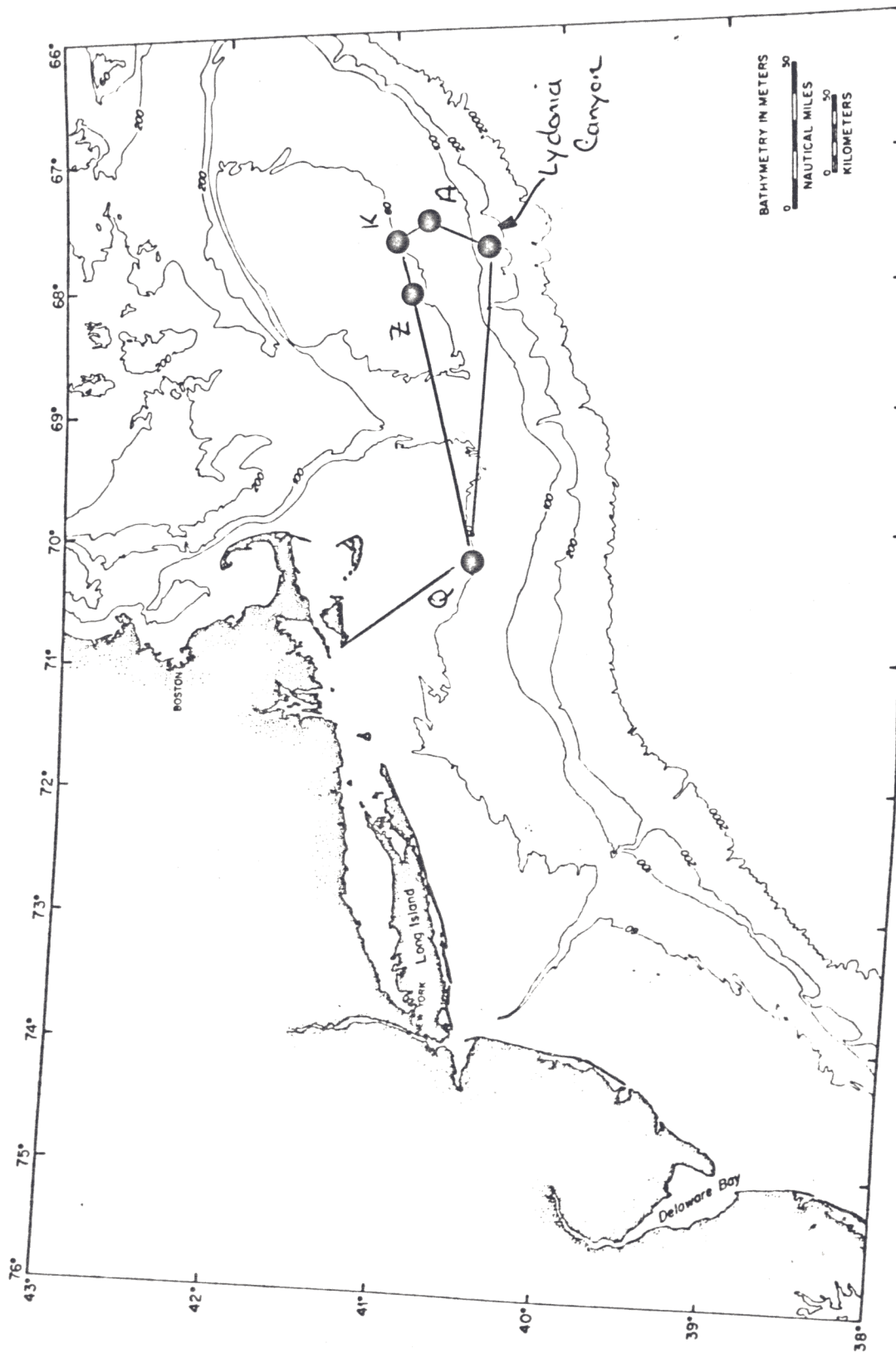


Figure 1. Cruise track for OCEANUS cruise. Most work conducted near Lydonia Canyon.

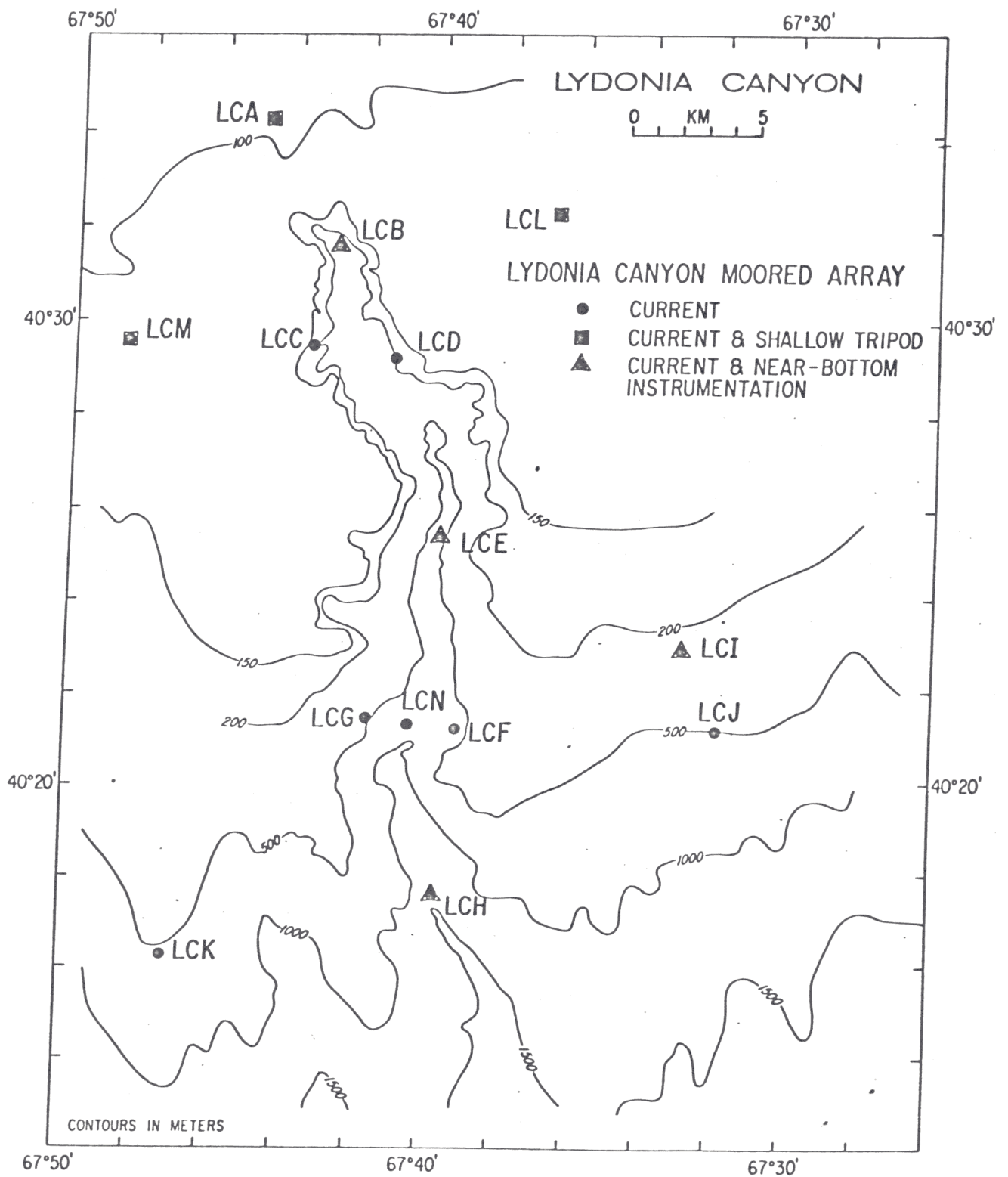


Figure 2. Location of moorings recovered on OCEANUS cruise. All moorings were retrieved except at LCE. Moorings redeployed at stations LCA, LCB, LCE, LCI. Tripods deployed at LCA and LCL.

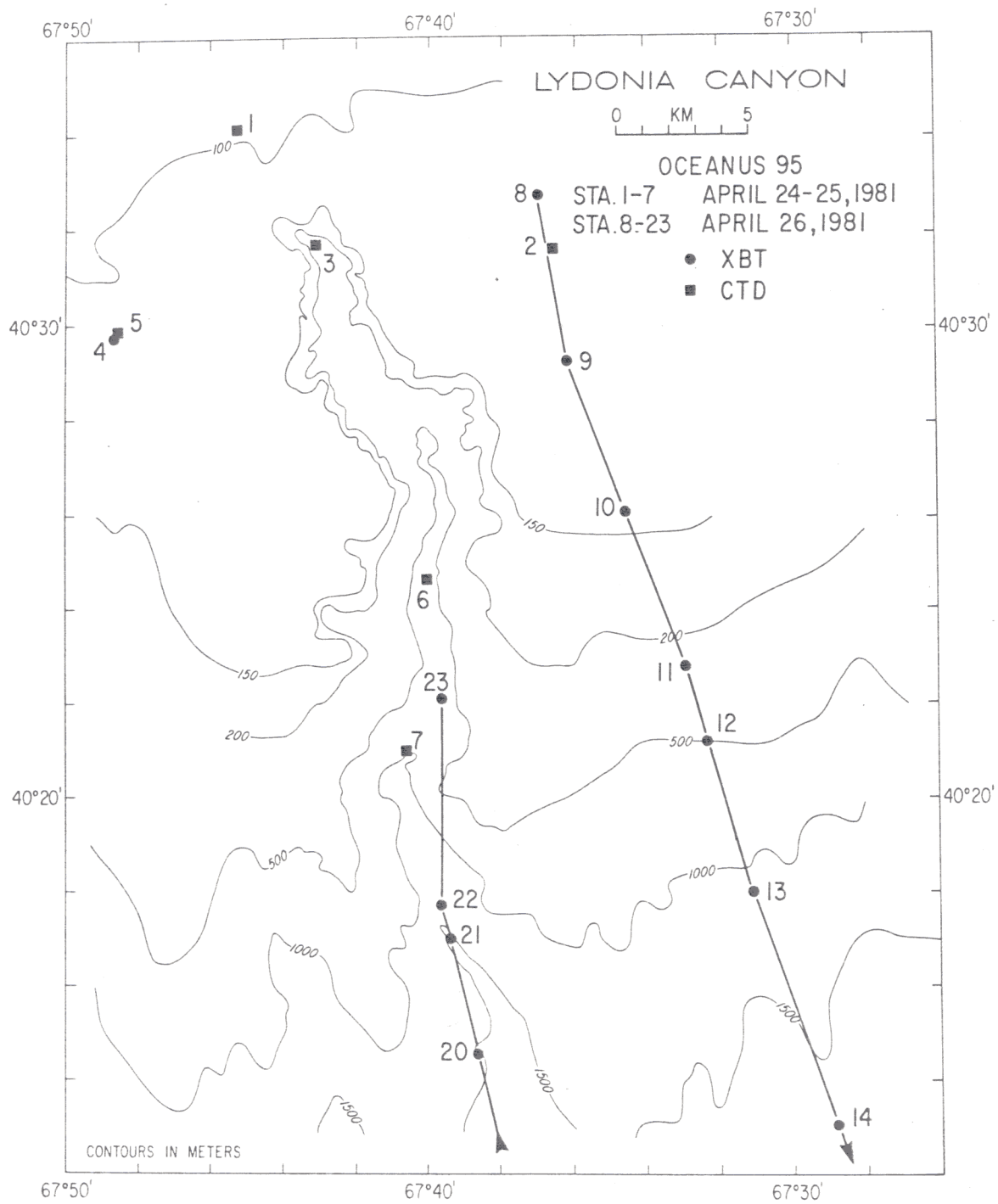


Figure 3a. Hydrographic stations, OCEANUS 95.

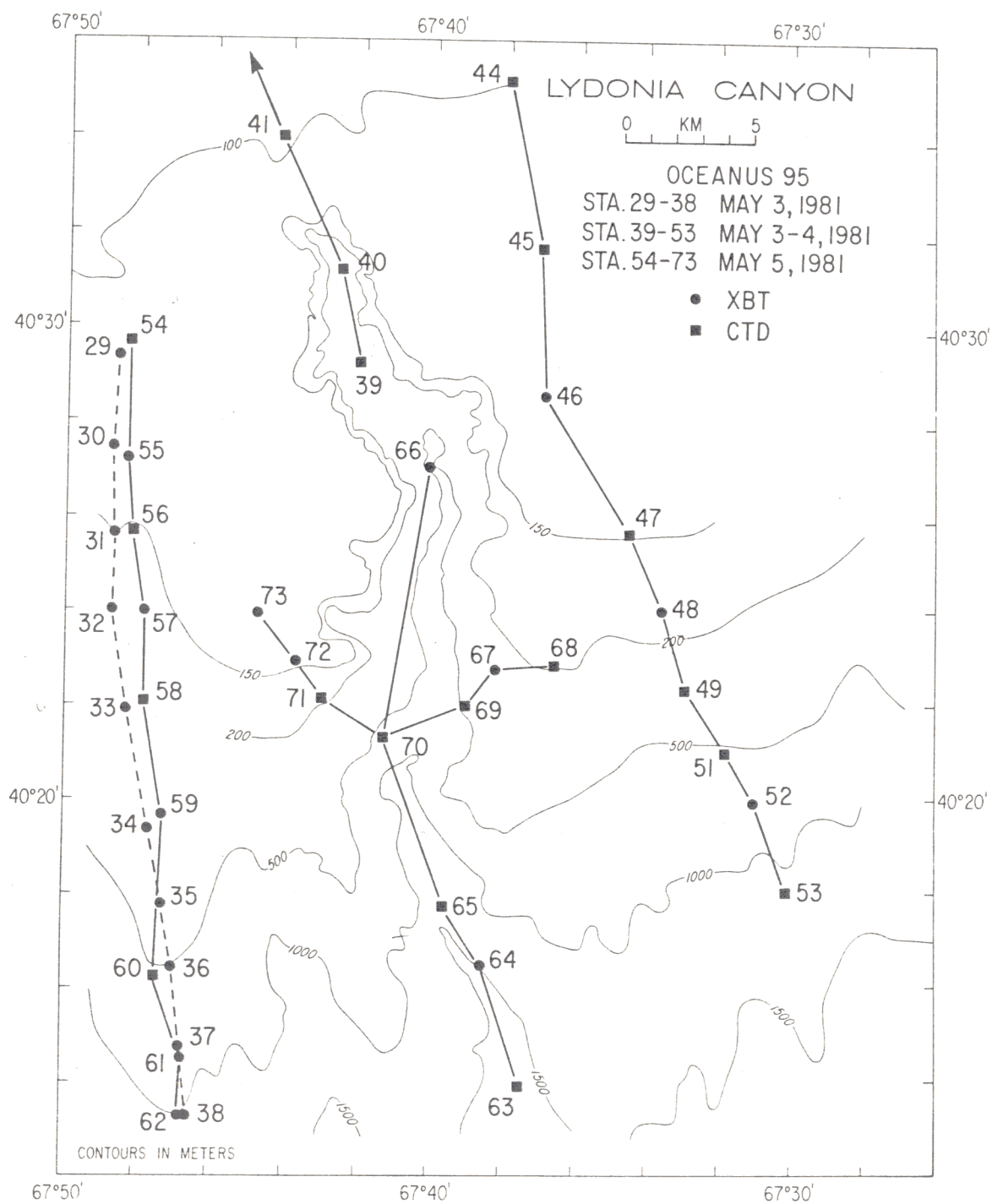


Figure 3b. Hydrographic stations, OCEANUS 95.

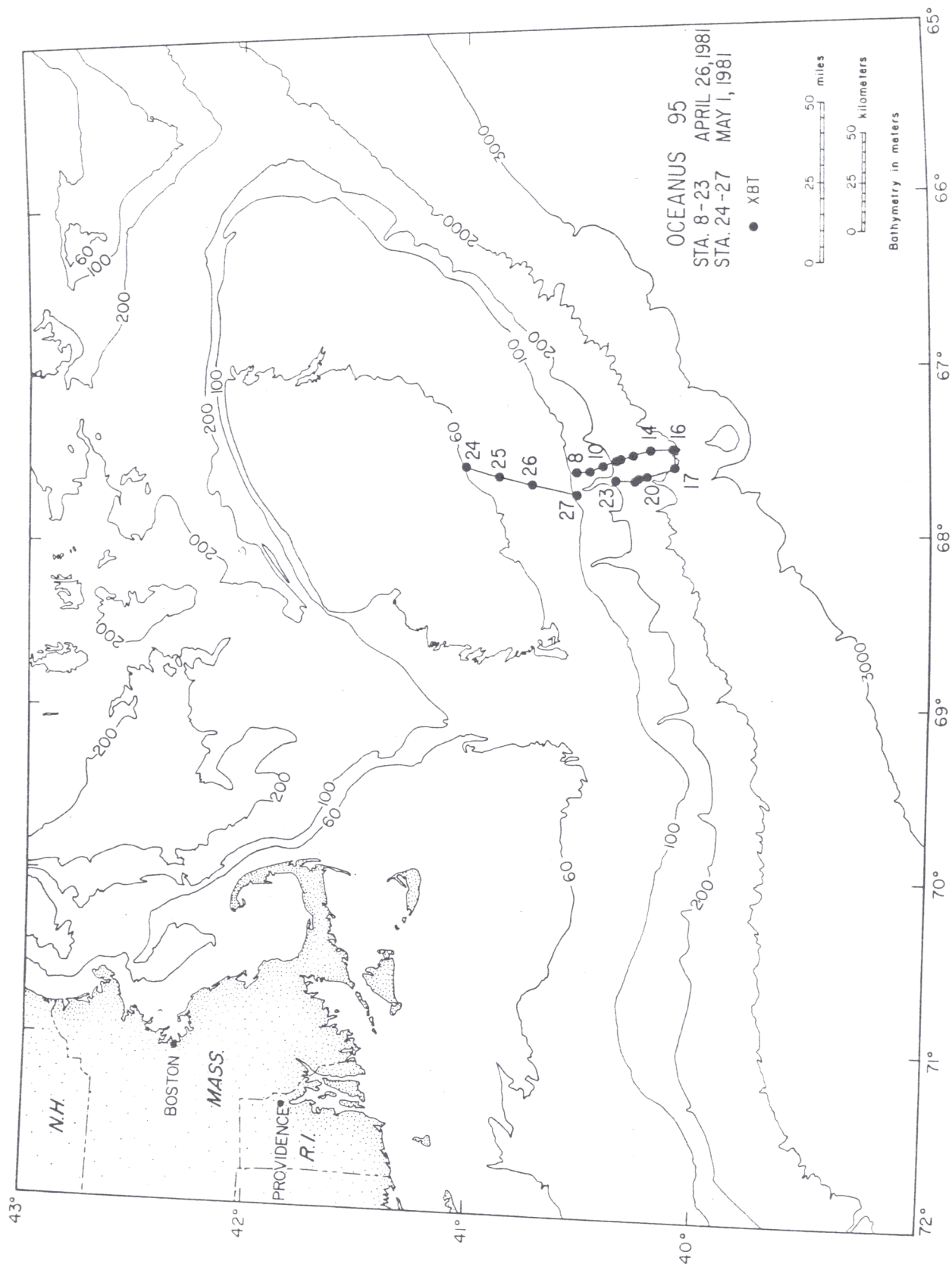


Figure 3c. Hydrographic stations, OCEANUS 95.

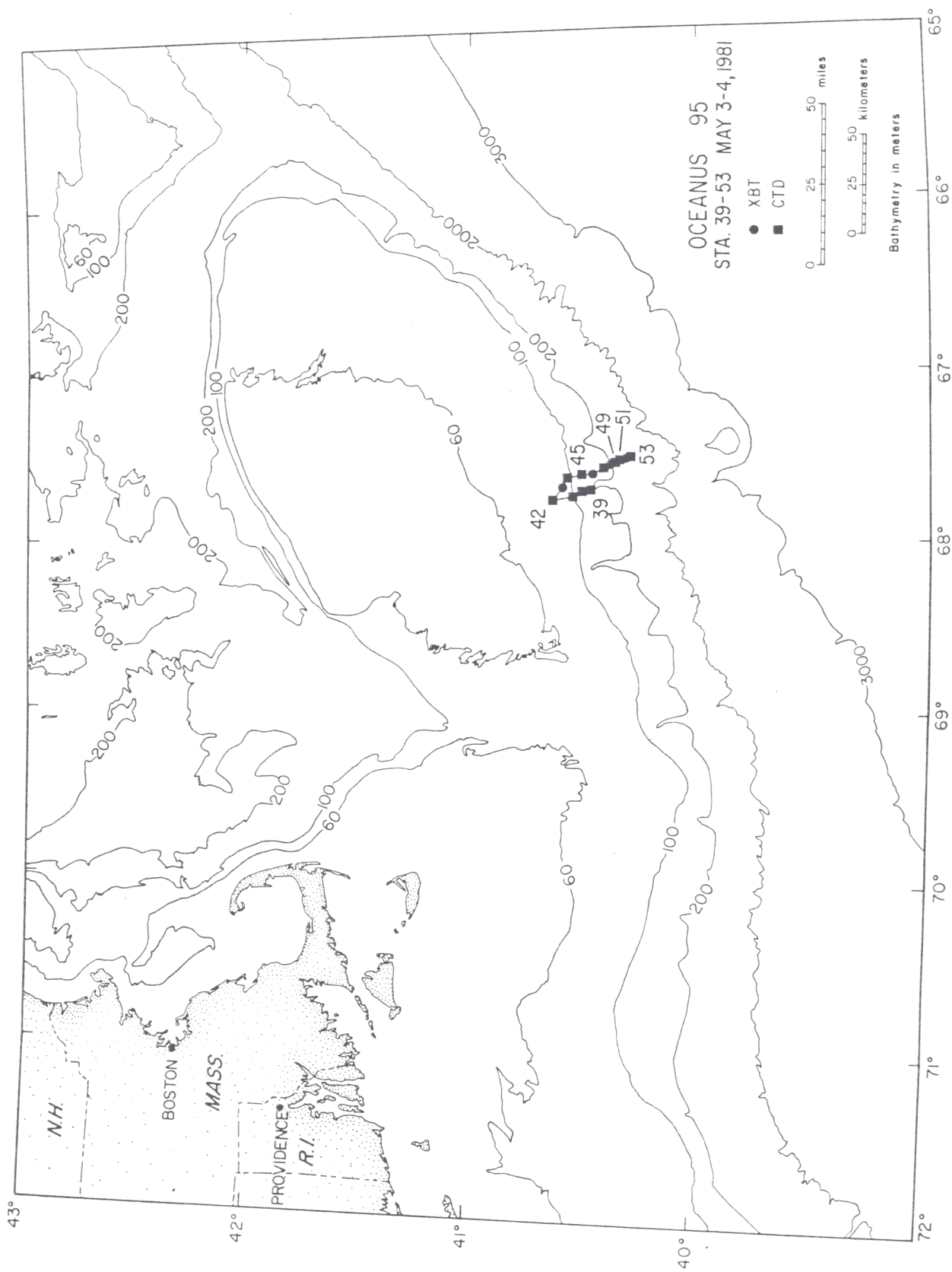
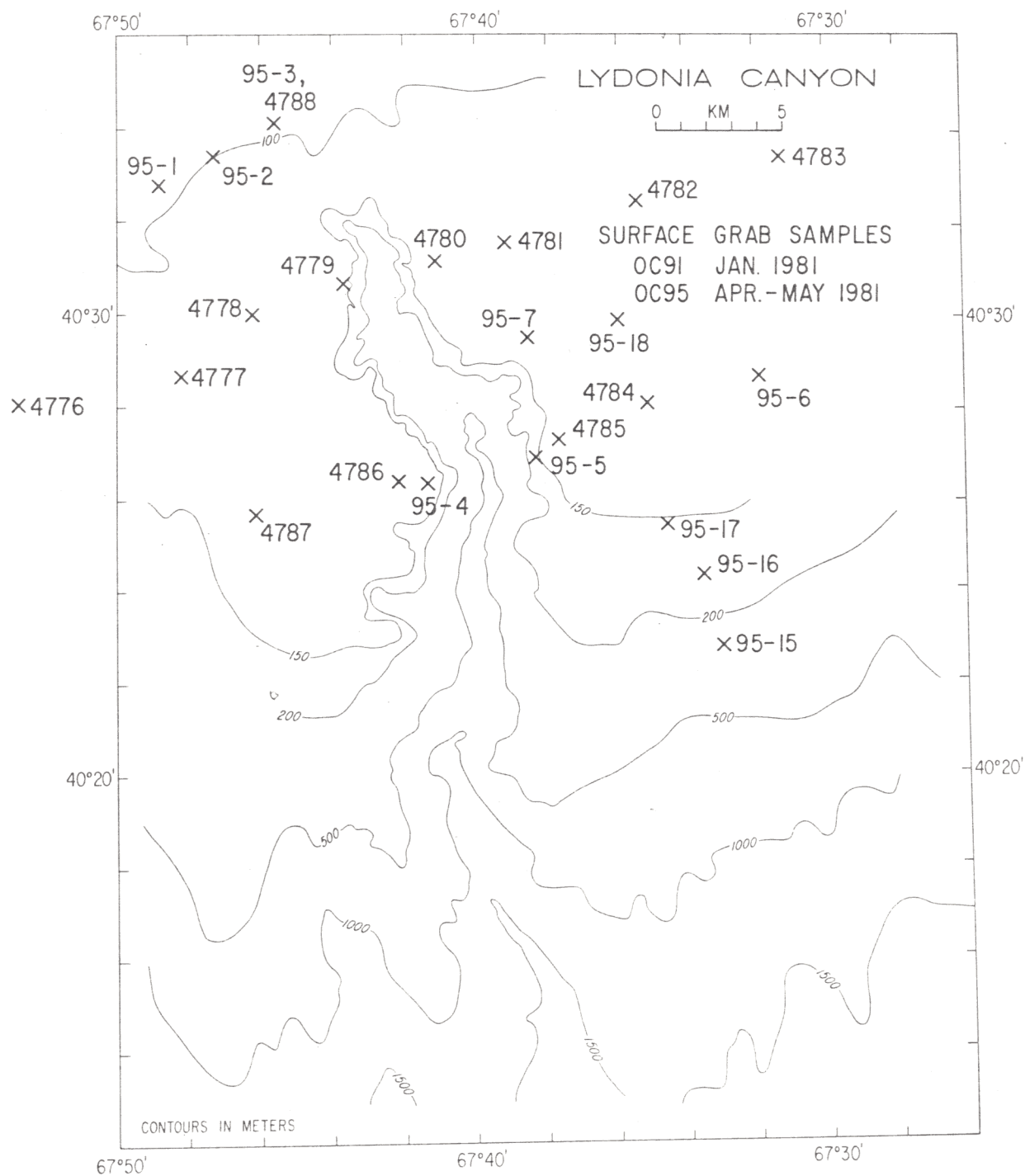


Figure 3d. Hydrographic stations, OCEANUS 95.



APPENDIX I

BRIDGE LOG

OCEANUS 95

Date	⁺⁵ Time	^{GMT} Sta.	+/-	Reading	Latitude	Longitude	Remarks +5
THURS 4-23	1107				41-31.4	70-40.2	S-1 TD-43 AT DOCK S-2-14
4-23	1554				41-12.1	70-51.5	SW SHOAL @ 1.5m
	1700	2200	LC		41-04.6	70-38.8	
	1800	2300	LC		40-57.6	70-27.1	
	1814	2314	SA-	42 ³	40-55.953	70-24.410	
	1900	2400	LC		40-50.8	70-15.4	
	2000	0100	LC		40-44.47	70-04.22	
	2017	0117	LC		40-42.67	70-01.08	Davis Shoal BDS #037: .85mi dist 40095-G - 110 M
	2115	0215	LC		40-41.9	69-47.2	
	2202	0302	LC		40-41.45	69-35.6	c/c 096-G
	2200	0300	Sat	11° 3	40-41.45	69-36.11	
	2350	0450	Sat		40-41.0	69-06.8	
FRI 4-24	0100	0600	LC		40-40.2	68-48.6	
	0200	0700	LC		40-38.9	68-34.7	
	0300	0800	LC		40-37.3	68-18.8	9/101°

Vessel OCEANUSPage 2Cruise #95LORAN LOG

Date	Time	Sta.	+/-	Reading	Latitude	Longitude	Remarks
	ts	GAT			N	W	
APR 24	0400	0900	LC		40-34.9	68-03.2	
	0455	0955	LC		40-33.0	67-49.4	H.T. for GRAB SAMPLE
	0520	1020	SAT	NO FIM	40-32.811	67-49.151	
	0536	1036	LC		40-32.9	67-48.9	GRAB SAMPLE
							0545 VHS
							0600 H.T.
	0610	1110	LC		40-33.3	67-47.3	GRAB SAMPLE
							0628 VHS
	0702	1202	SAT	NO FIM	40-33.6	67-46.1	0650 H.T. clo by 'LCA'
	0723	1223	LC		40-34.0	67-45.4	GRAB SAMPLE
	0743	1243	LC		40-34.1	67-45.2	" "
	0758	1258	LC		40-34.01	67-45.31	" "
	0809	1309	LC		40-34.00	67-45.25	" "
	0951	1451			40-32.65	67-43.36	Hauling back Trawl #209 LCA
	1131	1631			40-34.45	67-44.65	Sub Surface #219 LCA abd
	1247	1747			40-34.	67-45.38	GRAB SAMPLE
	1300	1800			40-34.1	67-45.34	" "
	1325	1825			40-34.67	67-45.45	" "
	1332	1832			40-34.14	67-45.38	" "
	1338	1838			40-34.18	67-45.37	" "

Vessel OCEANUS

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Cruise # 95

LORAN LOG

Date	+5 Time	GMT Sta.	+/-	Reading	N Latitude	W Longitude	Remarks
FRI 4-24	1351	1851			40°34.02	67°45.43	GRAB SAMPLE 1N/G
	1355	1855			40°34.04	67°45.43	" " N/G
	1400	1900			40°34.07	67°45.40	" " N/G
	1405	1905			40°34.08	67°45.37	" " O.K.
	1424	1924			40°34.22	67°45.18	CTD 1N WATER
	1437	1937			40°34.26	67°45.11	" ON SURFACE
	1457	1957			40°34.37	67°44.94	DEP FOR LCL
	1615	2115			40-32	67-36.8	H.T.
		0147			40-33.09	67-40.15	CTD
	2050	0150			40-31.75	67-36.59	2046 Cme CTD
	2100	Loran	out due to rain signal				2100 CTD abel.
	2114	0214	S/C 270-C @ 140 RPM				
	2150	0250	H-T				
	2159	0259			40-31.76	67-43.15	Cme CTD
	2227	0327			40-32.08	67-41.06	CTD abel
	2239	S/C	233-C @ 140 RPM				
	2330	H-T					
	2344				40-29.95	67-48.42	CTD away
	0006				40-29.24	67-48.36	CTD abel

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Date	Time	Sta.	+/-	Reading	Latitude	Longitude	Remarks
	0125	0625			40 32.35	67 44.26	c/c 185° G
	0139	0639			40 31.31	67 44.20	% 190° G
	0151	0651			40 30.3	67 44.34	% 157° G
	0157	0657					% 164° G
	0221	0721			40 27.87	67 43.07	% 070 G
	0225	0725			40 27.93	67 42.66	% 337 G
	0235	0735			40 28.57	67 42.92	% 333° G
	0238	0738					% 323° G
	0255	0755			40 30.0	67 43.6	% 321° G
	0300	0800			40 30.36	67 43.95	% 092 G
	0304	0804					% 095° G
	0319	0819			40 30.23	67 41.87	% 157° G
	0336	0836			40 28.83	67 41.06	% 140 G SECURE
	0345	0845			40 28.28	67 40.58	% 202° G
	0352	0852					% 199° G
	0408	0908	LC		40-26.7	67-41.2	
	0440	0940	LC		40-26.4	67-41.27	GRAB SAMPLE
	0453	0953	LC				SC 065 G, 140 RPM
	0519	1019	LC		40-27.27	67-38.23	Hove TO
	0524	1024	LC		40-27.21	67-38.16	GRAB SAMPLE
	0535	1035	LC		40-27.08	67-38.11	" "
	0544	1044	LC				SC 065 G, 160 RPM
	0619	1119	LC		40-28.9	67-32.5	Hove TO.
	0625	1125	LC		40-28.78	67-32.54	GRAB SAMPLE
	0634	1134	LC				SC 280 G, 160 RPM

Date	Time	Sta.	+/-	Reading	Latitude	Longitude	Remarks
26 APRIL	15	GMT			N	W	
	0710	1210					HUETU
	0715	1215	LC		40-29.52	67-38.37	GRAB SAMPLE
	0720	1220					SL 0249, 140 RPM
	0746	1246	LC				HUETU AT LCL
	0900	1300	LC		40 31.24	67 37.12	
	1004	1504	LC		40 31.51	67 36.78	Hauling back SS-LCL ^{#218}
							1030 Gem abt.
	1140	1640	LC		40-28.79	67-42.04	Var C/spids
	1200	1700	LC		40 29.28	67 41.51	NOON POSIT
	1311	1811	LC		40 29.23	67 41.78	SUB SUR "D" SECURED
	1315	1815	—				SUB SUR "D" 210 ABD
	1530	2030	LC		40 29.28	67 44.47	CINC TRAWL FOR #209
	1600	2100	LC		40 29.31	67 44.30	HAUL BACK
	1700	2200					V's TO PICK UP buoy 'C'
	1725	2225	LC				BUOY OUTWARD V's
							TO STA 'LCM'
	1745	2245	LC		40-29.4	67 48.2	H.T. AT STA 'LCM'
	1949		LC		40 30.71	67 51.76	Haul Back LCM ^{#219} "SS"
	2102		LC		40-29.31	67-48.77	Var C/spids to LCE
							2218- H-T
	2226	0326	LC		40-24.72	67-40.07	CTD away
	2316		LC		40-24.29	67-40.16	CTD abt

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Date	+40 Time	GMT Sta.	+/-	Reading	N Latitude	W Longitude	Remarks
	2333	0458	LC		40 23.90	67 40.19	
SUN 26 APR	0114	0514	LC		40 20.87	67 40.57	CTD IN WATER
	0213	0613	LC		40 20.87	67 48.85	CTD ON DECK
	0228	0628	LC		40 20.82	67 40.93	DEPART FOR BATHYMET START
	0300	0700	LC		40 22.17	67 38.83	CMC BATHYMETRIC RUN
	0408	0808	LC		40-19.95	67-39.5	C/L 2775
	0431	0831	LC		40-20.24	67-41.54	C/L 0289
	0500	0900	LC		40-20.57	67-41.02	C/L 321 G, C/L 60 RM
	0600	1000	LC		40-29.7	67-48.2	AT SITE 'LCM' V 45
							DRAWING FOR TRIPOD
	0812	1212	LC		40-28.27	67-49.97	Tripod secure on deck
	1000				40-29.43	67 48.61	Haul abd Surface Mooring LCM
	1114				40-29.38	67-48.34	Haul 2nd S. Mooring LCM
	1200	1600			40 31.40	67 41.73	NOON POSIT
	1230	1630			40 32.37	67 36.67	LCL AREA N.T.
							1415-Setting Surface Mooring
	1433	1833	LC		40-32.34	67-36.60	Let go anchor to S. Buoy LCL
	1538	1938	LC		40-32.40	67-36.08	Let go 2nd Surface Mooring LCL
	1656	2056	LC		40-32.36	67-36.3	SET TRIPOD.

Date	Time	Sta.	+/-	Reading	Latitude	Longitude	Remarks
^{MISAL} 27 APR	+40	Z			N	W	
	0040	0440			40-32.24	67-40.99	
	0133	0533			40-32.52	67-36.77	CMC XBT RUN
	0215	0615			40-26.68	67-34.84	
	0330	0730			40-18.58	67-31.47	
	0400	0800			40-14.85	67-29.69	
	0415	0815			40-12.88	67-28.87	
	0430	0830			40-11.1	67-28.2	
	0445	0845			40-09.15	67-27.66	4/5 10KN.
	0452	0852			40-08	67-27.36	4/5 259G.
	0500	0900			40-07.7	67-29.0	
	0515	0915			40-07.25	67-32.34	
	0529	0929			40-06.81	67-35.6	4/5 315G. 4/5 200RPM
	0600	1000	LC		40-12.6	67-37.95	
	0630	1030			40-17.8	67-39.5	
	0655	1055			40-22.09	67-39.43	4/5 AT SITE 'LCG'
	0848	1248	LC		40-21.36	67-41.35	Morning recovery at site LCG (sub surface #213) 0855 All gear aboard.
	1015	1415	LC		40-21.2	67-40.37	Haul back morning at site LCN #220
	1134	1534	LC		40-21.15	67-39.01	Haul back morning at site LCF #212
	1200	1600	LC		40-20.92	67-38.74	NOON POSIT
	1300	1700	LC		40-20.57	67-36.16	4/5 221/5 150 FOR STA "H"
	1402	1802	LC		40-17.51	67-39.66	HAUL BACK MORNING STA "H"
	1539	1939	LC		40-17.44	67-38.97	GEAR ABOARD LC "H"

Date	⁺⁴⁰ Time	^Z Sta.	^{+/-}	Reading	^N Latitude	^W Longitude	Remarks
MON 27 APR							
	1630	2030	LC		40-17.28	67-40.46	S/C 0055, 170 RPM
	1700	2100	LC		40-22.9	67-39.8	
	1721	2121	LC		40-26.8	67-39.7	H.I. AT STE 'LCO'
	1745	2145	LC				PICK UP MOORING 'O'
	1757	2157	LC		40-26.6	67-39.6	S/C 0225, 170 RPM TO SITE 'LCL'
	1825	2225					V 'S' AT SITE 'LCL'
	1850	2250			40-32.3	67-36.83	S/C 206-G @ 170 RPM
	1900	2300	LC		40-31.2	67-37.6	
	1930	2330	LC		40-25.8	67-40.9	
	2000	0000	LC		40-20.42	67-44.34	
	2029	0029	LC		40-16.34	67-46.94	At LCK Site Van C/ep
	2105				40-16.26	67-46.84	Haul Back LCK #217
	2224				40-17.7	67-50.24	S/C 006- @ 160 RPM
	2316				40-24.6	67-44.5	

Vessel OCEANUSPage 10Cruise #95LORAN LOG

Date	Time	Sta.	+/-	Reading	N Latitude	W Longitude	Remarks
TUES 11-28	14	Z					
"	0005	0405					%C0076
	0030	0430			40 37.21	67 46.48	%C020
	0045	0445			40 39.24	67 45.20	H.T MUD GRAB SITE #1
	0119	0519			40 39.37	67 45.23	GRAB #1
	0134	0534			40 39.29	67 45.26	GRAB #2
	0139	0539			40 39.31	67 45.26	" #3
	0145	0545			40 39.30	67 45.28	" #4
	0150	0550			40 39.32	67 45.31	" #5
	0154	0554			40 39.32	67 45.35	" #6
	0323	0723			40 39.31	67 45.17	Posit
	0327	0727			40 39.34	67 45.16	248' 1.5m DEP FOR GRAB SITE #2
	0355	0755			40 38.84	67 47.00	H.T
	0537	0937	LC		40-38.8	67 46.5	FIN GRABS 5/C160 G, V/S TO SITE 'LCB'
	0633	1033	LC		40-31.6	67 42.8	AT SITE 'LCB', V/S
	0907	1307	LC		40-31.38	67-42.62	Recover Sub Surface LCB
	1015					67 44.70	1115- H.T at Site LCA
	1215	1615	LC		40 34.21	67.44.76	SET TRIPOD 'LCA' 204
	1607	2007	LC		40 34.30	67 44.58	SET SUBSURFACE 'LCA' 205
	1707	2107	LC		40-34.6	67-45.1	FIN STA, 5/C167 G, 170 RPM
	1800	2200	LC		40-25.3	67 42.6	

Date	⁺⁴ Time	^Z Sta.	+/-	Reading	^N Latitude	^W Longitude	Remarks
	0001	0401			40 32.62	67 41.88	MIDNIGHT POS. T
	0052	0452			40 38.32	67 48.94	H.T. FOR GRABS
	0102	0502					CMC GRABS #3
	0240	0640			40 38.49	67 48.91	DEP FOR H4% 166
	0258	0658			40 37.36	67 48.53	H.T. GRAB SITE #4
	0533	0933	LC		40- 37.5	67- 48.5	FINISH SEISOG, SA
	0600	1000	LC		40- 34	67- 46.1	
	0620	1020	DR		40-31.5	67-42.8	H.T. AT SITE LCB'
	0700	1100					VCS ON PATHY SURVEY
	0758						H.T.
	1017				40-32.07	67-42.84	Cmc Launch LCB* Var c/s/d
	1028				40-31.89	67-42.89	
	1129	1529			40-31.56	67-42.79	Let go anchor
	1200	1600			40-31.32	67 42.80	NOON POS. T
	1225	1625			40 31.16	67 43.79	%138 %150
	1405	1805			40 21.17	67 31.99	H.T. SITE "LCJ"
	1442	1842			40-21.19	67-31.89	Recovery of subsurface mooring a LCJ
	1545	1945			40 21.57	67 31.43	SECURE LCJ % 3206
	1600	2000			40-22.19	67 32.8	H.T. AT SITE LCJ'
	1735	2135					RECOVER SUBSURFACE MOORINGS

Date	Time	Sta.	+/-	Reading	Latitude	Longitude	Remarks
29 APRIL	+5	GMT 75			N	W	
	1847				40 21.8	67 31.7	S/C 010
	1930	2330	LC		40-28.1	67-29.9	
	2000	0000	LC		40-32.52	67-28.83	
	2113	0113	LC		40-43.2	67-25.48	C/C 007-G
							2130 Uel Co
	2145	0145	LC		40-46.2	67-21.0	C/C 305-G
	2305	0305	LC		40-54.6	67-25.74	²⁹⁵ C/C 296-G
30 THUR. APR	0001	0401	LC		40 57.59	67 34.93	% 298°G
	0100	0500	LC		41 00.90	67 44.60	% 305°G
	0200	0600	LC		41 05.63	67 54.64	
	0240	0640					H-T BOW INSIGHT
	0247	0647	LC		41 06.83	68 00.14	H-T
	0330	0730	LC		41 09.22	68-02.37	POSIT
	0550	1050	LC		41-08.5	68-02.8	H-T. cloudy buoy for FISHING
	0910	1310			41 08.03	68-02.32	Recover Surface Mooring
	1016	1416			41-08.28	68-02.88	Recover 2nd Mooring
	1028	1428	LC		41-07.59	68-02.71	S/C 150-G @ 160RPM
	1100				41-01.8	68-58.3	

Date	+4 Time	Z Sta.	+/-	Reading	N Latitude	W Longitude	Remarks
FRI 1 MAY	0001	0401	LC		40-36.04	67-28.12	MIDNIGHT POSIT
	0100	0500	LC		40 46.30	67 25.59	%0149
	0140	0540	LC		40-51.05	67-24.40	H.T. GRAB SITE "A"
	0230	0630	LC				TDS 13 USING 43
	0317	0717	LC		40 51.40	—	% 325 %s 170 RPM
	0330	0730	LC		40 53.00	67 26.70	% 327.6
	0400	0800	LC		40-57.18	67-30.64	
	0437	0837	LC		41-02.50	67-34.44	H.T.
	0443	0843	LC		-02.54	-34.56	1 st GRAB
	0457	0857	LC		-02.52	-34.42	2 nd "
	0506	0906	LC		-02.47	-34.42	3 rd "
	0520	0920	LC		-02.52	-34.47	4 th "
	0529	0929	LC		-02.47	-34.39	5 th GRAB
	0535	0935	LC		-02.52	-34.47	6 th "
	0543	0943	LC		-02.46	-34.39	7 th "
	0547	0947	LC		-02.51	-34.46	8 th "
	0556	0956	LC		-02.45	-34.40	9 th "
	0610	1010	LC		"	"	5/195 G, 170 RPM
	0620	1020	SA	12 ³	40-59.552	67-36.293	
	0700	1100	LC		40-54.3	67-38.1	
	0810	1200	LC		40-41.91	67-41.11	
	0859				40-34.14	67-45.04	
							0952 Side LCE Vex 9/44
	1155				40-25.27	67-39.82	Dredging for LCE morning

[illegible]

Date	+4 Time	Z Sta.	+/-	Reading	N Latitude	W Longitude	Remarks
SAT 2 MAY	0000	0400	LC		40-24.98	67-40.08	Dredging at Site LCF
	0113	0513	LC		40-24.70	67-40.81	% 108 % 140
	0216	0616	LC		40-22.89	67-32.93	H.T. SITE #1 GRABS
	0257	0657	LC		40-24.35	67-33.69	H.T. SITE #2 "
	0321	0721	LC		40-25.56	67-34.45	H.T. SITE #3 "
	0415	0815	LC		40-30.04	67-35.96	H.T. SITE #4
	0430	0830					V4s TO SITE 'LCL'
	0600	1000	LC		40-32.14	67-36.8	CLUBBY SITE 'LCL'
	1200	1600	LC		40-31.8	67-37.53	POSIT
	1600	2000	LC		40-32.10	67-36.96	POSIT CONTINUED TO DRAG
	2112				40-32.33	67-37.25	Tripped on deck
	2204	0204	LC		40-31.88	67-38.24	S/c 253-6 @ 1550 PM
							2320 - H-T
3	0016	0416	LC		40-28.05	67-49.68	CTD STA
	0153	0553	LC		40-29.55	67-48.57	CMC XBT RUN
	0345	0745	LC		40-15.34	67-46.76	POSIT
	0407	0807	LC		40-13.0	67-46.6	% 063 M. 045 G.
	0500	0900	LC		40-15.4	67-42.9	% 040 G.
	0600	1000	LC		40-18.7	67-39.4	
	0743	1143	LC				0650 % 055 G
	0743	1143	LC		40-22.8	67-33.4	Dredging at site 'I'

Date	+4 Time	Z Sta.	+/-	Reading	N Latitude	W Longitude	Remarks
	0854				40-22.48	67-32.78	Var C/sps
	1148	1548			40-22.96	67-32.99	Launch subsurface at site LCI
	1207	1607			40-22.83	67-33.30	% 2979
	1313	1713	LC		40-25.38	67-40.25	JOGGING ON STA 'E'
	1515	1915	LC		40-25.39	67-39.11	VAR %s WHILE DRAGGING
	1600	2000	LC		40-26.8	67-37.7	
	1700	2100	LC		40-29.2	67-36.9	
	1730	2130	LC		40-30.4	67-36.6	% 2109.
	1815	2215	LC		40-26.8	67-39.7	% 0259, D/S
	1950	2350	LC		40-28.5	67-40.09	
	2028				40-29.3	67-40.28	Var C/sps
	2108		LC		40-29.3	67-42.12	Jogging CTD STA 2135 CTD abd 2140- Var C/sps
	2222	0222	LC		40-31.37	67-42.56	Jogging CTD-STA
	2248				40-31.47	67-42.87	Var C/sps
	2326				40-34.14	67-44.15	Jogging CTD STA

Date	⁺⁴ Time	^Z Sta.	+/-	Reading	^N Latitude	^W Longitude	Remarks
14	0001	0401			40 34.89	67 44.67	MIDNIGHT POSIT
	0110	0510			40 39.55	67 45.00	H-T CTD
	0140	0540			40 39.56	67 45.20	% FOR CTD #2
	0315	0715			40 35.13	67 37.7	H-T CTD
	0440	0840	LC		40-31.7	67-37.0	H-T CTD
	0505	0905	LC		40-31.9	67-37.6	FIN STA % 150G, 130 RPM
	0600	1000	LC		40-34.6	67-36.0	
	0616						VLC
	0622	1022	LC		40-25.67	67-34.54	H-T, CTD STA
	0647	1047	LC		40-26.0	67-34.9	FIN STA % 150G, 130 RPM
	0729	1129			40-22.32	67-32.81	H-T CTD STA
	0808				40-22.54	67-33.08	S/C Val
	0841				40-21.06	67-31.95	H-T CTD STA
	0916	1316	LC		40-21.18	67-32.52	S/C Val
	0953	1353	LC		40-18.01	67-30.29	H-T CTD STA
	1055				40-18.00	67-30.26	S/C 318-G @ 140 RPM
	1205				40 24.78	67 38.71	POSIT H-T ON STA 'E'
	1615	2015	LC		40-24.8	67-41.6	FIN DRAGING % 070G, 570G
	1719	2119	LC		40-26.2	67-37.5	% 325G, 170 RPM
	1815						VESAT SITE 'A'
	2010						PICK UP SUBSURFACE
	2152				40-34.30	67 44.7	MOORING Launch submersible at site 'A'

Date	⁺⁴ Time	^Z Sta.	+/-	Reading	^N Latitude	^W Longitude	Remarks
							2215 Cmc hauling
							Tripod moving
TUES 5 MAY	0011	0411	LC		40-34.25	67-44.78	Launch Tripod
	0130	0530	LC		40-29.66	67-48.31	H.T. CTD AT 'LCM'
	0223	0623	LC		40-25.80	67-48.14	H.T. CTD AT #2
	0302	0702	LC		40-22.06	67-47.83	H.T. CTD AT #3
	0355	0755	LC		40-16.32	67-46.99	H.T. CTD AT #4
	0433	0833	LC		40-14.36	67-46.92	FW STA S/C 175 G, 150 RPM.
	0457	0857	LC		40-13.41	67-46.70	H.T. CTD #5
	0603	1003	LC		40-13.37	67-46.34	FW STA S/C 086 G, 150 RPM
	0649	1049	LC		40-13.97	67-37.61	H.T. CTD #6
	0813	1213	LC		40-13.86	67-37.57	End St. - Van C ^o /140 RPM
	0851	1251	LC		40-17.7	67-39.64	H.T. CTD STA
	0943				40-17.78	67-40.33	END STA S/C 003 G @ 145 RPM
	1056				40-25.8	67-40.66	Van %/sds - Setting subsurface mooring
	1158						
	1158	1558	LC		40-25.68	67-39.58	Let go mooring to LCE
	1223	1623	LC		40-25.34	67-39.65	H.T. CTD STA 'E'
	1310	1710	LC		40-22.74	67-36.55	H.T. CTD SITE #8
	1352	1752	LC		40-21.96	67-38.91	H.T. CTD " #9
	1425	1825	—		—	—	H.T. " " #10?
	1505	1905	LC		40-22.25	67-42.94	H.T. CTD SITE #11
	1517	1917	LC		40-22.50	67-43.40	FW EXERCISE % 325 % 170
	1530	1930	LC		40-24.0	67-44.7	% 280 G
	1600	2000	LC		40-24.8	67-51.8	

Date	Time	Sta.	+/-	Reading	Latitude	Longitude	Remarks
5 May	+4	GMT			N	W	
	1700	2100	LC		40-25.7	68-06.7	C/C 245 G.
	1746	2146	SAT	14 ³	40-25.879	68-18.515	
	1800	2200	LC		40-26.6	68-21.1	C/C 290 G.
	1900	2300	LC		40-29.9	68-35.5	
	1930	2330	LC		40-31.8	68-42.9	C/C 280 G.
	2008	0008	LC		40-33.4	68-52.8	C/C 275-G
	2108	0108	LC		40-35.5	69-08.4	C/C 270-G
	2155	0155	LC		40-36.5	69-20.0	C/C 260-G
							2158 - Van Co
							2220 - C/C 260
	2305	0305	LC		40-37.16	69-35.75	C/C 250
	0000				40-34.6	69-47.9	
	0100	0500	LC		40-30.93	70-01.36	C/C 263 G.
	0149	0549	LC		40-29.7	70-12.2	147 SITE Q
	0323	0723	LC		40-29.60	70-12.44	RECOVERED SURFACE BOMB STA Q
	0330	0730	—		"	"	C/C 304 S 175 RPM
	0400	0800	LC		40-33.3	70-16.3	
	0500	0900	LC		40-41.7	70-25.2	
	0544	0944	SAT	20 ³	40-48.135	70-32.284	
	0600	1000	LC		40-50.4	70-34.3	C/C 330 G.
	0645						S 205 RPM VIS IMPROV.
	0700	1100	LC		40-59.7	70-43.6	

Vessel OCEANUS

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LORAN LOG

[illegible]