CRUISE REPORT OF THE CCGS HUDSON MISSION 2002-075

PARTICIPANTS:

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OBJECTIVES:

The main objective of the mission was to determine the overwintering vertical depth distribution of the copepod *Calanus finmarchicus* along the AR7W section across the Labrador Sea. This organism dominates the zooplankton biomass in North Atlantic waters north of the Gulf Stream, although its abundance and distribution is influenced by changes in hydrography resulting from climatic variations. There is currently an international collaboration to determine life history parameters, including overwintering depth distribution, in order to model the space/time dynamics of *C. finmarchicus* in the northwest sub-polar gyre, with a view to predicting how they might be affected by global warming. This cruise, together with one conducted in June/July (Mission no. 2002032), and alligned cruises in the Irminger sea, by a group from the UK, will provide data for modelling. Secondary objectives were: to measure a series of other biological/environmental variables (concentrations of the copepod *Oithona*, phytoplankton, bacterial, nutrient, oxygen and dissolved organic carbon concentrations); to determine biological rates (primary and bacterial production and microbial respiration); to determine levels of metabolism in zooplankton (by use of biochemical indices); to determine underwater light fields; and, to make standard hydrographic measurements (temperature, salanity). A final objective of the mission was the deployment of a mooring on Makkovik Bank. Further details of these activities are given in the reports of the individual scientists included below.

SCIENTIFIC BRIDGE LOG - CCGS HUDSON MISSION 2002075

DATE	TIME (z)	EVENT #	STN #	LAT (N) Deg.	LAT (N) Min.	LONG (W) Deg.	LONG (W) Min.	DEPTH (m)	WIND S(kt) D	ACTIVITY
01/12/02	1407	1	L3_01	53	40.56	55	33.03	152	13 N	CTD in water
	1429	1	L3_01	53	40.17	55	32.31	152	13 N	CTD on board
	1439	2	L3_01	53	39.94	55	32.88	144	10 NE	Light meter in water
	1452	2	L3_01	53	39.71	55	32.75	141	10 NE	Light meter on board
	1512	3	L3_01	53	39.34	55	32.67	141	10 NE	Ring net in water
	1525	3	L3_01	53	39.19	55	32.63	141	10 NE	Ring net on board
	1532	4	L3_01	53	39.05	55	32.64	140	10 NE	Ring net in water
	1544	4	L3_01	53	39.89	55	32.65	140	10 NE	Ring net on board
	1549	5	L3_01	53	38.80	55	32.72	137	10 NE	Ring net in water
	1555	5	L3_01	53	38.72	55	32.80	137	10 NE	Ring net on board
	1606	6	L3_01	53	38.60	55	33.08	134	10 NE	Mooring release test in water
	1613	6	L3_01	53	38.52	55	33.24	134	10 NE	Mooring release test on board
02/12/02	302	7	Makk.Bnk.	55	24.60	58	3.80	100	20 NW	Mooring deployment
	303	8	Makk.Bnk.	55	24.49	58	3.55	100	20 NW	Mooring deployment
	1809	9	L3_03	53	59.30	55	15.09	150	30 W	Light meter in water
	1817	9	L3_03	53	59.30	55	15.09	150	30 W	Light meter on board
	1837	10	L3_03	53	59.39	55	15.20	146	30 W	Ring net in water
	1847	10	L3_03	53	59.38	55	15.32	146	30 W	Ring net on board
	1851	11	L3_03	53	59.33	55	15.23	148	25 W	Ring net in water
	1858	11	L3_03	53	59.37	55	15.26	148	25 W	Ring net on board
	1905	12	L3_03	53	59.39	55	15.17	146	25 W	Ring net in water
	1913	12	L3_03	53	59.45	55	15.13	147	25 W	Ring net on board
	1929	13	L3_03	53	59.63	55	15.25	147	25 W	CTD in water
	1956	13	L3_03	53	59.73	55	14.91	150	25 W	CTD on board
	2238	14	L3_05	54	29.55	54	45.33	196	15/20 W	CTD in water
	2306	14	L3_05	54	29.56	54	45.08	197	20/25 W	CTD on board
	2324	15	L3_05	54	29.56	54	44.85	199	15/20 W	Ring net in water
	2334	15	L3_05	54	29.56	54	44.60	199	15/20 W	Ring net on board
	2338	16	L3_05	54	29.56	54	44.41	199	15/20 W	Ring net in water
	2347	16	L3_05	54	29.58	54	44.16	198	20/25 W	Ring net on board
	2354	17	L3_05	54	29.55	54	43.84	200	20/25 W	Ring net in water
03/12/02	2	17	L3_05	54	29.57	54	43.63	200	20/25 W	Ring net on board
	7	18	L3_05	54	29.58	54	43.47	200	20/25 W	Ring net in water
	14	18	L3_05	54	29.53	54	43.34	200	20/25 W	Ring net on board
	102	19		54	36.92	54	35.52		20/25 W	XBT drop
	139	20		54	45.09	54	27.67		20/25 W	XBT drop
	144	21		54	46.22	54	26.43		20/25 W	XBT drop
	216	22		54	52.78	54	20.24		20/25 W	XBT drop
	252	23	L3_07	54	57.38	54	16.75	360	20/25 W	CTD in water
	321	23	L3_07	54	57.20	54	15.95		20/25 W	CTD on board
	406	24		55	2.60	54	10.48		20/25 W	XBT drop
	410	25		55	3.14	54	10.05		20/25 W	XBT drop
	523	26	L3_08	55	6.48	54	7.65	1034	20/25 W	CTD in water
	613	26	L3_08	55	6.41	54	8.17		25/30 W	CTD on board
	654	27	L3_08	55	6.73	54	8.22	1130	25/30 W	Multi-net in water
	740	27	L3_08	55	6.92	54	7.70		25/30 W	Multi-net on board
	801	28	L3_08	55	6.95	54	7.57		25/30 W	Ring net in water

	810	28	L3_08	55	6.97	54	7.59	25/30 W	Ring net on board
	816	29	L3_08	55	6.97	54	7.66	25/30 W	Ring net in water
	823	29	L3_08	55	7.02	54	7.61	25/30 W	Ring net on board
	829	30	L3_08	55	7.06	54	7.66	25/30 W	Ring net in water
	837	30	L3_08	55	7.08	54	7.63	25/30 W	Ring net on board
	856	31		55	9.00	54	5.65	25/30 W	XBT drop
	920	32		55	14.30	54	0.60	25/30 W	XBT drop
	934	33		55	17.18	53	57.67	25/30 W	XBT drop
	952	34		55	21.05	53	53.75	25/30 WSW	XBT drop
	1052	35	L3_10	55	24.55	53	48.03	25/30 WSW	Multi-net in water
	1150	35	L3_10	55	23.90	53	47.36	25/30 WSW	Multi-net on board
	1216	36	L3_10	55	23.46	53	46.91	25/30 WSW	Multi-net in water
	1409	36	L3_10	55	22.59	53	45.66	25/30 WSW	Multi-net on board
	1451	37	L3_10	55	22.29	53	44.74	25/30 WSW	Ring net in water
	1502	37	L3_10	55	22.19	53	44.38	25/30 WSW	Ring net on board
	1506	38	L3_10	55	22.13	53	44.07	25/30 WSW	Ring net in water
	1518	38	L3_10	55	21.91	53	43.45	25/30 WSW	Ring net on board
	1524	39	L3_10	55	21.89	53	43.29	25/30 WSW	Ring net in water
	1534	39	L3_10	55	21.91	53	42.81	25/30 WSW	Ring net on board
	1552	40	L3_10	55	22.00	53	41.21	25/30 WSW	CTD in water
	1740	40	L3_10	55	22.10	53	40.59	25/30 WSW	CTD on board
	1756	41	L3_10	55	21.92	53	40.66	30/36 SW	Light meter in water
	1807	41	L3_10	55	21.89	53	40.61	25/30 SW	Light meter on board
	1840	42	L3_10	55	21.63	53	40.38	25/30 WSW	CTD in water
	1900	42	L3_10	55	21.51	53	40.24	25/30 WSW	CTD on board
	1924	43		55	25.16	53	37.25	25/30 WSW	XBT drop
	1943	44		55	29.21	53	34.69	25/30 WSW	XBT drop
	1959	45		55	32.45	53	32.80	25/30 WSW	XBT drop
	2014	46		55	35.74	53	30.89	25/30 WSW	XBT drop
	2035	47		55	40.66	53	28.20	25/30 WSW	XBT drop
	2054	48		55	45.18	53	25.96	25/30 WSW	XBT drop
	2148	49	L3_12	55	50.73	53	23.58	25/30 SW	Multi-net in water
	2242	49	L3_12	55	51.22	53	23.54	25/30 W	Multi-net on board
	2317	50	L3_12	55	51.64	53	23.47	25/30 W	CTD in water
04/12/02	118	50	L3_12	55	51.59	53	22.65	25/30 W	CTD on board
	138	51	L3_12	55	51.61	53	22.57	15 W	Ring net in water
	148	51	L3_12	55	51.61	53	22.55	15 W	Ring net on board
	152	52	L3_12	55	51.61	53	22.55	15/20 W	Ring net in water
	202	52	L3_12	55	51.65	53	22.52	15/20 W	Ring net on board
	206	53	L3_12	55	51.65	53	22.47	15/20 W	Ring net in water
	216	53	L3_12	55	51.66	53	22.44	15/20 W	Ring net on board
	243	54		55	55.33	53	18.89	15/20 W	XBT drop
	303	55		55	59.61	53	14.50	15/20 W	XBT drop
	323	56		56	3.85	53	10.11	15/20 W	XBT drop
	343	57		56	8.00	53	5.84	15/20 W	XBT drop
	406	58		56	12.85	52	0.80	15/20 W	XBT drop
	428	59		56	17.62	52	55.78	15/20 W	XBT drop
	453	60		56	22.94	52	50.33	15/20 W	XBT drop
	513	61		56	27.23	52	46.04	15/20 W	XBT drop
	555	62	L3_14	56	32.25	52	40.58	10/15 WNW	Ring net in water
	603	62	L3_14	56	32.35	52	40.53	10/15 WNW	Ring net on board
	607	63	L3_14	56	32.34	52	40.45	10/15 WNW	Ring net in water

	616	63	L3_14	56	32.37	52	40.24	10/15 WNW	Ring net on board
	623	64	L3_14	56	32.38	52	40.19	10/15 WNW	Ring net in water
	631	64	L3_14	56	32.42	52	39.96	10/15 WNW	Ring net on board
	705	65	L3_14	56	32.38	52	39.65	10/15 WNW	Multi-net in water
	803	65	L3_14	56	32.91	52	39.25	10/15 WNW	Multi-net on board
	848	66	L3_14	56	32.89	52	39.72	10/15 WNW	CTD in water
	1057	66	L3_14	56	32.82	52	38.57	10/15 WNW	CTD on board
	1123	67		56	35.96	52	34.70	20/25 NNW	XBT drop
	1145	68		56	40.73	52	30.16	25/30 NNW	XBT drop
	1210	69		56	45.47	52	25.50	25/30 WNW	XBT drop
	1232	70		56	49.93	52	20.93	25/30 WNW	XBT drop
	1252	71		56	54.13	52	16.68	20 NWN	XBT drop
	1257	72		56	55.40	52	15.41	20 NWN	XBT drop
	1312	73		56	49.47	52	26.28	20/25 NWN	XBT drop
	1333	74		57	2.88	52	7.87	20/25 NNW	XBT drop
	1353	75		57	7.18	52	3.57	15/20 N	XBT drop
	1414	76		57	11.59	51	59.31	15/20 N	XBT drop
	1519	77	L3_16	57	22.50	51	47.80	5/10 N	CTD in water
	1538	77	L3_16	57	22.28	51	47.66	5/10 N	CTD on board
	1552	78	L3_16	57	22.09	51	47.28	5/10 N	Light meter in water
	1601	78	L3_16	57	22.13	51	47.34	5/10 N	Light meter on board
	1630	79	L3_16	57	22.22	51	47.62	5/10 N	CTD in water
	1847	79	L3_16	57	21.73	51	46.91	5/10 N	CTD on board
	1903	80	L3_16	57	21.98	51	46.79	5/10 N	Multi-net in water
	2004	80	L3_16	57	22.24	51	46.20	5/10 N	Multi-net on board
	2033	81	L3_16	57	22.20	51	46.02	5/10 N	Multi-net in water
	2127	81	L3_16	57	22.34	51	46.07	5/10 N	Multi-net on board
	2151	82	L3_16	57	22.37	51	46.13	5/10 N	Ring net in water
	2200	82	L3_16	57	22.29	51	46.13	5/10 N	Ring net on board
	2204	83	L3_16	57	22.19	51	46.17	5/10 N	Ring net in water
	2213	83	L3_16	57	22.16	51	46.16	5/10 N	Ring net on board
	2219	84	L3_16	57	22.15	51	46.18	5/10 N	Ring net in water
	2227	84	L3_16	57	22.11	51	46.19	10/15 N	Ring net on board
	2244	85	L3_16	57	22.16	51	46.31	10/15 N	Multi-net in water
05/12/02	56	85	L3_16	57	22.11	51	46.93	15 NW	Multi-net on board
	121	86		57	23.22	51	46.45	10 NW	XBT drop
	132	87		57	25.73	51	44.11	10 NW	XBT drop
	148	88		57	29.00	51	40.61	10/15 NWN	XBT drop
	204	89		57	32.30	51	37.08	10/15 NWN	XBT drop
	225	90		57	36.72	51	32.35	30/35 NNW	XBT drop
	243	91		57	40.50	51	28.28	30 NNW	XBT drop
	247	92		57	41.40	51	27.29	30 NNW	XBT drop
	256	93		57	43.22	51	25.36	30/35 NWN	XBT drop
	307	94		57	45.50	51	22.87	30/35 NWN	XBT drop
	319	95		57	47.90	51	20.24	30/35 NWN	XBT drop
	322	96		57	50.43	51	17.55	30/35 NWN	XBT drop
	346	97		57	55.43	51	14.28	30/35 NWN	XBT drop
	357	98		57	55.82	51	11.71	30/35 NWN	XBT drop
	408	99		57	58.08	51	9.23	30/35 NWN	XBT drop
	419	700		58	0.46	51	6.66	30/35 NWN	XBT drop
	434	101		58	3.45	51	3.39	30/35 NWN	XBT drop
	448	102		58	6.54	51	0.02	30/35 NWN	XBT drop

	504	103		58	9.88	50	57.00		30/35 NWN	XBT drop
	541	104	L3_18	58	12.78	50	52.53	3475	20/25 NWN	Multi-net in water
	644	104	L3_18	58	13.57	50	51.93		30/35 NW	Multi-net on board
	728	105	L3_18	58	12.82	50	52.34		30/35 NW	Ring net in water
	739	105	L3_18	58	12.77	50	51.88		30/35 NW	Ring net on board
	742	106	L3_18	58	12.78	50	51.78		30/35 NW	Ring net in water
	750	106	L3_18	58	12.67	50	51.46		30/35 NW	Ring net on board
	756	107	L3_18	58	12.43	50	51.27		30/35 NW	Ring net in water
	805	107	L3_18	58	12.44	50	50.99		30/35 NW	Ring net on board
	821	108	L3_18	58	12.19	50	50.37		30/35 NW	CTD in water
	1051	108	L3_18	58	12.57	50	47.80		30/35 W	CTD on board
	1123	109		58	16.60	50	43.87		30/35 W	XBT drop
	1134	110		58	18.89	50	41.84		30/35 W	XBT drop
	1152	111		58	22.78	50	38.37		25/30 WNW	XBT drop
	1212	112		58	26.40	50	34.50		35/40 W	XBT drop
	1230	113		58	30.22	50	30.49		25/30 WNW	XBT drop
	1252	114		58	35.02	50	25.14		30/35 NWW	XBT drop
	1313	115		58	39.35	50	20.22		25/30 W	XBT drop
	1332	116		58	43.40	50	15.87		25/30 W	XBT drop
	1352	117		58	41.75	50	11.62		25/30 W	XBT drop
	1413	118		58	52.37	50	7.00		35/40 W	XBT drop
	1433	119		58	56.77	50	2.83		35/40 W	XBT drop
	1519	120	L3_20	59	3.92	49	56.84		30/35 W	CTD in water
	1539	120	L3_20	59	3.86	49	56.76		30/35 WNW	CTD on board
	1559	121	L3_20	59	3.93	49	56.65		30/35 WNW	Light meter in water
	1615	121	L3_20	59	3.94	49	56.67		30/35 WNW	Light meter on board
	1650	122	L3_20	59	4.07	49	56.44		35/40 WNW	CTD in water
	1907	122	L3_20	59	4.80	49	54.83		25/30 WNW	CTD on board
	1916	123	L3_20	59	4.77	49	54.86		20/25 WNW	Multi-net in water
	2028	123	L3_20	59	5.08	49	56.26		30/40 WNW	Multi-net on board
	2121	124		59	7.92	49	50.05		30/40 WNW	XBT drop
	2155	125		59	11.24	49	42.39		35 W	XBT drop
	2209	126		59	12.16	49	38.29		35 W	XBT drop
	2226	127		59	13.78	49	33.86		35/40 WS	XBT drop
	2247	128		59	18.26	49	29.78		35/40 WS	XBT drop
	2348	129		59	27.14	49	27.83		35/40 WN	XBT drop
06/12/02	120	130		59	35.12	49	31.80		25/30 W	XBT drop
	136	131		59	36.89	49	27.27		30/35 W	XBT drop
	204	132		59	39.94	49	19.22		30/35 W	XBT drop
	219	133		59	41.82	49	14.45		30/35 W	XBT drop
	315	134	L3_22	59	44.85	49	9.71	3155	25/30 W	Multi-net in water
	408	134	L3_22	59	44.72	49	10.18	3155	35/40 W	Multi-net on board
	447	135	L3_22	59	44.66	49	10.13	3155	25/30 W	CTD in water
	700	135	L3_22	59	45.10	49	8.55	3155	15/25 W	CTD on board
	720	136	L3_22	59	45.11	49	9.02		15/20 W	Ring net in water
	730	136	L3_22	59	45.20	49	8.66		15/20 W	Ring net on board
	736	137	L3_22	59	45.20	49	8.54		15/20 W	Ring net in water
	744	137	L3_22	59	45.25	49	8.37		15/20 W	Ring net on board
	749	138	L3_22	59	45.28	49	8.24		20/25 W	Ring net in water
	758	138	L3_22	59	45.38	49	8.11		20/25 W	Ring net on board
	829	139		59	49.27	49	3.20		20/25 W	XBT drop
	841	140		59	51.94	49	0.14		15/20 W	XBT drop

	857	141		59	55.48	48	56.56		15/20 W	XBT drop
	910	142		59	58.50	48	53.48		15/20 W	XBT drop
	922	143		60	1.12	48	50.85		15/20 W	XBT drop
	936	144		60	4.16	48	47.94		15/20 W	XBT drop
	949	145		60	7.24	48	45.01		10/15 SW	XBT drop
	1003	146		60	10.49	48	41.99		10/15 SW	XBT drop
	1034	147	L3_24	60	11.06	48	41.48		15/20 W	Multi-net in water
	1138	147	L3_24	60	12.76	48	42.97		15/20 SW	Multi-net on board
	1159	148	L3_24	60	13.09	48	43.12		15/20 S	Multi-net in water
	1350	148	L3_24	60	14.19	48	45.82		15/20 S	Multi-net on board
	1409	149	L3_24	60	14.38	48	46.28		15/20 SW	Light meter in water
	1420	149	L3_24	60	14.42	48	46.61		15/20 SW	Light meter on board
	1450	150	L3_24	60	14.47	48	47.06		15/20 SW	Ring net in water
	1500	150	L3_24	60	14.48	48	48.24		15/20 SW	Ring net on board
	1505	151	L3_24	60	14.51	48	48.34		15/20 SW	Ring net in water
	1513	151	L3_24	60	14.55	48	48.56		15/20 SW	Ring net on board
	1518	152	L3_24	60	14.60	48	48.70		15/20 SW	Ring net in water
	1527	152	L3_24	60	14.72	48	48.84		15/20 SW	Ring net on board
	1544	153	L3_24	60	14.82	48	49.44		10/15 SW	CTD in water
	1600	153	L3_24	60	15.01	48	49.78		20/25 SW	CTD on board
	1706	154	L3_24	60	10.54	48	40.10		10/15 SW	CTD in water
	1857	154	L3_24	60	11.98	48	41.09		15/20 SW	CTD on board
	1921	155		60	14.67	48	37.36		5/10 SW	XBT drop
	1932	156		60	16.94	48	34.82		5/10 SW	XBT drop
	1945	157		60	19.35	48	32.28		5/10 SW	XBT drop
	2029	158	L3_26	60	22.53	48	22.48	610	5/15 SW	Multi-net in water
	2057	158	L3_26	60	23.02	48	29.11		5/115 SW	Multi-net on board
	2151	159	L3_26	60	20.73	48	31.20		5/10 SWS	CTD in water
	2302	159	L3_26	60	22.31	48	33.42		10/15 SW	CTD on board
	2326	160	L3_26	60	22.68	48	34.89		10/15 SW	Ring net in water
	2336	160	L3_26	60	22.89	48	35.37		10/15 S	Ring net on board
	2340	161	L3_26	60	22.99	48	35.57		10/15 S	Ring net in water
	2348	161	L3_26	60	23.17	48	35.90		5/10 S	Ring net on board
	2353	162	L3_26	60	23.28	48	36.05		10/15 S	Ring net in water
07/12/02	1	162	L3_26	60	23.40	48	36.27		5/10 S	Ring net on board
	20	163		60	25.31	48	33.43		10/15 SES	XBT drop
	30	164		60	26.87	48	30.51		10/15 SES	XBT drop
	45	165		60	29.02	48	25.81		5/10 SES	XBT drop
	134	166	L3_28	60	34.15	48	13.75	131	5/10 SE	Ring net in water
	141	166	L3_28	60	34.21	48	13.90	126	15/20 SE	Ring net on board
	146	167	L3_28	60	34.31	48	14.00	146	15/20 SE	Ring net in water
	152	167	L3_28	60	34.46	48	14.11		15/20 SE	Ring net on board
	157	168	L3_28	60	34.59	48	14.19		15/20 SE	Ring net in water
	203	168	L3_28	60	34.63	48	14.29		15/20 SE	Ring net on board
	217	169	L3_28	60	34.81	48	14.71		15/20 SE	CTD in water
	229	169	L3_28	60	34.94	48	14.98		15/20 SE	CTD on board
	434	170	L3_25	59	17.68	48	32.72	2630	15/20 SSE	CTD in water
	545	170	L3_25	59	19.19	48	35.40		10/15 SSE	CTD on board, Cable shortout
	807	171	L3_23	59	59.03	48	53.60		5/15 SE	CTD in water
	840	171	L3_23	59	59.31	48	53.66		5/15 SE	CTD on board, Cable shortout
	907	172	L3_23	59	59.38	48	53.63		10/15 S	Multi-net in water
	1007	172	L3_23	59	59.24	48	53.89		10/15 S	Multi-net on board

	1315	173	L3_21	59	29.03	49	28.38		15/20 SEE	CTD in water
	1448	173	L3_21	59	29.30	49	28.82		10/15 SEE	CTD on board
	1458	174	L3_21	59	29.32	49	28.89		5/10 SEE	Light meter in water
	1508	174	L3_21	59	29.34	49	28.90		10/15 SEE	Light meter on board
	1523	175	L3_21	59	29.33	49	29.04		10/15 SSE	Multi-net in water
	1610	175	L3_21	59	29.18	49	29.14		10/15 SE	Multi-net on board
	1631	176	L3_21	59	29.10	49	28.76		10 S	Multi-net in water
	1800	176	L3_21	59	28.97	49	28.17		5 S	Multi-net on board
	2056	177	L3_20	59	3.80	49	51.12		10/15 N	Multi-net in water
	2145	177	L3_20	59	3.88	49	56.88		10/15 N	Multi-net on board
	2225	178	L3_20	59	3.14	49	57.94		15 NEN	Ring net in water
	2231	178	L3_20	59	3.14	49	58.08		15/20 E	Ring net on board
	2236	179	L3_20	59	3.09	49	58.10		15/20 E	Ring net in water
	2241	179	L3_20	59	3.06	49	58.17		15/20 E	Ring net on board
	2246	180	L3_20	59	3.02	49	58.23		15/20 E	Ring net in water
	2251	180	L3_20	59	3.03	49	58.34		15/20 E	Ring net on board
08/12/02	127	181	L3_19	58	38.25	50	25.50		15/20 NNE	Multi-net in water
	312	181	L3_19	58	38.29	50	24.80		15/20 NE	Multi-net on board
	345	182	L3_19	58	38.13	50	25.32		15/20 E	Multi-net in water
	432	182	L3_19	58	37.71	50	24.91		15/20 E	Multi-net on board
	512	183	L3_19	58	37.91	50	25.60		15/20 E	CTD in water
	624	183	L3_19	58	37.36	50	26.81		15/20 E	CTD on board
	724	184		58	29.13	50	41.99		15/20 E	XBT drop
	738	185		58	26.96	50	46.04		15/20 E	XBT drop
	755	186		58	24.29	50	50.87		15/20 E	XBT drop
	819	187		58	20.44	50	57.82		15/20 E	XBT drop
	824	188		58	19.69	50	59.25		15/20 E	XBT drop
	843	189		58	16.75	51	4.55		15/20 E	XBT drop
	900	190		58	13.91	51	9.71		15/20 E	XBT drop
	915	191		58	11.19	51	14.66		25/30 WNW	XBT drop
	934	192		58	8.63	51	1.31		25/30 WNW	XBT drop
	944	193		58	6.60	51	20.41		25/30 NW	XBT drop
	954	194		58	4.24	51	20.40		25/30 NW	XBT drop
	1004	195		58	2.00	51	20.39		25/30 NW	XBT drop
	1015	196		57	54.46	51	20.40		25/30 NW	XBT drop
	1026	197		57	57.06	51	20.40		25/30 NW	XBT drop
	1038	198		57	54.28	51	20.39		25/30 NW	XBT drop
	1050	199		57	51.61	51	20.41		20/25 NW	XBT drop
	1124	200	L3_17	57	47.83	51	20.62		20/25 NWW	Multi-net in water
	1215	200	L3_17	57	48.00	51	20.60		20/25 NWW	Multi-net on board
	1249	201	L3_17	57	47.88	51	20.98		20 W	CTD in water
	1419	201	L3_17	57	47.30	51	21.26		15/25 W	CTD on board
	1436	202	L3_17	57	47.17	51	20.99		10/20 W	Light meter in water
	1446	202	L3_17	57	47.00	51	21.06		15/20 W	Light meter on board
	2039	203	L3_15	56	57.32	52	14.32		10/15 SE	Multi-net in water
	2126	203	L3_15	56	57.01	52	14.52		5/10 SE	Multi-net on board
	2156	204	L3_15	56	57.41	52	14.39		15/20 E	CTD in water
	2255	204	L3_15	56	57.40	52	14.48		10/20 SSW	CTD on board
09/12/02	341	205	L3_13	56	6.72	53	7.15	3310	20/25 SW	Multi-net in water
	523	205	L3_13	56	6.53	53	7.23	3310	20/25 SW	Multi-net on board
	555	206	L3_13	56	6.82	53	6.92		15/20 SSW	Multi-net in water
	648	206	L3_13	56	6.60	53	7.24		20 SSW	Multi-net on board

	729	207	L3_13	56	6.82	53	6.84		15/20 SSW	CTD in water
	825	207	L3_13	56	6.79	53	6.92		15/20 SSW	CTD on board
	922	208		55	57.33	53	16.80		20/25 SSW	XBT drop
	1118	209	L3_11	55	36.77	53	37.58		15/20 SW	Multi-net in water
	1205	209	L3_11	55	36.50	53	37.00		10/15 SW	Multi-net on board
	1215	210	L3_11	55	36.50	53	36.79		10/15 SW	CTD in water
	1317	210	L3_11	55	36.45	53	36.53		Light airs	CTD on board
12/12/02	1103	211	HL_2	44	17.04	63	19.03		20/25 E	CTD in water
	1119	211	HL_2	44	17.00	63	18.97		20/25 E	CTD on board
	1147	212	HL_2	44	16.97	63	18.98		20/25 E	CTD in water
	1200	212	HL_2	44	17.01	63	19.98		25/30 SEE	CTD on board
	1218	213	HL_2	44	17.05	63	19.13		25/30 SEE	Ring net in water
	1227	213	HL_2	44	17.00	63	19.10	160	20/25 SE	Ring net on board
	1236	214	HL_2	44	17.00	63	19.13	120	20/25 SE	Ring net in water
	1244	214	HL_2	44	16.94	63	19.10	169	15/20 SE	Ring net on board
	1250	215	HL_2	44	16.96	63	19.19	166	20/25 SE	Ring net in water
	1300	215	HL_2	44	17.00	63	19.17		20/30 SE	Ring net on board
	1313	216	HL_2	44	17.06	63	19.21		20/25 SE	CTD in water
	1330	216	HL_2	44	17.09	63	19.34		15/20 E	CTD on board

REPORTS ON INDIVIDUAL PROJECTS:

Mooring programme (M. Scotney)

Two instrumented moorings were deployed December 1st, 2002 on Makkovik Bank, approximate position 55 24.50 N and 58 03.70 W. One mooring contained an Ice Profiling Sonar to measure ice thickness and the other an Acoustic Doppler Current Profiler to measure ice movement and water currents.

These moorings are to monitor the freshwater flux within the pack ice along the Labrador Shelf as part of Climate studies and contributing to international ASOF (Arctic, Sub-Arctic Ocean Flux) program. Funded through PERD Climate program sector.

Recovery is scheduled for July 2003.

Overwintering vertical and spatial distribution of *Calanus finmarchicus* along the AR7W section across the Labrador Sea. (Erica Head, Ed Horne, Tim Perry)

The main aim of the cruise was to collect samples to enable us to establish the overwintering depth distribution of the copepod *Calanus fimarchicus* in the Labrador Sea. We sampled zooplankton using a Multi-net sampler fitted with 200 μm mesh nets at a total of 17 stations of the L3 (AR7W) section between Hamilton Bank and Cape Desolation (Greenland). At 11 of these stations we sampled to 1000 m or to the bottom (in the slope regions), while at 6 we sampled to 2000 m. Depth strata were every 200 m between 1000 m and the surface, and every 250 m between 2000 and 1000 m. The Multi-net system worked flawlessly and while most times wind strengths were below 35 knots, at one station we managed a totally successful recovery when wind strengths had reached 40-50 knots. A total of 111 formalin preserved samples were taken for species identification and enumeration. Some tows were given to a colleague (Lidia Yebra Mora) from the Plymouth Marine Laboratories in UK for the analysis of levels of enzyme indicative of levels of metabolic activity in selected stages and species of copepods. These samples were preserved in liquid nitrogen.

Sampling stations at which Multi-net tows were carrried out.

Tow #	Event #	Station	Date	Start time (local)	Depth ranges
01	26	L3-8	3.12.02	01.26	840-800, 800-600, 600-400, 400-200, 200-0
02	35	L3-10	3.12.02	06.45	800-600, 600-400, 400-200, 200-0
03	36	L3-10	3.12.02	08.20	1500-1250, 1250-1000, 1000-800, 800-0*
04	49	L3-12	3.12.02	17.40	1000-800, 800-600, 600-400, 400-200, 200-0
05	65	L3-14	4.12.02	03.05	1000-800, 800-600, 600-400, 400-200, 200-0
06	80	L3-16	4.12.02	15.00	1000-800, 800-600, 600-400, 400-200, 200-0
07	81	L3-16	4.12.02	18.45	2000-1750, 1750-1500, 1500-1250, 1250-1000, 1000-0*
08	104	L3-18	5.12.02	01.45	1000-800, 800-600, 600-400, 400-200, 200-0
09	123	L3-20	5.12.02	15.20	1000-800, 600-400, 400-200, 200-0
10	134	L3-22	5.12.02	23.15	1000-800, 800-600, 600-400, 400-200, 200-0
11	147	L3-24	6.12.02	06.30	1000-800, 800-600, 600-400, 400-200, 200-0
12	148	L3-24	6.12.02	08.00	2000-1750, 1750-1500, 1500-1250, 1250-1000, 1000-0*
13	158	L3-26	6.12.02	16.30	540-400, 400-300, 300-200, 200-100, 100-0
14	172	L3-23	7.12.02	05.13	1000-800, 800-600, 600-400, 400-200, 200-0
15	175	L3-21	7.12.02	11.15	1000-800, 800-600, 600-400, 400-200, 200-0
16	176	L3-21	7.12.02	12.32	2000-1750, 1750-1500, 1500-1250, 1250-1000, 1000-0*
17	177	L3-20	7.12.02	16.52	1000-800, 800-600, 600-400, 400-200, 200-0
18	181	L3-19	7.12.02	21.30	2000-1750, 1750-1500, 1500-1250, 1250-1000, 1000-0*
19	182	L3-19	7.12.02	23.53	1000-800, 800-600, 600-400, 400-200, 200-0
20	200	L3-17	8.12.02	07.25	1000-800, 800-600, 600-400, 400-200, 200-0
21	203	L3-15	8.12.02	16.39	1000-800, 800-600, 600-400, 400-200, 200-0
22	205	L3-13	8.12.02	23.44	2000-1750, 1750-1500, 1500-1250, 1250-1000, 1000-0*
23	206	L3-13	9.12.02	02.00	1000-800, 800-600, 600-400, 400-200, 200-0
24	209	L3-11	9.12.02	07.19	1000-800, 800-600, 600-400, 400-200, 200-0

*Samples given to Lidia Yebra Mora for biochemical analysis.

Continuous Flow Multisensor System (Jeff Anning)

Water from approximately 4m was continuously pumped to the forward lab. The temperature, conductivity and fluorescence was measured and logged every 30 sec. The temperature and conductivity were measured with Seabird sensors and the fluorescence by a Wetlabs flowthrough fluorometer. Incident Photosynthetically Active Radiation was measured with a Li-Cor Spherical Quantum Sensor and these data were merged with the sea water parameters. Exact time and positions were provided by a Northstar GPS and logged with the other data. In addition discrete water samples were collected every 15 minutes by an auto sampler for later analysis for nitrate and silicate. The times and positions of these samples were also logged by the computer. Sampling was terminated on Dec. 10 when the GPS signal was lost due to icing conditions.

Sampling of Phytoplankton in Rosette Profiles (Erica Head, Tim Perry, Jeff Anning)

Chlorophyll samples were taken in duplicate from all depths sampled in the upper 100 m. of the water column. Integrated phytoplankton samples were collected from 50 m to the surface and preserved in 5% Lugols solution. Particulate organic Carbon (POC), photosynthetic pigments and absorption spectra samples were collected from all stations at the surface and also at the same depths as the PI incubations when these were conducted.

2002-075 Station Log

Station	Event	Date
L3-01	1	12/01/02
L3-03	13	12/02/02
L3-05	14	12/02/02
L3-07	23	12/03/02
L3-08	27	12/03/02
L3-10	42	12/03/02
L3-12	50	12/03/02
L3-14	66	12/04/02
L3-16	77	12/04/02
L3-18	108	12/05/02
L3-20	120	12/05/02
L3-22	135	12/06/02
L3-24	153	12/06/02
L3-26	159	12/06/02
L3-28	169	12/06/02
L3-21	173	12/07/02
L3-19	183	12/08/02
L3-17	201	12/08/02
L3-15	204	12/08/02
L3-13	207	12/09/02
L3-11	210	12/09/02

Determination of Primary Production rates (Jeff Anning)

Water samples for primary production experiments were collected from the rosette. For each incubation, 33 aliquots were inoculated with sodium bicarbonate 14C and then incubated at in situ temperatures at 30 light levels (+ 3 dark bottles) for approximately 3 hours. At the end of

the incubation period the cells were harvested onto GF/F glass fibre filters for later counting in a scintillation counter.
Photosynthesis/Irradiance incubations were conducted at the following stations:

2002-075 PI Log

Station	Event/ CTD	Date	Time GMT	ID	Depth
L3-01	1	12/01/02	14:00	259575	4
				259567	20
L3-03	13	12/02/02	19:30	259592	4
				259584	30
L3-10	42	12/03/02	19:00	259666	4
				259660	10
L3-16	77	12/04/02	15:30	259732	4
				259724	30
L3-20	120	12/05/02	15:30	259794	4
				259787	20
L3-24	153	12/06/02	16:00	259856	4
				259849	20
L3-21	173	12/07/02	10:45	259938	4
				259931	30
L3-17	201	12/08/02	14:20	259974	4
				259967	20
L3-11	210	12/09/02	13:15	260033	4

Optical Measurements (Edward Horne)

Once per day for the period Dec 1- Dec 8 an optical profile was made with a Biospherical Instruments Mer2040 profiler to a depth of 100m. The locations for the stations are the same as those for the PI measurements. In addition, water samples were draw in the upper 100m of the CTD profile at the station and analyzed for Colored Dissolved Organic Matter (CDOM). CDOM was low for all stations and with chlorophyll concentrations of less than 1 micro gram per liter the water was very clear and blue light penetrated best.

Stable Isotope Studies of Carbon and Nitrogen (nitrate and ammonium) Utilization by Phytoplankton (Glen Harrison)

This work represents a continuation of research begun in 1994 to determine the primary productivity (in terms of inorganic carbon and nitrogen) of phytoplankton in the Labrador Sea. Carbon dioxide (CO_2), nitrate (NO_3) and ammonium (NH_4) utilization rate measurements, due to the expectation of icing weather conditions on deck this time of year, were modified from the standard deck incubation protocol to P-I style experiments performed in the lab, similar to those described by J. Anning. A total of 8 experiments were conducted (see Table). Carbon and nitrogen-based primary productivity rates along the L3 line will be related to vertical fluxes of particulate biogenic carbon and nitrogen derived from our sediment trap deployed on the "Bravo" mooring in July and scheduled for recovery in July, 2003.

In addition to productivity measurements, samples from one deep cast (L3_17) were collected for determination of suspended particulate organic carbon (POC) and nitrogen (PON) from surface to ~1,000 m.

Date	Site	EV#	$^{15}N/^{13}C$	POC/PON
01-Dec-02	L3_01	001	X	
02-Dec-02	L3_03	013	X	
03-Dec-02	L3_10	042	X	
04-Dec-02	L3_16	077	X	
05-Dec-02	L3_20	120	X	
06-Dec-02	L3_24	153	X	
07-Dec-02	L3_21	173	X	
08-Dec-02	L3_17	201	X	X

Table. Sampling for stable isotope productivities and particulates.

Bacterial abundance and production (Paul Dickie for Dr. Bill Li)

Samples were collected for subsequent Flow Cytometric analysis from almost all depths of all CTDs at all stations occupied on the cruise. These samples were preserved with 1% final concentration of filtered paraformaldehyde and frozen in liquid nitrogen. They will be analyzed at BIO by Dr.Bill Li for marine pico-phytoplankton, bacteria and viruses.
At all stations occupied (except #s 8 and 18), water from all depths from surface down to at least 100 meters was incubated with tritiated leucine to determine rates of increase of heterotrophic (bacterial) biomass. A total of 19 Depth Profiles were obtained.
For most stations (17/24), the uppermost sample (closest to the surface) was checked for nano-zooplankton. These samples were preserved with 1% formaldehyde, filtered in 30 ml aliquots onto 0.8 micron polycarbonate filters and stained with DAPI dye. They will be kept frozen until counting can be done with a fluorescence microscope.

Zooplankton studies (Lidia Yebra Mora)

Oithona project

In order to study distribution of Oithona and other species in the Labrador Sea, vertical nets were performed every other station from St. Johns to Greenland along the L3 transect. Samples were collected with Bongo (63 um) and WP2 nets (200 um), from 0 to 100 m, and fixed with formalin 4%. At PML, species abundance and distribution will be determined, and compared with the data obtained at the same time in the Irminger Sea.

Zooplankton biomass and growth

Bongo and WP2 nets were used also to collect ZP from 0-100 m, along line L3. On board, samples were fractionated by size: 63-200, 200-450, 450-1000 and >1000 um, and frozen in liquid Nitrogen. At PML (Plymouth Marine Laboratory), biomass and structural growth will be determined. Biomass will be estimated as protein content, following the method of Lowry *et al.* (1951), modified by Rutter (1967). Growth will be approached by the method of Chang et al. (1984), modified by Yebra (2002). Relationship between hydrography and growth will be also studied.

Calanus finmarchicus, growth or dormancy?

When available groups of 20 CV of *C. finmarchicus* were selected from the vertical hauls and from the MultiNet, and stored in liquid Nitrogen. At PML, biomass and growth of copepods collected with vertical nets (0-100 m) will be compared with the ones from the MultiNet (0-1000 m). Growth rates will be also compared with growth of *C. finmarchicus* collected in the same period in the Irminger basin with the ARIES net.

When available, groups of 10 CV *C. finmarchicus* were collected from the Multinet tows (0-1000 m) and frozen in liquid Nitrogen. Samples will be sent to Aberdeen to analyse lipid content. Data will be also compared with the ones from the Irminger Sea, at the same period.

Stations sampled for zooplankton studies by L. Yebra Mora

Event	Station	Date	Oithona	Zooplankt	CV surf g	CV MN g	CV Mn l
3-5	L3-1	1/12/02	X	X			
10-12	L3-3	2/12/02	X	X			
15-18	L3-5	2/12/02	X	X			
28-30	L3-8	3/12/02	X	X			
37-39	L3-10	3/12/02	X	X	X	X	X
51-53	L3-12	4/12/02	X	X			
62-64	L3-14	4/12/02	X	X			
82-84	L3-16	4/12/02	X	X	X	X	X
105-107	L3-18	5/12/02	X	X			
136-138	L3-22	6/12/02	X	X			
150-152	L3-24	6/12/02	X	X	X	X	
160-162	L3-26	6/12/02	X	X			
166-168	L3-28	7/12/02	X	X			
176	L3-21	7/12/02				X	X
178-180	L3-20	7/12/02	X	X			
181	L3-19	8/12/02				X	X
	L3-13	9/12/02				X	X

Organic carbon inventory and utilization rate (J. Bugden for P. Kepkay)

In order to better understand the cycling of carbon and the mechanisms controlling it in the Labrador Sea, it is necessary to examine the pool of total organic carbon (TOC), and look at the activity of the microbial community in the water column. By examining the rate of respiration and size fractionating the TOC, information on the fate of carbon in this marine environment may be elucidated.

During CCGS Hudson cruise 2002-075 nine (9) stations were sampled at the surface and at the chlorophyll maximum (usually between 10 and 30m depth) for gross microbial community respiration, and for the same stations only the surface was sampled for size fractionation of TOC (ultrafiltration). The stations sampled are listed below. TOC depth profiles were also collected from the stations indicated in the table below.

List of stations and what was sampled by Jay Bugden on CCGS Hudson cruise 2002-075.

Station	Respiration	Ultrafiltration	DOC Profile
AR7W site 1	X	X	X
AR7W site 2			
AR7W site 3	X	X	X
AR7W site 4			
AR7W site 5			X
AR7W site 6			
AR7W site 7			X
AR7W site 8			X
AR7W site 9			
AR7W site 10	X	X	X
AR7W site 11	X	X	X
AR7W site 12			X
AR7W site 13			X
AR7W site 14			X
AR7W site 15			X
AR7W site 16	X	X	X
AR7W site 17	X	X	X
AR7W site 18			X
AR7W site 19			X
AR7W site 20	X	X	X
AR7W site 21	X	X	X
AR7W site 22			X
AR7W site 23			
AR7W site 24	X	X	X
AR7W site 25			
AR7W site 26			X
AR7W site 27			
AR7W site 28			X

Physical Oceanography (Allyn Clarke / Igor Yashayaev)

CTD stations

Full depth CTD profiles were obtained along WOCE Hydrographic Repeat section AR7W using a Seabird Model 9 dual sensor system mounted in a 24 bottle Seabird rosette. The following sensors were used on all casts:

Sensor	Primary or Secondary	Serial #	Manufacture Date
Temperature	primary	03P2129	14-Jun-2000
Conductivity	primary	041730	07-Jun-1996
Pressure		51403	20-Nov-1992
Temperature	secondary	03P2303	03-Dec-1997
Conductivity	secondary	041874	21-Feb-1997
Altimeter			
Fluorometer, chelsea		088172	10-Feb-1997
Oxygen, SBE	primary	430042	16-May-2001
Oxygen, SBE	secondary	430133	16-May-2001

The following sites were sampled

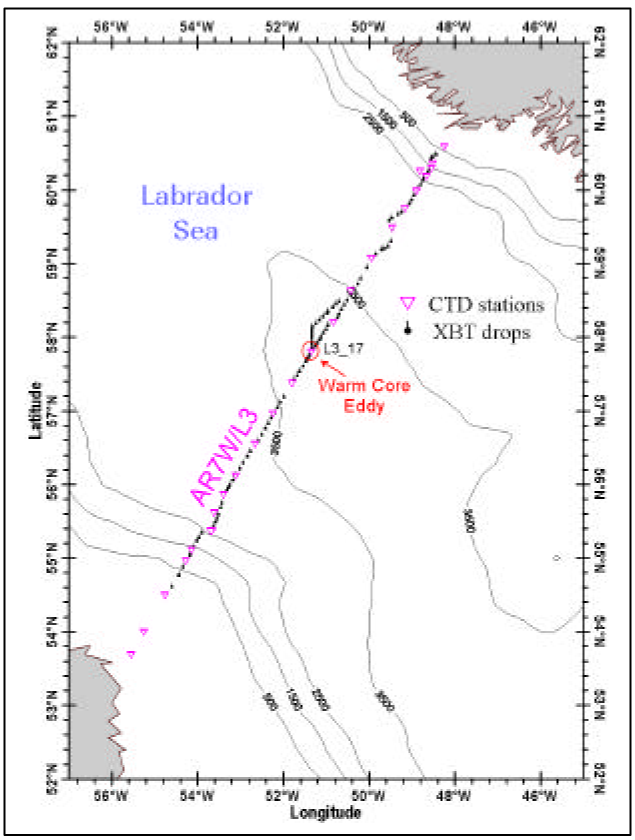
Site	Operation #	Maximum Depth	Site	Operation #	Maximum Depth
L3_01	1	full depth	L3_15	204	1600 metres
L3_02		not sampled	L3_16	79	full depth
L3_03	13	full depth	L3_17	201	2300 metres
L3_04		not sampled	L3_18	108	full depth
L3_05	15	full depth	L3_19	183	2100 metres
L3_06		not sampled	L3_20	122	full depth
L3_07	23	full depth	L3_21	173	2300 metres
L3_08	27	full depth	L3_22	135	full depth
L3_09		not sampled	L3_23	171	804 metres (splice failure)
L3_10	40	full depth	L3_24	154	full depth
L3_11	210	1450 metres	L3_25	170	full depth
L3_1	50	full depth	L3_2	159	full depth

2			6		
L3_13	207	1600 metres	L3_27		not sampled
L3_14	66	full depth	L3_28	169	full depth

Water samples were drawn for oxygen concentration, nutrients and salinities. The samples for oxygen and salinity were processed at sea. The nutrient samples were frozen and returned to BIO for analysis.

Thermal structure of the upper ocean from XBT (Expendable Bathythermographs).

Every spring-summer BIO carries out physical, chemical and biological observations in the Labrador Sea along WOCE Hydrographic Repeat section AR7W (map). In 2002 this line was resurveyed in the end of the year, providing unique early winter measurements of the seawater state and biomass (Cruise 2002075, CCGS Hudson, Nov.29–Dec.12, 2002, Chief scientist: Erica Head).



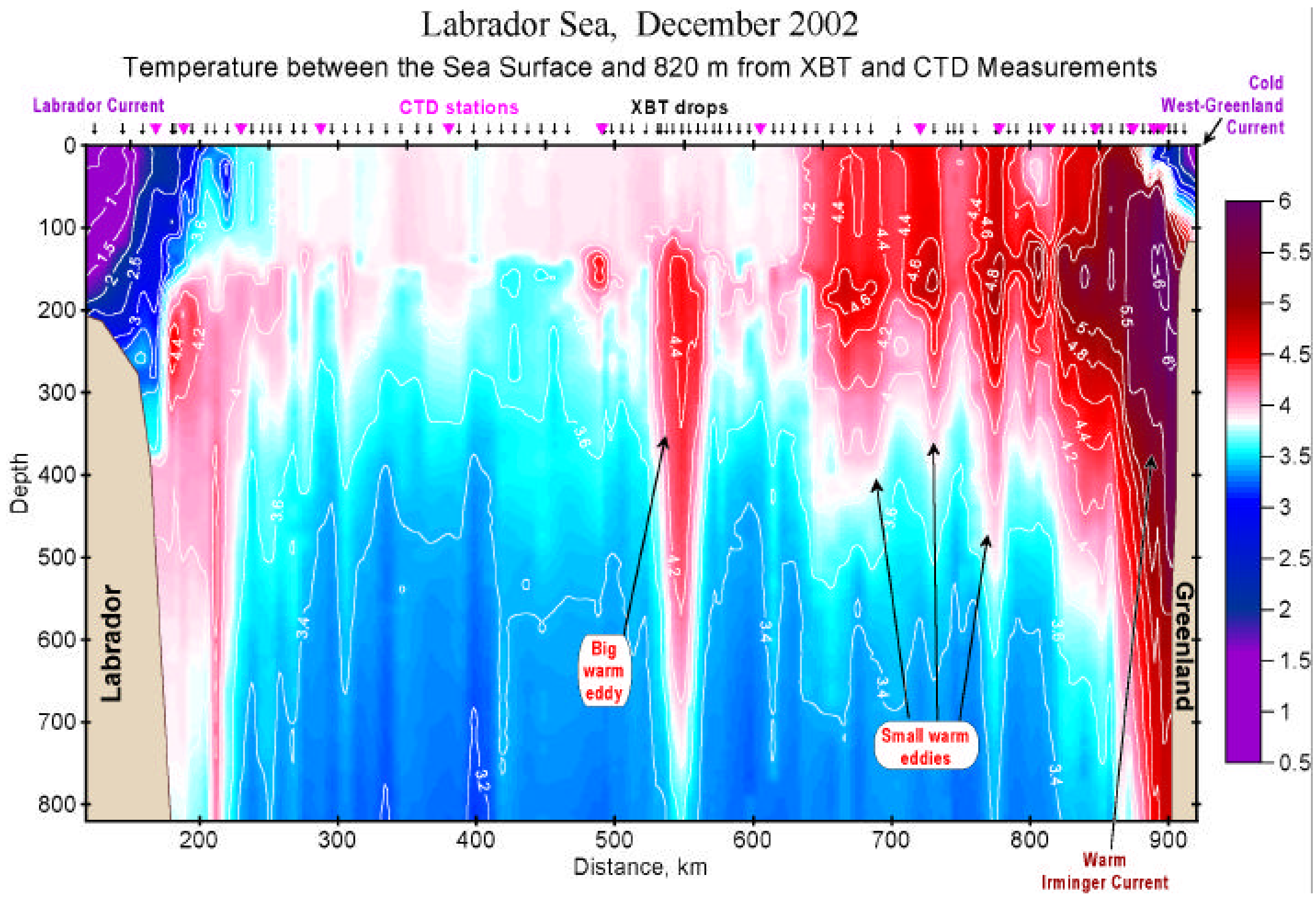
In addition to the CTD profiles along section AR7W/L3 (map), 105 XBT (Sparton T7) probes were dropped with a spacing of 5 miles and less providing the measurements from the sea surface to 830 m at the full cruising speed of the ship (15 knots). The vertical resolution of the measurements is 0.6-0.8 m. Continuous deployment of XBT along with the CTD casts provides a detailed thermal survey of the upper 800 m between the Labrador and Greenland shelves (the section plot is based on the data from the eastward passage of the line). A homogeneous layer up to 160 m thick created by the vertical mixing of the cold season is clearly seen through the western and central regions.

The warm (>4.5C) and salty Irminger Current (on the Greenland side), its warm core (>6C) and sharp front are clearly resolved by the XBT profiles. A chain of small eddies with the warm cores between 150 and 200 m and horizontal scales between 20 and 45 km span over 200 km from the Irminger Current and are presumably shed from this current. This relatively deep location of their cores indicates that the cooling and mixing of the upper 150 m has also already started in the eastern part.

Another warm water flow can be identified offshore the Labrador slope. It is 1.6C colder than the Irminger Current, but still forms a strong contrast with the shelf and Labrador Current above and inshore. This warm flow has been strongly altered by the mixing and was capped by 150 m of cold water.

The XBT profiles collected on the eastward passage of ARW7/L3 reveal a strong warm core eddy, coincidently centred at the deepest point in the middle of the line. This eddy was deeper than 800 m and at the crossing with the section its size was about 45 km (resolved by 12 XBT profiles). However, we were unable to identify the exact location of the centre of the eddy off to the section line. Below 110 m the eddy was up to 1C warmer the surrounding water, above 100 m the eddy was covered with cold mixed water similar to that in the other XBT profiles. Four days later after we found the eddy we dropped 16 more XBTs along a north to south section approaching L3_17 in order to better define this eddy and planned a deep CTD station at the station L3_17, where the warmest core was first found. This section captured the eddy, however it was shifted 25 km north from its previous location. The CTD cast at L3_17 8th as of December did not show any signs of the eddy (on the 4th the eddy's centre was found right at the location of L3_17, but a CTD cast wasn't conducted at that time).

Warm and cold eddies play an important role in physical and biological processes in the Labrador Sea and are well described by moored and remote measurements, however we lack direct observations of water mass and biological structure of these formations. Hence, in the planning of future missions to the Labrador Sea, we suggest to consider a research opportunity if a distinct and deep eddy was identified from XBT or remote observations.



Labrador Sea, December 2002
Temperature between the Sea Surface and 820 m from XBT and CTD Measurements
Labrador Current
CTD stations
XBT drops
Cold West-Greenland Current
Depth
Distance, km
Labrador
Greenland
Big warm eddy
Small warm eddies
Warm Irminger Current