FINAL CRUISE INSTRUCTIONS
NOAA Ship *Ronald H. Brown*
RB-01-03, Leg 2

April 6, 2001

FOCI No: 1RB01

Operating Area: Continental shelf and slope region of the Gulf of Alaska between Kodiak Island and Middleton Island (Cape Cleare (See map in Figure 1)

Dates:	13 May 2001	DEPART Seward, AK
	23 May 2001	ARRIVE Kodiak, AK

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1.0 CRUISE OVERVIEW

1.1 Program Justification: Fisheries-Oceanography Coordinated Investigations (FOCI) is an effort by NOAA and associated academic scientists. At present, FOCI consists of a Shelikof Strait (western Gulf of Alaska) walleye pollock project, and a NOAA Coastal Ocean Program project: Southeast Bering Sea Carrying Capacity. FOCI also supports associated projects, such as the Arctic Research Initiative, U.S. GLOBEC, and North Pacific Marine Research Program, that address scientific issues related to FOCI's goal. That goal is to understand the effects of abiotic and biotic variability on ecosystems of the North Pacific Ocean and Bering Sea and to discern the physical and biological processes that determine recruitment variability of commercially valuable finfish and shellfish stocks in Alaskan waters. This cruise is in support of NOAA/PMEL/FOCI and US GLOBEC programs in the Northern Gulf of Alaska (GLOBEC/GOA). This area of focused GLOBEC process studies will provide a unique coupled bio-physical description of the ecosystem and the processes occurring on the shelf that affect the concentration and availability of the prey species of Steller sea lions.

1.2 Cruise Objectives: The objectives are to

(a) Detect movements of nutrient-rich slope water onto the shelf and relate them to temporal and spatial variations in biological distributions and processes.
(b) Support the process studies taking place concurrently on R/V *Alpha Helix* for GLOBEC/GOA.
(c) To assess the role of Amatouli Trough in replenishing nutrients to the Gulf of Alaska shelf.

1.3 Applicability: These instructions in conjunction with the "FOCI Standard Operating Instructions for NOAA Ship *Ronald H. Brown*, 2001" (attached to leg1 cruise instructions), provide complete information for this cruise. The Chief Scientist is authorized to alter the scientific portion of this cruise plan with the concurrence of the Commanding Officer, provided that the proposed changes will not

(a) Jeopardize the safety of personnel or the ship,
(b) Exceed the time allotted for the cruise,
(c) Result in undue additional expense, or
(d) Change the general intent of the cruise.

1.4 Operating Area: Continental shelf and slope region of the Gulf of Alaska between Kodiak Island and Middleton Island (Cape Cleare (See map in Figure 1)

1.5 Participating Organizations

a) NOAA/Alaska Fisheries Science Center (AFSC)
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Seattle, WA 98115-6439

b) NOAA/Pacific Marine Environmental Laboratory (PMEL)
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1.6 Personnel

	Name	Title/Role	Affil.	Sex	Nation
1.	Dr. Nancy. Kachel	Chief Scientist/ CTD operations	PMEL/NOAA	F	USA
2.	Sigrid Salo	Research Scientist/ Watch Chief/CTD operations/ Satellite Images	PMEL/NOAA	F	USA
3	Dr. Calvin Mordy	Research Scientist/ Nurient Chemistry	PMEL/NOAA	M	USA
4.	Margaret Sullivan	Phys. Oceanographer/ CTD operations	PMEL/NOAA	F	USA

5	Dr. Carol Ladd	Research Scientist/ CTD operations	PMEL/NOAA	F	USA
6	Susan Picquelle	Biologist/Zooplankton Net Sampling	AFSC	F	USA
7	Destry Wion	Biologist/Zooplankton Net Sampling	AFSC	M	USA
8	Bern Megrey	Biologist/Zooplankton Net Sampling	AFSC	M	USA
9	Jay Clark	Biologist/Zooplankton Net Sampling	AFSC	M	USA

1.7 Administrative

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2.0 OPERATIONS

A standard oceanographic watch will be utilized which consists of a winch operator and a scientific staff of four. Operations will be conducted 24 hours a day primarily along lines extending southeast from the mainland, over the shelf and to the slope, primarily between Montague and Kodiak Islands (Figure 1). At most CTD stations there will also be both CalVET and MARMAP Bongo Net hauls. Multiple water bottles will be taken on each cast to sample nutrients and chlorophyll, as well as to calibrate salts. Continuous use of the shipboard ADCP and SeaBeam systems are requested as well. The purpose of the SeaBeam will be to gather improved bathymetry data for future projects associated with FOCI and the GLOBEC/GOA programs. As many as 14 satellite-tracked drifters will be deployed during the cruise.

At most of our CTD stations, 12 water bottles will be fired to sample salinity, nutrients and chlorophyll. Over Amatouli Trough approximately 4-5 bottles will be fired. Stations will be sampled to within 5m of the bottom, or to 1500m depth depending on which is deeper, except where noted. Zooplankton samples will be taken using Bongo Tows to near-bottom depths and CalVET net tows to a depth of 50 m at all stations on the Seward and Gore Pt.

Lines, and, most likely, at every second station on other lines. The exact plan to be followed on this cruise will depend on both weather conditions and the accomplishments of the LTOP/GLOBEC Cruise on R/V *Alpha Helix* that overlaps the beginning of this cruise. The locations of stations during the latter portion of the cruise will also depend on the findings and events that occur during the cruise. If R/V *Alpha Helix* is able to occupy the CTD line out of Cape Cleare, that line will be dropped from the schedule. We will try to contact them, ship-to-ship to find out. After we finish occupying the lines of stations shown on figure 1, the remainder of the cruise will be occupied with some combination of the following targeted experiments. Once again, we shall be doing CTD/nutrient casts plus bongo and CalVET net tows at most stations.

1) We hope to identify an appropriate eddy using the shipboard satellite downloading system aboard *Ron Brown*. Sigrid Salo has the necessary training and will be a member of the scientific party. She will be using the satellite data acquisition system to identify features of interest for our process studies. If a nearby eddy is found impinging on the continental shelf/slope, we shall occupy a grid of stations crossing from the continental slope to the shelf, in the area where the eddy impinges on the shelf. In addition, a satellite-tracked drifter would be deployed in the eddy. We would allot as much as 2 days to this study.
2) If our CTD transit of the Seward line identifies a structural dome in the distribution of temperature and salinity (previously identified in the vicinity of 20-90km offshore), we plan a grid of stations to investigate this feature on a tighter grid (10-km spacing)
3) If time permits, we plan to reoccupy at least two of the CTD lines crossing the Amatouli Trough.
4) If satellite images show a 30-60 km sized high fluorescence feature on the shelf a tight grid of stations will be occupied to sample it.

The following operations are to be conducted on this cruise. The procedures for these operations are listed in the FOCI Standard Operating Instructions (SOI). Operations not addressed in the SOI and changes to standard procedures are addressed in sections 2.5 and 2.6 below.

CTD/Water/Nutrient samples (SOI 2.2.1)
MARMAP Bongo tow (SOI 2.2.2)
CalCOFI vertical egg tow (SOI 2.2.6)
Chlorophyll samples (SOI 2.2.7)
Satellite tracked drifter buoy s (SOI 2.2.8)
ADCP (SOI 2.2.9)

2.1 Data to be collected:
Measurements will be collected with shipboard sensors including the ADCP and Sea Beam. PMEL will supply a CTD profiler with water bottles, fluorometer, and PAR sensors and user-supplied mast-mounted radiometers. A few satellite-tracked drifting buoys may also be launched.

2.1.1: SCS will be configured to record the following:

Navigation - GPS P-code and differential position, time, COG, SOG and data-quality parameters; Ring-Laser-Gyro heading; Seapath 200 position, time, COG, SOG, heading, pitch, roll and data-quality parameters; bottom depth;

Flow-through sampler- Thermosalinograph temperature, conductivity and salinity; fluorescence, with CO2 and NO3 sensors added by PMEL personnel;

Meteorological - Solar radiation, relative and absolute wind speed and direction, barometric pressure, air temperature and humidity, precipitation.

2.1.2: The ADCP will be configured according to the Chief Scientist's specifications. It should receive position input from a P-code GPS receiver with DGPS input as a backup and heading from the Ring-Laser Gyro and the Seapath 200. Data will be stored on 100 MB Zip disks.

2.1.3: It is requested that Sea Beam data be collected whenever possible and that the data be copied to a CD for transfer back to PMEL.

2.1.4: CTD cast data will be collected using a SeaBird 911+ system supplied by PMEL. CTD casts will be taken round-the-clock for most of the duration of the cruise. 12 to 18 10-liter water samples will be taken on most casts.

2.1.5: It is requested that the Ship's technician run the AutoSal to compare salinities with CTD values. Usually two samples will be taken per cast, one at depth and one in the surface mixed layer. This could be relaxed to one sample per cast taken near-bottom.

2.1.6: Both AVHRR and SeaWiFS satellite observations of SST and ocean color will be downloaded using TeraScan and full-resolution, geo-referenced images made available in a timely manner to facilitate cruise planning. In clear weather these should prove invaluable for locating nutrient-rich slope water that moves onto the shelf and promotes phytoplankton blooms. We will attempt to use these systems to identify an eddy impinging on the continental shelf. If we do so, we shall conduct at least 24 hrs of CTD casts there, as well as deployment of a satellite-tracked drifter. Other features identified may also be surveyed.

2.1.7: The ship will maintain a Marine Operations Abstract (MOA) on paper giving the date, time and location of significant events such as CTD casts, buoy deployments, etc.

2.2 Staging plan:
Gear will be shipped to Dutch Harbor and loaded on 4-6 May 2001. Chemical analysis equipment will be set up during Leg-1 for use on this leg (2). Seven participants, including the chief scientist will join Leg-2 when it stops in Seward, AK on 13 May 2001. Those scientists and their gear will drive from Anchorage to Seward in a rented van. The ship's RHIB will be used to move personnel and gear to the ship. It is requested that if possible, nets and other gear stored for use during Leg-1 be taken out of storage during the last part of Leg-1. This would expedite setup needed before our arrival at the first station on Leg-2.

2.3 Cruise plan:
Before and during the cruise, eddies will be located in three ways:

(a) From sea-surface height anomalies observed by the TOPEX/Poseidon satellite (images downloaded directly off the World Wide Web if feasible, or faxed from PMEL),
(b) From SeaWiFS ocean color images downloaded and processed via TeraScan (or downloaded of the World Wide Web, if available),
(c) AVHRR satellite data

The water structure of temperature, salinity, nutrients, fluorescence, irradiance and pigments will be surveyed with CTD sections. Currents will be observed from ADCP transects and drifting-buoy trajectories.

2.3.1: Nutrient and chlorophyll samples will be taken and analyzed aboard ship. Chlorophyll samples will be taken, filtered and frozen for analysis at AFSC.

2.3.2 Drifters deployed near the shelf edge of a GOA eddy will permit tracking of on-shelf flow of nutrient-rich waters from the deep sea onto the continental shelf.

2.3.4 CalVET and Bongo nets will be deployed at most CTD stations to sample zooplankton and ichthyoplankton. Samples will be preserved for counting at AFSC.

2.4 Waypoints:
Figure 1 shows a map of the stations lines to be sampled during the cruise both in support of the GLOBEC/ GOA process studies and over Amatouli Trough. The position of a possible Gulf of Alaska eddy impinging on the shelf will need to be ascertained immediately prior to and during the cruise. It is planned that approximately 24 hours be devoted to sampling that area during the cruise. Other small-scale CTD survey sites may be occupied as identified during the cruise and as discussed in section 2.0. These would take place if an appropriate eddy cannot be located.

The following is a list of the planned stations. The Cape Cleare Line will be eliminated if done on the LTOP cruise.

Transect	Stn. No.	Lat. Deg.	Lat Min	Lon. Deg.	Lon Min.	Dist. nm	Spd kt	Transit hr	Water Depth m	CTD Depth m	CTD time ADD min	Net time ADD min	Arrive (Local) Date / Time	Depart Date / Time
SEWARD		60	6.000	149	26.000		8	0.00	0	0	15	0	5/13/01 16:00	5/13/01 16:15
~Pilot Rock		59	43.600	149	28.000	22.42	10	2.24	0	0	15	0	5/13/01 18:29	5/13/01 18:44
GP-32A	1	59	6.000	150	59.400	59.80	12	4.98	92	82	20	45	5/13/01 23:43	5/14/01 0:48
	2	59	0.600	150	57.600	5.48	10	0.55	157	147	24	45	5/14/01 1:21	5/14/01 2:30
GP-34A	3	58	57.000	150	55.800	3.72	10	0.37	128	118	22	45	5/14/01 2:52	5/14/01 3:59
	4	58	52.800	150	54.000	4.30	10	0.43	150	140	24	45	5/14/01 4:25	5/14/01 5:34
	5	58	49.200	150	52.800	3.65	10	0.37	154	144	24	45	5/14/01 5:56	5/14/01 7:05
GP-36A	6	58	45.000	150	52.000	4.22	10	0.42	174	164	25	45	5/14/01 7:30	5/14/01 8:40
	7	58	35.400	150	48.000	9.82	10	0.98	165	155	24	45	5/14/01 9:39	5/14/01 10:48
	8	58	25.680	150	43.712	9.98	10	1.00	73	63	19	45	5/14/01 11:48	5/14/01 12:52
	9	58	15.959	150	39.443	9.98	10	1.00	64	54	18	45	5/14/01 13:52	5/14/01 14:55
elbow pt.	10	58	6.238	150	35.194	9.98	10	1.00	165	155	24	45	5/14/01 15:55	5/14/01 17:04
	11	58	6.238	150	57.810	11.95	10	1.19	119	109	22		5/14/01 18:16	5/14/01 18:38
	12	58	6.238	151	20.425	11.95	10	1.19	128	118	22		5/14/01 19:49	5/14/01 20:12
	13	58	6.238	151	43.041	11.95	10	1.19	119	109	22		5/14/01 21:23	5/14/01 21:45
Granite Cape	1	59	31.000	149	49.000	103.3	10	10.33	119	109	22		5/15/01 8:05	5/15/01 8:26
	2	59	25.845	149	45.437	5.46	10	0.55	119	109	22		5/15/01 8:59	5/15/01 9:21
	3	59	20.291	149	39.889	6.23	10	0.62	137	127	23	45	5/15/01 9:58	5/15/01 11:06
	4	59	14.736	149	34.357	6.23	10	0.62	137	127	23	45	5/15/01 11:43	5/15/01 12:51
	5	59	9.181	149	28.839	6.23	10	0.62	156	146	24	45	5/15/01 13:29	5/15/01 14:38
	6	59	3.626	149	23.336	6.23	10	0.62	220	210	28	45	5/15/01 15:15	5/15/01 16:28
	7	58	58.071	149	17.848	6.23	10	0.62	238	228	29	45	5/15/01 17:05	5/15/01 18:19
	8	58	52.516	149	12.375	6.23	10	0.62	220	210	28	45	5/15/01 18:56	5/15/01 20:09
	9	58	46.961	149	6.916	6.23	10	0.62	220	210	28	45	5/15/01 20:47	5/15/01 21:59
	10	58	41.405	149	1.472	6.23	10	0.62	183	173	26	45	5/15/01 22:37	5/15/01 23:47
	11	58	33.077	148	53.337	9.34	10	0.93	110	100	21	45	5/16/01 0:44	5/16/01 1:50
	12	58	24.748	148	45.234	9.34	10	0.93	119	109	22	45	5/16/01 2:46	5/16/01 3:52
	13	58	16.419	148	37.163	9.34	10	0.93	124	114	22	45	5/16/01 4:48	5/16/01 5:55
	14	58	8.090	148	29.123	9.34	10	0.93	124	114	22	45	5/16/01 6:51	5/16/01 7:58
	15	57	59.761	148	21.115	9.34	10	0.93	124	114	22	45	5/16/01 8:55	5/16/01 10:02
	sw of FATE	57	57.700	147	39.750	22.03	10	2.20	2013	1500	92	45	5/16/01 12:14	5/16/01 14:31
GAK/GOA line	se of FATE	58	12.000	147	24.000	16.55	10	1.65	2379	1500	92	45	5/16/01 16:10	5/16/01 18:27
FATE-1	FATE-1	58	14.000	147	40.000	8.66	10	0.87	2200	2000	116	45	5/16/01 19:19	5/16/01 22:00
	GAK 12	58	14.600	147	56.000	8.44	10	0.84	1916	1500	92	45	5/16/01 22:51	5/17/01 1:08
	GAK 11	58	23.300	148	4.300	9.73	10	0.97	1400	1390	87	45	5/17/01 2:06	5/17/01 4:18
	GAK 10	58	32.500	148	12.700	10.20	10	1.02	1400	1390	87	45	5/17/01 5:19	5/17/01 7:31
	GAK 9	58	40.800	148	21.000	9.36	10	0.94	275	265	31	45	5/17/01 8:27	5/17/01 9:43
	GAK 8	58	47.500	148	29.400	7.99	10	0.80	290	280	32	45	5/17/01 10:31	5/17/01 11:48

	Stn.	Lat.	Lat	Lon.	Lon	Dist.	Spd	Transit	Water	CTD	CTD time	Net time	Arrive (Local)	Depart
GB-6	GAK 7i	58	52.900	148	33.600								5/17/01 11:48	5/17/01 11:48
	GAK 7	58	58.300	148	37.800	11.64	10	1.16	230	220	28	45	5/17/01 12:58	5/17/01 14:12
GB5	GAK6i	59	3.650	148	42.000								5/17/01 14:12	5/17/01 14:12
GB4	GAK 6	59	7.000	148	46.200	9.71	10	0.97	145	135	23	45	5/17/01 15:10	5/17/01 16:18
GBP3 /GBM3	GAK 5	59	15.700	148	54.500	9.68	10	0.97	175	165	25	45	5/17/01 17:16	5/17/01 18:26
	GAK 4	59	24.500	149	2.900	9.79	10	0.98	200	190	27	45	5/17/01 19:25	5/17/01 20:37
GB2	GAK 3	59	33.200	149	11.300	9.69	10	0.97	220	210	28	45	5/17/01 21:35	5/17/01 22:48
GB1	GAK 2	59	41.500	149	19.600	9.30	10	0.93	220	210	28	45	5/17/01 23:43	5/18/01 0:56
	GAK 1	59	50.700	149	28.000	10.13	10	1.01	220	210	28	45	5/18/01 1:57	5/18/01 3:10
Fairfield-P	1	59	48.146	148	46.375	21.08	10	2.11	220	210	28	45	5/18/01 5:16	5/18/01 6:29
	2	59	42.591	148	40.766	6.23	10	0.62	165	155	24	45	5/18/01 7:06	5/18/01 8:16
	3	59	37.037	148	35.172	6.23	10	0.62	183	173	26	45	5/18/01 8:53	5/18/01 10:04
	4	59	31.482	148	29.594	6.23	10	0.62	128	118	22	45	5/18/01 10:41	5/18/01 11:49
	5	59	25.928	148	24.031	6.23	10	0.62	128	118	22	45	5/18/01 12:26	5/18/01 13:33
	6	59	17.600	148	15.719	9.34	10	0.93	137	127	23	45	5/18/01 14:29	5/18/01 15:37
	7	59	9.272	148	7.441	9.34	10	0.93	101	91	21	45	5/18/01 16:33	5/18/01 17:39
	8	59	0.944	147	59.196	9.34	10	0.93	137	127	23	45	5/18/01 18:35	5/18/01 19:42
	9	58	52.616	147	50.984	9.34	10	0.93	137	127	23	45	5/18/01 20:38	5/18/01 21:46
	10	58	44.288	147	42.806	9.34	10	0.93	165	155	24	45	5/18/01 22:42	5/18/01 23:52
Cape Cleare	8	59	4.507	147	46.375	6.23	10	0.62	639	629	49		5/19/01 0:29	5/19/01 1:19
	7	59	10.741	147	46.375	6.23	10	0.62	164	154	24		5/19/01 1:56	5/19/01 2:20
	6	59	16.975	147	46.375	6.23	10	0.62	201	191	27		5/19/01 2:58	5/19/01 3:24
	5	59	23.210	147	46.375	6.23	10	0.62	183	173	26		5/19/01 4:02	5/19/01 4:27
	4	59	29.444	147	46.375	6.23	10	0.62	164	154	24		5/19/01 5:05	5/19/01 5:29
	3	59	35.678	147	46.375	6.23	10	0.62	119	109	22		5/19/01 6:07	5/19/01 6:28
	2	59	41.912	147	46.375	6.23	10	0.62	119	109	22		5/19/01 7:06	5/19/01 7:27
	1	59	48.146	147	46.375	6.23	10	0.62	119	109	22		5/19/01 8:05	5/19/01 8:26
Amatouli Axis line	1	58	50.240	148	14.947	17.69	10	1.77	586	576	47		5/19/01 10:12	5/19/01 10:59
	2	58	53.922	148	39.866	13.40	10	1.34	265	255	31		5/19/01 12:20	5/19/01 12:50
	3	58	56.066	149	11.957	16.71	10	1.67	242	232	29		5/19/01 14:31	5/19/01 15:00
	4	58	54.532	149	32.719	10.83	10	1.08	238	228	29		5/19/01 16:05	5/19/01 16:34
	5	58	56.534	150	6.763	17.69	10	1.77	201	191	27		5/19/01 18:20	5/19/01 18:46
Amatouli E	5	58	45.668	150	9.710	10.97	10	1.10	146	136	23	45	5/19/01 19:52	5/19/01 21:01
Eastern line	4	58	51.101	150	8.238	5.49	10	0.55	183	173	26	45	5/19/01 21:33	5/19/01 22:44
	3	58	56.534	150	6.763	5.49	10	0.55	201	191	27	45	5/19/01 23:17	5/20/01 0:29
	2	59	1.967	150	5.283	5.49	10	0.55	192	182	26	45	5/20/01 1:02	5/20/01 2:13
	1	59	7.400	150	3.800	5.49	12	0.46	134	124	23	45	5/20/01 2:40	5/20/01 3:48
Amatouli D	5	59	10.563	149	26.390	19.44	10	1.94	146	136	23	45	5/20/01 5:44	5/20/01 6:53
	4	59	2.547	149	29.561	8.18	10	0.82	210	200	27	45	5/20/01 7:42	5/20/01 8:54
	3	58	54.532	149	32.719	8.18	10	0.82	238	228	29	45	5/20/01 9:43	5/20/01 10:57
	2	58	46.516	149	35.866	8.18	10	0.82	229	219	28	45	5/20/01 11:46	5/20/01 12:59
	1	58	38.500	149	39.000	8.18	12	0.68	156	146	24	45	5/20/01 13:40	5/20/01 14:49
Amatouli C	6	58	40.691	149	17.182	11.56	10	1.16	146	136	23	45	5/20/01 15:59	5/20/01 17:07
	5	58	46.831	149	15.100	6.23	10	0.62	183	173	26	45	5/20/01 17:44	5/20/01 18:55
	4	58	52.971	149	13.012	6.23	10	0.62	229	219	28	45	5/20/01 19:32	5/20/01 20:46
	3	58	56.066	149	11.957	3.14	10	0.31	242	232	29	45	5/20/01 21:05	5/20/01 22:19
	2	58	59.160	149	10.901	3.14	10	0.31	220	210	28	45	5/20/01 22:38	5/20/01 23:50
	1	59	5.300	149	8.800	6.23	12	0.52	137	127	23	45	5/21/01 0:22	5/21/01 1:29

	Stn.	Lat.	Lat	Lon.	Lon	Dist.	Spd	Transit	Water	CTD	CTD time	Net time	Arrive (Local)	Depart
Amatouli B	7	59	9.744	148	31.065	19.87	10	1.99	128	118	22	45	5/21/01 3:28	5/21/01 4:36
	6	59	4.470	148	34.006	5.49	10	0.55	220	210	28	45	5/21/01 5:09	5/21/01 6:21
	5	58	59.196	148	36.940	5.49	10	0.55	256	246	30	45	5/21/01 6:54	5/21/01 8:09
	4	58	53.922	148	39.866	5.49	10	0.55	265	255	31	45	5/21/01 8:42	5/21/01 9:58
	3	58	48.648	148	42.785	5.49	10	0.55	247	237	29	45	5/21/01 10:31	5/21/01 11:45
	2	58	43.374	148	45.696	5.49	10	0.55	220	210	28	45	5/21/01 12:18	5/21/01 13:31
	1	58	38.100	148	48.600	5.49	12	0.46	146	136	23	45	5/21/01 13:58	5/21/01 15:07
Amatouli A	7	58	29.720	148	24.768	14.99	10	1.50	234	224	29	45	5/21/01 16:37	5/21/01 17:50
Western line	6	58	34.850	148	22.321	5.29	10	0.53	469	459	41	45	5/21/01 18:22	5/21/01 19:48
	5	58	39.980	148	19.869	5.29	10	0.53	486	476	42	45	5/21/01 20:20	5/21/01 21:47
	4	58	45.110	148	17.411	5.29	10	0.53	502	492	43	45	5/21/01 22:19	5/21/01 23:46
	3	58	50.240	148	14.947	5.29	10	0.53	586	576	47	45	5/22/01 0:18	5/22/01 1:50
	2	58	55.370	148	12.476	5.29	10	0.53	519	509	44	45	5/22/01 2:22	5/22/01 3:50
	1	59	0.500	148	10.000	5.29	10	0.53	519	509	44	45	5/22/01 4:22	5/22/01 5:50
Eddy Kodiak Is		58	40.000	152	20.000	128.7	12	10.73					5/22/01 16:34	5/22/01 16:34

The following are a list of deployment sites for satellite-tracked drifters.

Drifter Deployments RB0103 Leg2							
Drifter deployments	STA.ID	Latdeg	Latmin		Londeg	Lonmin	
Gore Pt Line	2	59	0.60	N	150	57.60	W
	4	58	51.00	N	150	53.40	W
FATE/GAK	FATE-1	58	14.00	N	147	40	W
Possible	~GAK12	58	16.00		147	58	W
Possible	GAK10	58	32.50	N	148	12.7	W
	GAK 7i	58	12.68	N	148	45.15	W
	GAK5-6	59	11.35	N	148	50.3	W
	GAK 4	59	24.50	N	149	2.9	W
	GAK 3	59	33.20	N	149	11.3	W
	GAK 2	59	41.50	N	149	19.6	W
S of Portlock Bank	On route to Kodiak	58	0	N	150	49	W

2.5 Station operations: CTD operations will proceed 24 hours per day in the study area for ~120 casts. We request that the ship provide ~120 AutoSal salinity determinations to calibrate this data. The CTD will be deployed with 10-liter bottles on its rosette, a flash fluorometer, and an altimeter.

2.5.1: A standard station will consist of the following:

(a) CTD profile to ~10 m above the sea floor with a SeaTech fluorometer on the package to measure *in vivo* fluorescence and an altimeter to ascertain the location of the equipment relative to the bottom. Discrete 10-L samples will be obtained at selected depths with Niskin bottles on the rosette. Nutrient analysis will require 50 ml and the remaining water sample will be available for chloroplyll and salinity samples. Chlorophyll samples will be placed in a dark refrigerator until

they can be filtered. After filtering, the filters need to be stored in a freezer (-20 F or colder, at least 10 cu. ft.).

(b) CalVET zooplankton net tow to 50m depth

(c) Bongo Net tow with a SeaBird SeaCat attached to near bottom depth.

Each standard station should take no more than 1.0 hr to conduct. CTD casts will be collected to within 10 m of the bottom depth over the continental shelf and slope, or to a depth of 2000m over the outer slope. Discrete samples will be processed on board for nutrient analysis. Chlorophyll samples will be filtered and frozen for later analysis. One of each net haul sample will be roughly assessed on board for zooplankton and ichthyoplankton and the other will be preserved in formalin for analysis at AFSC. Any fish larvae from the sorted net will be fixed in 95% ethanol in vials.

2.6 Underway operations:
Several underway measurements are required. The Thermosalinograph, flow-through fluorometer, CO2 and NO3 meters will be used continuously, as will the ADCP. These and other SCS data should be logged throughout the cruise.

2.6.1: Sea Beam - SeaBeam Bathymetry is requested, whenever possible, to improve maps and provide bathymetry data for later GLOBEC/GOA research. In particular, better bathymetric data is needed during the portion of the cruise where we are studying an eddy impinging on the slope.

2.6.1: Satellite Data Downlinks - Both AVHRR and SeaWiFS satellite observations of SST and ocean color will be downloaded using TeraScan and full-resolution, geo-referenced images made available in a timely manner to facilitate cruise planning.

2.7 Applicable restrictions: None.

2.8 Small boat operations: Transfer personnel and gear during Touch-n-go in Seward, AK.

2.9 De-staging plan: Most gear and hazardous chemicals will be off-loaded from the ship at the end of this leg in Kodiak, AK. The CTD and computers will stay aboard for use during Leg-3. That gear will be off-loaded in Dutch Harbor on 8 June 2001 and transported via NMFS van to the airport.

3.0 FACILITIES

3.1 Equipment and capabilities provided by ship:

- Oceanographic winch with slip rings and 3-conductor cable terminated for CTD,
- Sea-Bird 911 plus CTD system with stand (**back up system**),
- Wire-angle indicator and readout for oceanographic winch,
- 10-liter sampling bottles for use with rosette (spares),
- AUTOSAL salinometer for CTD salinity calibration,
- Thermosalinograph with fluorometer and Flow-thru CO2 meter, if available.
- For meteorological observations: 2 anemometers, barometer, and air temperature sensor, relative humidity sensor and rainfall sensor,
- Freezer space for storage of biological and chemical samples (-20 F or colder, at least 10 cu. ft.),
- Bench space (at least 10 linear feet for nutrient chemistry, 5 linear feet for chlorophyll filtering),
- Laboratory refrigerator (at least 6 cu. ft.),
- Ultra-cold (-70°F) freezer for Chlorophyll samples if available, otherwise a blast freezer (-20°F)
- Distilled or reverse-osmosis water source,
- Laboratory space with exhaust hood, sink, lab tables and storage space,
- Echo sounders for deep and shallow water measurements,

- RDI 150-KHz ADCP with position input from P-code GPS receiver, heading input from Ring-Laser Gyro and Seapath 200 and output to Iomega Zip drive,
- SCS (Shipboard Computer System),
- One or more networked PCs,
- Internet access for downloading TOPEX/Poseidon sea-surface height anomaly plots and SeaWiFs images
- TeraScan oceanographic data satellite downlink system,
- Sea Beam 2112 swath bathymetric sonar system,
- Adequate deck lighting for nighttime operations,
- Safety harnesses for working on deck,
- Float coats.

3.2 Equipment and capabilities provided by scientists: PMEL/AFSC/NMFS

- Sea-Bird 911-plus CTD system including underwater CTD with twin temperature and conductivity sensors (plus spares), fluorometer, PAR sensor, 12-bottle rosette, pinger, weights, deck unit, PC with Seasoft software
- Benthos Altimeter for CTD,
- 18 Niskan bottles (10-l)
- Salinity sample bottles
- Networked Macintosh computer with WordPerfect, Word, Excel and eXodus,
- Networked Unix computer with EPIC and Ferret,
- Networked PC computer for processing CTD data,
- PC computer for AFSC sample database,
- 10 bottles of IAPSO water,
- 16 Argos-trackeddrifters to be deployed,
- Miscellaneous scientific sampling and processing equipment,
- Flow-Through CO2 and NO3 sensors.
- Auto-analyzer for nutrients (Calvin Mordy's, already on board),
- Polyethylene water sampling bottles for nutrients,
- PC computer for data logging,
- Profiling ac-9 absorption/attenuation meter
- Filter rigs
- Various laptop computers
- SeaCat for MARMAP nets
- 60 cm Bongo sampling array
- 20 cm Bongo sampling array
- CALVET net
- Chlorophyll filtering apparatus
- Cruise Operations Database (COD) software and forms - this is used now instead of the old Discrete Sample Database (DSDB)
- Sample bottles for biological samples
- Wooden crates to ship samples back to Seattle
- Laptop computer for data logging, and printer
- 8 Mustang float coats
- Formaldehyde and ethanol for specimen preservation
- Consumables (i.e. data storage media, printer supplies, paper, pens, pencils, etc.)
- Steel-toed boots

4.0 DISPOSITION OF DATA AND REPORTS

4.1 Data responsibilities: The Chief Scientist will receive all original data gathered by the ship for the primary project, and this data transfer will be documented on NOAA Form 61-29 "Letter Transmitting Data". The Chief Scientist in turn will furnish the ship a complete inventory listing all data gathered by the scientific party detailing types and quantities of data. The Chief Scientist will be responsible for the disposition, feedback on data quality, and archiving of data and specimens collected on board the ship for the primary project. The Chief Scientist will

also be responsible for the dissemination of copies of these data to participants in the cruise, to any other requesters, and to notify NODC of measurements and samples taken at sea via a Cruise Summary Report (IOC ROSCOP, Third Edition). The ship may assist in copying data and reports insofar as facilities allow. Metadata describing data collected during FOCI, SEBSCC, and NPMR cruises must be submitted to the Bering Sea Ecosystem Biophysical Metadatabase within one month of completion of the cruise. On-line guidance and submission forms are available through the World Wide Web at http://www.pmel.noaa.gov/bering/mdb/. Alternately, forms may be requested from the FOCI Coordinator.

4.1.1: The Chief Scientist will ensure that all stations, deployments, etc. are entered into the FOCI Cruise Operations Database.

4.1.2: Individuals in charge of supplementary ("piggyback") projects conducted during the cruise have the same responsibilities for their project's data as the Chief Scientist has for primary project data. All requests for data should be made through the Chief Scientist.

4.1.3: The Commanding Officer is responsible for all data collected for fleet ancillary projects until those data have been transferred to the project's principal investigators or their designees. Data transfers will be documented on NOAA Form 61-29. Copies of fleet ancillary project data will be provided to the Chief Scientist when requested. Reporting and sending copies of fleet ancillary project data to NESDIS (ROSCOP) is the responsibility of the program office sponsoring those projects.

4.2 Pre- and post-cruise meetings: All scientific personnel will meet with ship's representatives in a pre-cruise meeting the day of departure to discuss scientific objectives, operations, safety and Standing Orders. A post-cruise meeting will be scheduled between the Chief Scientist and Commanding Officer for a convenient time at the end of the cruise. Project accomplishments will be reviewed, as will general aspects of ship's performance and any administrative issues.

4.3 Ship operation evaluation report: Reporting requirements for the Shipboard Operations Evaluation Form, to be completed and submitted by the Chief Scientist to the Office of Marine and Aviation Operations (OMAO) within 30 days of cruise completion, will also be reviewed.

5.0 ADDITIONAL PROJECTS

Any additional work will be subordinate to the primary project and will be accomplished only with the concurrence of the Commanding Officer and the Chief Scientist(s).

5.1 Supplementary ("Piggyback") projects:

Underway Measurements in support of Global Carbon Cycle Research (GCC)

A1. Request:
As part of the ongoing research to quantify the CO2 uptake by the world's oceans we have installed underway systems on BROWN. On many cruises we request bunk space for one scientist of our laboratories to maintain the many systems outlined below. If we cannot send a dedicated person we try to have a scientist of the specific scientific party look after the Underway pCO2 system (described in section A4 below). On some cruises we are unsuccessful in attracting a volunteer and would like to use the services of the survey technician for the Underway pCO2 system only. After initial start-up, which requires about one hour of monitoring, the system needs checking twice a day requiring a total of about 20-minutes. We would also request weekly data downloads and transmission such that we can perform on shore near-real-time quality control to assess if the instrument is operating satisfactorily. All costs of the email transmissions and survey technician overtime would be covered by AOML. The chief survey technician, J. Shannahoff, has operated the instrument before with good results. In the event of system malfunction that cannot be easily repaired, we will ask Mr. Shannahoff to shut the system down. The shoreside leader of the effort, Mr. Robert Castle has interacted closely with J. Shannahoff and feels that this arrangement would work well.

A2. Introduction:
The underway sensors on RHB will be used in support of the objectives of the Global Carbon Cycle Research (GCC) to quantify the uptake of carbon by the world's ocean and to understand the bio-geochemical mechanisms responsible for variations of partial pressure of CO2 in surface water (pCO2). This work is a collaborative effort between the CO2 groups at AOML and PMEL.

Principal investigators:

Dr Rik Wanninkhof	305-361-4379	wanninkhof@aoml.noaa.gov	AOML
Dr. Richard Feely	206-526-6214	feely@pmel.noaa.gov	PMEL

The semi-automated instruments are installed on a permanent basis in the hydrolab of RHB and are operated by personnel from AOML and PMEL. All work is performed on a not-to-interfere basis and does not introduce any added ship logistic requirements other than the continuous operation of the bow water pump and thermosalinograph. This effort requires one permanent berth for the operator of the systems. The instrumentation is comprised of an underway system to measure pCO2, a SOMMA (single operator multi-parameter metabolic analyzer)-coulometer system to measure total dissolved inorganic carbon, a Turner Designs fluorometer, and a YSI oxygen probe. An oxygen titrator and stand-alone fluorometer will be used to calibrate the underway oxygen and fluorometer, respectively. All the instruments are set up along the port side wall and aft bench in the hydrolab.

A3. Rationale:
Current estimates of anthropogenic CO2 uptake by the oceans range from 1 to 2.8 Gigatons per year. The CO2 fluxes between air and water are poorly constrained because of lack of seasonal and geographic coverage of delta pCO2 (the air-water disequilibrium) values and incomplete understanding of factors controlling the air-sea exchange of carbon dioxide. Seasonal and temporal coverage can be increased dramatically by deploying pCO2 analyzers on ships.

The effort on RHB is expanded beyond the historical scope of the underway programs by incorporating additional sensors to improve our understanding of the factors controlling pCO2 levels.

A4. Sensor Suite and Maintenance:
A. Underway pCO2 system
This system consists of a large (40-liter) air-water equilibrator requiring an unobstructed drain at floor level for the 15 L/min outflow, an infrared analyzer with valves and flow meters, and a computer controlling the operating sequence and which also logs the data. The underway pCO2 system is an integrated package for measurement of pCO2 in air and water and support sensors necessary to reduce the data (such as equilibrator temperature, location, salinity, sea surface temperature and barometric pressure). This system is an upgrade from the initial systems and requires routine checks at 6-12 hour intervals, including logging of mercury thermometers in the equilibrator.

B. Oxygen sensor
This is a compact pulsed electrode unit, which also contains a temperature sensor. This is a new sensor built by Dr. Langdon at LDEO. Water requirement is 2-Liter/minute with a bench top drain. One foot of bench space is required. During this cruise the data will be validated against samples taken four time a day and analyzed by potentiometric winkler titrations

C. Turner Designs Fluorometer
This instrument, which was jointly purchased by AOML and MOC-Atlantic for BALDRIGE, requires a water throughput of about 5 L/min. Periodic cleaning of the flow through cell (2-14 days) is required . The signal of the fluorometer is logged on the shipboard SCS system or on the computer logging the underway pCO2 data. Aliquots of seawater are extracted twice per day and analyzed for chlorophyll and phaopigments on a separate fluorometer following routine procedures to calibrate the fluorometer signal. This information will be particularly useful to extrapolate the observations from the NASA SEAWIFS satellite to in situ pigment concentrations.

A5. Summary - Ship infrastructure support:
1. Continuous seawater supply: 20 lpm minimum, 40 lpm maximum for instruments, and 75 lpm throughput to assure short residence time of water in line and minimal heating.

2. Access to TSG and SCS data: Temperature at intake, salinity from TSG, fluorometer signal, wind speed (true and relative), wind direction (true and relative), time, latitude, longitude, and ship speed.

3. Bench space, hydrolab space, access to bow water line and drains.

Specific questions should be directed to:
Robert Castle, phone 305-361-4418, castle@aoml.noaa.gov

5.2 NOAA Fleet ancillary projects:
Ancillary tasks will be accomplished in accordance with the NOAA Fleet standing Ancillary Instructions.

6.0 HAZARDOUS MATERIALS

6.1 Policy/Compliance: *Ronald H. Brown* will operate in full compliance with all NOAA hazardous materials (HAZMAT) requirements. All hazardous materials and substances needed to carry out the objectives of the embarked science mission, including ancillary tasks, are the direct responsibility of the embarked designated Chief Scientist, whether or not that Chief Scientist is using them directly. The ship's Environmental Compliance Officer will work with the Chief Scientist to ensure that this management policy is properly executed.

6.1.1: All hazardous materials require a Material Safety Data Sheet (MSDS). Copies of all MSDSs shall be forwarded to the ship at least 60 days prior to sailing. The Chief Scientist shall have copies of each MSDS available when the hazardous materials are loaded aboard. HAZMAT for which the MSDS is not provided will not be loaded aboard.

6.1.2: The Chief Scientist will provide the Commanding Officer with an inventory indicating the amount of each hazardous material brought onboard, and for which the Chief Scientist is responsible. This inventory shall be updated at departure, accounting for the amount of material being removed, as well as the amount consumed in science operations and the amount being removed in the form of waste.

6.1.3: The ship's dedicated HAZMAT Locker contains two 45-gallon capacity flame cabinets and one 22-gallon capacity flame cabinet. All HAZMAT, except small amounts for ready use, must be stored in the HAZMAT Locker. If science party requirements exceed ship's storage capacity, excess HAZMAT must be stored in dedicated lockers meeting OSHA/NFPA standards to be provided by the science party.

6.1.4: The scientific party, under supervision of the Chief Scientist, shall be prepared to respond fully to emergencies involving spills of any mission HAZMAT. This includes providing properly trained personnel for response, as well as the necessary neutralizing chemicals and clean-up materials. Ship's personnel are not first responders and will act in a support role in the event of a spill. The Chief Scientist shall provide a list of science party members that are properly trained to respond in the event of a HAZMAT spill.

6.1.5: The Chief Scientist is directly responsible for the handling, both administrative and physical, of all scientific party hazardous wastes. No liquid wastes shall be introduced into the ship's drainage system. No solid waste material shall be placed in the ship's garbage.

6.1.6: The embarking Chief Scientist will work with the departing Chief Scientist and the ship's Environmental Compliance Officer to ensure proper tracking of inherited hazardous materials.

6.2 Inventory:

AFSC: Chemical Inventory

1 - 500 ml acetone
1 - 10 L 95% ethanol
1 - 20 L 37% formaldehyde
1 - 5 L hydrochloric acid
1 - 4 L methanol
1 - 300 g phenol
1 - 20 L saturated sodium borate solution
1 - 100 g sodium hydroxide
1 - 2.5 L sulfuric acid

***All chemicals will be over-packed for shipping.

Spill Clean-up Kit

gloves
goggles
formaldehyde respirator
Formalex (in a spray bottle)
FanPads
Polyform-F
Spill-X-A (for acid spills)
Spill-X-C (for base spills like sodium borate)
3M Sorbent Pads (for solvents)
dustpan and brush
garbage bags

*use Formalex, FanPads, or Polyform-f for formaldehyde spills
*use 3M Sorbent Pads for solvents
*use Spill-X-C for base spills such as sodium borate
*use Spill-X-A for acid spills

PMEL Chemical Inventory
Nutrient chemicals left on board Ron Brown after GASEX (Calvin Mordy)

Acetone (1x500 ml)
Ammonium Chloride (3 x 0.2g, 0.6g)
Ammonium Molybdate (28 x 2.3g, 26 x 10.8g, 345g total)
Antimony Potassium Tartrate (0)
Ascorbic Acid (12 x 5g, 9 x 17.6, 218g total)
Brij (250 ml)
Cadmium (20g)
Copper Sulfate (20g)
Dowfax (200 ml)
Hydrochloric Acid (2 x 2.5 liter, 5 liters total)
Imidazole (15 x 13.6g, 204g total)
N-1-Naphthylethylenediamine Dihydrochloride (15 x 1g, 15 g total)
Oxalic Acid (15 x 50g, 750g total)
Phenol (18g)
Potassium Nitrate (0)
Potassium Phosphate (0)
Sodium Citrate (140g x 2, 280g total)
Sodium Fluorosilicate (4 x 0.4 g, 1.5 g total)
Sodium Hydroxide (25g)
Sodium Nitrite (2 x .1g, 0.2g)
Sodium Nitroprusside (3 x 0.5 g, 1.5 g total)
Stannous Chloride (0)
Sulfanilamide (14 x 10g, 140g)
Sulfuric Acid (2 x 500 ml, 1 liter total)
Tartaric Acid (0)

PMEL Spill Clean up Equipment:
4-40lb bags of dri-zorb: This product is for use in absorbing all hazardous liquids except: hot or concentrated nitric acid and perchloric acids, fuming sulfuric acid at 60ºC (140ºF) or above and liquid chlorine. This is an all-natural corncob product that is particularly useful as an alternative to clay when disposal methods dictate your absorbent medium. Dri-Zorb® has 98.4% less residual ash than clay and adds BTU value. It absorbs 10-15 gallons liquid per 40 lb. bag. We have 4 bags so this should be sufficient for 40-60 gallons of liquid.

1- 30 gal. drum. - blue, poly
1- 20 gal. drum - blue, poly
6- 5 gal pails - white, plastic + covers
6- 2 gal pails - white, plastic + covers
6- 1 gal pails - white, plastic + covers

-polyethylene drums of various sizes to store the sorbent (and spilled material) until the ship is at a pier where they can turn over the hazardous waste to qualified waste haulers.
5 to 10- five gallon pails,
2-3- 15 gallon pails,
1-2- 30 gallon pails.
1 small pail lid opener
1- Portable Mercury Kit
3- Anti static Scoops - 1 quart

Personal Protective Equipment:

4- R95 respirator (dust masks) for nuisance level acid gas relief
4- R95 respirator (dust masks) for nuisance level organic vapor
3- XL Tyvek Body coverall
2- Medium Tyvek body coverall
10- Large Silvershield Gloves
100- Large "Touch n Tuff" Nitrile Gloves
3- Stealth Teal Frame Uvex Goggles

The spill response kit provided by PMEL will be used in the event of a chemical spill. This kit is located in the aft part of the forward science stores. Some of the spill response equipment is stored in the drums to protect it.

6.3 Material Safety Data Sheets (MSDS): Have been sent to ship

7.0 Radioactive Isotopes

There will be no radioactive isotope work on this cruise

8.0 MISCELLANEOUS

8.1 Scientific Berthing: The Chief Scientist is responsible for assigning berthing for the scientific party within the spaces approved as dedicated scientific berthing. The Ops Officer will send stateroom diagrams to the Chief Scientist showing authorized berthing spaces. The Chief Scientist is responsible for returning the scientific berthing spaces in the condition in which they were received; for stripping bedding and for linen return; and for the return of any room keys that were issued. Only one set of linens/towels will be provided to embarked personnel; the scientific complement is responsible for laundering their linens and towels during the cruise.

8.1.1: The Chief Scientist is responsible for the cleanliness of the laboratory spaces, berthing spaces, and storage areas used by the science party, both during the cruise and at its conclusion prior to departing the ship.

8.1.2: In accordance with NC Instruction 5355.0 dated 16 August 1985, and other guidance regarding controlled substances aboard NOAA Vessels, all personnel boarding NOAA vessels give implied consent to conform with all safety and security policies and regulations which are administered by the Commanding Officer. All spaces and equipment on the vessel are subject to inspection or search at any time.

8.2 Medical Forms: The *NOAA Health Services Questionnaire* must be completed in advance by each participating scientist. It should reach the ship no later than 4 weeks prior to the cruise to allow time to medically clear the individual, to request more information if needed, and to prepare for special circumstances. In order to ensure that all NHSQs are reviewed in a timely manner, medical forms, which have not reached the ship prior to the 4-week deadline (i.e. scientist added late), should either be faxed or emailed to the ship, or sent to MOC Health services for review. All personnel are required to meet the NOAA Physical/Health Standard as specified in the NOAA Fleet Medical Policy Manual. If there are any questions about eligibility, individuals can directly contact RHB'S medical officer (e-mail: Medical.Ronald.Brown@noaa.gov) or MOC Health services office. All personnel must bring with them prescription and routine over-the-counter medication (i.e. an aspirin a day). Supplies on board are limited, and chances to restock are few.

8.2.1 Emergency Contacts: Prior to departure, the Chief Scientist must provide a listing of emergency contacts to the Executive Officer for all members of the scientific party, with the following information: scientist's name, emergency contact's name, address, relationship to scientist, telephone number and e-mail address (if available).

8.3 Shipboard Safety: Wearing open-toed footwear or shoes that do not completely enclose the foot (such as sandals or clogs) outside of private berthing areas is not permitted. Steel-toed shoes are required to participate in any work dealing with suspended loads, including CTD deployment and recovery. Hard hats are also required. The Chief Scientist is responsible for the scientific party's compliance with these regulations

8.4 Communications: The Chief Scientist or designated representative will have access to ship's telecommunications systems. Where possible, it is requested that direct payment (e.g. by credit card) be used as opposed to after-the-fact reimbursement. Specific information on how to contact NOAA Ship Ron*ald H. Brown* and all other fleet vessels can be found at http://www.moc.noaa.gov/phone.htm.

8.4.1 E-mail Policy: The shipboard electronics staff will establish an e-mail account for all embarked personnel. Due to the escalating volume of e-mail and its associated transmission costs, each member of the ship's complement, crew and scientist, will be authorized to send/receive up to $45/month of email at no cost. The individual must reimburse e-mail costs accrued in excess of this amount. At or near the end of the cruise, the Commanding Officer will provide the Chief Scientist with a detailed billing statement for all members of the scientific party with established email accounts. Prior to departure, the Chief Scientist will be responsible for obtaining reimbursement from any member of the scientific party whose e-mail costs have exceeded the complimentary amount.

It should be understood that the cost of personal e-mail being transmitted from shore to an individual aboard ship will be charged against that individual's complimentary amount. A detailed billing statement will be issued periodically to any individual or Chief Scientist whose costs have exceeded his or her group's monthly entitlement. All costs in excess of an individual's or group's complimentary amount must be reimbursed. When personal use cannot be easily distinguished from official business, the amount of reimbursement will equal the total cost minus the complimentary amount. All embarked personnel (if they so desire) will have an e-mail account/address established in his/her name by the Lead Electronic Technician (LET) at the time of arrival. The general format is:

Firstname_Lastname%BROWN@ccmail.rdc.noaa.gov

8.4.2 Satellite Communications: Standing Order 9.21-2: INMARSAT-A (voice and fax) and INMARSAT-M (voice) communications are available aboard ship and may be used for personal or business related calls so long as the caller makes arrangements to pay for the calls via credit card or by calling collect. INMARSAT calls can be extremely expensive and the exact cost may not be known until you receive your bill. Brevity is encouraged. See the Lead Electronic Technician (LET) for any questions regarding the use of these phones.

8.4.2.1 Ship Phone Services: Standing Order 9.21-3: Routine incoming non-emergency phone calls are discouraged. Use e-mail communications for this purpose. In an emergency, embarked personnel can be contacted by phone. Phone numbers for NOAA Ship Ronald H. Brown can be found at http://www.moc.noaa.gov/phone.htm#RB.

8.4.2.2 INMARSAT-A: For high-speed data transmission, including FTP, and high quality voice telephone communications. Costs range from $5-$11 per minute for use of the service, and may be charged to credit card or called collect.

8.4.2.3 INMARSAT MINI-M: For voice telephone communications and 2400 baud data transfer. Cost is about $3 per minute to the US and may be charged to credit card or called collect. Mini-M coverage is by spot beam and may not be available in all the areas the ship may be working in.

8.4.2.4 Messages: can also be left with the Marine Operations Center-Pacific. After hours and on weekends and holidays, an answering service will relay a message to the appropriate duty officer.

8.4.3 Ship's Mail: Standing Order 9.22: Incoming letters and packages can be sent to embarked members of the ship's operating crew and scientific complement by addressing them to:

Name
NOAA Ship RONALD H. BROWN
Marine Operations Center-Pacific
1801 Fairview Ave. E.
Seattle, WA 98102

Mail received at the marine center will be periodically forwarded to the ship's next port of call. When the ship is on a foreign deployment, senders are encouraged to mail letters and packages earlier to ensure delivery. Be advised that some foreign customs authorities routinely open and inspect incoming mail. Arrangements for ship's outgoing mail will be made on the morning of departure. In foreign ports, mail must have US postage affixed as it will be boxed and overnight-expressed to the Marine Operations Center-Pacific where it will enter the US postal system. US postage stamps are not routinely available aboard ship.

8.5 Port Agent Services/Billing: Contractual agreements exist between the port agents and the commanding officer for services provided to NOAA Ship *Ronald H. Brown*. The costs for any services arranged through the ship's agents by the scientific program, which are considered to be outside the scope of the agent/ship support agreement, will be the responsibility of that program. Direct payment is to be arranged between the science party and port agent.

8.6 Wage Marine Dayworker Working Hours and Rest: Chief Scientist shall be cognizant of the reduced capability of *Ronald H. Brown*'s operating crew to support 24-hour mission activities with a high tempo of deck and survey department operations at all hours. Wage marine employees are subject to negotiated work rules contained in the applicable collective bargaining agreement. Dayworkers' hours of duty are a continuous eight-hour period, beginning no earlier than 0600 and ending no later than 1800. It is not permissible to separate such an employee's workday into several short work periods with interspersed non-work periods. Dayworkers called out to work between the hours of 0000 and 0600 are entitled to a rest period of one hour for each such hour worked. Such rest periods begin at 0800 and will result in no dayworkers being available to support science operations until the rest period has been observed. All wage marine employees are supervised and assigned work only by the Commanding Officer or designee. The Chief Scientist and the Commanding Officer shall consult regularly to ensure that the shipboard resources available to support the embarked mission are utilized safely, efficiently and with due economy.

9.0 APPENDICES

9.1 Equipment Inventory

PMEL/AFSC

- Sea-Bird 911-plus CTD system including underwater CTD with twin temperature and conductivity sensors (plus spares), fluorometer, beam transmissometer, PAR sensor, 12-bottle rosette, pinger, weights, deck unit, PC with Seasoft software
- Benthos Altimeter for CTD,
- 18 Niskan bottles (10-l)
- Salinity sample bottles
- 10 bottles of IAPSO water,
- 16 Argos-trackeddrifters to be deployed,
- Miscellaneous scientific sampling and processing equipment,
- Flow-Through CO2 and NO3 sensors.
- Discrete Sample Data Base software and forms,
- Auto-analyzer for nutrients (Calvin Mordy's, already on board,
- Polyethylene water sampling bottles for nutrients,
- CalVET nets
- MARMAP nets
  Frame for MARMAP nets
- SeaCat for MARMAP nets
- Sample bottles for biological samples
- PC computer for data logging,
- Profiling ac-9 absorption/attenuation meter
- Filter rigs
- Various laptop computers
- Networked Macintosh computer with WordPerfect, Word, Excel and eXodus,
- Networked Unix computer with EPIC and Ferret,
- Networked PC computer for processing CTD data,
- PC computer for AFSC sample database,
- Consumables (i.e. data storage media, printer supplies, paper, pens, pencils, etc.)
- 4 Float Coats
- Steel-toed boots

9.2 Operating Area

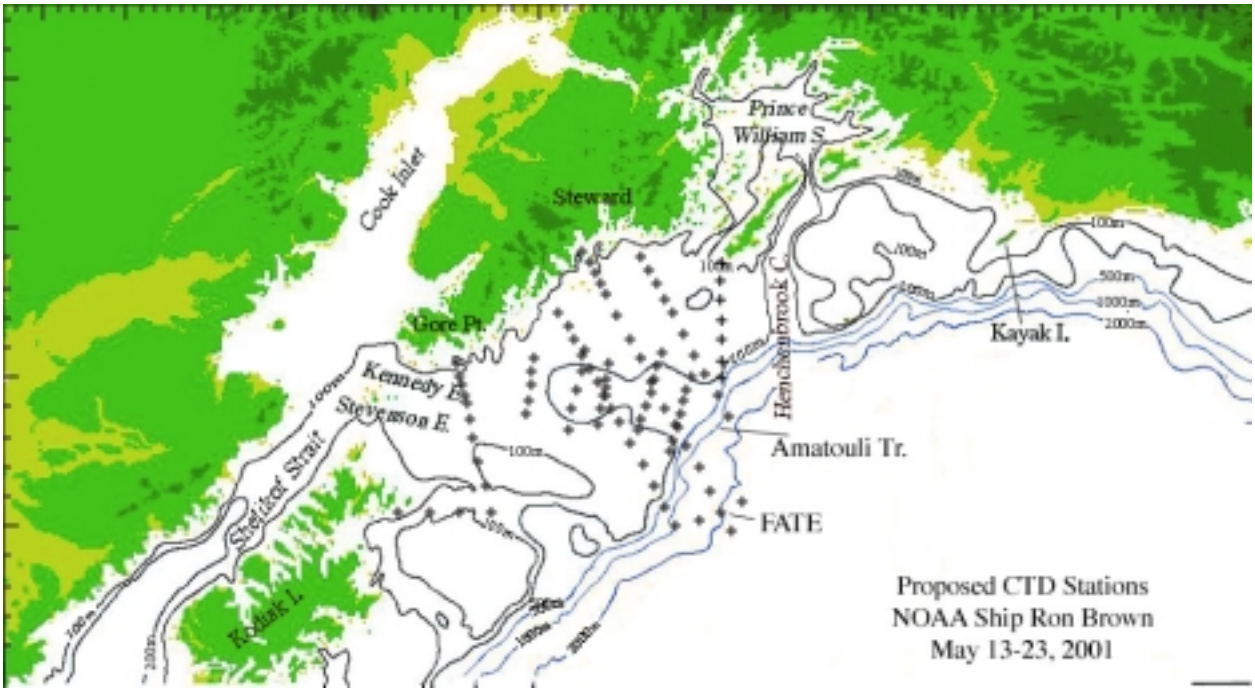

Figure 1. Map with lines of proposed CTD stations as of March 30, 2001. These do not include station of the Eddy Study, which will be ascertained immediately prior to and during the cruise.