

CRUISE REPORT

Cruise Number: KM0309-Leg 2

FOCI Number: 2KM03

Ship: R/V KILO MOANA

Area of Operations: Gulf of Alaska

Kodiak, AK – APRIL 29, 2003

SEWARD, AK (touch and go) – May 11, 2003

KODIAK, AK – May 18, 2003

Participating Organizations:

NOAA Pacific Marine Environmental Laboratory

Alaska Fisheries Science Center

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Objectives of Cruise:

FOCI's goal is to understand the effects of abiotic and biotic variability on ecosystems of the North Pacific Ocean and Bering Sea in order 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 the Steller Sea Lion Research Programs, FOCI base, and United States Global Ocean Ecosystems Dynamics (U.S. GLOBEC).

This cruise was undertaken by FOCI to support research into the physical, chemical, and biological mechanisms acting in the coastal Gulf of Alaska. Most of this second leg consisted of closely spaced CTD stations with MARMAP bongo tows at approximately one-third of them. From April 29 to May 11 we were focusing on the transport of nutrients and fish larvae up the troughs that incise the continental shelf between Kodiak Island and Seward AK. We occupied

multiple transects across Chiniak, Stevenson and Amatuli Troughs. We also spent 1.5 days occupying transects north and east of Afognak Island to measure the transport of the Alaskan Coastal Current and the mixing that takes place in Kennedy and Stevenson Entrances. May 12-15 was spent investigating one of the warm-core eddies that often impinge on the CGOA in spring and summer. Our experiment involved deployment of four ARGOS satellite tracked drifters and 30 CTD/Bongo stations to depths of 2000-4000m with water samples to characterize the relationships between temperature, salinity, nutrients and chlorophyll within the eddy, and to measure the transport within the eddy and at the leading edge, if it was impacting the slope south of Seward, AK

Summary of Cruise:

R/V KILO MOANA departed Kodiak, AK at 12:30 on April 29, 2003 on the high tide. To study water properties we made CTD measurements with dual temperature and conductivity sensors, with attached PAR and fluorescence sensors. We sampled for chlorophyll and nutrients. At approximately one-third of the stations before May 11, MARMAP bongo tows with 0.505mm mesh nets were made to sample for larval fish and zooplankton. During the eddy study another 9 tows were made. Surface water samples were taken at 11 stations and preserved with Lugol's solution for later examination of protists species by Dr. Evelyn Lessard, one of the GLOBEC scientists. Maps of the CTD stations are shown in [Fig 1](#) and [2](#). Stations with Bongos are shown in [Fig 3](#).

After departing Kodiak, the ship proceeded northward to occupy four transects (AP, GP, KE and SE), which together with Afognak Island and a portion of the Kenai Peninsula form a box of stations east and north of Kodiak Island. Data from these lines should permit us to calculate the transport of the Alaskan Coastal Current, as well as understand the mixing processes and water properties occurring in Kennedy and Stevenson Entrances.

Next we proceeded south to the mouth of Chiniak Trough to occupy stations across a series of troughs of different sizes that cut across this continental shelf and act as conduits for nutrients to the shelf and for larval fish to move from the slope to nursery areas near the coast. We sampled three transects across Chiniak Trough (CBA, CBB, CBC), then one across an extension going between Cape Chiniak (CC) and Northern Albatross Bank, then another across the upper extension of Stevenson Trough Bank (UST). Next we occupied four lines of stations across the main part of Stevenson Trough (STD, STC, STB, and STA). During this time fluorescence values were relatively low and nutrient concentrations high.

Four casts were done on the transit to the first Amatuli Trough line (ATB). Pods of orcas were observed in this area. Some of them were in pursuit of a fin whale. At least one baby orca was seen among them.

Two lines of stations across Amatuli trough (ATB and ATD lines) were occupied three times each to observe the effect of tides on the cross-trough hydrography. MARMAP tows were made on the first ATB and the second ATD transects. At the end of the third transit of ATD, operations were suspended for almost 20 hours due to storm and wave conditions. Therefore, the ATE line was occupied only once.

After that, a line of stations (KCW) parallel to the Kenai coast was occupied to help understand the difference in physical/chemical/biological processes between higher and lower surface chlorophyll zones that persist across this region in summer. This was done in support of the U.S. GLOBEC/NCEP scientists aboard R/V ALPHA HELIX, who were occupying a subset of stations on the Seward Line. The position of our transect was chosen in coordination with Dave Musgrave who was surveying with a SeaSOAR aboard R/V WECOMA, and from SeaWiFS images provided by other scientists on land. At the end of the KCW line, KILO MOANA made a touch-and-go in Seward, AK to disembark four of the scientists aboard.

En route to our next work, we stopped at Hinchinbrook Canyon, where one CTD with protist sampling was done for Dr. Evelyn Lessard, as well as a MARMAP tow for scientists at AFSC.

The next four days were spent occupying two transects of stations (ENS and EEW) across one of the warm-core eddies that regularly impinge on the shelf in this region. At this time it was off the continental slope, centered south of Middleton Island. Its diameter was approximately 200km. The location of the eddy was found from the sea surface altimetry analysis results distributed by Colorado Center for Astrodynamic Research at:

http://www-ccar.colorado.edu/~realtime/global-real-time_ssh/

The results of the first transect from north to south allowed refinement of the location of the east to west transect. Since the eddy appeared to be moving westward, we extended our sampling westward, up the slope to the shelf south of Amatuli Trough, ending the line at the southern end of the ATB line. Crossing the eddy, we saw few seabirds, and low surface fluorescence at stations on the eastern edge, and once again on the western side (in ~2000m depth) numerous jellyfish up ~0.5m in diameter were observed. They were not noticed at the stations in between. Weather was excellent for the duration of the eddy experiment.

We ended the cruise by returning to the box of 28 stations north and east of Afognak Island.

KILO MOANA returned to Kodiak at 9:00 A.M. on 18 May 2003.

Table 1: Summary of Operations:

Operations	# Events
60cm bongo (60Bon) (0.505mm)	67
Seabird SeaCat CTD (CAT)	63
CTD with bottle samples (CTD)	243
Deployment of satellite buoy (SatBuoy)	4
Bathymetry Data	~2000mi
Multiscan Hydrosweep Bathymetry	2000mi

Table 2: Samples Collected

	Number
SeaBird CTD (CTD casts)	243
SeaBird SeaCat CTD (CAT)	63
Extracted chlorophyll (Chlor)	~1600
Stimulated fluorescence collected during CTD casts (Fluor)	all
Microzooplankton samples preserved in Lugol's solution (MZ)	12
Photosynthetically Active Radiation data during CTD casts (PAR)	211
Quantitative tow preserved in formalin (QTowF)	67
Water samples for nutrient analyses	~2500

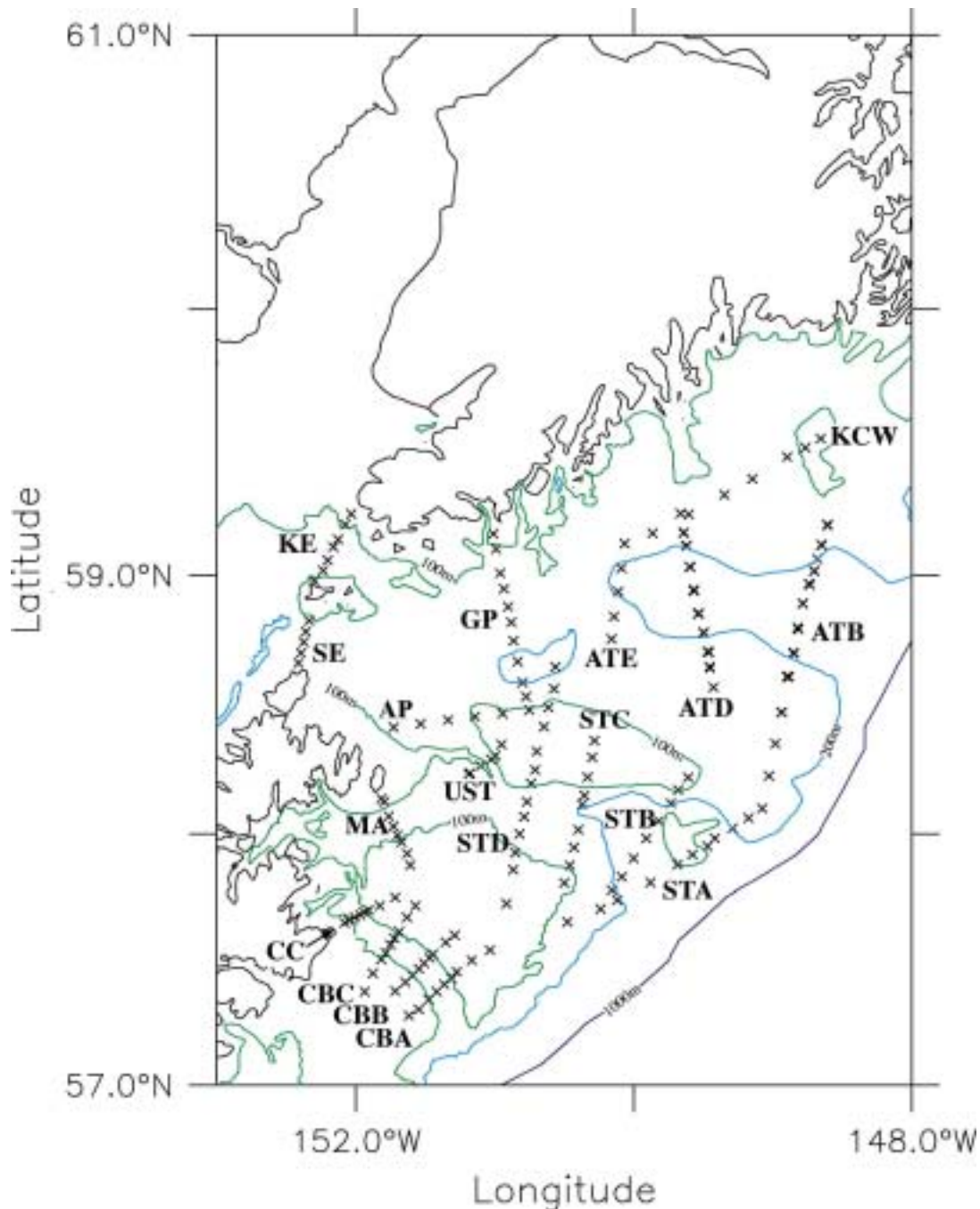


Figure 1- Map of CTD lines and stations for KM0309b for April 29- May 11, 2003. Line AP crosses between Afognak Island and Portlock Bank. GP is the Gore Point line. SE and KE cross Stevenson and Kennedy Entrances, respectively. Lines CBA, CBB, and CBC cross Chiniak Trough, while line CC runs from Cape Chiniak to Albatross Bank. Line MA runs from Marmot Island to Albatross Bank and is at the western end of Stevenson Trough. Line UST crosses an upper branch of Stevenson Trough. STA, STB, STC, and STD traverse the main portion of Stevenson Trough. Lines ATB, ATD and ATE cross Amatuli Trough. ATB and ATD were occupied three times each, only once with bongo stations. KWC is a line of stations intended to sample differences in chlorophyll concentrations along the Kenai Shelf.

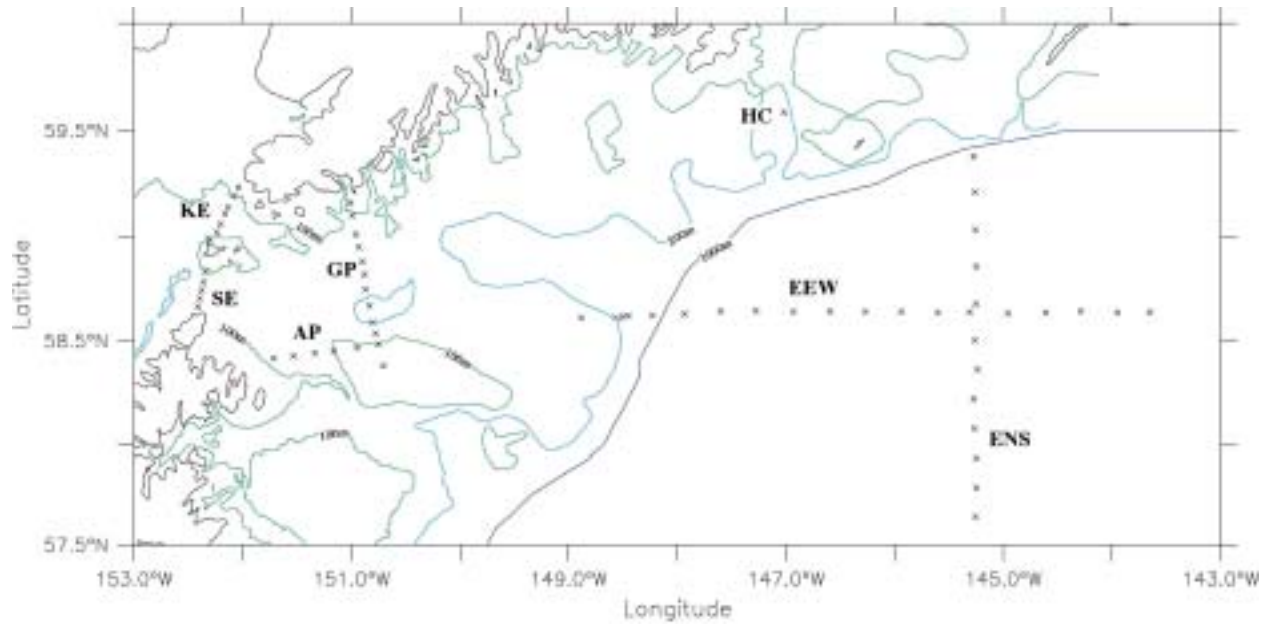


Figure 2- Station map for CTDs taken 11 –18 May 2003. One station was occupied in Hinchinbrooke Canyon. Then, two transects ENS and EEW sampled a warm core eddy from north to south and then east to west. The center of the eddy was on the EEW line, approximately 15 km west of the ENS line. Lines SE and KE cross Stevenson and Kennedy Entrances, respectively. GP is the Gore Point line. AP crosses between Afognak Island and Portlock Bank.

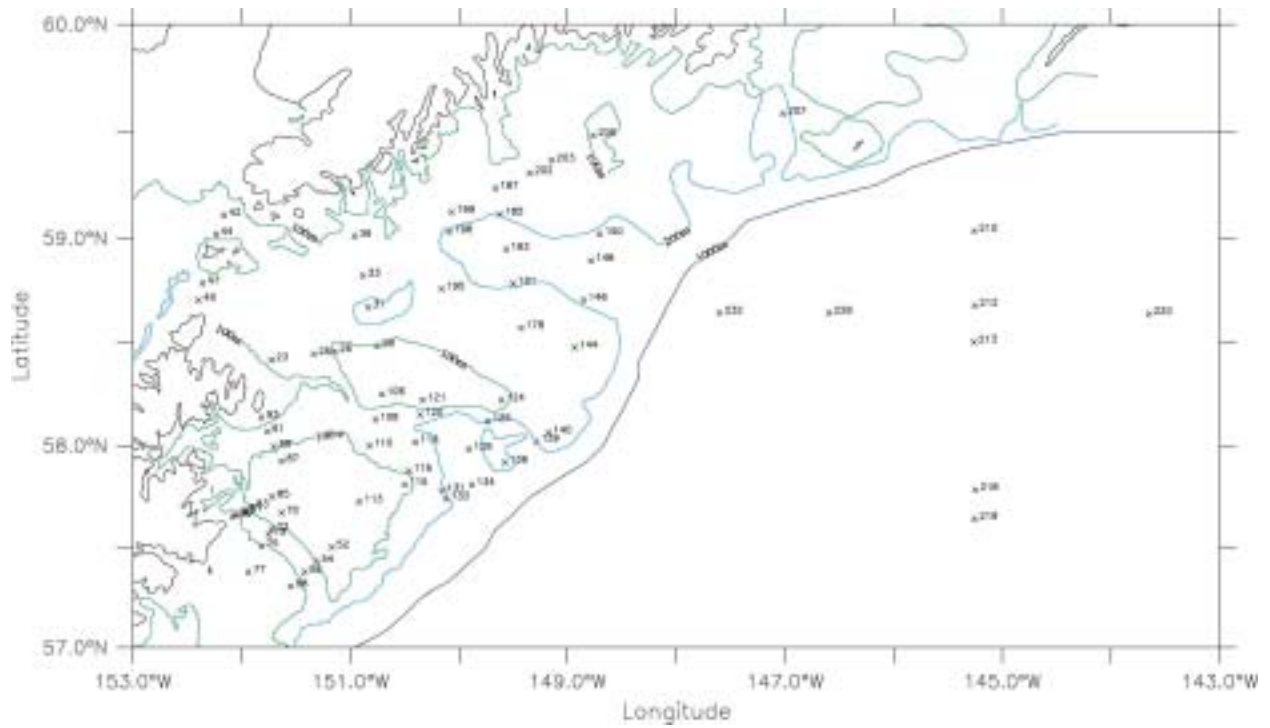


Figure 3- CTD stations with MARMAP bongo tows conducted between April 30 and May 16, 2003.

Table 1- [Event log for R/V KILO MOANA cruise KM0309](#)