



EX-09-04

Water Column Exploration Field Trial I

Gorda Ridge and Blanco Fracture Zone

CRUISE INSTRUCTIONS

NOAA Ship *Okeanos Explorer*
June 1 – June 12, 2009

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NOAA Office of Oceanic and Atmospheric Research

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NOAA Office of Marine and Aviation Operations

1 CRUISE INSTRUCTIONS

1.1 Cruise Title: Water Column Exploration Field Trial I

1.2 Cruise Number: EX-09-04

1.3 Cruise Dates

1.3.1 Departure: June 1, 2009, Depart San Francisco, CA

1.3.2 Arrival: June 12, 2009, Arrive Newport, OR

1.4 Operating Area

The principal operating area is the axial valley and west flank of the Gorda Ridge, a spreading center off the coast of Oregon and California. Depending on available time, further mapping and CTD operations will be conducted along the Blanco Fracture Zone and the eastern flank of the Juan de Fuca Ridge.

2 CRUISE OVERVIEW

2.1 Background

This cruise is a water column exploration field trial cruise, designed to test and refine operations for conducting water column exploration using NOAA Ship *Okeanos Explorer* (EX) systems and sensors.

In August 2008, NOAA Commissioned the EX as “America’s Ship for Ocean Exploration”. The EX is America’s first ship dedicated solely to ocean exploration and discovery. The ship carries cutting-edge technology that will enable explorers at sea and at Exploration Command Centers ashore to investigate the unknown and poorly understood ocean and its phenomena. Exciting new discoveries will be shared live through the Internet with everyone from top government policymakers to students learning about the mysterious ocean. The EX is a partnership program of exploration with NOAA’s Office of Ocean Exploration and Research (OER) and NOAA’s Office of Marine and Aviation Operations (OMAO) to systematically explore the world ocean.

Following Commissioning, the EX began a period of shakedown and field trials cruises. Field trial cruises are designed to refine operations, standard operating procedures, training, and utilization of ship systems and personnel in different defined modes of exploration. This cruise is a continuation of the field trial period.

2.2 Goals and Objectives

The goals of this field trial cruise are more operational than exploratory. Like other field trials, this cruise has primary and secondary goals and objectives. Completion of primary goals and objectives will make the cruise a success. Following are the primary and secondary goals and objectives of this cruise:

2.2.1 Primary Goal: Test and evaluate EX, systems and sensors for water column exploration capabilities.

2.2.1.1 Exercise the CTD rosette in vertical station casts and Tow-yos to establish and refine SOPs, deploy and recover equipment, utilize and evaluate laboratory and computer processes.

Tow-yos are designed to detect anomalies in the water column over a larger area than a station cast. Tow-yos involve deployment of the CTD package over the starboard side using the J-Frame; towing the package at slow speed (1.5 kts); continuously slowly raising and lowering the package through the water column in a straight line to generate a transect across a target on the bottom through sensor data and water sample collection and analysis. There will be 12 hours of CTD operations during the day, depending on weather conditions.

2.2.1.2 Utilize the EM-302 Multibeam mapping system to test and evaluate system efficacy, SOPs, and processing capability for collecting water column data.

The EM-302 has proven capable of collecting bottom feature and water column data. New tools are being developed to analyze and visualize water column data. Mapping sensors will continuously collect data. Processing will occur when CTD operations are not occurring. New tools will be tested and evaluated for value in collecting water column data.

2.2.1.3 Evaluate onboard capabilities for processing and storing water column samples collected during CTD operations and evaluate sample pipeline.

The remotely triggered rosette and bottle system of the CTD package has proven fully functional for collecting water samples. The onboard processing and storage capabilities have yet to be tested and evaluated. Samples collected during station casts and Tow-yos will be minimally processed and stored. Sample pipeline will be evaluated to ensure broad public access. Samples will be returned to PMEL for analysis and data will be provided to the public archives without proprietary rights.

2.2.1.4 Learn how to recognize normal features and anomalies in the water column

The primary mission of the EX is exploration and discovery. How a discovery is made and determined varies. Through continuous water column and mapping data collection and analysis, the EX team will attempt to evaluate applications, systems, sensors, and results to learn how to distinguish normal or expected features from anomalies.

2.2.1.5 Continue testing and calibrating the shipboard USBL ROV Tracking System to prepare for future ROV operations.

The EX will be equipped with an integrated and dedicated two-body ROV system. Tracking the ROV system when deployed requires the shipboard Ultra Short BaseLine (USBL) acoustic tracking system to be in good working order. A recent calibration operation in Puget Sound, Washington, identified problems with the tracking system. Personnel require two days to conduct additional testing and calibration of the USBL system. Personnel will work in the front row of the ROV control room training on, testing, troubleshooting, calibrating and evaluating the USBL system and SOPs.

2.2.2 Secondary Goal: Continue preparations, training, testing and evaluating of other EX systems and sensors.

2.2.2.1 Test data management pipeline components and systems:

NCDDC is developing for OER an integrated Cruise Information Management System (CIMS) for real-time metadata generation from collected data. CIMS is designed to integrate with OMAO Scientific Computing System (SCS). Testing of this integration remains incomplete. NCDDC personnel will test CIMS handling of multibeam data, CTD sensor data, seawater flowthrough system sensor data and other appropriate sensor data. Personnel will work in the dry lab, rack room and available computers to refine CIMS and SCS.

2.3 Participating Organizations

NOAA – Office of Ocean Exploration and Research (OER)
1315 East-West Hwy, Silver Spring, Maryland 20910

NOAA – Olympic Coast National Marine Sanctuary (OCNMS)
115 East Railroad Ave Suite 301, Port Angeles, WA 98362

NOAA – Pacific Marine Environmental Laboratory (PMEL)
7600 Sand Point Way N.E., Seattle, Washington 98115-6439

NOAA – Pacific Marine Environmental Lab/Vents (Vents)
2115 SE OSU Drive, Newport, OR 97365

NOAA – National Coastal Data Development Center (NCDDC)
Building 1100, Suite 101, Stennis Space Center, MS 39529

NOAA – Office of Marine and Aviation Operations (OMAO)
8403 Colesville Road, Suite 500, Silver Spring Maryland 20910

UNH – University of New Hampshire, Center for Coastal and Ocean Mapping (CCOM)
Jere A. Chase Ocean Engineering Lab, 24 Colovos Road, Durham, NH 03824 USA

3 PERSONNEL

All embarking personnel are required to arrive at and report to the ship no later than 24-hours prior to the scheduled departure time. Personnel embarking via small boat are required to arrive at the originating city no later than 24-hours prior to the scheduled small boat departure time. Personnel shall depart their origin leaving sufficient time to allow for travel delays.

The EX may carry out 24-hour water column exploration operations during some portions of this cruise. Water column exploration may include up to 12-hours of CTD (station casts and tow-yo's) operations during daylight hours and up to 12-hours of mapping operations during nighttime hours. Watches will be defined at sea.

3.1 Onboard Personnel

Name	Affiliation	Role	Dates	M/F	Status
Martinez, Catalina	OER	Expedition Coordinator	1-Jun to 12-Jun	F	US
Walker, Sharon	PMEL	Lead, CTD	2-Jun to 12-Jun	F	US
Nadeau, Megan	OER	Mapping/CTD/Bridge Watchstander	1-Jun to 12-Jun	F	US
Greene, Ron	PMEL	Mapping/CTD	2-Jun to 12-Jun	M	US
Hill, P. Scott	NCDDC	Data Management	1-Jun to 12-Jun	M	US
Freeman, McKinley	NCDDC	Data Management	1-Jun to 12-Jun	M	US
Lovalvo, Dave	OER (2020)	Tracking Testing	1-Jun to 2-Jun	M	US
Wright, Dave	OER (EO)	Tracking Testing	1-Jun to 2-Jun	M	US
He, George	Linkquest	Tracking Testing	1-Jun to 2-Jun	M	Canadian Citizen

Organization Acronyms

OCNMS – NOAA Olympic Coast National Marine Sanctuary
OER – NOAA OAR Office of Ocean Exploration and Research
NCDDC – NOAA NESDIS National Coastal Data Development Center
UNH CCOM – University of New Hampshire Center for Coastal and Ocean Mapping
PMEL – NOAA OAR Pacific Marine Environmental Lab
OMAO – NOAA Office of Marine and Aviation Operations
ERT – ERT, Inc, a NOAA Contractor
2020 – 2020 LLC, a NOAA Contractor
EO – Eastern Oceanics, a NOAA Contractor
Linkquest – Linkquest (Tracking system vendor)

3.2 Remotely Participating Personnel

The following personnel will participate or be available to participate from shore via limited communications at Exploration Command Centers.

Name	Affiliation	Role	Dates	M/F	Status	ECC
Russell, Craig	OER	EX Senior Planner	1-Jun to 12-Jun	M	US	PMEL
McDonough, John	OER	Deputy Director	1-Jun to 12-Jun	M	US	SSMC
Malik, Mashkoor	OER	Mapping Lead	1-Jun to 12-Jun	M	US PR	UNH
Baker, Edward	PMEL	CTD	1-Jun to 12-Jun	M	US	PMEL
TBD	OMAO	SCS Programmer	1-Jun to 12-Jun	M	US	SSMC
McDonald, Emily	OER (2020)	Operations Support	1-Jun to 12-Jun	F	US	SSMC

US PR: US Permanent Resident

3.3 Foreign Nationals

See Section 7.2 for details regarding foreign nationals.

Catalina Martinez will sponsor Gang He while he is on board May 31 – June 2.

4 ADMINISTRATION

4.1 Ship's Location

The ship will be docked at Pier 27 in San Francisco starting May 26, 2009.

The ship will be docked in Newport, OR, starting June 12, 2009. Presumed pier is the OSU pier near Hatfield Marine Sciences Center.

4.2 Key Points of Contact

4.2.1 Ship Operations

Marine Operations Center, Atlantic (MOA)
439 West York Street
Norfolk, VA 23510-1145
Telephone:
Fax:

Chief, Operations Division, Atlantic
(MOA1)
CDR Keith Roberts

Marine Operations Center, Pacific (MOP)
1801 Fairview Avenue East
Seattle, WA 98102-3767
Telephone:
Fax:

Chief, Operations Division, Pacific
(MOP1)
CDR Mike Francisco

Telephone: 757-441-6842
E-mail: ChiefOps.MOA@noaa.gov

Telephone: 206-553-8705
Email: ChiefOps.MOP@noaa.gov

4.2.2 Mission Operations

Steven Hammond, Chief Scientist
NOAA Ocean Exploration & Research
Phone: 541-867-0183
E-mail:
Stephen.R.Hammond@noaa.gov

Catalina Martinez, Expedition
Coordinator
NOAA Ocean Exploration & Research
Phone: 401-330-9662
E-mail: Catalina.Martinez@noaa.gov

Nicola VerPlanck, Field Operations Officer
NOAA Ship *Okeanos Explorer*
Phone: 321-960-3726
E-mail: Nicola.Samuels@noaa.gov

4.2.3 Other Mission Contacts

Craig Russell, EX Senior Planner
NOAA Ocean Exploration & Research
(ERT, Inc.)
Phone: 206-526-2803 / 206-518-1068
E-mail: Craig.Russell@noaa.gov

John McDonough, Deputy Director
NOAA Ocean Exploration & Research
Phone: 301-734-1023 / 240-676-5206
E-mail: John.McDonough@noaa.gov

Mashkooor Malik, Physical Scientist
NOAA Ocean Exploration & Research
(ERT, Inc.)
Phone: 603-862-4332 / 603-377-6319
E-mail: mamalik@cisunix.unh.edu

4.3 Shipments

Shipments to be received by the ship prior to June 1, 2009 can be shipped to:

NOAA Ship Okeanos Explorer
c/o San Francisco Bay NERR
Romberg Tiburon Center- SFSU

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3152 Paradise Drive
Tiburon, CA 94920

NOTE: Send an email to the EX Ops Officer OPS.Explorer@noaa.gov indicating the size and number of items being shipped.

Shipments to be received by the ship after June 1, 2009 can be shipped to:

NOAA Ship *Okeanos Explorer*
OSU Ship Operations
2020 S.E. OSU Drive
Newport, OR 97365

4.4 Shipboard Meetings

Daily Operations Briefing meetings will be held at 1530 in the forward lounge to review the current day, and define operations, associated requirements and staffing needs for the following day. A Plan of the Day (POD) will be posted each evening for the next day in specified locations throughout the ship. A safety brief and overview of POD will occur on the Bridge each morning at 0800. Daily Situation Reports (SITREPS) will be posted as well and shared daily through e-mail and/or the EX PLONE site (<http://terra.gso.uri.edu/NOAAShipOkeanosExplorer>).

4.5 Medical Clearance

All personnel will satisfy NOAA Health and Safety requirements, completing and providing NHSQ and PPD (Tuberculosis test) test results 30 days prior to the cruise.

The revised NHSQ can be found at <http://www.oma.noaa.gov/medical.html>. Clearances are valid for 2 years for personnel under age 50 and 1 year for age 50 and over. All PPD's expire after one year from the date of administration.

Cruise participants will follow standard protocols described in the NHSQ, and will fax completed forms to CDR Pelkey as follows:

CDR Michelle Pelkey
Fax: 206-553-1112

5 OPERATIONS

Following is a description of the data to be collected including specific sensors or systems used; the operations implementation plan, including staging, conducting operations (on-station, underway) and de-staging, station or trackline geographic information, and any other operational requirements.

5.1 Data to be collected

As a field trial cruise, the primary data collected is evaluation and assessment information of operations, protocols, systems and processes. The secondary data collection objective is water column exploration data for Gorda and Blanco Ridges, USBL tracking data and sensor and SCS data to support ongoing development of the data management pipeline. Following is a list of sensor measurements that will be required to accomplish the primary and secondary objectives:

5.1.1 Primary Systems and Sensors

- Linkquest Tracklink 10000HA USBL Tracking System (USBL)
- Linkquest Tracklink Computer and Software
- Hypack Positioning Computer and Software
- Kongsberg Simard EM302 Multibeam Echosounder (MBES)
- Kongsberg Simrad EA600 Deepwater Echosounder
- Knudsen 320BR Sub-bottom profiler (SBP)
- LHM Sippican XBT (various probes)
- Seabird 911Plus CTD with LSS and ORP sensors
- Seabird 32 Carousel
- General Oceanics 2.5L water sampling bottles
- Altimeter [PROVIDED BY PMEL]
- CNAV GPS
- POS/MV
- Seabird 45 (Micro TSG)
- Seabird 38 remote temperature sensor
- Kongsberg Dynamic Positioning-1 System
- NetApp mapping storage system
- CARIS HIPS Software
- SIS Software
- Hypack Software
- MapInfo Software
- Fledermaus Software
- ArcMap Software
- Scientific Computing System (SCS)
- ECDIS
- Met/Wx Sensor Package

5.1.2 Secondary Systems and Sensors

- Telepresence System
- VSAT High-Speed link (Comtech 20 Mbps and 10 Mbps ship to shore)

5.1.3 Staging Plan

On or before May 31, the mission party will embark on the EX and begin preparations. All additional equipment and material to be brought aboard by the mission party will be shipped to the address provided by the ship (Section 4.3). This equipment shall be loaded by the mission party with any necessary assistance from the ship no later than close of business May 31, 2009 and placed in the appropriate destination aboard the EX. Mission personnel shall provide an estimate weight of all equipment brought onboard. Mission personnel shall provide an inventory of all HAZMAT material. Mission personnel must ensure proper stowage, installation and securing of all material brought onboard, including personal effects. The mission party is responsible for arranging all necessary transportation of material and personnel to and from the ship. Mission personnel will coordinate with the Ship Operations Officer for any services required to assist with loading or mobilizing mission materials. Crane service requests must be requested by the mission party no less than 24-hours in advance of the required loading time.

5.1.4 De-Staging Plan

Upon return to port in Newport, Oregon, on 12-Jun-2009, the mission party shall dismantle any additional equipment brought aboard for removal no later than COB 13-Jun-2009. The mission party is responsible for arranging all necessary transportation of material and personnel to and from the ship. Mission personnel will coordinate with the Ship Operations Officer for any ship services required to assist with unloading transient mission materials. Crane service requests must be requested by the mission party no less than 24-hours in advance of the required loading time.

5.2 Cruise Implementation Plan

The first two days of operations will be dedicated to USBL tracking system testing and calibration. This requires protected waters and depths between 200m and 500m, with 500m being optimal. The remainder of the cruise will be dedicated to water column exploration. A combination of mapping and CTD operations will occur. This will require the EM302, EA600, Sub-bottom profiler, CTD package and topside computers, J-frame and hydrographic winch. Processing and analysis of mapping and sonar data will be processed and analyzed for bottom and water column characteristics. XBT and CTD data, including water samples, will be collected to improve the quality of the mapping data acquisition and to characterize the water column.

5.2.1 USBL Tracking Testing and Calibration

During the April 24, 2009, USBL system calibration operation in Puget Sound, Washington, there remained questions as to the readiness of the Tracklink 10000HA system to support ROV operations. Personnel observed dramatic loss in signal detection by the transceiver. The system will again be tested and calibrated at a depth of 200m – 500m (with 500m being optimal) in San Francisco Bay, California, using a transponder tripod, recovery line, surface float, high-flyer rigging and tracking computer (USBL and Hypack) and software located in the Rack Room and Control Room. This will allow the USBL transponder to remain at depth in a static location for testing and calibration while the ship conducts figure eight loops on one side of the positioned

transponder (see the Tracklink 10000HA Calibration Manual aboard the EX for more information). A representative from Linkquest, George He, will be on board to assist with troubleshooting, testing, and analysis.

5.2.2 Evaluation of EM 302 bottom and water column backscatter data

Detailed analysis of EM 302 bottom and water column backscatter data has been due pending implementation of Kongsberg of EM 302 backscatter calibration and unavailability of appropriate processing tools. Provided the water column processing tool is available (IVS Fledermaus Ver. 7 Beta), evaluation of EM 302 water column processing will enable testing to determine if the EM 302 can be used for detection of different water column targets including fish schools, hydrothermal vents, deep plankton layers, etc. The sites of hydrothermal vents on Gorda Ridge and Blanco Ridge will be explored for this particular purpose. XBTs will be deployed as necessary, approximately four XBTs per day, to improve the quality of the multibeam data acquisition.

5.2.3 Testing and Evaluation of CTD Station Casts for water column exploration

The EX is equipped with a Seabird 911Plus system including a 24-position 2.5 L bottle rosette. CTD station casts are designed to characterize and detect anomalies in the water column of a single location. During CTD station operations, the EX will hold station, and deploy and recover the CTD to depth using the hydrographic winch, J-Frame, DP-1 System. Initial stations are identified in the detailed operations schedule below.

5.2.4 Testing and Evaluation of CTD Tow-Yo's for water column exploration

Tow-yos are designed to detect anomalies in the water column over a larger area than a station cast. Tow-yos involve deployment of the CTD package over the starboard side using the J-Frame; towing the package at slow speed (1.5 kts); continuously slowly raising and lowering the package through the water column in a box or straight line to generate a profile of a linear or areal extent of a target on the bottom through sensor data and water sample collection and analysis. There will be 12 hours of CTD operations during the day, depending on weather conditions.

5.2.5 Testing and Evaluation of onboard capabilities for processing and storing water column samples collected during CTD operations

The remotely triggered rosette and bottle system of the CTD package has proven fully functional for collecting water samples. The onboard processing and storage capabilities have yet to be tested and evaluated. Samples collected during station casts and Tow-yos will be stored onboard in unrefrigerated space in the wet lab. Sample pipeline will be evaluated to ensure broad public

access. Samples will be returned to PMEL for analysis and data will be provided to the public archives without proprietary rights.

5.2.6 Testing of Data Management Pipeline and System

<i>Goals/Objectives</i>	<i>Performance Measures</i>
Deploy and verify latest version of code base and system configurations on ship for Cruise Information Management System (CIMS) At-Sea Data Collection and CIMS Broker	Software operational during cruise
Generate Standard Operating Procedures (SOP) for operating CIMS software on the ship without an onboard CIMS developer	SOP documentation produced
Test EM302 data / metadata pipeline	Successful receipt of data sets and metadata at NCDDC and to NGDC
Extend and test CIMS Broker metadata generation capability to handle CTD data files	Successful metadata generation from CIMS for CTD data sets saved to file system on ship
Develop routines to generate “archive ready format” files from SCS raw data text files	Successful transfer of data from SCS sensors
Develop routines to pack and send “archive ready format” files from ship to NCDDC	Successful receipt of data sets at NCDDC
Develop routines to extract payload from files received and process data into NCDDC Syndication Proxy Service (SPS)	Successful processing of data sets at NCDDC

5.2.7 Continue working on mapping data products, pipeline, documentation and sensor integration

The EX and OER teams collaborated over the last year to develop, refine and document the mapping data products pipeline, documentation (SOPs) and sensor integration. All cruise activities will result in additional information to be captured in these ongoing documents and activities.

5.3 Detailed Operations Schedule

The following tables and figures provide a detailed representation of the planned schedule and cruise track. Any revised locations will be provided prior to the arrival of the mission party to the EX. Operations require varying vessel speeds depending on the operation. Transit operations presume a maximum vessel speed of 10kts and average or likely speed of 8kts. CTD station cast operations will be conducted while holding station. CTD tow-yo operations presume a vessel

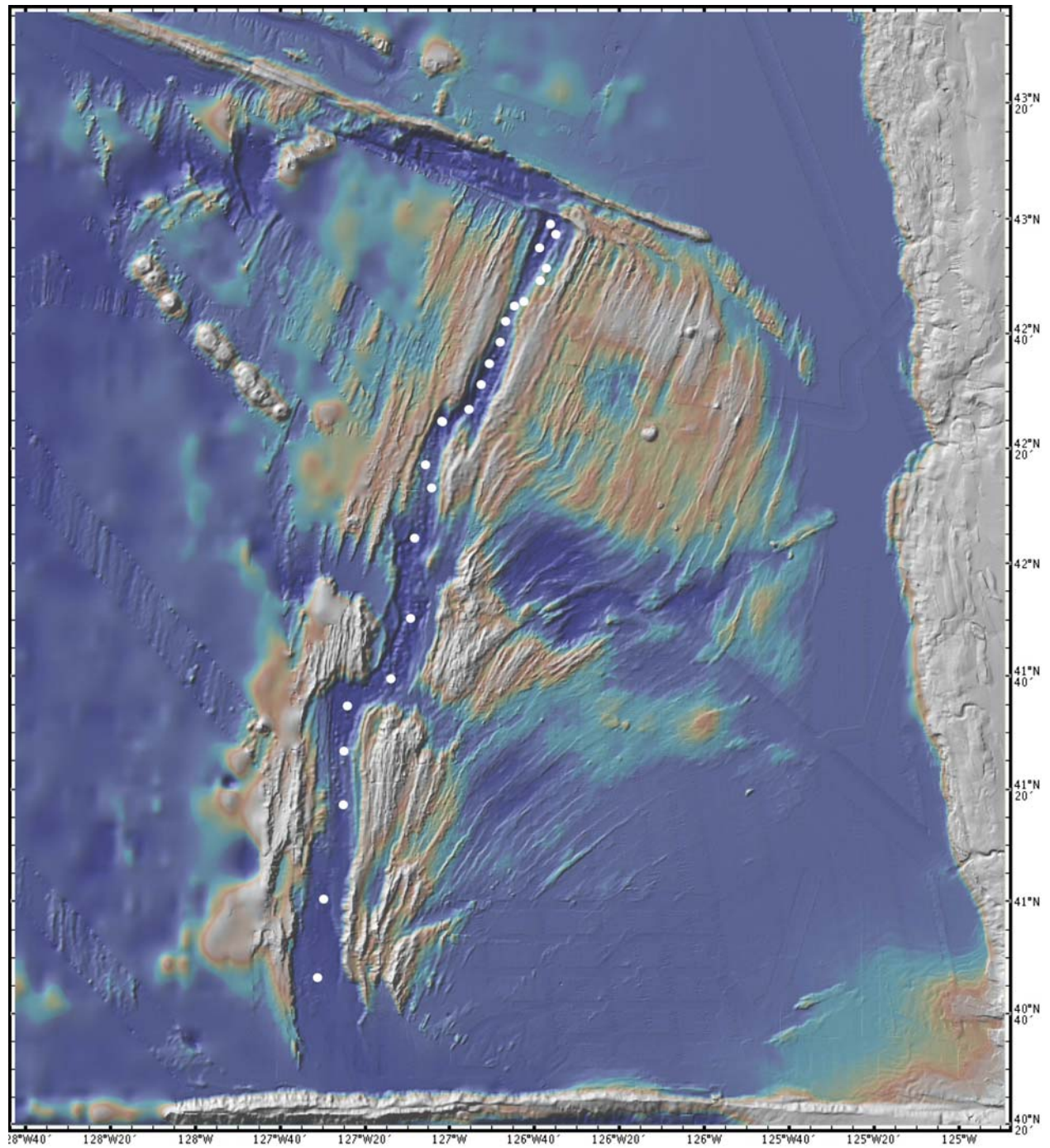
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speed of 1.5 kts. XBT operations presume a vessel speed of 4kts. Mapping operations presume a vessel speed of 8 kts.

Table 1. List of projected major operations associated with USBL tracking system testing and water column field trials. Operating dates and locations are subject to change based on performance and weather. The CTD/XBT casts listed are in addition to the daily CTD/XBT casts.

DATES (MM/DD)	LOCATION	OPERATIONS	TIME (DAYS) APPROXIMATE	DISTANCE (NM) APPROXIMATE
05/31	San Francisco, CA	(a) Personnel Embark (b) Load USBL test gear	--	--
06/01	San Francisco, CA	(a) Departure; Transit to USBL Testing location (b) USBL Testing	.5 .5	
06/02	San Francisco Bay, CA	(a) USBL Calibration (b) Personnel Transfer (c) Commence Transit	.5 .25 .25	
06/02- 06/04	Transit to Escanaba Trough/Gorda Ridge		2.1	688
06/04- 06/07	Escanaba Tough / Gorda Ridge Sites	(a) Tow-Yo operation (b) CTD Profile at Stations	2.9	260
06/04- 06/10	Gorda Ridge West Flank	(a) Mapping	2.5	308
06/10- 6/11	Blanco Ridge [MAY HAVE TO CUT LAST WAYPOINT FOR TRANSIT /TIMING PURPOSES]	(a) Tow-Yow Operation (b) CTD Profiles at Stations	1.3	401
06/11- 06/12	Transit to Newport, OR	(a) Mapping Operations?	1.2	
06/12	Newport, OR	Arrive		

Figure 1. Map of planned CTD stations along the axial valley of Gorda Ridge. If bathymetric maps are available, one or more tow-yos may be substituted for some stations.



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Table 2. Gorda Ridge / Escanaba Trough Stations with distance (km) from previous station, depth, transit time based on a speed of 8kts and cumulative DAS.

<i>Gorda Ridge / Escanaba Trough</i>	Waypoints		Dist (km)	Depth	Transit Hrs	Station Time	Cumulative Days
	LONG	LAT	Straight Line	meters	at 8kts	hrs	at 8kts
Escanaba Trough, S	-127.520	40.770	688.2	3221	47.8	2.3	2.1
Escanaba Trough, N	-127.494	41.001	25.8	3261	1.8	2.3	2.3
	-127.419	41.278	31.9	3267	2.2	2.3	2.4
	-127.417	41.436	17.6	3051	1.2	2.2	2.6
GR9 revised	-127.402	41.568	14.7	3295	1.0	2.3	2.7
	-127.233	41.648	16.6	3322	1.2	2.3	2.9
	-127.154	41.825	20.6	3452	1.4	2.4	3.0
GR5	-127.138	42.060	26.1	3640	1.8	2.5	3.2
	-127.071	42.208	16.6	3143	1.2	2.2	3.3
	-127.095	42.276	7.6	3050	0.5	2.2	3.5
GR3 revised	-127.031	42.404	14.3	3500	1.0	2.4	3.6
v96a 1	-126.926	42.438	3.8	3460	0.3	2.4	3.7
v96a 3	-126.876	42.512	8.2	3800	0.6	2.6	3.8
v96a 5	-126.844	42.572	6.7	3580	0.5	2.5	4.0
v96a 7	-126.803	42.635	7.0	3300	0.5	2.3	4.1
v96a 9	-126.780	42.697	6.9	3120	0.5	2.2	4.2
v96a 10 (GR14)	-126.745	42.742	5.1	3060	0.4	2.2	4.3
Sea Cliff	-126.708	42.755	2.0	2730	0.1	2.0	4.4
	-126.645	42.817	7.3	2780	0.5	2.0	4.5
	-126.622	42.852	4.0	2700	0.3	2.0	4.6
V08B10	-126.667	42.867	2.7	3304	0.2	2.3	4.7
	-126.648	42.913	5.2	3240	0.4	2.3	4.8
GR15	-126.583	42.952	5.5	3410	0.4	2.4	4.9
	-126.604	42.983	3.7	3340	0.3	2.3	5.0

Figure 2. Waypoints for mapping survey west of Gorda Ridge. This track will be occupied as time permits between Gorda Ridge CTD stations.

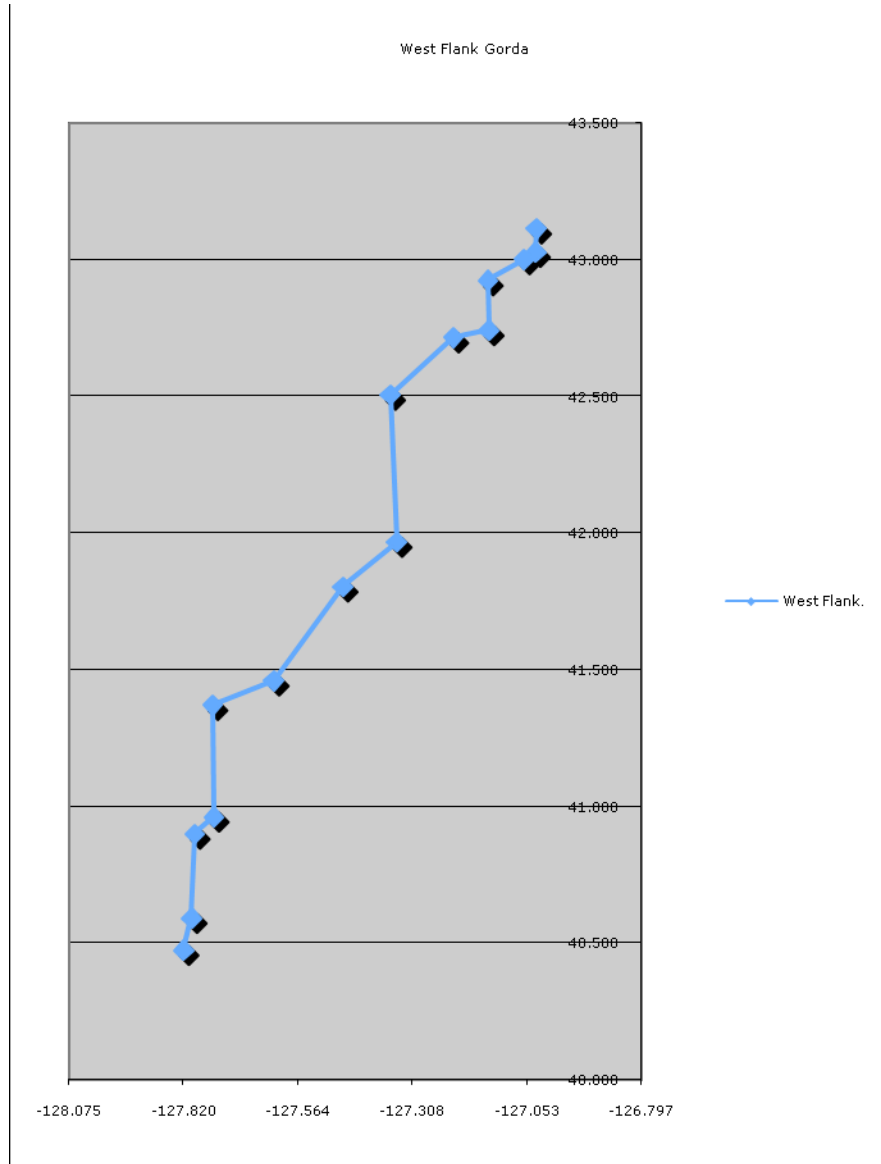
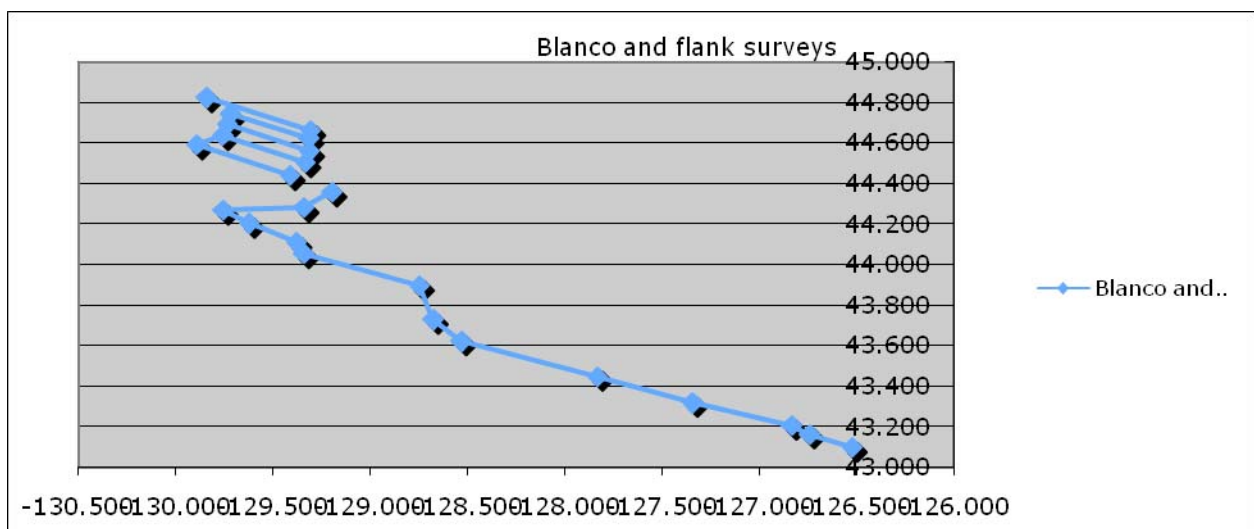


Table 3. Blanco Ridge Stations with distance (km) from previous station, depth (m), transit time (hrs) based on a speed of 8kts and cumulative DAS.

<i>Blanco Ridge</i> Stations	Waypoints		Dist (km)	Depth	Transit Hrs	Station Time	Total Days
	LONG	LAT	Straight Line	meters	at 8kts	hrs	at 8kts
	-126.522	43.098	13.7		0.9		7.6
	-126.744	43.164	17.2		1.2		7.6
	-126.836	43.207	8.4		0.6		7.6
	-127.345	43.320	42.3		2.9		7.8
	-127.834	43.449	45.2		3.1		7.9
	-128.536	43.624	69.9		4.9		8.1
	-128.679	43.731	19.1		1.3		8.1
	-128.751	43.897	20.0		1.4		8.2
	-129.346	44.055	68.2		4.7		8.4
	-129.381	44.110	7.3		0.5		8.4
V08B05	-129.625	44.205	28.8	3445	2.0	2.4	8.6
	-129.760	44.270	16.4		1.1		8.7
V08B04	-129.345	44.283	44.3	2422	3.1	1.8	8.9

Figure 3. Waypoints and CTD locations along the Blanco Fracture Zone and the flank of the Juan de Fuca Ridge. This work will be done as time permits.



5.4 Station Operations

The following station operations will be conducted during this cruise. The procedures for these operations can be found in Standard Operating Procedures aboard the EX.

- CTD Casts
- XBT Casts (various probes)

5.5 Underway Operations

The following underway operations will be conducted during this cruise. The procedures for these operations can be found in the Standing Operating Procedures aboard the EX.

- Mapping operations using EM302, EA600 and Knudsen 320BR
- XBT casts (various probes)
- TSG Monitoring
- SCS Data Acquisition
- Data management system testing and development
- Telepresence system transmission and communications

5.6 Applicable Restrictions

Data collected during this cruise are considered public domain and carry no proprietary rights or restrictions.

5.7 Small Boat Operations

A small boat transfer will occur at the Golden Gate Yacht Club in San Francisco, CA on 2-Jun-2009 to disembark three mission personnel, personal effects and limited equipment, and to bring two mission personnel on board for the remainder of the cruise. See Appendix 11.3 for information on Golden Gate Yacht Club point of transfer. Personnel transferring off are He, Lovalvo, and Wright. Personnel coming on board are Greene and Walker.

6 FACILITIES

6.1 Equipment and Capabilities Provided by the EX

- EM302 Multibeam Echosounder
- EA600 Single Beam Echosounder
- Knudsen 3260 Chirp Subbottom Profiler
- POS/MV
- CNAV DGPS
- SCS System
- Dynacon Hydrographic Winch with .32" 8000m electromechanical conductor cable terminated for CTD operations, positioned for use with the starboard J-Frame.
- Starboard J-Frame rigged to Dynacon Hydrographic Winch.
- Manual Wire Angle indicator for CTD casts
- SeaBird Electronics 9/11 plus CTD and deck unit with dual temperature and conductivity sensors and auxiliary ports for additional sensors.
- Teledyne Benthos BFP-312HP pinger
- Conductivity and temperature sensor package to provide dual sensors on the CTD (primary)
- Sensor ports on Seabird SBE 911plus underwater unit for LSS and ORP sensors
- LHM Sippican XBT system and probes
- Telepresence System
- NetApp network storage devices
- Color copier and printer
- Mission party computer and network access
- Desk and workspace in the dry and wet-labs
- Adequate deck lighting for night-time operations
- Navigational equipment including GPS and radar
- Safety harnesses for working on quarterdeck and fantail
- Ship's crane(s) used for loading and/or deploying
- Limited rain gear for inclement weather
- Hard hats for deck operations
- Berthing and meals for embarked personnel

6.2 Equipment and Capabilities Provided by the Mission Party

- Altimeter
- Ancillary mission laptop computers
- Ancillary mapping and CTD processing workstation
- Water sample storage bottles (provided by PMEL)
- Transponder tripod
- 500m Spool Recovery Line
- Recovery Float
- Hi-Flyer
- Light-scattering sensor

- Oxidation-reduction sensor
- Associated CTD cables for sensors

6.3 OPERATIONAL RISK MANAGEMENT

For every operation to be conducted aboard the ship (NOAA-wide initiative), risk management procedures will be followed. For each operation, risks will be identified and assessed for probability and severity. Risk mitigation strategies / measures will be investigated and implemented where possible. After mitigation, the residual risk will have to be assessed to make Go-No Go decisions for the operations. Particularly with new operations, risk assessment will be ongoing and updated as necessary. This does not only apply to over-the-side operations, but to everyday tasks aboard the vessel that pose risk to personnel and property.

- Mapping, Tracking, CTD (and other pertinent) ORM documents will be followed by all personnel working on board the EX
- All personnel on board may call a halt to operations/activities in the event of a safety concern.

7 MISCELLANEOUS

7.1 Communications

Specific information on how to contact the NOAA Ship *Okeanos Explorer* and all other fleet vessels can be found at:

<http://www.moc.noaa.gov/phone.htm>

7.1.1 Important Telephone and Facsimile Numbers and E-mail Addresses

7.1.1.1 *Ocean Exploration and Research (OER):*

OER Program Administration:

Phone: (301) 734-1010

Fax: (301) 713-4252

E-mail: Firstname.Lastname@noaa.gov

7.1.1.2 *Pacific Marine Environmental Laboratory (PMEL)*

VENTS Program Administration:

Phone: (206) 526-6810

Fax: (206) 526-6815

E-Mail: FirstName.LastName@noaa.gov

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7.1.1.3 National Coastal Data Development Center (NCDDC):

Main Line: 228-688-2936
Toll Free: 866-732-2382
Fax: 228-688-2010 or 2968

7.1.1.4 University of New Hampshire, Center for Coastal and Ocean Mapping

Phone: (603) 862-3438
Fax: (603) 862-0839

7.1.1.5 NOAA Ship Okeanos Explorer - Telephone methods listed in order of increasing expense:

United States Coast Guard – San Francisco, California:

Primary Phone: (415) 399-3547
Emergency Phone: (415) 556-2103
Fax Number: (415) 399-3521

EX Cellular:
OOD (401) 378-7414

EX Iridium:
808-659-9179

EX INMARSAT B
Line 1: 011-872-764-852-328
Line 2: 011-872-764-852-329

Mission personnel may obtain access to these systems with permission from the Commanding Officer on a cost-reimbursable basis.

E-Mail: Ops.Explorer@noaa.gov (mention the person's name in SUBJECT field)

expeditioncoordinator.explorer@noaa.gov

For dissemination of all hands emails by Expedition Coordinator while on board. See ET for password.

7.1.1.6 Marine Operations Center, Pacific (MOP):

Operations Division (MOP1)
Phone: (206) 553-4548
Fax: (206) 553-1109

E-Mail: FirstName.LastName@noaa.gov

7.1.1.7 Marine Operations Center, Atlantic (MOA):

Operations Division (MOA1)

Phone: (757) 441-6206
Fax: (757) 441-6495

7.2 Foreign Nationals

Foreign National Access and Deemed Export Controls on NMAO Vessels.

All foreign national access to the vessel shall be in accordance with NAO 207-12 and OMAO RADM March 16, 2006 memo (<http://deemedexports.noaa.gov>). The foreign national's sponsor is responsible for obtaining clearances and export licenses required and for providing for required escorts by the NAO. Programs sponsoring foreign nationals should consult with their designated line office personnel to assist with the process (<http://deemedexports.noaa.gov/contacts.html>).

Catalina Martinez will sponsor Gang He while he is on board May 31 – June 2.

8 DISPOSITION OF DATA

8.1 Responsibilities

- a. Ship
The Commanding Officer is responsible for all data collected for missions until those data have been transferred to mission party designees. Data transfers will be documented on NOAA Form 61-29. Reporting and sending copies of project data to NESDIS (ROSCOP form) is the responsibility of OER.
- b. NOAA OE
(Develop boilerplate wording over time to include NOAA OE data policies.)

8.1.2 Deliverables

- a. At sea
 - Daily plans of the Day (POD)
 - Daily situation reports (SITREPS)
- b. Post cruise
 - Refined documentation on ROVs, ROV control room and telepresence system.
 - Refined SOPs for use of control room and telepresence system.
 - Strategy for preparing for FY 09 operations.
 - Assessments of all activities.
- c. Science party
 - CTD data on CDs

8.1.3 Archive

- The Program and ship will work together to ensure proper archive of metadata and acquired data sets, and that all metadata and data formats meet FGDC compliance. Details TBD.

9 ADDITIONAL PROJECTS

9.1 Definition - Ancillary and piggyback projects are secondary to the objectives of the cruise and should be treated as additional investigations. The difference between the two types of secondary projects is that an ancillary project does not have representation aboard and is accomplished by the ship's force. None.

10 HAZARDOUS MATERIALS

The field party chief shall be responsible for complying with MOCDOC 15, Fleet Environmental Compliance #07, Hazardous Material and Hazardous Waste Management Requirements of Visiting Scientists. July 2002. None.

11 APPENDICES

11.1 Equipment Inventory (List all program supplied equipment, including quantity, weight, and dimensions.)

For CTD work Sharon Walker will bring an altimeter, a light scattering sensor, an ORP sensor, and associated cables. Total weight is approx. 20 lbs. Plastic sampling bottles, approx 20 lbs.

11.2 HAZMAT Inventory

None.

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11.3 Golden Gate Yacht Club

GOLDEN GATE YACHT CLUB

Nautical Chart: 18650
 Channel Entrance Depth: 12 Ft. MLLW
 Average Marina Depth: 8 Ft. MLLW
 Tide Corrections: (SFO)
 Hi: +:13 Lo: +:11

Many Services Within Walking Distance

Not for navigational purposes

AMERICA'S CUP 2007
GGYC
 Golden Gate Yacht Club
 One Yacht Road
 San Francisco, CA 94123
 415-346-2628

Established in 1939 the Golden Gate Yacht Club is appropriately named with its unique location on San Francisco Bay and its fantastic view of the Golden Gate.

GGYC is a private yacht club. It is open to members and their guests. Members of yacht clubs and boating groups with reciprocal privileges are invited to **THE GOLDEN GATE YACHT CLUB.**

The Golden Gate Yacht Club Is The Challenger of Record for the next Americas Cup in 2007. This beautiful location is available for weddings, private parties and special events, call GGYC for rates.

* Go to Pump out dock

* At Gate 31, near Harbor Office

415-831-6322 - Harbormaster
 Address: 3950 Scott St