



EX-09-03

Mapping Field Trial I

Mendocino Ridge

DRAFT CRUISE INSTRUCTIONS

NOAA Ship Okeanos Explorer
May 5 – May 26, 2009

John McDonough, Deputy Director
Office of Ocean Exploration and Research
NOAA Office of Oceanic and Atmospheric Research

CAPT Emily B. Christman, Commanding Officer
Marine Operations Center Atlantic
NOAA Office of Marine and Aviation Operations

1 CRUISE INSTRUCTIONS

1.1 Cruise Title: Mapping Field Trial I

1.2 Cruise Number: EX-09-03

1.3 Cruise Dates

1.3.1 Departure: May 5, 2009, Depart San Francisco, CA

1.3.2 Arrival: May 26, 2009, San Francisco, CA

1.4 Operating Area

Mendocino Ridge is located off the coast of Northern California, USA, and is a known gap in the US Extended Continental Shelf (ECS) map inventory. OER provides NOAA leadership in the multi-agency Extended Continental Shelf initiative and works closely with ECS principals to identify and plan acquisition of data to fill information gaps.

2 CRUISE OVERVIEW

2.1 Background

This cruise is a mapping field trial cruise in the area of Mendocino Ridge, designed to test and refine operations for conducting mapping operations for exploration using NOAA Ship *Okeanos Explorer* (EX) mapping and related 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.

NOAA Okeanos Explorer (EX) is equipped (at present) with three deep water mapping sonars including Multibeam echo sounder (EM 302, 30 kHz), single beam echo sounder (EA 600, 12 kHz) and Knudsen sub-bottom profiler (SBP, 3.5 kHz). The sonars have been heavily tested during earlier cruises in shallower depth ranges (EM 302 < 3000 m, EA 600 < 3000 m and SBP < 300 m), however, uncertainty remains about the achievable performance in deeper water. The performance characteristics that are considered important for the EX mission include maximum operable depths of EX sonars, depth vs. swath coverage curves of the EM 302, expected resolution and accuracy estimation of data collected in deeper waters. These performance metrics are essential for planning future EX exploration voyages and will dictate the expected mapping results of exploration missions.

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. The primary goal and objectives will be achieved in the context of mapping in the vicinity of San Francisco, CA, Monterey, CA and predominantly Mendocino Ridge. Following are the primary and secondary goals objectives of this cruise:

2.2.1 Primary Goal: Test, troubleshoot, refine and evaluate EX mapping systems, sensors, protocols and processes to support systematic exploration.

2.2.1.1 Perform deep water patch test

Deep water patch test is necessary to identify any biases in Multibeam sonar installation. The ship has only performed patch tests in shallow waters (< 500 m). A deep water patch test will help identify any installation offsets and will help ensure high quality of data. Also any biases, if present, are magnified in deeper waters and therefore a carefully carried out deep water patch test ensure that data collected are free from different data artifacts.

2.2.1.2 Resolve EM302 and EA600 Interference with Knudsen Sub-bottom profiler

During earlier cruises, Knudsen SBP was observed to interfere with EM 302 and EA 600. Efforts will continue, in collaboration with OMAO and Knudsen, during this cruise to resolve the interference issues. Also Knudsen SBP has not been tested fully in deeper waters (> 260m). Operation of SBP in deeper waters along with EM 302 and EA 600 will help identify any operational limitations of SBP in addition to the performance evaluation of Knudsen SBP in deeper waters.

2.2.1.3 Continue refining data products pipeline, documentation and sensor integration

A major focus of this cruise will be to continue to develop and improve methodologies to acquire, process, analyze and archive mapping data. Ancillary documentations in regards to standard operating procedures, system and wiring diagrams and operational reports will continue to be developed through out the cruise.

2.2.1.4 Investigate extent of bubble sweep down effects on performance of mapping sensors

Bubbles can get trapped under the ship's bow in heavy seas and then sweep across the mapping sonars transducers along the ship's hull. The swept down bubbles can have devastating affects on the performance of the mapping sonars including failure to detect bottom. As the ship gets to operate in different sea states it is critical to examine and analyze extent of bubble sweep down effects on performance of mapping sensors.

2.2.1.5 Evaluate EM302 bottom and water column backscatter data

In addition to bathymetric data, EM 302 is capable of providing bottom and water column backscatter data. These data are much more complex as compared to bathymetric data and at present work in collaboration with Kongsberg is in progress to evaluate EM 302 bottom and water column backscatter data. These efforts will definitely benefit from collection of additional data sets in deeper water and over distinct and identifiable water column targets for example fish schools, hydrothermal vents etc.

2.2.1.6 Map targets for future ROV performance acceptance testing cruise

In collaboration with National Marine Sanctuary personnel, several targets in vicinity of Monterey bay have been identified as potential targets for future ROV performance acceptance testing. During this cruise, few / all of these targets will be mapped to provide geospatial frame work for the ROV dives.

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

2.2.2.1 Continue tuning and testing integrated telepresence system

The EX has an integrated telepresence system to support remote exploration from shore. Personnel require additional time to tune and test the system and components to ensure proper planning and adaptation of the technology into live operations. Personnel will work in the background of mapping operations in the ROV control room and rack room, testing and evaluating the telepresence system.

2.2.2.2 Continue ROV operations readiness preparations

The EX is destined to have an integrated two-body ROV system, pending final contractor delivery. In order to effect delivery and successful performance testing, NOAA must provide an operable platform and facility to utilize the vehicles. Two ROV team personnel will work in the ROV hangar, workshop, winch room and fantail to continue preparations for the ROV contractor's undetermined return.

2.3 Participating Organizations

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

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

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

It is envisioned that EX will carry out 24 hours mapping operations during this cruise. Therefore, the requirement is for 6 watch keepers (2 for each watch) for mapping sensors data acquisition and data processing. Five watch keepers have been identified including EX SST Peters, EX SST Stuart, PS Malik, UNH Gardner and UNH Armstrong. Several partner offices and programs have been contacted to identify additional watch keepers.

3.1 Onboard Personnel

Name	Affiliation	Role	Dates	M/F	Status
Malik, Mashkoor	OER (ERT)	Expedition Coordinator	5-May to 26-May	M	US Permanent Resident
Gardner, James	UNH CCOM	Mapping	5-May to 26-May	M	US
Pinner, Webb	OER (2020)	Telepresence	5-May to 17-May	M	US
Raynes, Brian	OER (EO)	Telepresence	5-May to 17-May	M	US
DeRoche, Mark	OER (EO)	ROV	5-May to 26-May	M	US
Wright, Dave	OER (EO)	ROV	5-May to 26-May	M	US
		Mapping	5-May to 26-May	M	US

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 (ERT)	EX Program Planner	5-May to 26-May	M	US	PMEL
McDonough, John	OER	Deputy Director, Backup Expedition Coordinator	5-May to 26-May	M	US	SSMC

3.3 Participating Organization Acroynms

OER – NOAA OAR Office of Ocean Exploration and Research

ERT – ERT, Inc, a NOAA Contractor

2020 – 2020 LLC, a NOAA Contractor

EO – Eastern Oceanics, a NOAA Contractor

UNH CCOM – University of New Hampshire Center for Coastal and Ocean Mapping

3.4 Foreign Nationals – NOT APPLICABLE TO THIS CRUISE

See Section 8.2 for details regarding foreign nationals, including the responsibilities of the OER Expedition Coordinator, Commanding Officer and foreign national sponsor.

4 ADMINISTRATION

4.1 Ship's Location

The ship will be docked in San Francisco, CA, starting April 30, 2009. Actual Pier TBD.

The ship will re-dock in San Francisco, CA, starting May 26, 2009. Actual Pier TBD.

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: (757) 441-6776
Fax: (757) 441-6495

Chief, Operations Division, Atlantic
(MOA1)

Marine Operations Center, Pacific (MOP)
1801 Fairview Avenue East
Seattle, WA 98102-3767
Telephone: (206) 553-4548
Fax: (206) 553-1109

Chief, Operations Division, Pacific
(MOP1)

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

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

4.2.2 Mission Operations

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

Craig Russell, EX Program Planner
NOAA Ocean Exploration & Research
(ERT, Inc.)
Phone: 206-526-4803 / 206-518-1068
E-mail: craig.russell@noaa.gov

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

4.2.3 Other Mission Contacts

Craig Russell, EX Program 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

4.3 Shipments

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

NOAA Ship *Okeanos Explorer*
Gulf of the Farallones National Marine Sanctuary
991 Marine Drive
The Presidio
San Francisco, CA 94129

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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 Local time 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 through out the ship. 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 before boarding.

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 operations 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 mapping

data for Mendocino Ridge, ROV performance test dive targets and patch test data. 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

- Kongsberg Simard EM302 Multibeam Echosounder (MBES)
- Kongsberg Simrad EA600 Deepwater Echosounder
- Knudsen 320BR Sub-bottom profiler (SBP)
- LHM Sippican XBT (various probes)
- Seabird SBE 911Plus CTD
- Seabird SBE 50 CTD Stand
- CNAV GPS
- POS/MV
- Seabird SBE-45 (Micro TSG)
- Kongsberg Dynamic Positioning-1 System
- NetApp mapping storage system
- CARIS HIPS Software
- SIS Software
- Hypack 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 May 4, the mission party will embark on the EX and begin preparations. All additional equipment to be brought aboard by the mission party will be shipped to the Gulf of Farallone's address provided by the ship. This equipment shall be loaded by the mission party onto EX no later than COB 4-May-2009 and placed in the wet lab or other appropriate destination location aboard the EX and ensure proper stowage, installation and securing of the material. 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 loading mission materials. Crane service requests must be requested by the mission party 24 hours in advance of the required loading time.

5.1.4 De-Staging Plan

Upon return to port in San Francisco on 26-May-2009, the mission party shall dismantle any additional equipment brought aboard for removal no later than COB 28-May-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 24 hours in advance of the required loading time.

5.2 Cruise Implementation Plan

The shipboard EM 302 and EA 600 will be operated around the clock (24 hours per day) during this cruise. SBP will also be operated simultaneously provided no interference is observed between the EM 302 and EA 600. Multibeam data will be processed, and digital terrain maps will be developed to assist in day to day planning and operational decisions. XBT/CTD data will be collected in survey regions to improve the quality of the multibeam data acquisition.

5.2.1 MBES Patch Test

A patch test will be conducted to identify any roll, heave, pitch and time offsets between MBES and the ship's POS/MV motion sensor. The ship will run over small lines (~ 1-4 km) in several configurations to assess these offsets. For detailed description of carrying out patch test refer to the EX SOPs for carrying out a patch test. A deep-water patch test will be carried out in the deep-water dive site south of Mendocino ridge. The patch test will ensure the sonar system is able to collect good quality bathymetric data and is properly integrated with ancillary sensors. A CTD cast concurrent with an XBT cast will be collected before the start of the patch test at the patch test site. Suggested location of the patch test is shown in Figure 2.

5.2.2 MBES, SBP, SBES Extinction test

After the Sept 2008 testing of MBES and SBES, there remains some uncertainty about the maximum operating depths of these sensors. MBES has been tested up to 3000 m of water depths. The Kongsberg reported a maximum depth of 7000 m with swath width up to 5.5 times water depth / 8 km. This claim needs to be verified. During this cruise, it is expected that EX will encounter a maximum depth of 5000m.

5.2.3 SBP Deep Water Test

The Knudsen SBP was accepted in Nov 2009 and limited open water tests of SBP were carried out during EX 0901 cruise (restricted to depths < 260 m) which showed SBP to interfere with EM 302 and EA 600. Concurrent operation of MBES/SBES and SBP in deeper waters will enable EX to verify: (a) Correct picking of bottom by SBP in deeper waters; and (b) Extent of interference between SBP and MBES/SBES in deeper waters. SBP performance testing will best be carried out if SBP is tested over different types of the seafloor (e.g. hard and soft). This test can be carried out in conjunction with MBES tests and no separate time needs to be allocated for SBP tests. Proper logging of data in appropriate formats and data processing using Sonar wiz will be attempted.

5.2.4 MBES bubble sweep down issues

Bubble sweep down was observed during the mapping shake down cruise in Sept 09. However, no detailed assessment of bubble sweep down problems was conducted. Bubble sweep down is usually exacerbated while heading into wind / currents / swell. To assess the effect of direction of wind / swell on the extent of the bubble sweep down, 8 lines will be run in different direction, covering all the quadrants. These lines will be run in comparatively rough weather with high wind speed and swell. This test is subject to weather conditions and availability of time during this cruise.

5.2.5 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 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 just north of Mendocino ridge will be explored for this particular purpose.

5.2.6 Map targets for future ROV cruise

The data collected with EM 302 will be used to map suitable targets in Monterey Canyon identified by the ROV team with assistance from the National Marine Sanctuary Program for an upcoming ROV Performance Acceptance Testing cruise. A few of the proposed dive sites in vicinity of Monterey Bay are shown in Figure 3 and table 1. Provided there is time available to map these sites few / all of these sites will be mapped using EM 302.

5.2.7 Continue working on 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

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EX. Mapping operations presume a vessel speed of 8 knots. Transit operations presume a maximum vessel speed of 10 knots and average or likely speed of 8 knots. CTD operations will be conducted while holding station. XBT operations presume a vessel speed of 4 knots.

Table 1. List of projected major operations associated with performance evaluation of mapping sensors. Operating dates and locations are subject to change based on sequential satisfactory performance the mapping sensors. The CTD/XBT casts listed are in addition to the daily XBT/CTD casts.

Dates (mm/dd)	Location	Operations	Time (Days) Approximate	Distance (nm) Approximate
05/05	San Francisco, CA	Departure		
05/05-05/06	Transit to patch test site	(a) Transit (b) Investigate Knudsen interference	1	190
05/06-05/07	Patch test site	(a) Conduct CTD / XBT cast (b) Conduct deep water patch test (c) Conduct cross line (d) Transit to start of mapping area	1	-
05/08 – 05/16	Run survey tracks over Mendocino ridge	(a) EM 302 / EA 600 data collection and processing (b) Continue to analyze and assess quality of EX mapping sensors	9.5	1800
05/17	Eureka, CA	(a) Transit to Eureka, CA (b) Small boat Personnel transfer (c) Transit to mapping area	1	60
05/18	South of Hydrothermal vents	(a) Break survey (b) Explore hydrothermal vents with EM 302, EA 600 and SBP (c) Transit back to mapping area	1	~240
05/19 – 05/22	Mendocino ridge	Complete Mendocino ridge survey	4	900
05/23	Transit to Monterey Bay	Conduct mapping of ROV dive site#3	1.5	275
05/24	Transit to and map ROV#4	Conduct mapping of ROV dive site # 4	1	150
05/25	Transit to ROV#2	Conduct mapping of ROV site # 2 and 1	0.5	100
05/25	Transit from ROV # 2 to San Francisco, CA	Transit to San Francisco, CA	0.5	80
26 May	San Francisco, CA	Arrival		
Total			21	3755

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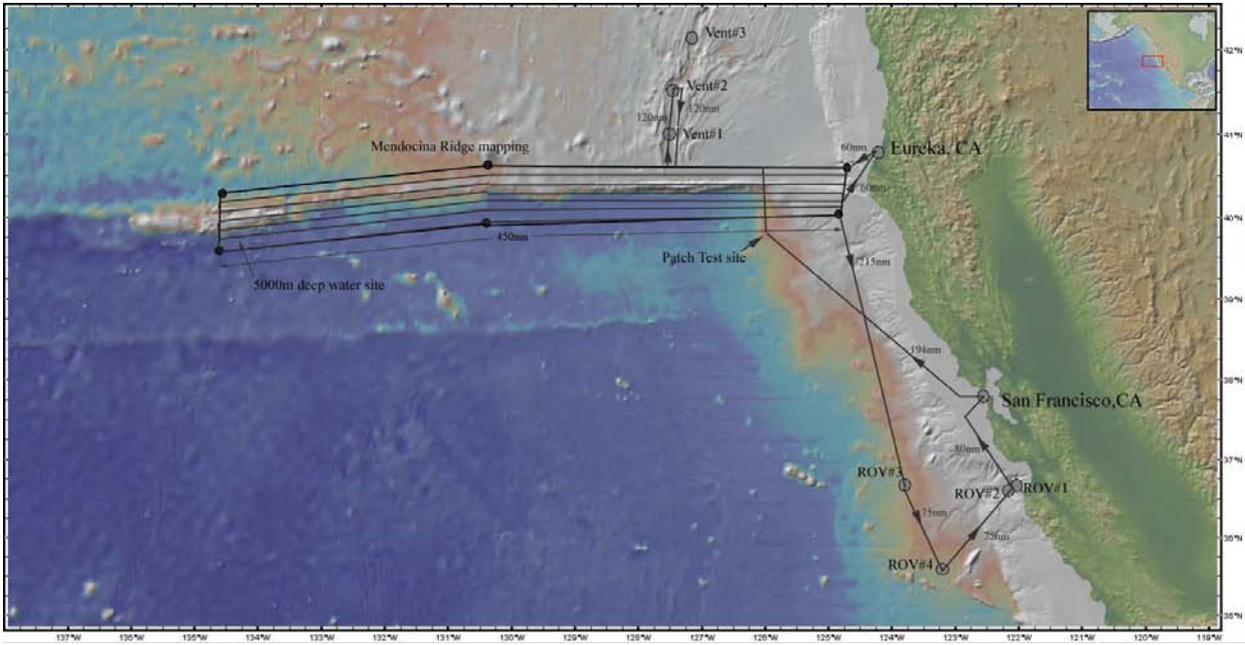


Figure 1. Overview of the different test sites including ROV dive sites, Pitch and Roll patch test sites and extinction test site with depth ~ 5000 m. The locations of the ROV dive sites is listed in Figure 3.

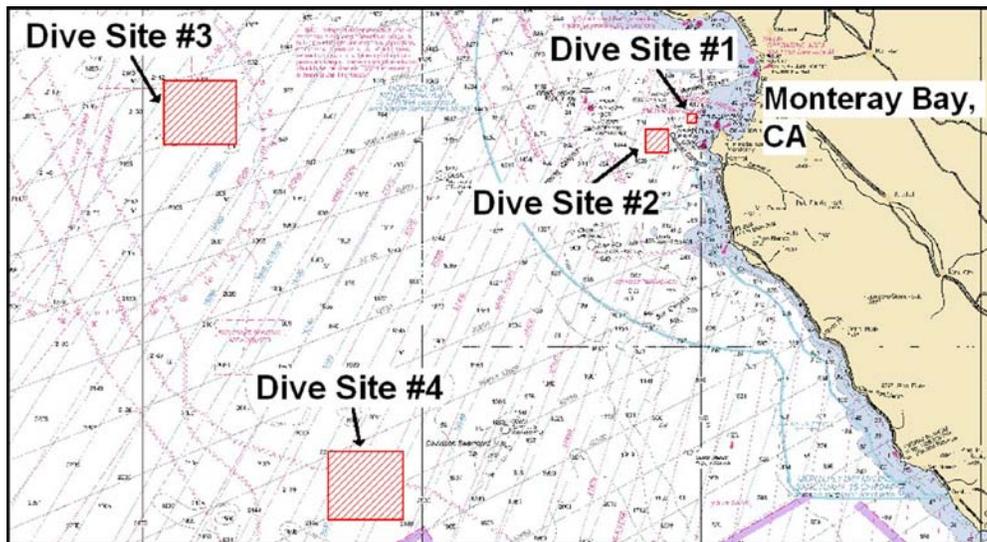


Figure 2. Location of four possible ROV dive sites ranging in depths from 400 to 4,000 meters. Dive Site 1 is located just outside Monterey Bay and offers the most protection. Dive Site 2 is slightly offshore at the mouth of the Monterey Canyon while Dive Site 3 is beyond the 2,000 fathom contour. Dive Site 4 is the location of a known submarine (coordinates supplied by MBARI). Image compiled in MapInfo by E. Stuart.

Table 2. Approximate mapping locations for this cruise.

	Approx Depths (m)	Location (Not to be used for Navigation) Lat (N), Long (W)	Approximate linear survey distances
Patch Test site	3000	39.8, -125.5	
Mendocino Ridge mapping area (Bounding box)	3000-5000	40.6, -124.7 40.6,-130.4 40.3,-134.6 39.6,-134.6 39.9,-130.4 40.0,-124.8 40.6,-124.7	2700 NM
Eureka		40.8, -124.2	
Hydrothermal vents	2000	41.0,-127.5 41.5,-127.4 42.1,-127.1	200 NM
5000m deep site		39.4,-133.5	
ROV#3	3500	36.7,-123.8	60 NM
ROV #4	3800	35.6,-123.2	75 NM
ROV #2	2000	36.6,-122.1	20 NM
ROV # 1	500	36.7,-122.0	10 NM

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 Standing Operating Procedures aboard the EX.

- Mapping operations using EM302, EA600 and Knudsen 320BR
- XBT casts (various probes)
- TSG Monitoring
- SCS Data Acquisition
- Meteorological Data Acquisition
- ROV mission space cleaning and preparations

- Telepresence system tuning and testing

5.6 Applicable Restrictions

None.

5.7 Small Boat Operations

A small boat transfer is required 17-May-2009 to disembark two mission personnel, personal effects and limited equipment. The point of transfer is Eureka, California, USA. If an offshore small boat transfer is prohibited due to weather, the ship may be requested to transit into the bay to conduct the small boat transfer. Personnel transferring off are Pinner and Raynes.

6 FACILITIES

6.1 Equipment and Capabilities Provided by the EX

- EM302 Mapping System
- EA600 Echosounder System
- Knudsen 320 BR Subbottom profiler system
- 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
- Sea-Bird Electronics' SBE 911plus CTD system with stand, including include underwater CTD, weights, pinger and deck unit.
- Conductivity and temperature sensor package to provide dual sensors on the CTD (primary)
- 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

- Ancillary mission laptop computers
- Ancillary mapping processing workstation
- Additional XBT probes (TBD)

7 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.

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

8 MISCELLANEOUS

8.1 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>

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8.1.1 Important Telephone and Facsimile Numbers and E-mail Addresses

8.1.1.1 Ocean Exploration and Research (OER):

OER Program Administration:
Phone: (301) 734-1010
Fax: (301) 713-4252
E-mail: Firstname.Lastname@noaa.gov

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

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

8.1.1.3 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)

8.1.1.4 Marine Operations Center, Pacific (MOP):

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

E-Mail: FirstName.LastName@noaa.gov
E-Mail to Radio Room: Radio.Room@noaa.gov

8.1.1.5 Marine Operations Center, Atlantic (MOA):

Operations Division (MOA1)

Phone: (757) 441-6206

Fax: (757) 441-6495

8.2 Foreign Nationals

Foreign National Access and Deemed Export Controls on NMAO Vessels (This section (8.3) should be deleted if no foreign nationals are among the scientific party)

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>).

The following are basic requirements. Full compliance with NAO 207-12 is required.

8.2.1 Responsibilities of the Expedition Coordinator:

Ensure the following is provided to the Commanding Officer before any foreign national will be allowed on board for any reason:

1. Written notification identifying the NOAA Program individual who is responsible for ensuring compliance with NOAA and export regulations for the foreign national (see Foreign National Sponsor responsibilities below).
2. A copy of the DOC/OSY clearance authorization for access by the foreign national.
3. A copy of Appendix B of NAO 207-12 with NOAA Chief Administrative Officer concurrence endorsement.
4. Written notification that the foreign national has been cleared against the State, Commerce and Treasury departments' Lists to Check.
<http://www.bis.doc.gov/ComplianceAndEnforcement/ListsToCheck.htm>
5. Provide the NOAA Foreign National List spreadsheet for each foreign national in the scientific party.

Escorts – The Expedition Coordinator is responsible to provide escorts to comply with NAO 207-12 Section 5.10, or as required by the vessel's DOC/OSY Regional Security Officer.

Ensure all non-foreign national members of the scientific party receive the briefing on Espionage Indicators (NAO 207-12 Appendix A) at least annually or as required by the servicing Regional Security Officer.

Export Control - The Expedition Coordinator is responsible for complying with NAO 207-12 and the development of Technology Access Control Plans for items they bring aboard. The Expedition Coordinator must notify the Commanding Officer of any export controlled items they bring aboard and any access restrictions associated with these items.

The Commanding Officer and the Expedition Coordinator will work together to implement any access controls necessary to ensure no unlicensed export occurs of any controlled technology onboard regardless of ownership.

8.2.2 Responsibilities of the Commanding Officer:

Ensure only those foreign nationals with DOC/OSY clearance are granted access..

Deny access to OMAO platforms and facilities by foreign nationals from countries controlled for anti-terrorism (AT) reasons and individuals from Cuba or Iran without written NMAO approval and compliance with export and sanction regulations.

Ensure foreign national access is permitted only if unlicensed deemed export is not likely to occur.

Ensure receipt from the Expedition Coordinator of the NOAA Foreign National List spreadsheet for each foreign national in the scientific party.

Ensure Foreign Port Officials, e.g., Pilots, immigration officials, receive escorted access in accordance with maritime custom to facilitate the vessel's visit to foreign ports.

Export Control - 8 weeks in advance of the cruise, provide the Expedition Coordinator with a current inventory of OMAO controlled technology onboard the vessel and a copy of the vessel Technology Access Control Plan (TACP). Also notify the Expedition Coordinator of any OMAO-sponsored foreign nationals that will be onboard while program equipment is aboard so that the Expedition Coordinator can take steps to prevent unlicensed export of Program controlled technology.

The Commanding Officer and the Expedition Coordinator will work together to implement any access controls necessary to ensure no unlicensed export occurs of any controlled technology onboard regardless of ownership.

Ensure all OMAO personnel onboard receive the briefing on Espionage Indicators (NAO 207-12 Appendix A) at least annually or as required by the servicing Regional Security Officer.

8.2.3 Responsibilities of the Foreign National Sponsor

Export Control - The foreign national's sponsor is responsible for obtaining any required export licenses and complying with any conditions of those licenses prior to the foreign national being provided access to the controlled technology onboard regardless of the technology's ownership.

The Departmental Sponsor/NOAA of the foreign national shall assign an on-board Program individual, who will be responsible for the foreign national while on board. The identified individual must be a U.S. citizen, NOAA employee or be approved by the vessel's DOC Regional Security Officer homeport.

Ensure completion and submission of Appendix C (Certification of Conditions and Responsibilities for a Foreign National Guest) as required by NAO 207-12 Section 5.03.h

9 DISPOSITION OF DATA

9.1 Responsibilities

9.1.1 Shipboard

9.1.1.1 Responsibilities

9.1.1.1.1 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.

9.1.1.1.2 NOAA OE

(Develop boilerplate wording over time to include NOAA OE data policies.)

9.1.1.2 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.

9.1.1.3 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.

9.1.2 Deliverables

9.1.2.1 At sea

9.1.2.1.1 Daily plans of the Day (POD)

9.1.2.1.2 Daily situation reports (SITREPS)

9.1.2.2 Post Cruise

9.1.2.2.1 Refined SOPs for water column mode of exploration

9.1.2.2.2 Data sets from CTD profiles

9.1.2.2.3 Mapping data from multi-beam operations

9.1.2.2.4 Assessment of all activities

9.1.2.3 Archive

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

10 ADDITIONAL PROJECTS

10.1 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.

1.1 Ancillary Projects - Any ancillary work done during this project will be accomplished with the concurrence of the Chief Scientist and on a not-to-interfere basis with the programs described in these instructions and in accordance with the *NOAA Fleet Standing Ancillary Instructions*.

1.2 Piggyback Projects - (list projects or state "None")

11 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 (Edit sections 7.1 and 7.2. If no HAZMATs are being brought aboard then delete sub-sections 7.1 through 7.2 and state that no HAZMATs will be brought aboard.)

1.3 Inventory

If the inventory is for 20 or fewer hazardous materials, include the list here. Otherwise, attach it as part of the section 9 Appendix. Include quantity, neutralizing agent(s) brought aboard and their quantity. Also, document existence of spill kits, and identify the individual on board the vessel to be notified should a spill occur.

1.4 Material Safety Data Sheet (MSDS)

(Provide an electronic MSDS for each hazardous material that will be brought aboard the ship. These may be included as part of the Appendix of these instructions. If so, refer here to that section of the Appendix. Otherwise, state that MSDSs will be forwarded separately.)

12 APPENDICES

EX-09-04 Water Column Exploration Field Trials
June 1-12, 2009

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

12.2 HAZMAT Inventory (If the inventory is for more than 20 hazardous materials, include the list here. Otherwise, attach it as part of section 7. List all HAZMATS and quantities, MSDSs, spill kits, and buffering agents.)

12.3 Figures (Include any figures, schematics, and/or chartlets.)

12.4 Tables (Include any tables of station locations.)