

# Project Instructions: EX2308, EXPRESS: Exploration of Central California Coast

**Date Submitted:** September 26, 2023  
**Platform:** NOAA Ship *Okeanos Explorer*  
**Project Number:** EX2308  
**Project Title:** EXPRESS: Exploration of Central California Coast  
**Project Dates:** October 21 - November 11, 2023

**Prepared by:** \_\_\_\_\_ **Dated:** \_\_\_\_\_  
Sam Cuellar  
Expedition Coordinator  
NOAA Ocean Exploration

**Approved by:** \_\_\_\_\_ **Dated:** \_\_\_\_\_  
Kasey Cantwell  
Operations Chief  
NOAA Ocean Exploration

**Approved by:** \_\_\_\_\_ **Dated:** \_\_\_\_\_  
Kelley Suhre  
Chief (acting), Expeditions and Exploration, Division  
NOAA Ocean Exploration

**Approved by:** \_\_\_\_\_ **Dated:** \_\_\_\_\_  
CAPT Amanda Goeller  
Commanding Officer  
NOAA Marine Operations Center — Atlantic

# I. Overview

## A. Brief Summary and Project Period

This document contains project instructions specific to EX2308. For the annual cross-expedition details, see the [“NOAA Ship \*Okeanos Explorer\* FY23 Field Season Instructions.”](#) This expedition will commence on October 21, 2023, in San Francisco, California, and conclude on November 11, 2023, in San Francisco, California. Operations will be conducted 24 hours a day, and may consist of autonomous underwater vehicle (AUV) dives, mapping operations, conductivity, temperature, and depth (CTD) operations, and full shore-based participation via telepresence.

Operations will include the use of the ship’s deepwater mapping systems (Kongsberg EM 304 multibeam, EK60/EK80 split-beam sonars, Knudsen 3260 Chirp sub-bottom profiler, and Teledyne acoustic Doppler current profilers), expendable bathythermograph (XBTs) in support of multibeam sonar mapping operations, conductivity, temperature, depth profiler (CTD) casts, the large AUVs Eagle Ray and Mola Mola operated by the University of Southern Mississippi, launched and recovered from a Launch and Recovery Systems (LARS), ship crane, and small boat, and a high-bandwidth satellite connection for continuous ship-to-shore communications. Operations will focus on exploring deep waters (greater than 200 m for mapping operations and between 40 and 130 m for AUV operations) in U.S. waters off the central California coast.

## B. Days at Sea

Of the 22 days at sea (DAS) scheduled for this expedition, 22 DAS are provided by the OAR line office base allocation. The total number of DAS and allocation distribution was increased from an original count of 21 DAS due to a desire from OMAO for more at-sea days for *Okeanos Explorer*. The information here reflects the most recent working information and schedule between the ship’s Command and the program and will be finalized as new information is available.

While mapping operations are planned 24 hours a day during this expedition, a high operational tempo due to extended operations, which may include AUV dives and recoveries and small boat operations, is expected periodically and will require 12 hours a day of support from the ship’s deck and engineering department. Additional support beyond 12 hours may be required to include unscheduled recovery operations of the AUV.

## C. Operating Area

EX2308 will focus operations on U.S. waters off the coast of California. Mapping and AUV operations will be conducted at depths between 100 and 6,000 meters. **Figure 1** shows the

planned dive sites for the expedition and tentative expedition track. The dive sites and proposed expedition track are in **Appendix A**.

As this expedition is operating in remote locations and/or far from a suitable port to treat medical emergencies, a medical officer is requested to be aboard for the entirety of the expedition.



**Figure 1.** Map showing the proposed expedition track and operating area for EX2308. The track and operating area are subject to change based on survey results, field conditions, and the discretion of the commanding officer.

## D. Summary of Objectives

EX2308 operations will depart San Francisco, conducting AUV and focused ocean mapping operations within U.S. territorial waters along the Californian coast, primarily in deep water (>200m). AUV operations will involve 2 vehicles owned and operated by the University of Southern Mississippi, collecting bathymetric, magnetometer, video, and laser line scanner data. This expedition will collect critical baseline information to support priority NOAA science and management needs, as well as needs identified by the EXPRESS campaign.

Mission objectives for EX2308 include a variety of objectives focused on science, mapping, education, outreach, and data management. Overarching objectives that span the entire Fiscal Year 2023 (FY23) field season are covered in the [“NOAA Ship Okeanos Explorer FY23 Field Season Instructions.”](#) See **Appendix B** for the expedition data management plan. Additional objectives specific to EX2308 follow:

### 1. Science Objectives

- a. Map geologic features to better understand the geological context of the region and improve knowledge of past and potential geohazards.
- b. Acquire acoustic and oceanographic data as a foundation to better understand the characteristics of the water column and the pelagic fauna that inhabit it.
- c. Engage a broad spectrum of the scientific and management community, as well as the public, in telepresence-based exploration.
- d. Create and provide input into standard science products to provide a foundation of publicly accessible data and information products to spur further exploration, research, and management activities.
- e. Conduct stationary CTD casts as required to support high-priority requests from the science community (e.g., to help identify potential hydrothermal vents).
- f. Use the onboard laboratory to preserve and catalog all biological and geological samples and ready them for shipping to their respective public archives.
- g. Collect water samples using the AUV- and CTD-mounted Niskin bottles and filter samples in the onboard laboratory to obtain eDNA samples for shoreside processing.
- h. Collect sun photometer measurements as part of surveys of opportunity in partnership with NASA.
- i. Collect baseline oceanographic, geologic, and biological data from the proposed Chumash Heritage National Marine Sanctuary to help inform of critical habitats and other important information to aid management decisions and justifications.

## 2. Acoustic Mapping Objectives

- a. Collect transit data that addresses bathymetric gaps or prioritizes areas with poor bathymetric or seabed backscatter data quality. The requested transit speeds will be the best possible speed up to 10 kts.
- b. Conduct 24-hour mapping operations for the entirety of the expedition. Mapping operations will consist of concurrent data acquisition from the EM 304 multibeam echosounder, EK60/80 split-beam echosounder suite, and Knudsen 3260 sub-bottom profiler.
- c. Collect high-resolution bathymetry in areas with no (or low quality) sonar data.
- d. Execute mapping line plans as defined by onboard personnel, with real-time adjustments made to obtain complete seabed coverage as necessary. An average survey speed of 8-9 kn will be used during mapping operations.
- e. Conduct XBT casts as data quality requires, but not more than six hours apart.
- f. Maintain CTD capabilities as a backup sound velocity profiling method for mapping data requirements.
- g. Collect acoustic, bathymetric, magnetic, video stills, and laser scan data from the two AUVs, Eagle Ray and Mola Mola, operated on board by the University of Southern Mississippi.

## 3. Video Engineering Objectives

- a. Provide onboard support for 24-hour exploration operations.
- b. Verify Global Foundation for Ocean Exploration (GFOE) managed telepresence systems perform as expected.

## 4. Network/Onboard Data Objectives

- a. Ensure integrity of all data processing pipelines and automated transfer to shore for all raw sonar data and daily bathymetry and bottom backscatter mosaic products.
- b. Ensure GFOE managed VSAT, network, and computing infrastructure operate as required to meet mission objectives.
- c. Ensure shipboard instruments/teams are producing expected data products at the expected rates according to established conventions.
- d. Ensure data management processes organize, backup, and transmit data to shore as expected.
- e. Support shore-based personnel with remote access to shipboard resources to better meet mission objectives.
- f. Cross-train network, system administration, and data management personnel.
- g. Improve system documentation.



- h. Conduct at-sea testing and evaluation of Starlink low earth orbiting satellite systems and applicability to operations.

## 5. Outreach and Education Objectives

- a. Host limited scheduled ship tours while in port (exact schedule TBD)
- b. Engage the general public in ocean exploration through social media and live video and timely content (dive summaries, web features, highlight videos, video clips, still imagery, and mapping products) on the NOAA Ocean Exploration website.
- c. Conduct live interactions with the shore, supporting NOAA Marine Sanctuaries and NOAA Ocean Exploration in an outreach event.

## 6. Ship Objectives

- a. Review ROV emergency procedures.
- b. Conduct wardroom and deck department training on AUV deployment and recovery with a discussion of emergency procedures.
- c. Conduct wardroom Aft Conn familiarity refresher training for AUV recoveries.
- d. Conduct small boat training and operations for AUV recovery support.
- e. Conduct deck training and interfacing between USM and ship personnel on AUV launch and recovery procedures.
- f. Practice and discuss man-overboard scenarios during AUV recovery, depending on weather and operations.
- g. Support pier side AUV dunk tests for ballasting.

## 7. Ethanol Testing

- a. Test the quality of the ethanol stored in the 02 Deck container before and after each ROV expedition.
- b. Use NOAA Ocean Exploration's Ethanol Test Guide (**Appendix C**), which provides detailed instructions on how to test the ethanol, calculate the measurements, and record the results.
- c. Update NOAA Ocean Exploration's internal Ethanol Test Guide as procedures are refined.

## E. Participating Institutions

- University of Southern Mississippi
- NOAA Marine Sanctuaries

- Ocean Exploration Cooperative Institute

See “[NOAA Ship \*Okeanos Explorer\* FY23 Field Season Instructions](#)” for institutions that consistently participate throughout the field season.

## F. Personnel (Mission Party)

Mission personnel (see **Table 1**) will arrive in San Francisco California, as early as October 15th - 16th, 2023 to support AUV mobilization. Mission personnel will then be aboard for the duration of the expedition, moving on board October 17-18. (October 21st - November 11th, 2023). Some personnel will depart on November 12th, 2023, and others will stay aboard for the expedition that follows (EX2309). The expedition will also be supported by shoreside personnel (see **Table 2**).

Mission personnel sailing aboard NOAA Ship *Okeanos Explorer* must fill out a [Sailing Contact Form](#) that collects emergency contact information for each person. This information is available to the operations officer to fulfill safety requirements to sail.

**Table 1.** Seagoing mission personnel: This list is tentative until travel is booked. Arrival dates are dependent upon downstream impacts related to the scheduling of the March 2023 dry dock and will be confirmed once expedition dates are finalized. Any deviations will be communicated to the operations officer.

#	Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
1	Cuellar, Sam	Expedition Coordinator	10/19	11/14	M	NOAA Ocean Exploration	USA
2	Freitas, Dan	Mapping Watch Lead	TBD	TBD	M	UCAR	USA
3	Coulson, Anna	Mapping Watch Lead	TBD	TBD	F	UCAR	USA
4	O’Brien, Andy	GFOE Team Lead	TBD	TBD	M	GFOE	USA
5	Aragon, Fernando	Technical Team	TBD	TBD	M	GFOE	USA
6	Murphy, Lars	Technical Team	TBD	TBD	M	GFOE	USA
7	Howard, Art	Photographer/ Videographer	TBD	TBD	M	GFOE	USA

#	Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
8	Brian, Roland	Video and Satellite Engineer	TBD	TBD	M	GFOE	USA
9	Dr. Leo Macelloni	AUV Team Lead	10/18 or 10*19	11/13 or 11/14	M	USM	US Permanent Resident
10	Marco D'Emidio	AUV Team Lead	10/18 or 10/19	11/13 or 11/14	M	USM	US Permanent Resident
11	Rubim de Assis, Agno	AUV Team	10/18 or 10/19	11/13 or 11/14	M	USM	Brazil
12	Woolsey, Max	AUV Team	10/18 or 10/19	11/13 or 11/14	M	USM	USA
13	Jarnagin, Roy	AUV Team	10/18 or 10/19	11/13 or 11/14	M	USM	USA
14	Battista, Brad	AUV Team	10/18 or 10/19	11/13 or 11/14	M	USM	USA
15	Lopez, Mia	Chumash Community Representative	10/20	10/28 Small boat X-fer to R/V <i>Shearwater</i>	F	Chumash Indigenous Community	USA
16	Lopez, Ray	Chumash Community Representative	10/20	10/28 Small boat X-fer from R/V <i>Shearwater</i>	M	Chumash Indigenous Community	USA

## 1. Foreign National Guests (FNGs) Access to OMAO Facilities and Platforms

There will be one Foreign National Guest who will require access to *Okeanos Explorer*. Agno Rubim de Assis is a native of Brazil and is currently studying for his PhD at the University of Southern Mississippi. He is part of the University of Southern Mississippi AUV Team and vital to the operation of the 2 AUV vehicles that will be on board. He will be escorted by Expedition Coordinator Sam Cuellar. He is expected to need access to *Okeanos Explorer* from October 15, 2023 until November 14, 2023



## G. Administrative

### 1. Points of Contact

**Table 2.** Points of contact.

Operations	Name, Title	Office	Address	Phone	Email
Marine Operations Center, Atlantic	CAPT Amanda Goeller, Commanding Officer	Marine Operations Center, Atlantic	439 West York Street Norfolk, VA 23510-1145	(757) 441-6778	<a href="mailto:co.moc.atlantic@noaa.gov">co.moc.atlantic@noaa.gov</a>
Marine Operations Center, Atlantic	CDR Steven Barry, Chief of Operations	Marine Operations Center, Atlantic	439 West York Street Norfolk, VA 23510-1145	(757) 441-6842	<a href="mailto:Chiefops.MOA@noaa.gov">Chiefops.MOA@noaa.gov</a>
NOAA Ship Okeanos Explorer (primary)	CAPT Colin Little, Commanding Officer	NOAA Ship Okeanos Explorer	NOAA Ship Okeanos Explorer 47 Chandler Street Newport, RI 02841	(401) 439-7848	<a href="mailto:CO.Explorer@noaa.gov">CO.Explorer@noaa.gov</a>
NOAA Ship Okeanos Explorer (primary)	LT Hunter Brendel, NOAA Operations Officer	NOAA Ship Okeanos Explorer	NOAA Ship Okeanos Explorer 47 Chandler Street Newport, RI 02841	(808) 659-9179 x221	<a href="mailto:ops.explorer@noaa.gov">ops.explorer@noaa.gov</a>
Mission (primary)	Sam Cuellar, Expedition Coordinator	NOAA Ocean Exploration	1315 East-West Highway, Silver Spring, MD, 20910	(202) 302-9474	<a href="mailto:samuel.cuellar@noaa.gov">samuel.cuellar@noaa.gov</a>
Mission (other)	Kasey Cantwell, Operations Chief	NOAA Ocean Exploration	1315 East-West Highway, Silver Spring, MD 20910	(301) 717-7776	<a href="mailto:kasey.cantwell@noaa.gov">kasey.cantwell@noaa.gov</a>
Mission (other)	Kelley Suhre, Chief (acting), Expeditions and Exploration Division	NOAA Ocean Exploration	1315 East-West Highway, Silver Spring, MD 20910		<a href="mailto:kelley.suhre@noaa.gov">kelley.suhre@noaa.gov</a>
Mission (other)	Jeremy Weirich, Director	NOAA Ocean Exploration	1315 East-West Highway, Silver Spring, MD 20910	(301) 452-7366	<a href="mailto:jeremy.weirich@noaa.gov">jeremy.weirich@noaa.gov</a>

### 2. Diplomatic Clearances

None required.

### 3. Licenses and Permits

This project will have elements conducted in part within Alaska state waters, potentially involving Underwater Cultural Heritage exploration. This work will be done under a State

Cultural Resource Investigation Permit (SCRIP) provided by the Alaskan Department of Natural Resources, Office of History and Archaeology. The expedition coordinator is responsible for obtaining and listing all permits as well as any identification numbers they contain. See **Appendix D** for the applicable documents. Final documents will be archived with the associated expedition report.

## 4. Shipments

The *Okeanos Explorer* operations officer should be notified of any shipments to the ship. Send an email describing the shipment (including size and number of items) to

[OPS.Explorer@noaa.gov](mailto:OPS.Explorer@noaa.gov).

For shipments to arrive while in port in Seattle, Washington at the start of the expedition, **shipments should arrive no later than October 14, 2023**, and be shipped to the following address:

NOAA Ship *Okeanos Explorer*  
Attn: Name/Dept  
47 Chandler Street  
Newport, RI 02841

For shipments to arrive while in port in San Francisco, CA after the expedition from November 11 - 29, 2023, **shipments should arrive no later than November 19, 2023**, and should be shipped to the following address:

NOAA Ship *Okeanos Explorer*  
Attn: Name/Dept  
47 Chandler Street  
Newport, RI 02841

## 5. COVID-19 Contingency Plan for Scientific Party

In accordance with the “OMAO Marine Operations COVID-19 Protocols” effective May 3, 2023, shelter-in-place is not required for sailing, the COVID 19 booster is not required for sailing, and pre-sail testing requirements have an on/off toggle. All mission personnel shall follow the guidelines written within the documentation, subject to change, pending the release of the new guidance. All sailing personnel are required to have completed the initial vaccination series.

If any mission personnel develop COVID-19-like symptoms while underway, OMAO protocols will be strictly followed. The expedition coordinator (or designee if they are unable to fulfill this role) will remain the primary point of contact for all mission personnel. Additional support with onshore logistics for impacted mission personnel will be provided by:

Abby Letts  
 Technical Operations Team Lead, Expeditions and Exploration Division  
 NOAA Ocean Exploration  
 Joint Hydrographic Center  
 24 Colovos Road  
 Durham, NH 03824

## II. Operations

The expedition coordinator is responsible for ensuring mission personnel are trained in planned operations and are knowledgeable about expedition objectives and priorities. The commanding officer is responsible for ensuring all operations conform to the ship’s accepted practices and procedures.

### A. Expedition Itinerary

**Table 4** summarizes the expedition itinerary. All times and dates are subject to conditions and the discretion of the commanding officer. Locations are approximate.

Additional items may be added to the itinerary as expedition plans are further developed.

**Table 3.** Expedition itinerary: This is an approximate itinerary and is subject to change based on objective completion, weather, and logistical needs.

Date	Activities
10/16-10/20	Mobilization of USM AUVs on board EX.
10/21	Depart San Francisco on EX2308
10/22	Ship and AUV Launch and Recovery Familiarity Evolutions and Overnight Mapping Ops
10/23	AUV and Mapping Ops
10/24	AUV and Mapping Ops
10/25	AUV and Mapping Ops
10/26	AUV and Mapping Ops
10/27	AUV and Mapping Ops

Date	Activities
10/28	AUV and Mapping Ops – Small boat transfer with <i>R/V Shearwater</i>
10/29	AUV and Mapping Ops
10/30	AUV and Mapping Ops
10/31	AUV and Mapping Ops
11/1	AUV and Mapping Ops
11/2	AUV and Mapping Ops
11/3	AUV and Mapping Ops
11/4	AUV and Mapping Ops
11/5	AUV and Mapping Ops
11/6	AUV and Mapping Ops
11/7	AUV and Mapping Ops
11/8	AUV and Mapping Ops
11/9	AUV and Mapping Ops
11/10	AUV and Mapping Ops
11/11	Return to Port in San Francisco

## B. Staging and Destaging

Pre-staging is anticipated for this mapping expedition. Crane operations and forklift support will be needed to support the offloading and onloading of the USM CONEX container (20' x 8')

Crane operations for demobilization are anticipated to offload AUV vehicles and equipment.

Deck operations are also anticipated for the dunk testing of both AUVs while alongside before departure to support proper ballasting of the vehicles.

## C. Operations to Be Conducted

### 1. CTD Casts

CTD casts are not anticipated at this time due to damage to the CTD frame and its replacement not yet being received and installed on board *Okeanos Explorer*.

### 2. Extended Operations

This expedition includes planned extended over-the-side and small-boat operations. Current expedition plans include conducting extended over-the-side (e.g., CTD operations) and AUV operations up to four times per week during the expedition. The exact locations of AUV and CTD operations are to be finalized but will take place along the central and southern Californian coast. A final plan for extended operations will be included in the final project instructions and will be circulated prior to the start of the expedition. Best attempts will be made to stick to this schedule pending weather, mechanical issues, or other operational constraints. Extended dive operations may also be requested by the mission team in the case of unexpected late AUV deployments and/or exceptional discoveries.

Approval of extended dive and over-the-side operations is at the commanding officer's discretion, and every effort shall be taken to minimize undue hardship on the crew and disruptions to work schedules.

### 3. Telepresence/Outreach Events

- a. Three live video feeds will be used throughout the expedition to provide situational awareness for onshore personnel.
- b. Live interactions are not planned for this expedition.

### 4. In-Port Events

- a. No in port public events are planned for this expedition.

### 5. Special/Unusual Operations or Requests

- a. Crane and deck support may be needed during mobilization and demobilization to onload and offload NOAA-partner and AUV equipment.
- b. Small boat operations support will be needed for the deployment and recovery of the USM AUVs during the expedition with 1-2 AUV operators on board. Deck support is also requested during mobilization, likely around Aug 18-20, for dunk tests involving the AUVs while pier side.

## D. SCUBA Dive Plan

All SCUBA dives are to be conducted in accordance with the requirements and regulations of the [NOAA Diving Program](#) and require the approval of the ship’s commanding officer. No SCUBA science dives are planned during EX2308, but the ship may plan training, safety drills, or maintenance dives.

## E. Applicable Restrictions

Conditions that preclude normal operations include AUV dives, CTD and mapping operations within the state waters of Alaska. Permits have been requested for these activities and are expected prior to departure. Permits and operational restrictions will be reviewed with the ship during the pre-cruise meeting prior to departure (additional information in **Appendix D**).

## III. Equipment

A detailed list of equipment provided by the ship and NOAA Ocean Exploration can be found in the “[NOAA Ship \*Okeanos Explorer\* FY23 Field Season Instructions](#).” The University of Southern Mississippi’s AUV systems and associated components will be under the control and management of USM, but any hazardous materials, such as Lithium Ion batteries, will be stored in accordance with best practices and official guidelines.

## IV. Hazardous Materials

### A. Policy and Compliance

See the “[NOAA Ship \*Okeanos Explorer\* FY23 Field Season Instructions](#).”

### B. Inventory

**Table 4.** Inventory of hazardous materials that will be aboard for EX2308.

Item	Use	Approximate Locations
95% UPS denatured ethanol (275 gal)	Sample preservation	02 Deck, port side ethanol storage container
Formaldehyde (2 gal) to be buffered into 10% buffered formalin	Sample preservation	Wet lab, under the chemical hood
Bleach (1 qt)	Sterilization and sample preservation	Wet lab cabinet under sink
Magnesium chloride (500 g)	Sample preservation	Wet lab under hood



Item	Use	Approximate Locations
Sodium phosphate (1 kg)	Sample preservation	Wet lab under hood
AquaShield	Underwater lubricant	ROV workshop fire cabinet, pit
Dow Corning 4	Electrical insulating compound	ROV workshop fire cabinet, pit
Fluid film spray	Silicone lubricant	ROV workshop fire cabinet
Isopropanol alcohol (2 gal)	Solvent	ROV workshop fire cabinet
Scotchkote	Electrical insulating compound	ROV workshop fire cabinet
3M silicone spray	Silicone lubricant	ROV workshop fire cabinet
Synthetic AW hydraulic oil, ISO-22	Amsoil (AWG-05)	Hanger, pit, vehicles
Tap Magic cutting fluid	Cutting/machining lubricant	ROV workshop fire cabinet
Tap Magic heavyweight cutting fluid	Cutting/machining lubricant	ROV workshop fire cabinet
Tuff Coat M	Marine lubricant	Winch room
Dow Corning Molykote 111	Valve lubricant and sealant	ROV workshop Fire cabinet, pit
WD40	Lubricant	ROV workshop fire cabinet
Loktite	Bolt adhesive	ROV workshop fire cabinet
Shell Diala S2	Vitrea	Hanger, vehicles
Por-15	Paint kit	ROV workshop fire cabinet
Aeroshell 41	Hydraulic fluid	Hanger, ROV Deep Discoverer
Ultratane	Butane fuel	ROV workshop fire cabinet
Rust-oleum	Protective enamel	ROV workshop fire cabinet
Flux-Off	Soldering flux remover	ROV workshop fire cabinet
Propane	Torch fuel	ROV workshop fire cabinet
Adhesive Pliobond 25	General adhesive	Tool room
AP 120 Metal Prep	Degreaser/cleaner for metal surfaces	Pit
Butane fuel	Torch refill	Tool room

Item	Use	Approximate Locations
PVC cement	Adhesive for PFV plastic piping	Tool room
Phosphoric acid	Ferrous metal rust removal	Tool room
Pipetite paste	Plumbing sealant	Tool room/pit
Spindle oil 10, ROS PT	Lubricant/compensation oil	Tool room
DC557	Silicon grease	Tool room/pit
Tether potting catalyst	Two part epoxy catalyst	Pit
Tether potting compound	Two part epoxy ingredient	Pit
ThermaPlex bearing grease	Lubricant	Pit
Tritech Seaking	Compensator oil for sonar head	Pit

## Appendix A. Dive Sites

Dive	Dive Name	Longitude (D DM)	Latitude (D DM)
1	GFNMS Farallon Escarpment	123° 10.67740932' W	37° 37.14839958' N
2	GFNMS - No Name Canyon West of Point Arena South EFH	123° 56.86232886' W	38° 31.69186368' N
3	CBNMS - Bodega Canyon - Shallow	123° 37.58696400' W	38° 13.64857272' N
4	UCH	REDACTED	REDACTED
5	BOEM Wind Lease Area	121° 45.11657946' W	35° 28.89560064' N
6	CHNMS Santa Lucia Shelf	121° 19.57332120' W	35° 02.12793996' N
7	Arguello Canyon - Shallow	121° 06.50201898' W	34° 20.81529288' N
8	Rodriguez Sister Seamount	120° 50.04189204' W	34° 01.79489172' N
9	Rodriguez Seamount	121° 03.39703236' W	34° 02.64896886' N
10	San Juan Seamount	120° 58.44784974' W	33° 03.68285142' N
11	Lucia Chica Channel	121° 47.32649514' W	35° 44.74370718' N

**Table A1.** Waypoints for planned dives. This is subject to change.

# Appendix B. Data Management Plan

## Okeanos Explorer Mission EX2308 Data Management Plan

Report Date: 2023-09-08

### 1. General Description of Data to be Managed

#### 1.1 Name and Purpose of the Data Collection Project:

EX-23-08, EXPRESS: Exploration of Central California Coast

This expedition will commence on October 21, 2023, in San Francisco, California and conclude on November 11, 2023 in San Francisco, California. Operations will be conducted 24 hours a day, and may consist of autonomous underwater vehicle (AUV) dives, mapping operations, conductivity, temperature, and depth (CTD) operations, and full shore-based participation via telepresence.

#### 1.2 Summary Description of the data to be collected:

Operations will include the use of the ship's deepwater mapping systems (Kongsberg EM 304 multibeam, EK60/EK80 split-beam sonars, Knudsen 3260 Chirp sub-bottom profiler, and Teledyne acoustic Doppler current profilers), expendable bathythermograph (XBTs) in support of multibeam sonar mapping operations, conductivity, temperature, depth profiler (CTD) casts, the large AUVs Eagle Ray and Mola Mola operated by the University of Southern Mississippi, launched and recovered from a Launch and Recovery Systems (LARS), ship crane, and small boat, and a high-bandwidth satellite connection for continuous ship-to-shore communications. Operations will focus on exploring deep waters (greater than 200 m for mapping operations and between 40 and 130 m for AUV operations) in U.S. waters off the central California coast.

#### 1.3 Keywords or phrases that could be used to discover the data:

##### Theme Keywords:

bathymetric gaps, CTD, EM304, fish habitats, geohazards, habitat areas of particular concern, HAPC, mapping survey, marine education, multibeam, multibeam backscatter, multibeam sonar, multi-beam sonar, noaa, noaa fleet, ocean, ocean discovery, ocean education, ocean exploration, ocean exploration and research, ocean literacy, ocean research, oceans, OER, okeanos, okeanos explorer, R337, science, sun photometer, scientific computing system, scientific mission, scientific research, SCS, sea, Seabed 2030, single beam sonar, singlebeam sonar, single-beam sonar, site characterization, sonar anomalies, split beam sonar, stewardship, pelagic infauna, systematic exploration, sub-bottom profile, systematic exploration, water column backscatter, EXPRESS, EXpanding Pacific Research and Exploration of Submerged Systems, autonomous underwater vehicle, AUV, Eagle Ray, Mola Mola, magnetometer.

##### Place Keywords:

California, Chumash Heritage National Marine Sanctuary, San Francisco, U.S. West Coast

**1.4 If this mission is part of a series of missions, what is the series name?**

Okeanos AUV Cruises

**1.5 Planned or Actual Temporal Coverage of the data:**

Start Date: 2023-10-21 and End Date: 2023-11-11

**1.6 Actual or Planned Geographic Coverage of the data:**

Northernmost Boundary: 38.75 and Southernmost Boundary: 32.5

Westernmost Boundary: -124.5 and Easternmost Boundary: -117.9

**1.7 What data types will be created or captured and submitted for archive?**

Bottom Backscatter, Cruise Plan, Cruise Summary, CTD (processed), CTD (product), CTD (raw), EK60 Split Beam Data, EK80 Split Beam Data, Multibeam (image), Multibeam (processed), Multibeam (product), Multibeam (raw), Navigational Data, SCS Output (compressed), SCS Output (native), Seafloor Imagery, Sound Velocity Profile, Sub-Bottom Profile data, Temperature data, Water Column Backscatter, XBT (raw), SCS Output (compressed), SCS Output (native)

**1.8 What platforms will be employed?**

NOAA Ship Okeanos Explorer

**2 Points of Contact for this Data Producing Project**

Overall POC: Sam Cuellar, samuel.cuellar@noaa.gov

Title: Expedition Coordinator

Affiliation: NOAA Office of Ocean Exploration and Research

Phone: (202) 302-9474 (Sam Cuellar)

**3 Points of Contact for Managing the Data**

Data POC: Caitlin Ruby

Data POC Title: Stewardship Data Management

Data POC Email: caitlin.ruby@noaa.gov

**4 Resources**

**4.1 Have resources for management of these data been identified?**

Yes

**4.2 Approximate percentage of the budget devoted to data management. (specify % or unknown)**

Unknown

**5 Data Lineage and Quality**

**5.1 What is the processing workflow from collection to public release?**

SCS data shall be delivered in its native format to NCEI-MD (oceanographic archive); the data are then converted to an archive-ready, documented, and compressed NetCDF3 format which is made available for download through the Ocean Exploration Data Atlas; water column profile data and navigation data will be delivered in ASCII format to NCEI-MD; EM304 and EK60/80 output data and metadata along with water column profiles used for calibration will be delivered to NCEI-CO (geophysical archive). AUV seafloor imagery, water column profile data and navigation data will be delivered in ASCII format to NCEI-MD on a separate drive.

## **5.2 What quality control procedures will be employed?**

Quality control procedures for the data from the Kongsberg EM304 is handled at UNH CCOM/JHC. Raw (level-0) bathymetry files are cleaned/edited into new data files (level-1) and converted to a variety of products (level-2). Data from sensors monitored through the SCS are archived in their native format and are not quality controlled. Data from CTD casts and XBT firings are archived in their native format.

## **6 Data Documentation**

### **6.1 Does the metadata comply with the Data Documentation Directive?**

Yes

#### **6.1.1 If metadata are non-existent or non-compliant, please explain:**

Not Applicable

### **6.2 Where will the metadata be hosted?**

Organization: An ISO format collection-level metadata record will be generated during pre-cruise planning and published in the NOAA OneStop catalog and an OER Web Accessible Folder (WAF) hosted for public discovery and access at:

URL: <https://data.noaa.gov/waf/NOAA/NESDIS/ncei/oer/iso/>

Metadata Standard: ISO 19115-2 Geographic Information with Extensions for Imagery and Gridded Data will be the metadata standard employed.

### **6.3 Process for producing and maintaining metadata:**

Metadata will be generated via xml editors or metadata generation tools.

## **7 Data Access**

### **7.1 Do the data comply with the Data Access Directive?**

Yes

#### **7.1.1 If the data will not be available to the public, or with limitations, provide a valid reason.**

Not Applicable

#### **7.1.2 If there are limitations, describe how data are protected from unauthorized access.**

Account access to mission systems are maintained and controlled by the Program. Data access prior to public accessibility is documented through the use of Data Request forms and standard operating procedures.

## **7.2 Name and URL of organization or facility providing data access.**

Organization: NOAA National Centers for Environmental Information (NCEI)

URL: <https://www.ncei.noaa.gov>

## **7.3 Approximate delay between data collection and dissemination. By what authority?**

Hold time: Data are considered immediately publicly accessible as soon as possible after the mission, unless there are documented restrictions.

Hold authority: not applicable

## **7.4 Prepare a Data Access Statement**

No data access constraints, unless data are protected under Section 304 of the National Historic Preservation Act of 1966. Data collected and derivative data products produced by the *Okeanos Explorer* will be archived in a location where it can be withheld from public disclosure.

## **8 Data Preservation and Protection**

### **8.1 Actual or planned long-term data archive location:**

Data from this mission will be preserved and stewarded through the NOAA National Centers for Environmental Information. Refer to the *Okeanos Explorer* Data Management Plan at NOAA Central Library Institutional Repository for detailed descriptions of the processes, procedures, and partners involved in this collaborative effort.

### **8.2 If no archive planned, why?**

Not Applicable

### **8.3 If any delay between data collection and submission to an archive facility, please explain.**

The EM304 output data is a new format not currently read by NCEI archive systems. The new file format is being added to the system capability. There will be an unknown delay for the archive of these .kml files. All other data will be archived within 60-90 days of receipt.

### **8.4 How will data be protected from accidental or malicious modification or deletion?**

Data management standard operating procedures minimizing accidental or malicious modification or deletion are in place aboard the *Okeanos Explorer* and will be enforced.

### **8.5 Prepare a Data Use Statement**

Data use shall be credited to NOAA Office of Ocean Exploration and Research.



## Appendix C. NOAA Ocean Exploration Ethanol Testing

To ensure the quality of the ethanol stored aboard NOAA Ship *Okeanos Explorer*, NOAA Ocean Exploration has developed an [Ethanol Test Guide](#). This guide provides step-by-step instructions on how to test the ethanol stored in the ejectable ethanol storage barrel on the 02 Deck. This guide also provides a built in calculator to plug in the measurements and get a definitive result. Finally, this guide is a log of the current and previous results of the ethanol testing.

## Appendix D. Licenses, Permits, and Environmental Compliance

Pursuant to the National Environmental Policy Act (NEPA), NOAA Ocean Exploration is required to include in its planning and decision-making processes appropriate and careful consideration of the potential environmental consequences of actions it proposes to fund, authorize, and/or conduct. The companion manual for NOAA Administrative Order 216-6A describes the agency's specific procedures for NEPA compliance.

An environmental review memorandum was completed for NOAA Ocean Exploration expeditions on NOAA Ship *Okeanos Explorer* in 2023 in accordance with Section 4 of the companion manual in the form of a categorical exclusion worksheet. Based on this review, a categorical exclusion was determined to be the appropriate level of NEPA analysis necessary, as no extraordinary circumstances exist that require the preparation of an environmental assessment or environmental impact statement. This document is on file with NOAA Ocean Exploration and can be provided upon request.

The National Oceanic and Atmospheric Administration, Office of National Marine Sanctuaries (ONMS) has approved the issuance of permit number MULTI-2022-008 to conduct activities within Channel Islands, Cordell Bank, Greater Farallones, Monterey Bay and Olympic Coast National Marine Sanctuaries (CINMS, CBNMS, GFNMS, MBNMS and OCNMS; or sanctuaries) for research purposes.

See the "[NOAA Ship \*Okeanos Explorer\* FY23 Field Season Instructions](#)" for additional information regarding environmental compliance that applies to the entire field season (e.g., Endangered Species Act Section 7 consultation and potential impacts to essential fish habitat).

Final licenses, permits, or compliance documents will be appended to the associated expedition report.