doi: 10.25923/81bm-3t26

Project Instructions: EX-22-03, North Puerto Rico Mapping and Deep-Sea Camera Demonstration (Mapping)

Date Submitted: March 17, 2022

Platform: NOAA Ship *Okeanos Explorer*

Project Number: EX-22-03

Project Title: North Puerto Rico Mapping and Deep-Sea Camera Demonstration

Project Dates: April 4-28, 2022

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Captain Nicholas Chrobak
Commanding Officer
NOAA Marine Operations Center — Atlantic

I. Overview

A. Brief Summary and Project Period

April 4-28, 2022
San Juan, Puerto Rico - Newport, Rhode Island
EX-22-03 North Puerto Rico Mapping and Deep-Sea Camera Demonstration (Mapping)

This document contains project instructions specific to EX-22-03. For the annual, cross-expedition details, see the "NOAA Ship *Okeanos Explorer* FY2022 Field Season Instructions." This expedition will commence on April 4, 2022, in San Juan, Puerto Rico, and conclude on April 28, 2022, in Newport, Rhode Island. It will include 24-hour-a-day acoustic exploration mapping operations focused on areas generally deeper than 200 m north of Puerto Rico, the high seas, and U.S. waters off the U.S. East Coast. This expedition will also include a demonstration of two deep-sea cameras designed and provided by the Multidisciplinary Instrumentation in Support of Oceanography (MISO) Facility at the Woods Hole Oceanographic Institution (WHOI). These cameras will be deployed from a modified conductivity, temperature, and depth (CTD) rosette. Additional science objectives include collecting water samples during these operations and processing water samples for environmental DNA (eDNA).

Mapping 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, and a high-bandwidth satellite connection for continuous ship-to-shore communications.

B. Days at Sea

Of the 25 days at sea (DAS) scheduled for this expedition, 25 DAS are funded by NOAA Office of Oceanic and Atmospheric Research. While mapping operations are planned 24 hours a day, this expedition will require 12 hours a day of support from the ship's survey, deck, and engineering department to support camera operations deployed using the CTD overboarding capabilities.

C. Operating Area

EX-22-03 will focus operations on U.S. waters north of Puerto Rico, the high seas, and the U.S. East Coast. Priority mapping areas are indicated in **Figure 1**. The waypoints for the general working area and proposed cruise track are in Appendix B.

An

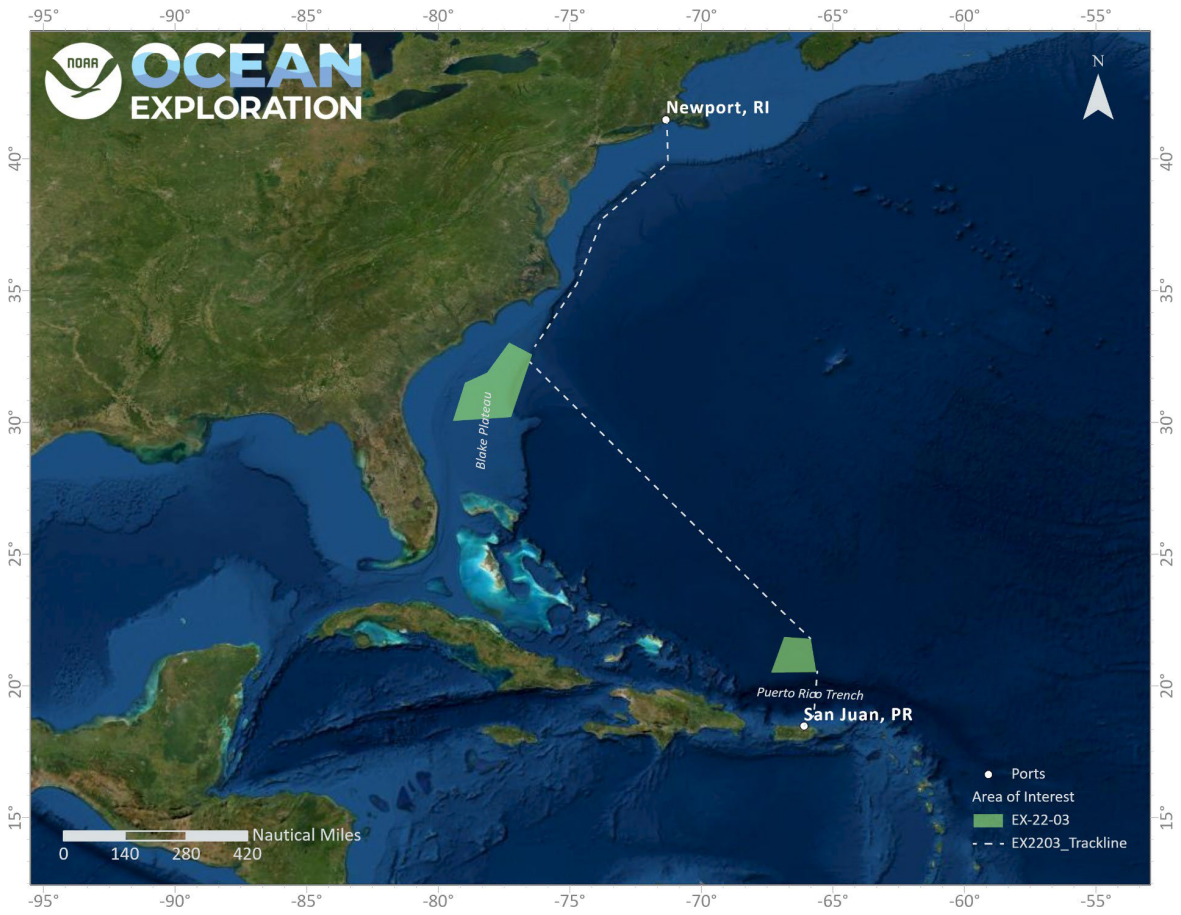

Figure 1. Map showing the general operating area for EX-22-03. Note that the cruise track is subject to change based on survey results, field conditions, and the discretion of the commanding officer.

D. Summary of Objectives

EX-22-03 operations will involve a transit crossing the Puerto Rico Trench, followed by focused ocean mapping operations that will occur north of Puerto Rico. Once the priority area has been mapped, the ship will transit towards the Blake Plateau for deep-sea camera operations, which will be followed by a transit up the east coast canyons ending in Newport, Rhode Island. The expedition will include 24-hour-a-day exploratory mapping operations to fill mapping gaps and deep-sea camera operations using the ship's CTD overboarding capabilities.

NOAA Ocean Exploration is testing out two relatively low-cost deep-sea camera systems developed by WHOI-MISO for the purpose of assessing the possibility of their inclusion in NOAA Ocean Exploration's standard operations aboard NOAA Ship *Okeanos Explorer*. This will include

temporary modifications to the CTD rosette onboard *Okeanos Explorer* to mount a 24 megapixel (MP) WHOI-MISO Ocean Imaging Systems (OIS) deep-sea still camera system and a WHOI-MISO GoPro deep-sea camera capable of acquiring either 12 MP still imagery or video imagery (from 1080P to 2.7k to 4k resolution). A telemetry system (MISO DataLink), that connects to the sea cable from the 24 MP WHOI-MISO OIS camera, will support real-time viewing of data and downward imagery. The WHOI-MISO GoPro camera (pointed out to the side of the CTD frame) will be configured to collect automated discrete intervals of either still imagery or video. Both cameras, and all related system components, are rated to 6,000 meters (m) operating depth; however, due to the length of the conducting cable on *Okeanos Explorer*, operations will be limited to 3,500 m during the expedition. CTD data and water sampling capability will be maintained through the use of the WHOI SBE25Plus SeaBird CTD, and additionally, WHOI-MISO will provide an altimeter (Valeport 500A) so that reliable altitude above bottom data, in a variety of soft to hard bottom environments, can be collected at a frequency of 1 hertz (Hz). Accurate altitude data are crucial to positioning the CTD within approximately 4 m of the seafloor so that optimal imaging can be conducted for both real-time and automated image acquisition.

Adding remote real-time and automated camera operations to *Okeanos Explorer* operations will increase NOAA Ocean Exploration's capacity to systematically and strategically collect a variety of data types. The cameras proposed here will provide imagery data that support the following exploration variables: species-specific and general biological density, distribution, diversity, and abundance; distribution and cover of habitats; seafloor substrate composition; and observations of organisms in their environment. Additionally, NOAA Ocean Exploration is focused on operationalizing the collection of eDNA, and imagery taken at the time of sample collection would help potentially ground-truth organisms identified in the eDNA samples. Beyond the scientific merit of increasing the number of exploration variables collected, the collection of these data will also benefit the optimization of resources and the value of data collected through ground-truthing of remotely sensed observations, selecting optimal sites for further higher-resolution and higher cost exploration (such as remotely operated vehicle (ROV) dives), and providing correlative data between these higher-resolution efforts. The adaptation of multidisciplinary wired systems to support deepwater exploration may also provide a relatively low-cost and technically feasible solution for expanding the exploration footprint to meet the goals of the National Strategy for Ocean Mapping, Exploration, and Characterization, not just for NOAA Ocean Exploration but for use on multiple platforms throughout the global fleet.

See Appendix A for an elaboration of camera equipment, mobilization, and operational procedures.

1. Science Objectives

Deep-Sea Camera Demonstration

- Mobilize two WHOI-MISO cameras (24MB still camera - pointing downward, and GoPro pointing outward) on the CTD frame.
- Successfully demonstrate camera operations deployed using a modified ship's CTD frame and overboarding capability.
- Utilize real-time images to drive operations, such as adjusting height above seafloor or collecting a water sample.
- Evaluate the feasibility of camera operations for integration into standard routine.
- Provide recommendations for platform and mission capabilities to support routine operations.
- Collect midwater video and benthic images.
- Test various image processing and annotation methods.
- Create documentation, such as standard operating procedures, for camera operations and image processing.

eDNA

- Collect water samples using Niskins on CTD rosette frames during camera operations using the established standard operating procedure *(will need to request access)*.
- Investigate using real-time camera feed to inform water sampling operations.
- Filter water samples for eDNA using the established standard operating procedure *(will need to request access)*.
- Collect EK 60/80 data prior to and during CTD casts to assist with identifying water column features of interest to sample in (e.g., deep scattering layers) and enhance data analysis. This may be particularly useful in identifying biological layers to obtain water samples for eDNA.

Mapping Objectives

- Perform standard mapping objectives with the EM 304 multibeam sonar, EK 60/80 split-beam echosounders, Knudsen 3260 sub-bottom profiler, and acoustic doppler current profilers.
- Collect mapping data in priority areas, as shown in **Figure 1**.
- Transit data will aim to address bathymetric gaps or prioritize areas with poor bathymetric or seabed backscatter data quality.
- Execute mapping line plans as defined by onboard personnel, with real-time adjustments made to obtain complete seabed coverage as necessary.

- Collect expendable bathythermograph casts as data quality requires but not more than 6 hours apart.
- POS/MV data will be monitored in real-time and collected to ensure data quality and watch for potential periodic dropouts that have been reported throughout the fleet.
- Seapath data from the newly installed system will be monitored and utilized as necessary.
- Perform extinction testing of the EM 304 while crossing the Puerto Rico Trench.

Education

- Train the next generation of ocean explorers by hosting three Explorers-in-Training on the ship. Training will include standing 8-hour watches of sonar data acquisition, processing, and documentation according to standard NOAA Ocean Exploration procedures. Ancillary projects may be assigned as necessary.

Miscellaneous

- Collect sun photometer measurements as part of an Exploration Project of Opportunity (EPO).

Data Management / Reporting

- Fill out a CTD summary form for every cast and ensure delivery to the archive.
- Amend the CTD summary form to record information on using deep-sea cameras.
- Develop and test out an over-the-side station log.
- Amend ROV expedition report template to be inclusive of operations.
- Investigate GIS layers for camera operations and collected images.
- Perform operational feasibility assessment of WHOI deep-sea camera operations following new protocol.

2. Ancillary Objectives

Video Engineering Objectives

- Provide onboard support for 24-hour mapping objectives
- Provide training and communication support using ‘belt-packs’ for camera operations.

Network/Onboard Data Objectives

- Ensure Global Foundation for Ocean Exploration (GFOE) managed VSAT, network and computing infrastructure operate as required to meet mission objectives.
- Ensure shipboard instruments/teams are producing expected data products at the expected rates according to established conventions

- Ensure data management processes organize, backup, and transmit data to shore as expected.
- Support shore-based personnel to remotely access shipboard resources to better meet mission objectives.
- Improve system documentation.

USBL Support

- Provide interface support for USBL use during camera operations.
- Winch support will be provided by the ship, with proximity to the seafloor data provided by the CTD's altimeter sensor.
- Provide raw USBL data to the science team.

E. Participating Institutions

- National Oceanic and Atmospheric Administration (NOAA), Ocean Exploration — 1315 East-West Highway, Silver Spring, MD 20910 USA
- NOAA, National Centers for Environmental Information (NCEI) — Stennis Space Center, MS 39529 USA
- University Corporation for Atmospheric Research (UCAR) Programs for Advancement of Earth System Science — P.O. Box 3000, Boulder, CO 80307 USA
- Global Foundation for Ocean Exploration (GFOE) — P.O. Box 417, Mystic, CT 06355 USA
- University of Rhode Island Inner Space Center (ISC) — 225 South Ferry Road, Narragansett, RI 02882 USA
- Woods Hole Oceanographic Institution, 360 Woods Hole Rd, Woods Hole, MA 02543 USA
- Ocean Exploration Cooperative Institute (OECI), University of Rhode Island Graduate School of Oceanography, 215 S Ferry Rd, Narragansett, RI 02882 USA

See "NOAA Ship *Okeanos Explorer* FY22 Field Season Instructions" for institutions that consistently participate throughout the field season.

F. Personnel (Mission Party)

Mission personnel (see **Table 1**) will begin joining the ship on March 30, 2022, after a RAPID negative COVID-19 test (as stated in the most current OMAO guidance on COVID protocols - see Section 4; protocols are subject to change). Mission personnel will then be aboard for the duration of the expedition (April 2-26, 2022). Some personnel will depart on April 27, 2022, and others will stay aboard for the expedition that follows (EX-22-04). The expedition will also be supported by shoreside personnel (see **Table 2**).

Table 1. Seagoing mission personnel: This list is tentative until travel is booked. Any deviations will be communicated to the operations officer.

#	Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
1	Hoy, Shannon	Expedition Coordinator/Mapping Lead	03/29	04/29	F	NOAA Ocean Exploration (FW[1])	USA
2	Egan, Katharine	Science Coordinator	04/02	04/29	F	NOAA Ocean Exploration	USA
3	Swartz, Marshall	Watch Lead	03/29	04/29	M	WHOI	USA
4	Freitas, Dan	Watch Lead	04/02	04/29	M	UCAR	USA
5	Peliks, Marcel	Watch Lead	04/02	04/29	M	UCAR	USA
6	Gillespie, Treyson	Watch Lead	Staying aboard from	04/29	M	UCAR	USA
7	Wu, Liang	Knauss Fellow	04/02	04/29	M	Knauss Fellow	Hong Kong (China)
8	Ruby, Caitlin	NCEI Lead	04/02	04/29	F	NCEI	USA
9	Wright, Chris	Ancillary Team Lead	Staying aboard from	04/29	M	GFOE	USA
10	Aragon, Fernando	Data Manager	04/02	04/29	M	GFOE	USA

#	Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
11	Brian, Roland	Video Engineer	Staying aboard from	04/29	M	GFOE	USA
12	Doros, Brian	Video Engineer	04/02	04/29	M	GFOE	USA
13	Cassandra Ferrante	Explorer-in-Training	04/02	04/29	F	UCAR	USA
14	Paige Hoel	Explorer-in-Training	04/02	04/29	F	UCAR	USA

[1] FedWriters

Table 2. Shoreside support personnel and key contacts

#	Name (Last, First)	Title	Affiliation	Nationality
1	Matt Dornback	Image Processor	NOAA Ocean Exploration (FW[1])	USA
2	Anna Lienesh	Data Manager	NCEI	USA
4	Dan Fornari	WHOI Lead	WHOI	USA
3	Christa Rabenold	Web Coordinator	NOAA Ocean Exploration (UCAR)	USA

[1] FedWriters

1. Foreign National Guests Access to OMAO Facilities and Platforms

One foreign national guest will be participating with EX-22-03. Liang Wu, Hong Kong, China, will be sailing on *Okeanos Explorer*. He will board on April 2, 2022, and depart on April 29, 2022. Katharine Egan from NOAA Office of Ocean Exploration and Research will serve as the site sponsor for the foreign national guest.

G. Administrative

1. Points of Contact

Table 3. Points of contact

Operations	Name, Title	Office	Address	Phone/Fax	Email
Marine Operations Center, Atlantic	CAPT Nicholas Chrobak, Commanding Officer	Marine Operations Center, Atlantic	439 West York Street Norfolk, VA 23510-1145	(757) 441-6776/ (757) 441-6495	co.moc.atlantic @noaa.gov
Marine Operations Center, Atlantic	LCDR Steven Barry, Chief of Operations	Marine Operations Center, Atlantic	439 West York Street Norfolk, VA 23510-1145	(757) 441-6842/ (757) 441-6776	Chiefops.MOA @noaa.gov
NOAA Ship Okeanos Explorer (primary)	CDR Colin Little, Commanding Officer	NOAA Ship *Okeanos Explorer*	NOAA Ship *Okeanos Explorer* 47 Chandler Street Newport, RI 02841	(401) 439-7848	CO.Explorer @noaa.gov
NOAA Ship Okeanos Explorer (primary)	LTJG Hunter Brendel, NOAA Operations Officer	NOAA Ship *Okeanos Explorer*	NOAA Ship *Okeanos Explorer* 47 Chandler Street Newport, RI 02841	(808) 659-9179 x222	ops.explorer @noaa.gov
Mission (primary)	Shannon Hoy, Expedition Coordinator	NOAA Ocean Exploration	24 Colovos Road Durham, NH 03824	(603) 775-9327	shannon.hoy@noaa.gov
Mission (other)	Kasey Cantwell, Operations Chief	NOAA Ocean Exploration	1315 East-West Highway, Silver Spring, MD 20910	(301) 717-7776	kasey.cantwell @noaa.gov
Mission (other)	Kelley Suhre, Deputy Chief, Expeditions and Exploration Division	NOAA Ocean Exploration	1315 East-West Highway, Silver Spring, MD 20910	(202) 689-4587	kelley.suhre@noaa.gov
Mission (other)	Genene Fisher Director (Acting)	NOAA Ocean Exploration	1315 East-West Highway, Silver Spring, MD 20910	(301) 452-7366	genene.fisher @noaa.gov

2. Diplomatic Clearances

This expedition will involve marine scientific research (MSR) in waters under the jurisdiction of the Dominican Republic, British Virgin Islands, U.S. Virgin Islands, Puerto Rico. A request to conduct MSR in the waters of the Dominican Republic and British Virgin Islands, was submitted to the U.S. Department of State on December 28, 2021. Deerwater mapping operations in the Dominican Republic were approved. The British Virgin Islands approval for operations are currently pending approval. Consent has not been requested from the Bahamas and Turks and Caicos, though transit through territorial waters is anticipated under

3. Licenses and Permits

See Appendix D.

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.

For shipments to arrive while in port in San Juan, Puerto Rico at the start of the expedition, **shipments should arrive no later than March 30, 2022,** and be shipped to the Newport address to be forwarded to San Juan:

[insert Name or port recipient's organization]
c/o [insert Name of recipient]
ATTN: NOAA Ship *Okeanos Explorer*
47 Chandler Street
Newport, RI 02841

Please note the ship's name must be used in the above address or the package may be lost.

For shipments to arrive while in port in Newport, Rhode Island after the expedition from April 26 - May 9, 2022, **shipments should arrive no later than May 9, 2022,** and should be shipped to the following address:

[insert Name or port recipient's organization]
c/o [insert Name of recipient]
ATTN: NOAA Ship *Okeanos Explorer*
47 Chandler Street
Newport, RI 02841

Please note the ship's name must be used in the above address or the package may be lost.

5. COVID-19 Plan for Mission Personnel

In accordance with the "OMAO COVID-19 Protocols" effective November 24, 2021, shelter-in-place is no longer required for sailing. All sailing personnel are required to follow guidelines written within the documentation. Section 3.3 of the OMAO Protocols requires all sailing personnel to be COVID-19 cleared for sailing using a Rapid Molecular Test (a copy of section 3.3 is below). This policy also requires that all personnel embarking on a NOAA Ship be fully vaccinated for COVID-19, which means 2 weeks after both doses of the Pfizer or Moderna vaccines or 2 weeks after one J&J vaccine. A recent update from NOAA leadership now also requires that all personnel embarking on a NOAA Ship receive one vaccine booster shot by April 16th, 2022.

3.3 Testing Strategy. To be cleared for sailing an individual must be tested prior to sailing, as follows:

- The same day of sailing or the night before using 1 Rapid Molecular Test.
- In the event of unanticipated delays, repeat testing may be necessary depending on how long the delay will be. (Additional molecular tests would need to be sent asap). To be reviewed on a case by case basis if timing exceeds 24-48 hours from the original test. All personnel are required to be at the ship for the scheduled testing event.

Any mission personnel who test positive will be disqualified from sailing, and backup personnel will be activated as mission objectives and priorities dictate.

If any mission personnel test positive for COVID-19 during any required testing as dictated by OMAO:

- NOAA Marine Health Services will notify the individuals who test positive that they are not cleared to board the ship. NOAA Ocean Exploration will reimburse the individual for 5 days of shelter-in-place lodging to complete their isolation and for a COVID-19 test to confirm they are negative prior to returning home.
- The expedition coordinator will be notified of any mission personnel who are not cleared to sail.
- The expedition coordinator will notify the NOAA Ocean Exploration operations chief.
- The expedition coordinator will determine, in consultation with the ship's commanding officer, NOAA Ocean Exploration's operations chief, and appropriate parties, whether the mission will continue without the uncleared personnel.

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:

LT Christopher "J" Dunn, NOAA
Acting Deputy Operations Chief, Expeditions and Exploration Division
NOAA Office of Ocean Exploration and Research
215 South Ferry Road
Narragansett, RI 02882
Desk: (401) 874-6478
Cell: (262) 995-3410

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 prevailing conditions and the discretion of the commanding officer. This is an approximate itinerary and is subject to change based on objective completion.

CTD casts will be regularly requested for deep-sea camera operational demonstrations throughout the cruise. Casts will occur during the Senior Survey Tech's working hours, expected to be 0600-1800. The number of casts per day will depend on depths, sea state, or technical challenges, which will be evaluated during the daily risk assessment. The ship will utilize dynamic positioning during casts. Additional discussions about operational tempo will be had during the pre-cruise meeting.

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

Table 4. Expedition itinerary: This is an approximate itinerary and is subject to change based on objective completion, weather, and logistical needs.

Date	Activities
03/29	Mission personnel participating with the WHOI equipment mobilization arrive at the ship throughout the day in San Juan, Puerto Rico.
03/30 - 04/01	WHOI deep-sea camera gear mobilization, support from SST, Chief ET, Chief Bosun, and BGL may be requested.

Date	Activities
04/02	Expedition mobilization day. Dockside sonar pinging may be requested. The rest of the mission personnel move aboard.
04/03	Pre-expedition meeting in the afternoon with expedition coordinator, operations officer, and commanding officer. Mission personnel orientation meeting. Vessel familiarization meeting with operations officer, executive officer, and safety officer for any new mission personnel. Mapping watch schedule posted.
04/04	First day underway. Depart San Juan, Puerto Rico. Safety drills, including donning of survival suits. Transit to north Puerto Rico mapping area. Perform coverage extinction while transiting Puerto Rico Trench.
04/05 - 04/15	Perform survey north of Puerto Rico. During this survey, test out CTD operations in the water column, and collect eDNA samples. The number of test casts possible will depend on progress and need. These tests will involve practice communication and precision winch control to hit specific depth targets.
04/15 - 04/18	Transit to Blake Plateau.
04/18 - 04/2	Deep-sea camera demonstration on the Blake Plateau. This will include CTD casts up to the frequency outlined in the above paragraph and transits to desired locations during the day and overnight. Site locations will depend on the location of the Gulf Stream.
04/25 - 04/28	Transit to Newport, Rhode Island.
04/28	Arrival in Newport, Rhode Island. Demobilization begins, may need ship's crane to offload WHOI camera equipment.
04/29	Demobilization ends, may need ship's crane to offload WHOI camera equipment. Mission personnel departs.

B. Staging and Destaging

Collaborative efforts between WHOI, OMAO, and NOAA Ocean Exploration to prepare for this project have been ongoing since September 2021, and have included two visits to the ship, in addition to numerous conversations. These two visits have provided the opportunity for hands-on scoping and testing for the feasibility of proposed operations. The equipment that was not loaded during the January visit will be loaded between March 4 and March 7, 2022, in Key West, Florida prior to the EX-22-02 expedition. WHOI engineers will mobilize the full system in San Juan, Puerto Rico, prior to cruise departure. They will need three full days to complete mobilization and discuss details with mission and crew team members. Mobilization will include removing the currently installed CTD rosette base and replacing it with a modified base pre-fit with all necessary gear (**Figure 2**). It will also require removing 2-3 Niskin bottles to make space

for additional gear, swapping the ship's Seabird 9/11 plus for WHOI's 25plus, and connecting with the DataLink. A pull-test of the hydrographic cable to test the termination will be required prior to any operations involving WHOI equipment, this is planned to occur between March 3-10.

Following the expedition, all WHOI camera equipment will be removed and the CTD will be configured to pre-demonstration status. WHOI equipment will be packed up prior to arrival and will be offloaded using the ship's crane. WHOI personnel will meet the ship to facilitate loading on a truck to return gear to Woods Hole. Forklift support may be required to load equipment onto a truck.

C. Operations To Be Conducted

1. Telepresence/Outreach Events

Three live video feeds will be used throughout the expedition to provide situational awareness for onshore personnel.

2. Port Events and Ship Tours

No public port events or ship tours are planned for this expedition.

3. Special/Unusual Operations or Requests

Specific operational requests for camera deployment and eDNA sampling are outlined in Appendix A.

D. SCUBA Dive Plans

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 science dives are planned during EX-22-03, but the ship may plan training, safety drills, or maintenance dives.

E. Applicable Restrictions

Not applicable.

III. Equipment

A detailed list of equipment provided by the ship and NOAA Ocean Exploration is in the "NOAA Ship *Okeanos Explorer* FY2022 Field Season Instructions." A list of equipment provided by WHOI for camera demonstration during this expedition is provided in **Table 5** and depicted in **Figure 2**. This equipment will be removed from the ship following this expedition.

Table 5. Additional equipment provided by WHOI for deep-sea camera expedition

Item	Quantity	Use
MISO OIS 24MP cameras (including deck cables)	2 (1 spare)	Downward still images
MISO power junction boxes	2 (1 spare)	Junction box for all equipment
MISO 300 watt/sec strobes + housing	2 (1 spare)	Lighting for 24MP camera
MISO strobe heads	4 (3 spares)	Lighting for 24MP camera
MISO green lasers	4 (2 spares)	Size reference for downward images
Seabird 25 CTDs	1 SBE25plus and 1 SBE25 (spare)	CTD and other sensors
Valeport 500 altimeters	2 (1 spare)	Provides height above seafloor
MISO OIS GoPro camera *(including deck cables)*	2 (1 spare)	Video/still imagery camera that will be looking outward from the frame
DSPL 5150 LED deep-sea lights	2 (1 spare)	Lighting for GoPro camera
MISO deep-sea batteries (24VDC, 40 amp/hr)	2 (1 spare)	Power
Deep-sea battery chargers	2	Battery chargers
Subsea cabling	assorted various	Connections
MISO DataLink telemetry systems	2 (1 spare)	Real-time connection from deck to camera
MISO timelapse intervalometer	1	Inveralometer to control LED light for GoPro
Laptops (PC and MAC)	4	Data acquisition and processing
Tools and Materials	assorted various	onsite fabrication if needed

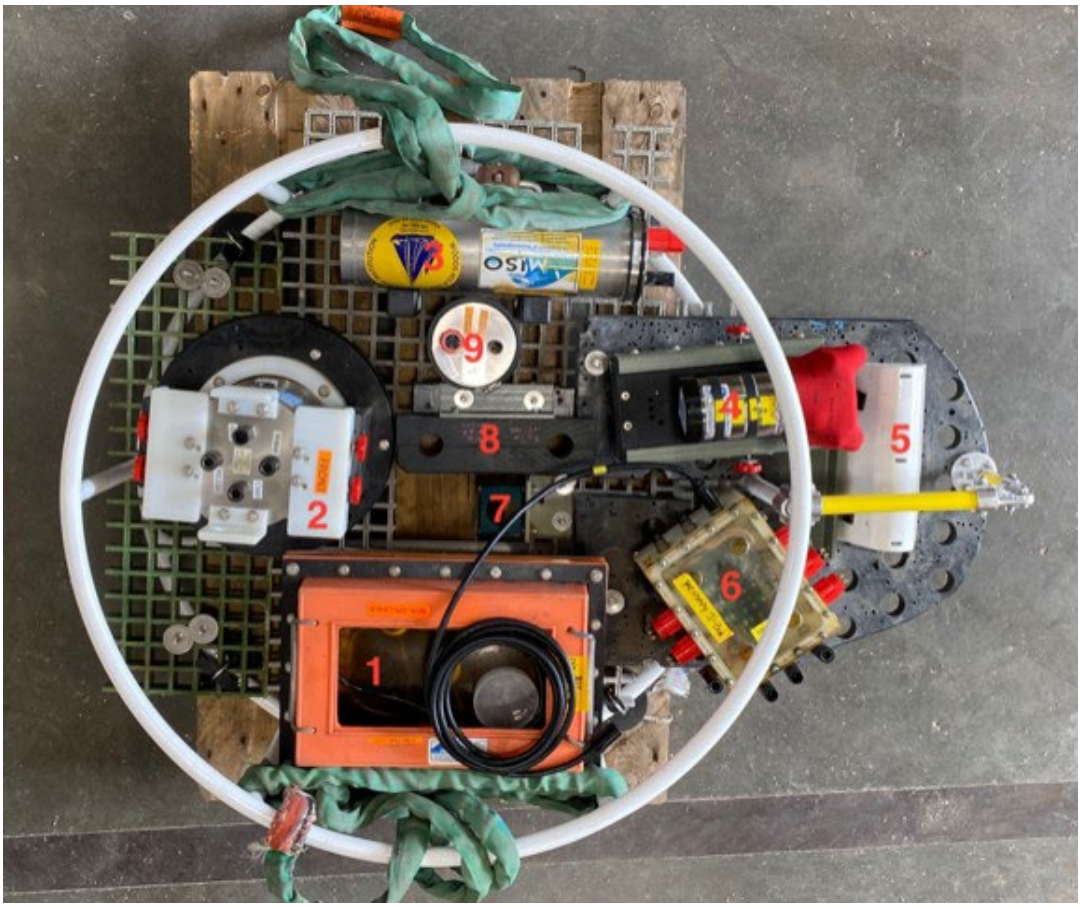

Figure 2. Additional equipment provided by WHOI for deep-sea camera expedition that will be mounted on the pre-fit base provided by WHOI: 1 - MISO 24VDC/40 amp/hr deep-sea battery, 2 - MISO - OIS 24MP deep-sea still camera, 3 - MISO-OIS 300 watt/sec strobe electronics housing, 4 - MISO-OIS GoPro video/still camera, 5 - strobe head reflector, 6 - MISO power junction box, 7 - Valeport 500 altimeter, 8 - MISO laser mounting bracket - 20 cm spacing, 9 - MISO wifi intervalometer.

IV. Hazardous Materials

A. Policy and Compliance

See the "NOAA Ship *Okeanos Explorer* FY2022 Field Season Instructions."

B. Inventory

Table 6. Inventory of hazardous materials that will be aboard for EX-22-03

Item	Use	Approximate Locations
95% UPS denatured ethanol (248 gal)	Sample preservation	02 Deck, port side ethanol storage container
Formaldehyde (20L) to be buffered into 10% buffered formalin	Sample preservation	Wet lab, under the chemical hood
Bleach	Sterilization and sample preservation	Wet lab cabinet under sink
Magnesium chloride	Sample preservation	Wet lab under hood
Sodium phosphate	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
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. Elaboration of Procedures

WHOI-MISO Deep-Sea Camera Demonstration

Operational procedures will be provided prior to the expedition. Generally, these operations will require communication and coordination amongst the WHOI technician, the Senior Survey Tech, and the winch operator to precisely lower the winch to the seafloor to get within 4 m of the seafloor for optimal image capture.

Environmental eDNA Collection

Environmental DNA (eDNA) collection protocols are detailed here in this SOP *(will need to request online access)*. This SOP lays out the process of collecting water samples with the CTD rosette, pulling water from the Niskins on the rosette, and filtering the water with vacuum filtration in the wet lab. From the ship's crew, we will need the following:

- Working with the Senior Survey Technician (SST) to set up an SCS event in order to capture the timestamp and associated CTD metadata every time a Niskin bottle is fired on the CTD. The data generated here will go into the aforementioned SCS spreadsheet on Google Drive. The details of setting up an SCS event are in the linked SOP.
- Working with the SST to collect water samples on the CTD upcast using a predetermined sampling strategy. Additionally, will need assistance from the SST to export the CTD data and save information from the SCS event.

Appendix B.

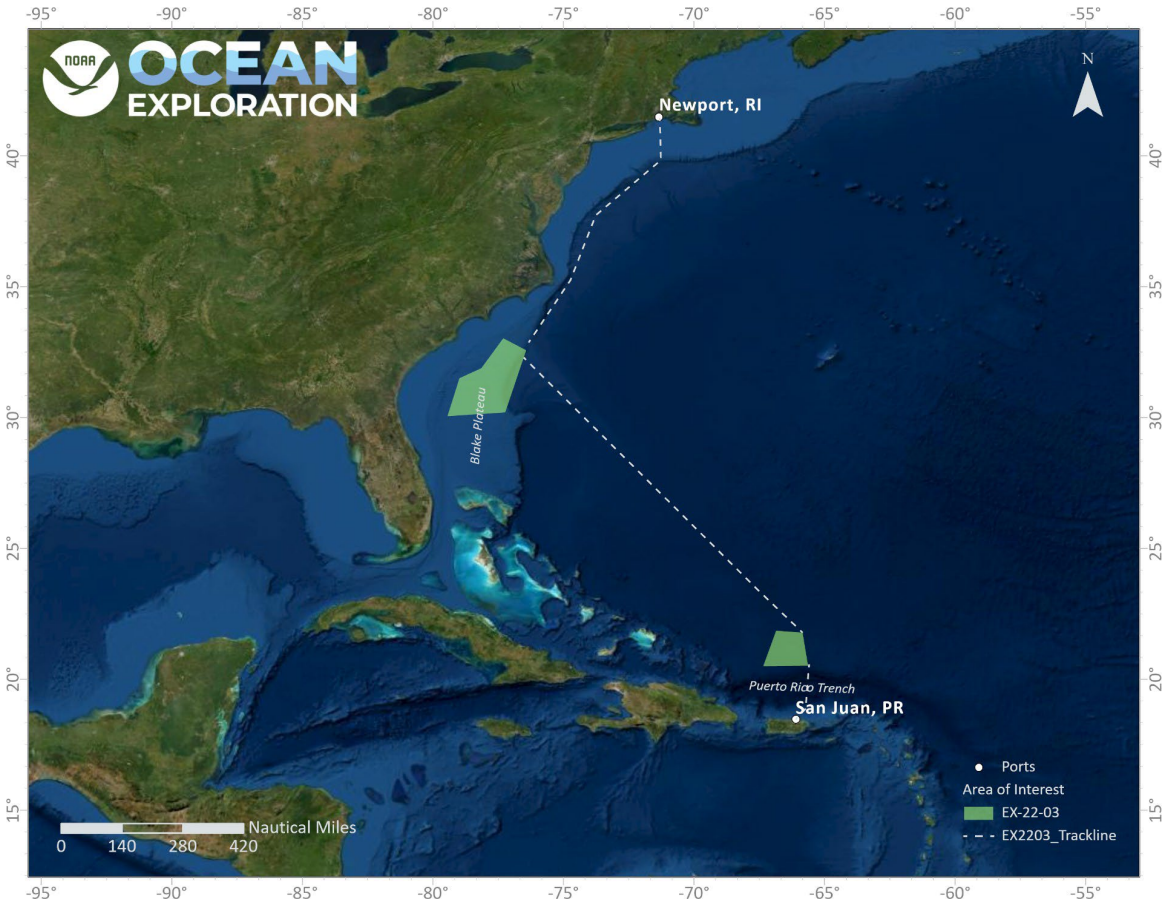

Figure B1 (for reference)**.** Map showing the general operating area for EX-22-03

Table B1. Waypoints for general working area (green polygon north of Puerto Rico)

Latitude (D DM)	Longitude (D DM)
20° 30.164'N	67° 20.796'W
21° 51.296'N	66° 51.132'W
21° 47.013'N	65° 50.49'W
20° 31.399'N	65° 37.968'W
20° 30.164'N	67° 20.796'W

Table B2. Waypoints for general working area (green polygon on Blake Plateau)

Latitude (D DM)	Longitude (D DM)
31° 27.419'N	76° 48.276'W
30° 11.746'N	77° 13.89'W
30° 3.149'N	79° 26.448'W
31° 30.103'N	78° 58.986'W
31° 52.985'N	78° 8.646'W
33° 1.633'N	77° 18.306'W
32° 34.174'N	76° 25.674'W
31° 27.419'N	76° 48.276'W

Table B3. Waypoints for proposed cruise track (dashed white line)

Latitude (D DM)	Longitude (D DM)
18° 27.805'N	66° 6.654'W
18° 52.617'N	65° 43.5'W
20° 34.27'N	65° 35.448'W
21° 47.013'N	65° 50.49'W
22° 59.119'N	66° 41.052'W
25° 52.572'N	70° 2.424'W
32° 18.55'N	76° 32.46'W
32° 51.933'N	76° 19.938'W
35° 15.021'N	74° 43.8'W
37° 43.699'N	73° 45.672'W
39° 50.018'N	71° 15.876'W
41° 27.074'N	71° 18.684'W

Appendix C. Data Management Plan

Okeanos Explorer Mission EX2203 Data Management Plan

Report Date: 2022-02-24

1. General Description of Data to be Managed

1.1 Name and Purpose of the Data Collection Project:
EX-22-03, North Puerto Rico Mapping and Deep-Sea Camera Demonstration (Mapping) EX-22-03 will commence on April 4, 2022, in San Juan, Puerto Rico, and conclude on April 28, 2022, in Newport, Rhode Island. It will include 24-hour-a-day acoustic exploration mapping operations focused on areas generally deeper than 200 m north of Puerto Rico, the high seas, and U.S. waters off the U.S. East Coast. This expedition will also include a demonstration of two deep-sea cameras designed and provided by the Multidisciplinary Instrumentation in Support of Oceanography (MISO) Facility at the Woods Hole Oceanographic Institution (WHOI).

1.2 Summary Description of the data to be collected:
Mapping 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, and a high-bandwidth satellite connection for continuous ship-to-shore communications.

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

altitude, bathymetric gaps, benthic habitats, Blake Plateau, chemosynthetic communities, CTD, CTD Rosette, deep-sea camera, deep-sea coral and sponge communities, deep-water habitats, eDNA, East Coast Canyons, EM304, essential fish habitats, EFH, expedition, exploration, explorer, fish habitats, GoPro, habitat areas of particular concern, HAPC, mapping survey, marine education, Multidisciplinary Instrumentation in Support of Oceanography, MISO, multibeam, multibeam backscatter, multibeam sonar, multi-beam sonar, noaa, noaa fleet, ocean, ocean discovery, ocean education, ocean exploration, ocean exploration and research, ocean imaging system, OIS, ocean literacy, ocean research, oceans, OER, okeanos, okeanos explorer, Newport, Puerto Rico, R337, Rhode Island, San Juan, science, 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, sub-bottom profile, systematic exploration, technology, undersea, underwater, water column backscatter, Woods Hole Oceanographic Institute, WHOI

1.4 If this mission is part of a series of missions, what is the series name?
Okeanos Mapping Cruises

1.5 Planned or Actual Temporal Coverage of the data:
Start Date: 2022-04-02 and End Date: 2022-04-26

1.6 Actual or Planned Geographic Coverage of the data:
Northernmost Boundary: 41.5 and Southernmost Boundary: 18.5
Westernmost Boundary: –80 and Easternmost Boundary: –65

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

Bottom Backscatter, Cruise Plan, Cruise Summary, EK60 Split Beam Data, EK80 Split Beam Data, Images, Image Annotations, 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, Water Samples eDNA Analysis, XBT (raw)

1.8 What platforms will be employed?
NOAA Ship Okeanos Explorer

2 Points of Contact for this Data Producing Project

Overall POC: Shannon Hoy, shannon.hoy@noaa.gov
Title: Expedition Coordinator
Affiliation: NOAA Office of Ocean Exploration and Research
Phone: 603-775-9327

3 Points of Contact for Managing the Data

Data POC: Megan Cromwell
Data POC Title: Stewardship Data Management
Data POC Email: megan.cromwell@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 Digital 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).

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-existant 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 the National Historic Preservation Act of 1966.

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's EDMC DMP 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 .kmall 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 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 2022 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. NOAA Ocean Exploration is preparing a programmatic environmental assessment to cover future expeditions.

Marine Scientific Research clearances for deepwater mapping operations are planned inside the waters of the United States and Puerto Rico, and permission to acquire data in the adjacent waters of the British Virgin Islands, and the Dominican Republic. Innocent passage may be conducted through the Bahamas and Turks and Caicos Islands as the vessel transits from Puerto Rico to the U.S. East Coast. Diplomatic clearances have been requested.

See the "NOAA Ship *Okeanos Explorer* FY22 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).

DCEP

El Ministerio de Relaciones Exteriores - Direcci6n de Ceremonial de Estado y Protocolo - saluda muy atentamente a la Embajada de los Estados Unidos de America, en ocasi6n de remitir copia del Oficio No. 6805, de fecha 17 de febrero de 2022, del Ministerio de Defensa, mediante el cual dan respuesta favorable a su Nota No. 2022-42, de fecha 26 de enero del presente ano, sobre una solicitud para que se le permita la entrada y salida, sin obstaculos, al Buque **Okeanos Explorer de la Administraci6n Nacional Oceanica Atmosferica (NOAA),** a las aguas territoriales de la Republica Dominicana, durante el perfodo del 01 **al** 28 de abril del presente ano.

El Ministerio de Relaciones Exteriores - Direcci6n de Ceremonial de Estado y Protocolo - hace provecho de la oportunidad para renovarle a la Embajada de los Estados Unidos de America, las seguridades de su mas alta y distinguida consideraci6n.

Santo Domingo, D.N.
21 de febrero de 2022

FJCN/VP/jfp.-

REPÚBLICA DOMINICANA
MINISTERIO DE DEFENSA
DISTRITO NACIONAL
"TODO POR LA PATRIA"

6805

17 FEB 2022

PRIMER ENDOSO

Del — Ministro de Defensa.

Al — Comandante General de la Annada de Republica Dominicana, (ARD).

Asunto — Remisi6n de copia de la Nota No. 2022-42, de fecha 26 de enero de 2022, de la Embajada de los Estados Unidos de America, y tiene a bien solicitar que se pennita la entrada y salida, sin obstaculos, del Buque **Okeanos Explorer de la Administraci6n Nacional Oceanica y Atmosferica (NOAA),** a las aguas te1Titoriales de la Republica Dominicana, durante el periodo del 01 al 28 de abril del presente afio.

Anexo — Comunicaci6n No. DCEP 02922, de fecha 28-01-2022, del Ministro de Relaciones Exteriores y anexo.

REFERID cortesmente, con la aprohaci6n de este Despacho.

MINISTERIO DE DEFENSA
Santo Domingo, R.D.

CARLOS LUCIANO DÍAZ MORFA,
Teniente General, ERD.

Severinir: (01)
11-02-2022.
Copia al:

Ministro de Relaciones Exteriores.
Viceministro de Defensa para Asuntos Navales y Costeros.
Asesor Militar, Terrestre, Naval y Aereo de! Poder Ejecutivo.
Inspecto.i· General de las Fuerzas Armadas.
J-2, DiTector de Inteligencia del Estado Mayor Conjunto, MIDE.
J-3, Director de Planes y Operaciones del Estado Mayor Conjunto, MIDE.
Director de! Cuerpo Especializado en Seguridad Portuaria (CESEP).
Dil'cctor General de Migrad6n.
DiTector General de Aduanas.
Director Ejecutivo de la Autoridad Portuaria Dominicana (APORDOM).
Honorable Embajada de los Estados Unidos de America en Republica Dominicana.
Archivo.-

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Expediente
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S01-22-1020-1

Ministerio de Relaciones Exteriores

Republica Dominicana

DCEP 0 2 9 2 2

Santo Domingo, D. N.
28 de enero de 2022

Al Teniente General, E.RD.
CARLOS LUCIANO DIAZ MORFA
Ministro de Defensa
Su Despacho.-

Asunto Remisi6n de copia de la Nota No. 2022-42, de fecha 26 de enero de 2022, de la Embajada de los Estados Unidos de America, y tiene a bien solicitar que se permita la entrada y salida, sin obstaculos, del Buque **Okeanos Explorer de la Administraci6n Nacional Oceanica y Atmosferica (NOAA),** a las aguas territoriales de la Republica Dominicana, durante el periodo del 01 al 28 de abril del presente ano.

Anexo Citado en el asunto.

Muy cortesmente remitimos a usted, lo citado en el anexo, para su conocimiento y fines qu€ estime procedentes.

Atentamente le saluda,

ROBERTO ALVAREZ
Ministro de Relaciones Exteriorns

RA/FJCN//VP/jfp.-

fil.

Avenida lndependencia 752 Estancia San Ger6nimo Santo Domingo Republica Dominicana Telefono 809 987 7001 Mirex.gob.do

TRADUCCIONNO OFICIAL

No. 2022-42

La Embajadade losEstados Unidos deAmericasaludamuyatentamente al Ministerio deRelaciones Exteriores de la RepublicaDominicanay tieneel honor de solicitar que se permita la entrada y salida sin obstaculos del buque Okeanos Explorer de la Administraci6nNacional Oceanicay Atmosferica(NOAA) a las· aguas tenitoriales de la Repu blica Dominicana.

Un equipo de cienti:ficos e ingenieros llevara a cabo en abril de 2022 investigaciones exploratorias sobre la diversidad y la distribuci6n de los habitats de aguas profundas en el Oceana Atlantico Sur, frente ala costa sureste deEstados Unidos y el Mar Caribe. El area principal del proyecto sera la extensi6nmas meridional de los habitats de coral de aguas profundas prevalentes en las zonas que bordean las aguas estadounidenses. El buqueOkeanos Explorer de la Administraci6n Nacional Oceanica y Atmosferica (NOAA) esta solicitando multiples entradas alaRepublicaDominicanacon elfin deproporcionar flexibflidad en la planificaci6n y ejecuci6n de la expedici6n.

Estos proyectos se llevaran a cabo en aguas territorial es dominicanas entre el 01 y el 28 de abril de 2022.

LaEmbajadade los Estados Onidos aprovechaestaoprntunidad para expresar al Ministerio de Relaciones Exteriores las renovadas seguxidades de su mas alta consideraci6n.

Adjuntos: Solicitud de autorizaci6n para realizar investigaciones cientificas mannas
Propuesta de ruta denavegaci6n
CV del Cien tifico a Cargo Kelley Suhre

Embajadade losEstados UnidosdeAmerica,
Santo Domingo, 26 de enero del 2022.

· No. 2022-42

The Embassy of the United States of America presents its compliments to the Ministry ofForeign Affairs of the Dominican Republic and has the honor to request that the National Oceanic and Atmospheric Administration's (NOAA) Ship Okeanos Explorer be permitted unabated ently and exit to the territorial waters of the Dominican Republic.

In April 2022, a team of scientists and engineers will conduct exploratory investigations on the diversity and distribution of deep-sea habitats in the South Atlantic Ocean off the southeast coast of the U.S. and the Caribbean Sea. The primary project focus area will be the southe.mmost extent of prevalent deep-sea coral habitats in areas that border U.S. waters. The National Oceanic and Atmospheric Administration's(NOAA) Ship Okeanos Explorer is requesting multiple entries to the Dominican Republic in order to provide flexibility in planning and executing the expedition.

The projects will be carried out in Dominican territorial waters between April 1 and April 28, 2022.

The Embassy avails itself of this opportunity to express to the Ministry of Foreign Affairs the renewed assurance ofits highest consideration.

Enclosures: Application for Consent to ConductIVIarine Scientific Research
Proposed Cruise Track
CV for Chief Scientist Kelley Suhre

EMBASSY OF THE UNITED STATES OF AMERICA * SANTO DOMINGO *

Embassy of the United States of America,
Santo Domingo, January 26, 2022

Categorical Exclusion (CE) Evaluation Worksheet

Project Identifier: EX2203

Date Review Completed: 2/1/2022

Completed by: Amanda Maxon, Environmental Compliance Specialist, Contractor, NOAA Office of Exploration and Research

OAR Functional Area: OER

Worksheet File Name: 2022-01-OER-G3-EX2203

Step 1. CE applicability

1. **Is this federal financial assistance, including via grants, cooperative agreements, loans, loan guarantees, interest subsidies, insurance, food commodities, direct appropriations, and transfers of property in place of money?**

   no

2. **What is the proposed federal action?**

   The proposed action is the NOAA's Office of Exploration and Research (OER) to complete a mapping expedition using the NOAA Ship Okeanos Explorer scientific sonar systems (Kongsberg EM304 multibeam, Simrad EK60 and EK80 split-beam, Knudsen 3260 chirp sub-bottom profiler, and Teledyne Acoustic Doppler Current Profiler) and including the WHOI-MISO cameras (deployed using the CTD rosette) and in waters greater than 200 meters within Puerto Rico's EEZ, the high seas, and offshore along the U.S. East coast. All research cruises by the Okeanos Explorer will focus on collecting critical baseline information unknown and poorly known areas in 200 m and deeper to meet NOAA science and management goals. The acquisition of high-resolution seafloor mapping data is an essential precursor to making significant biological, geological, archaeological and oceanographic discoveries. These maps form the basis for selecting ROV dive targets and contribute to global datasets of modern seafloor mapping data, which are estimated to currently cover only 5-10% of the global seafloor. The EX-22-03 mapping expedition will focus operations in Puerto Rico, high seas, and offshore the United States East Coast at depths between 200 and 6,000 m. EX-22-03 will commence from San Juan, Puerto Rico on April 2, 2022 and will conclude on April 26, 2022 in Newport, Rhode Island. The exact start and end dates may vary by a few days or weeks

depending on weather and other logistical considerations. The actions demonstrates independent utility and is not connected to any other federal action.

3. **Which class of CE in Appendix E of the NAO 216-6A Companion Manual is applicable to this action and why?**
    - **a.** G3: Topographic, bathymetric, land use and land cover, geological, hydrologic mapping, charting, and surveying services that do not involve major surface or subsurface land disturbance and involve no permanent physical, chemical, or biological change to the environment.
    - **b.** The scope of this action is consistent with Categorical Exclusion G3 in Appendix E of the Companion Manual to NOAA Administrative Order (NAO) 216-6A: EX-22-03 expedition will focus on performing mapping survey operations while transiting from San Juan, Puerto Rico to Newport, Rhode Island. Mapping operations would not involve surface or land disturbance that could cause permanent changes to the environment due to operations occurring 200 meters and greater and assessment of scientific sonar systems. Scientific sonar systems include Kongsberg EM304 multibeam, Simrad EK60 and EK80 split-beam, Knudsen 3260 chirp sub-bottom profiler, and Teledyne Acoustic Doppler Current Profiler and including the WHOI-MISO cameras (deployed using the CTD rosette) have been assessed to limit or prevent direct contact with or indirectly disturb the environment.

Step 2. Extraordinary Circumstances Consideration

4. **Would the action result in adverse effects on human health or safety that are not negligible?**

    The actions of NOAA Ship Okeanos Explorer will take place in remote deep-sea (>200m) areas within the Caribbean region, specifically in Puerto Rico, the high seas, and offshore the U.S. East Coast. All operations are underwater and will have no human presence in the area besides those on onboard the EX-22-03. The vessel will transit through different depths as it moves from the ports of call to the areas of operations in deeper waters. These actions do not involve any procedures or outcomes known to result in impacts on human health and safety.

5. **Would the action result in adverse effects on an area with unique environmental characteristics that are not negligible?**

    Data collection will primarily focus offshore in deep waters (greater than 200 meters), including areas offshore the U.S. East Coast, the high seas when the vessel transits from waters within Puerto Rico's EEZ where the effects are determined to be negligible, due to acoustic mapping being considered transient. Operations are well documented and developed following the

accepted Best Management Practices in order to lessen the chance of impacts in the action area and the intensity of expected discharges/deposits by the vessel. Discharges and deposits would be barely detectable and therefore discountable as to causing permanent impacts on the seabed or water column during the EX operations. The expedition is being planned to meet scientific objectives of scientific systems, in particular the mapping systems, onboard Okeanos Explorer.

6. Would the action result in adverse effects on species or habitats protected by the ESA, MMPA, MSA, NMSA, or MBTA that are not negligible?

The activities are not likely to have a negative effect on species or habitats protected by the ESA, MMPA, MSA, NMSA, or MBTA. According to NOAA Fisheries, two Endangered Species Act-listed species have critical habitat sectors in the action area: Loggerhead sea turtle(breeding, sargassum, and constricted migratory), and North Atlantic Right Whale. Okeanos Explorer operations will abide by the Best Management Practices and Mitigation Measures developed in collaboration with the various regulatory and federal agencies to ensure that operations in the these sectors would not result in any activities having adverse effects on the species or habitats protected under ESA, MMPA, MSA, NMSA, or MBTA.

7. Would the action result in the potential to generate, use, store, transport, or dispose of hazardous or toxic substances, in a manner that may have a significant effect on the environment?

The cruise operations will be in the compliance with FEC 07 Hazardous Materials and Hazardous Waste Management Requirements for Visiting Scientific Parties (or the OMAO procedure that supersedes it) to ensure generation, use, storage, transport, and disposal of such substances will not result in significant impacts.

8. Would the action result in adverse effects on properties listed or eligible for listing on the National Register of Historic Places authorized by the National Historic Preservation Act of 1966, National Historic Landmarks designated by the Secretary of the Interior, or National Monuments designated through the Antiquities Act of 1906; Federally recognized Tribal and Native Alaskan lands, cultural or natural resources, or religious or cultural sites that cannot be resolved through applicable regulatory processes?

The proposed action will not result in adverse effects that cannot be resolved through applicable regulatory processes since we will not be operating within listed or eligible properties, lands, resources or sites coming under the umbrella of protection referenced above.

9. Would the action result in a disproportionately high and adverse effect on the health or the environment of minority or low-income communities, compared to the impacts on other communities (EO 12898)?

NOAA Ship Okeanos Explorer will be operating in the remote and offshore areas along the U.S. Southeastern Atlantic region within Puerto Rico's EEZ, high seas, and offshore the United States East Coast during EX-22-03. There are no communities within or near the geographic scope of the cruise and the cruise does not involve actions known or likely to result in adverse impacts on human health.

10. Would the action contribute to the introduction, continued existence, or spread of noxious weeds or nonnative invasive species known to occur in the area or actions that may promote the introduction, growth, or expansion of the range of the species?

During EX-22-03, NOAA Ship Okeanos Explorer will not make landfall in areas other than commercial ports in San Juan, Puerto Rico and Newport, Rhode Island. The ship and mission team will comply with all applicable local and federal regulations regarding the prevention or spread of invasive species. At the completion of every CTD cast, the equipment will be thoroughly rinsed with fresh water and completely dried to prevent spreading organisms from one site to another. Also the Engineering Department aboard NOAA Ship Okeanos Explorer attends yearly Ballast Management Training in accordance with NOAA Form 57-07-13 NPDES VGP Annual Inspection and Report to prevent the introduction of invasive species.

11. Would the action result in a potential violation of Federal, State, or local law or requirements imposed for protection of the environment?

OER has taken measures to ensure that any effects on species or habitats protected by the ESA, MMPA, MSA or NMSA meet the definition of negligible. The proposed actions will not result in any Federal, State, or local law violations or requirements imposed for protection of the environment. In 2018, an informal consultation was initiated under Section 7 of the Endangered Species Act (ESA), requesting NOAA Fisheries' Protected Resources Division concurrence with our Biological Evaluation determining that NOAA Ship Okeanos Explorer operations conducted during the 2018-2019 field seasons are not likely to adversely affect ESA-listed marine species. The informal consultation was completed on August 8, 2018 when OER received a signed letter from the Chief ESA Interagency Cooperation Division in the NOAA Office of Protected Species, stating that NMFS concurs with OER's determination that operations conducted during NOAA Ship Okeanos Explorer 2018-2019 field seasons are not likely to adversely affect ESA-listed marine species. A Re-initiation of ESA Section 7 Letter of Concurrence was completed for the FY20 cruise season. ESA Section 7 Letter of Concurrence was received for the Okeanos Explorer's FY21 field season on February 4, 2021 which incorporated the usage of new technologies and

regions of interest. The ESA Section 7 Letter of Concurrence will be updated and provided in the FY22 Field Season Instructions.

Given the offshore focus of most of our proposed work, it is improbable that we will encounter marine mammals protected under the MMPA, or sea birds protected under the MBTA. If we did encounter any such protected animals, our impacts would be negligible because of the best management practices to which we adhere to avoid or minimize environmental impacts. These best management practices are all outlined in the Field Season Instructions. OER also initiated a request for an abbreviated Essential Fish Habitat (EFH) consultation for expeditions by NOAA Ship Okeanos Explorer in 2021 to the Greater Atlantic Region. OER is currently in the process of requesting a Letter of Acknowledgement from the Assistant Regional Administrator for the NOAA Office of Habitat Conservation stating that these expeditions will not adversely impact EFH. This letter will be provided in appendices of the EX FY22 Project Instructions. An additional Letter of Acknowledgement will be received from the Southeast Regional Fisheries Office to determine if there are any effects of operations during EX-22-03.

12. Would the action result in highly controversial environmental effects?

No, the exploration activities will be localized and of short duration in any particular area at any given time with no notable or lasting changes to the environment following the best management practices and guidance developed to limit the potential effects. Given the project's scope and breath, no notable or lasting changes or highly controversial effects to the environment will result.

13. Does the action have the potential to establish a precedent for future action or an action that represents a decision in principle about future actions with potentially significant environmental effects?

While each cruise contributes to the overarching goal of exploring, mapping, and sampling the ocean, every cruise is independently useful and not connected to subsequent future federal actions with potentially significant environmental effects.

14. Would the action result in environmental effects that are uncertain, unique, or unknown?

The techniques and equipment used are standard for this type of field study, and the effects are well known.

15. Does the action have the potential for significant cumulative impacts when the proposed action is combined with other past, present and reasonably foreseeable

future actions, even though the impacts of the proposed action may not be significant by themselves?

By definition, actions that a federal agency classifies as a categorical exclusion have no potential, individually or cumulatively, to significantly affect the environment. This cruise is consistent with a class of CE established by NOAA and there are no extraordinary circumstances for this action that may otherwise result in potentially significant impacts.

CE Determination

☒ I have determined that a Categorical Exclusion is the appropriate level of NEPA analysis for this action and that no extraordinary circumstances exist that would require preparation of an environmental assessment or environmental impact statement.

☐ I have determined that an environmental assessment or environmental impact statement is required for this action.

Signature:

Signed by: Rachel Medley, Acting Deputy Director, NOAA Office of Ocean Exploration and Research

Date Signed: 02/14/2022

Appendix E. Emergency Contact Data Sheet

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.