



Project Instructions: EX-21-07, Windows to the Deep 2021: Southeast U.S. (ROV and Mapping)

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Platform: NOAA Ship *Okeanos Explorer*
Project Number: EX-21-07
Project Title: Windows to the Deep 2021: Southeast U.S. (ROV and Mapping)
Project Dates: October 26 - November 15, 2021

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I. Overview

A. Brief Summary and Project Period

October 26 - November 15, 2021

Charleston, South Carolina — Port Canaveral, Florida

EX-21-07 Windows to the Deep 2021: Southeast U.S. (ROV and Mapping)

This document contains project instructions specific to EX-21-07. For the annual cross-expedition details, see the “NOAA Ship *Okeanos Explorer* FY22 Field Season Instructions.” This expedition will commence on October 26, 2021, in Charleston, South Carolina, and conclude on November 15, 2021, in Port Canaveral, Florida. Operations will be conducted 24 hours per day and consist of remotely operated vehicle (ROV) dives, mapping operations (primarily overnight), 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 profiler), expendable bathythermograph (XBTs) in support of multibeam sonar mapping operations, conductivity, temperature, depth profiler (CTD) casts, OER’s two-body ROV system (*Deep Discoverer* and *Seirios*), and a high-bandwidth satellite connection for continuous ship-to-shore communications. Operations will focus on exploring deep waters greater than 250 m for ROV operations and greater than 200 m for mapping operations in waters off the U.S. East Coast with a focus on the Blake Plateau.

B. Days at Sea

Of the 21 days at sea (DAS) scheduled for this expedition, 21 DAS are funded by a NOAA Office of Oceanic and Atmospheric Research allocation. This project is estimated to exhibit a high operational tempo due to 24-hour operations, which include daily ROV dives, overnight mapping operations, and continuous shoreside participation via telepresence.

C. Operating Area

EX-21-07 will focus operations on U.S. waters off the U.S. East Coast with a focus on the Blake Plateau. Mapping, ROV operations will be conducted at depths between 250-5000 meters.

Figure 1 shows the general operating area for the expedition.

Windows to the Deep 2021: Southeast U.S. ROV and Mapping

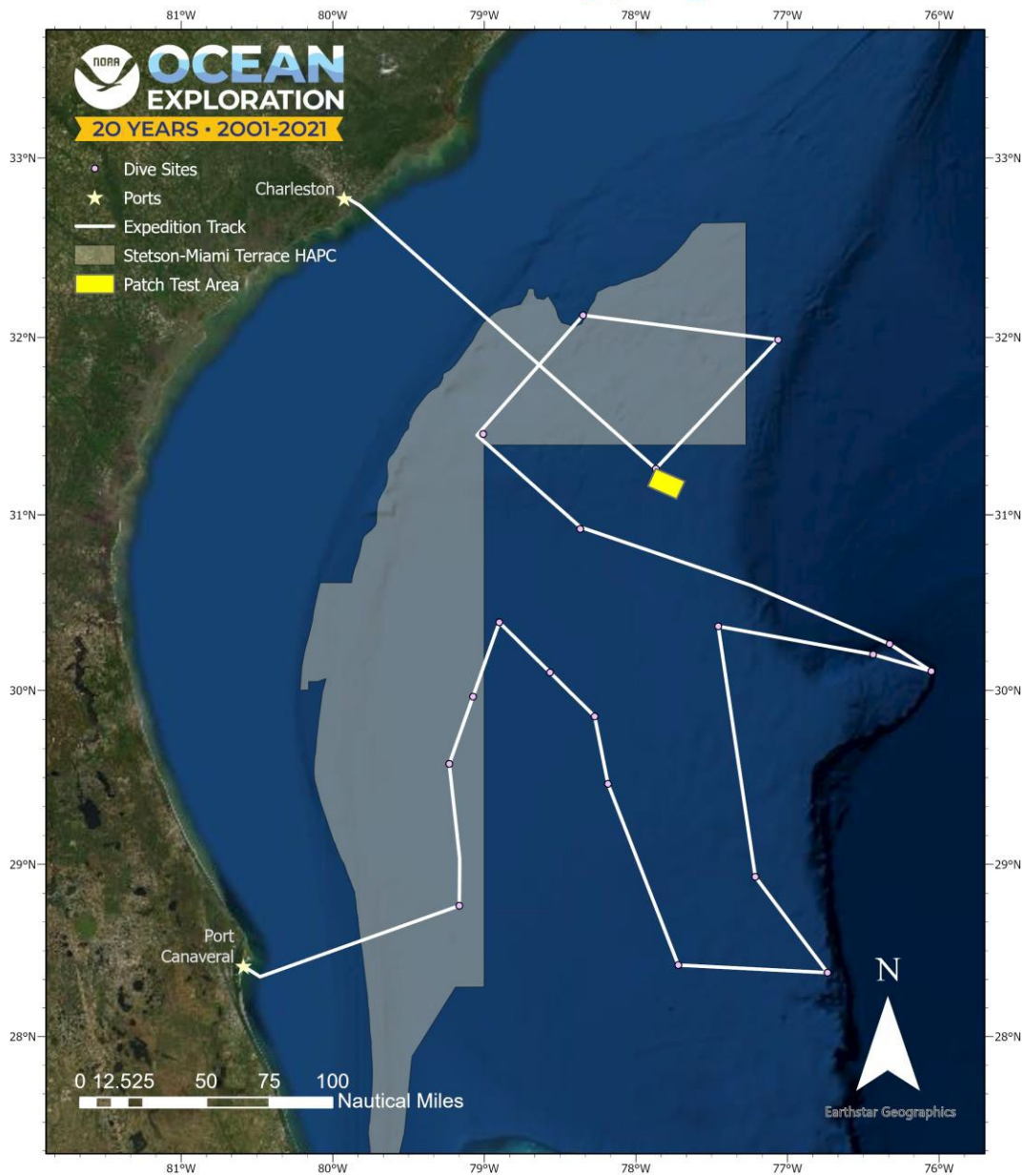


Figure 1. Map showing the general operating area for EX-21-07. Ports are yellow stars, dive sites are light blue dots, the expedition track is a white line, nautical boundaries are green or red lines, and the sonar patch test area is a yellow box. Note that the expedition track and dive locations are subject to change based on survey results, field conditions, and discretion of the commanding officer. All dives planned are outside of 12 nm, and in the U.S. EEZ or the high seas. No dives or transits are planned in Bahamian waters.

D. Summary of Objectives

EX-21-07 operations will involve a transit eastward followed by focused ocean mapping and ROV operations on and around the Blake Plateau off of the Southeast United States, in waters deeper than 250 m for ROV operations and greater than 200 m for mapping operations). This expedition will collect critical baseline information to support priority NOAA science and management needs.

Mission objectives for EX-21-07 include a variety of objectives focused on science, mapping, education, outreach, and data management. Overarching objectives that span the entire Fiscal Year 2022 (FY22) field season are covered in the “NOAA Ship *Okeanos Explorer* FY22 Field Season Instructions.” See Appendix A for elaboration of procedures/objectives. Additional objectives specific to EX-21-07 follow:

1. Science Objectives

- a. Acquire data to support priority science and management needs in support of the Atlantic Seafloor Partnership for Integrated Research and Exploration (ASPIRE) and the National Ocean Mapping, Exploration, and Characterization (NOMECE) strategy.
- b. Identify and map vulnerable marine habitats – particularly high-density deep-sea coral and sponge communities, and chemosynthetic communities.
- c. Explore areas relevant to resource managers such as Essential Fish Habitats (EFH), Habitat Areas of Particular Concern (HAPC), and National Marine Sanctuaries and their potential expansion areas.
- d. Explore the diversity and distribution of benthic habitats – including fish habitats, deep-sea coral and sponge communities, chemosynthetic communities, and biological communities that colonized or aggregate around shipwrecks;
 - i. Collect data on: habitat size and extent, animal diversity and density;
 - ii. Focus close-up imaging operations on potential new, rare and poorly documented animals, as well as dominant members of the communities;
 - iii. Collect and preserve biological samples of potential new species, new records, dominant community members if not easily recognized, and other animals to aid in site characterization;
 - iv. Investigate biogeographic patterns of deep-sea ecosystems and connectivity across the Atlantic Basin;
 - v. Document substrate types as it relates to characterizing habitat suitability;



- vi. Support transatlantic connectivity studies.
- e. Investigate the geology of the Southeast US Continental Margin;
 - i. Collect and preserve geologic specimens that can be used to age a feature, provide additional insight into the geological context of the region, or improve knowledge of potential future or past geohazards.
 - ii. Investigate potential locations of marine minerals to improve modeling efforts, understanding of habitat change over time, and to collect data for future analysis.
- f. Acquire a foundation of ROV, sonar, and oceanographic data to better understand the characteristics of the water column and fauna that live there. Collect high-resolution bathymetry in areas with no (or low quality) sonar data.
 - i. Continue to refine specimen processing procedures, including integration and subsequent testing of new genetic subsampling protocols of the Biorepository at the National Museum of Natural History, Smithsonian Institution.
- g. Ground-truth acoustic data using video imagery and characterize the associated habitat.
- h. Engage a broad spectrum of the scientific community and public in telepresence-based exploration.
- i. 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.
- j. Explore U.S. maritime heritage by investigating sonar anomalies and characterizing shipwrecks.
 - i. Follow maritime heritage SOPs as identified in FY22 Field Season Project Instructions.

2. Remote Science Objectives

- a. Provide operational support and training to scientists and managers to enable remote participation in at-sea operations.
- b. Continue to test best practices for hosting live interactions with zoom, google, etc.
- c. Facilitate outreach and engagement activities and events at aquariums and museums.



- d. Continue testing and integration of SeaTube v3.
- e. Test and troubleshoot new methods of distributing video to shore.

3. ROV Engineering Objectives

- a. Conduct daytime ROV dives on exploration targets.
- b. Complete engineering objectives during ROV dives.
- c. Ongoing training of engineers and pilots.
- d. Ongoing system maintenance, documentation, and training.
- e. Test and refine updated ROV mid-water exploration procedures.

4. Video Engineering Objectives

- a. Test terrestrial and high-speed satellite links.
- b. Support telepresence-enabled ROV operations.
- c. Collect/create all standard video products.
- d. Facilitate live outreach events between ship and shore.

5. Acoustic Mapping Objectives

- a. Conduct a multibeam sonar patch test will be required following the emergency drydock of the ship that is occurring before this expedition. Details are in **Appendix A**.
- b. Calibrate a new Teledyne OS38 acoustic doppler current profiler (ADCP) that may be installed during the emergency dry dock prior to this expedition. Details are in **Appendix A**.
- c. Collect high-resolution mapping data from sonars in priority areas as dictated by operational needs, as well as science and management community input.
- d. Collect mapping data in support of NOMEAC and ongoing collaborations between NOAA, the Bureau of Ocean Energy Management, and the U.S. Geological Survey with a priority on gathering high quality bathymetry and backscatter multibeam sonar data on regions of the Blake Plateau lacking multibeam mapping coverage.
- e. Support ROV operations with mapping products and expertise. Assist onboard and shore-based scientists with ROV dive planning and generate post-dive spatial data.



- f. Conduct mapping operations during transit, with possible further development of exploration targets for ROV dives.
- g. Collect XBT casts as data quality requires during mapping operations.
- h. Create daily standard mapping products.
- i. Collect sun photometer measurements as possible to support ongoing collaboration with NASA. This work does not impact ship operations or personnel.

6. Data Management Objectives

- a. Provide a foundation of publicly accessible data and information products to spur further exploration, research, and management activities.
- b. Provide daily products to shore for operational decision making purposes.
- c. Formalize Data Management SOPs.
- d. Continue to work on the GFOE network integration and develop SOPs.
- e. Complete sensor reports for each dive.
- f. Verify that GFOE data systems operate as expected
- g. Perform Sample Data Management (SDM) via a remote login to the SDM laptop and a teleconference connection to the Wet lab. Conduct a pre-cruise test of the system to ensure proper functioning prior to the first dive. Testing of this configuration was performed during the EX2103 and EX2104.

7. Outreach Objectives

- a. Engage the general public in ocean exploration through live video, social media, and content posted on the Ocean Explorer website (regular updates, expedition features, highlight videos, video clips, still imagery and mapping products).
- b. Host live virtual events and interactions with audiences on shore, including live interactions.
- c. Collaborate with the White House Office of Science and Technology Policy (OSTP) and the Smithsonian National Museum of Natural History (NMNH) to host a VIP and public live interaction.

8. Ship Objectives

- a. Develop and maintain proficiency with small boat operations for new and long term crew.
- b. Review and refine ROV Emergency Procedures.
- c. Allocate time for aftcon training.
- d. Conduct additional safety training such as a man over board drill if time allows.

E. Participating Institutions

- NOAA Office of Ocean Exploration and Research (OER)—1315 East-West Hwy, Silver Spring, MD 20910 USA
- NOAA Deep Sea Coral Research and Technology Program—1315 East-West Hwy, Silver Spring, MD 20910 USA
- NOAA National Center for Coastal and Ocean Science—1305 East-West Hwy, Silver Spring, MD 20910 USA
- NOAA National Centers for Environmental Information, Stennis Space Center MS, 39529 USA
- NOAA Office of National Marine Sanctuaries, 1305 East-West Highway, Silver Spring, MD 20910
- University Corporation for Atmospheric Research (UCAR), PO Box 3000 Boulder, CO 80307 USA
- University of New Hampshire (UNH) Center for Coastal and Ocean Mapping (CCOM) Jere A. Chase Ocean Engineering Lab, 24 Colovos Rd, Durham, NH 03824 USA
- Global Foundation for Ocean Exploration, P.O. Box 417, Mystic, CT 06355
- University of Rhode Island Inner Space Center, 215 South Ferry Road Narragansett, RI 02882
- White House Office of Science and Technology Policy, 1600 Pennsylvania Ave NW Washington, DC 20500
- Smithsonian National Museum of Natural History, 1000 Madison Drive NW Washington, D.C. 20560

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 arrive in Charleston, South Carolina, by October 17, 2021, and shelter in place for seven days from October 18 to October 24, 2021. Mission personnel will join the ship on October 25, 2021, after the shelter-in-place (SIP) periods and one negative PCR COVID-19 tests and one negative antigen COVID test. Mission personnel will then be aboard for the duration of in-bubble cruise preparation and the expedition (October 26 - November 15, 2021). Some personnel will depart on November 16, 2021, and others will stay aboard in-bubble to demobilize and remove the ROVs through November 17, 2021. 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	Dornback, Matt	Expedition Coordinator	10/25	11/17	M	OER (CNSP ¹)	USA
2	Sowers, Derek	Mapping Lead	10/25	11/16	M	OER (CNSP ¹)	USA
3	Candio, Sam	Mapping Lead	10/25	11/16	M	OER (CNSP ¹)	USA
4	Gillespie, Trey	Mapping Watch Lead	10/25	11/16	M	UCAR	USA
5	Farrington, Stephanie	Science Lead	10/25	11/16	F	UCAR	USA
6	Collins, Allen	Science Lead	10/25	11/16	M	NOAA Fisheries	USA
7	O'Brien, Andy	Data Manager	10/25	11/17	M	GFOE	USA
8	Aragon, Fernando	Data Manager	10/25	11/17	M	GFOE	USA
9	Wright, Chris	Data Engineer	10/25	11/17	M	GFOE	USA
10	Meyers, Jim	ROV Engineer	10/25	11/17	M	GFOE	USA
11	Unema, Levi	ROV Engineer	10/25	11/17	M	GFOE	USA
12	Laning, Jeff	ROV Engineer	10/25	11/17	M	GFOE	USA



13	Kennison, Sean	ROV Engineer	10/25	11/17	M	GFOE	USA
14	Ritter, Chris	ROV Engineer	10/25	11/17	M	GFOE	USA]
15	Murphy, Lars	ROV Engineer	10/25	11/17	M	GFOE	USA
16	Howard, Art	Videographer	10/25	11/16	M	GFOE	USA
17	Bailey, Caitlin	Videographer	10/25	11/16	F	GFOE	USA
18	Narrow, Emily	Videographer	10/25	11/16	F	GFOE	USA
19	Brian, Roland	Videographer	10/25	11/16	M	GFOE	USA

¹ Cherokee Nation Strategic Programs

Table 2. Shoreside support personnel and key contacts

#	Name (Last, First)	Title	Affiliation	Nationality
1	Cromwell, Megan	Remote Sample Data Manager	NOAA NCEI	USA
2	Meaker, Madalyn	Remote Sample Data Manager	NOAA NCEI	USA
3	Jackson, Jonathan	Remote Sample Data Manager	NOAA NCEI	USA
4	Gottfried, Susan	Remote Sample Data Manager	NOAA NCEI	USA

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

Foreign national access to *Okeanos Explorer* or other federal facilities will not be required for this expedition.

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 Fionna Matheson, 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 Nicole Manning, Commanding Officer	NOAA Ship Okeanos Explorer	NOAA Ship Okeanos Explorer Attn: Name or Department 47 Chandler Street Newport, RI 02841	(401) 439-7848	CO.Explorer@noaa.gov
NOAA Ship Okeanos Explorer (primary)	LT Bryan Pestone, NOAA Operations Officer	NOAA Ship Okeanos Explorer	NOAA Ship Okeanos Explorer Attn: Name or Department 47 Chandler Street Newport, RI 02841	(808) 659-9179 x221	ops.explorer@noaa.gov
Mission (primary)	Matt Dornback, Expedition Coordinator	NOAA Office of Ocean Exploration and Research	1315 East-West Highway, Silver Spring, MD 20910	(910) 512-3482	matt.dornback@noaa.gov
Mission (other)	Kasey Cantwell, Operations Chief	NOAA Office of Ocean Exploration and Research	1315 East-West Highway, Silver Spring, MD 20910	(301) 717-7776	kasey.cantwell@noaa.gov
Mission (other)	Rachel Medley, Chief, Expeditions and Exploration Division	NOAA Office of Ocean Exploration and Research	1315 East-West Highway, Silver Spring, MD 20910	(301) 789-3075	rachel.medley@noaa.gov
Mission (other)	Gene Fisher, Director (Acting)	NOAA Office of Ocean Exploration and Research	1315 East-West Highway, Silver Spring, MD 20910	(301) 452-7366	genene.fisher@noaa.gov



2. Diplomatic Clearances

None required.

3. 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 Charleston, South Carolina, at the start of the expedition, **shipments should arrive no later than October 25, 2021**, and be shipped to the following address:

[Insert name or department]
ATTN: OKEANOS EXPLORER
1670 Drydock Avenue
North Charleston, SC29405

For shipments to arrive while in port in Port Canaveral, Florida, after the expedition from November 14-17, **shipments should arrive no later than November 17**, and should be shipped to the following address:

NOAA Ship Okeanos Explorer
C/O: Ambassador Services
Attn: [Insert name or department]
245 Challenger Road
Cape Canaveral, FL 32920

During the port call in Port Canaveral, Florida, deliveries will be conducted contact-free in compliance with OMAO's COVID-19 protocols to maintain the bubble between expeditions.

4. COVID-19 Contingency Plan for Scientific Party

In accordance with the "NOAA OER COVID-19 Field Operations Guidelines and Expectations" (see summary in Appendix E), all mission personnel must have received a negative COVID-19 test prior to travel to the port of call. 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 the OMAO-required shelter-in-place periods:

- NOAA Marine Health Services will notify the individuals who test positive that they are not cleared to board the ship. OER will reimburse the individual for 14 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.
 - Lodging will be at: Residence Inn by Marriott Charleston Mt. Pleasant
1116 Isle of Palms Connector, Mt Pleasant, SC 29464
- The expedition coordinator will be notified of any mission personnel who are not cleared to sail (but they will not be told why).
- The expedition coordinator will notify the OER operations chief.
- The expedition coordinator will determine, in consultation with the ship's commanding officer, OER 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:

Christopher "J" Dunn, LTJG
 Operations Deputy, Expeditions and Exploration Division
 NOAA Office of Ocean Exploration and Research
 Phone: (262) 995-3410
 Email: christopher.dunn@noaa.gov
 16 Wakefield Ave, South Kingstown, RI 02879, UTC - 5:00

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. Project Itinerary

Table 4 summarizes the expedition itinerary. All times and dates are subject to prevailing conditions and the discretion of the commanding officer. Locations are approximate. Final ROV dive sites will be delivered to the bridge at night for the next day's ROV dive.

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. See **Table 5** for ROV dive details.

Date	Activities
10/16-10/17	Bubble reset. Mission personnel arrive to ship. Underway preparations and training. Mobilization. Mission personnel will need laptop computers added to the wireless network. High voltage and hydraulics needed by ROV team to roll <i>Deep Discoverer</i> out of hanger and conduct pre-expedition testing. ROV team may also need an operator for crane and A-frame operations to dunk <i>Deep Discoverer and Seirios</i> overboard. A dunk test is currently not planned, but may be needed prior to departing. GFOE personnel may also need to place a transponder overboard and ping the USBL. Potential stores delivery on 10/17.
10/18-10/24	Shelter in place. Virtual meetings to go over ship orientation, review policies and procedures while sailing.
10/25	Mission personnel move aboard the ship, Vessel familiarization meeting (~45 min) with mission personnel that have not sailed with EX within the last year. Mobilization will continue in bubble while the ship is alongside. Pre-project meeting to be held with the ship in combination with daily operations meeting. Welcome aboard briefings. Stores deliveries on both days..
10/26	Depart Charleston, South Carolina 0900. Mapping and transit to the location of Dive 1. Conduct underway drills. Gather data for OS38 ADCP calibration.
10/27	Dive 1, conduct overnight multibeam patch test calibration. Complete CTD cast after dive 1 and before patch test.
10/28	Dive 2, overnight mapping.
10/29	Dive 3, overnight mapping.
10/30	Dive 4, overnight mapping.
10/31	Dive 5, overnight mapping.
11/1	Dive 6, overnight mapping.
11/2	Dive 7, overnight mapping.
11/3	Dive 8, overnight mapping.
11/4	Dive 9, overnight mapping.
11/5	Dive 10, overnight mapping.
11/6	Dive 11, overnight mapping.



11/7	Dive 12, overnight mapping.
11/8	Dive 13, overnight mapping.
11/9	Dive 14, overnight mapping.
11/10	Dive 15, overnight mapping.
11/11	Dive 16, overnight mapping. Veterans Day Holiday.
11/12	Dive 17, overnight mapping.
11/13	Dive 18, overnight mapping.
11/14	Dive 19, overnight mapping and transit to Port Canaveral.
11/15	Arrive at Port Canaveral, Florida. Start demobilization of mission spaces and removal of ROVs.
11/16	Demobilization and removal of ROVs.
11/17	Finish demobilization and removal of ROVs. All mission crew moved off of ship.

B. Staging and Destaging

Minimal staging is expected as all mission equipment will already be aboard. Standard preparation for ROV expeditions is anticipated, which includes hydraulic use, the ability to place a transponder overboard and ping the USBL, high voltage operations, and crane and A-frame operations to potentially dunk *Deep Discoverer* and *Seirios* overboard. A dunk test is not currently planned, but may be needed prior to departing.

Demobilization of the mission spaces and removal of the ROVs and CONEX box will be immediately post cruise Nov. 15- Nov. 17. *Deep Discoverer* and *Seirios* will be craned off the ship and transported to Quonset for maintenance. This will require use of the hydraulic crane, high voltage operations, and the deck department to coordinate with the ROV team and truck/crane operators.

C. Operations to Be Conducted

1. ROV Dives

Table 5. List of planned ROV dive sites for EX-21-07: **Note, this is an approximate itinerary and is subject to change based on community input, survey results, field conditions, and discretion of the commanding officer.** The position information for each dive is tentative until the dive planning call, which is held one day before each scheduled ROV dive. Excluding the CTD cast for the EM304 patch test, there are no plans for extended operations during EX-21-07.

Dive #	Date	Location	Latitude	Longitude	Depth (m)	Dive Focus
1	10/27	Blake Shelf	078° 23' 36.60318520''' W	32° 30' 45.31989308''' N	-414.619	Benthic
2	10/28	Blake Ridge	078° 20' 58.63120601''' W	32° 06' 47.78169111''' N	-613.784	Benthic
3	10/29	Charleston Ridge	077° 33' 30.93858879''' W	32° 00' 39.46222279''' N	-834.489	Benthic
4	10/30	Bloody Marsh UCH	078° 13' 55.82632281''' W	31° 31' 54.40848843''' N	-697.981	Benthic
5	10/31	Blake USGS	078° 22' 01.92328527''' W	30° 55' 11.85300210''' N	-995.709	Benthic
6	11/1	Blake Spur 1	077° 27' 53.76104501''' W	30° 32' 16.32790457''' N	-2296.67	Benthic
7	11/2	Blake Spur 2	076° 26' 05.99772663''' W	30° 12' 21.13561599''' N	-2912.22	Benthic
8	11/3	Blake Spur 3	076° 03' 03.68734956''' W	30° 06' 36.25498331''' N	-3168.22	Benthic & Water Column
9	11/4	Eastern Mounds	076° 19' 35.59684408''' W	30° 15' 56.06876618''' N	-955.213	Benthic
10	11/5	Blake Water Column 1	077° 12' 35.06918353''' W	29° 51' 35.56676965''' N	-1043.59	Water Column
11	11/6	Blake Slope South	076° 47' 54.03794687''' W	28° 56' 36.19079209''' N	-823.538	Benthic
12	11/7	Southern Groundtruthing 1	077° 55' 43.53653698''' W	28° 36' 27.71425700''' N	-827.7	Benthic



13	11/8	Southern Groundtruthing 2	078° 50' 01.84075664'' W	28° 43' 20.58541437'' N	-805.4	Benthic
14	11/9	Daytona Mounds 1	078° 53' 11.14140652'' W	28° 59' 57.19837514'' N	-800	Benthic
15	11/10	Daytona Mounds 2	079° 13' 39.40788252'' W	29° 16' 20.77946425'' N	-800.1	Benthic
16	11/11	St. Augustine Mounds 1	079° 23' 45.61298632'' W	29° 43' 04.50201566'' N	-823.7	Benthic
17	11/12	Little Cliff	078° 58' 55.59024758'' W	30° 30' 34.68020176'' N	-882.7	Benthic & Water Column
18	11/13	Blake Water Column 2	078° 52' 53.41686508'' W	29° 31' 55.26465347'' N	-863.2	Water Column
19	11/14	Little Ridge	079° 09' 54.67624757'' W	28° 45' 38.83195228'' N	-850.3	Benthic

2. CTD Casts

A CTD cast is requested to be completed prior to the multibeam sonar patch test in order to calculate a sound speed profile of the water column. A less preferred option is to complete a CTD immediately after the patch test mapping work and prior to dive 2. No other CTD casts are planned.

3. Telepresence/Outreach Events

- a. Three live video feeds will be used throughout the expedition to provide situational awareness for onshore personnel.
- b. A live interaction with the White House Office of Science and Technology Policy and the Smithsonian National Museum of Natural History will occur sometime during the cruise.
- c. Live interactions with various other groups may be conducted throughout the expedition.

4. In-Port Events

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

5. Special/Unusual Operations or Requests

There are no special or unusual operations or requests for this expedition.

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 EX-21-07, but the ship may plan training, safety drills, or maintenance dives.

E. Applicable Restrictions

Not applicable.

III. Hazardous Materials

A. Policy and Compliance

See the "NOAA Ship *Okeanos Explorer* FY22 Field Season Instructions."

B. Inventory

Table 7. Inventory of hazardous materials that will be aboard for EX-21-07

Item	Use	Approximate Locations
95% UPS denatured ethanol (270 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 gallon)	Sterilization and sample preservation	Wet lab cabinet under sink
Magnesium chloride (1 kg)	Sample preservation	Wet lab under hood
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
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

IV. Equipment

A detailed list of equipment provided by the ship and OER can be found in the “NOAA Ship *Okeanos Explorer* FY22 Field Season Instructions.” There are no specific changes relative to this expedition.



Appendix A. Additional Information

EM304 Patch Test

The EM304 patch test should be completed within the first several days of the cruise, but will be planned to minimize impacts on daytime ROV dive operations. Precise line driving is important during the test to enable high quality calibration of the multibeam sonar. A CTD cast should be conducted just prior to starting the acquisition of the multibeam patch test line data, which may require SST and Deck Department support beyond normal daytime working hours. Alternatively, a CTD cast could be done first thing in the morning after the patch test data is collected and applied to the data in post-processing. Results of this CTD cast will also be used to compare with the TSG and newly replaced Reson sound velocity probe in order to verify consistency among the sensors. Refer to **Table 8** for the tentative patch test area.

Table 8. Approximate location of multibeam patch test bounding box (degrees decimal minutes)

Waypoint	Latitude	Longitude
1	31° 15.891 N	77° 52.218 W
2	31° 11.507 N	77° 40.501 W
3	31° 5.352 N	77° 43.900 W
4	31° 9.711 N	77° 55.514 W

ADCP Calibration

Calibrate a new Teledyne OS38 acoustic doppler current profiler (ADCP) that may be installed during the emergency drydock prior to this expedition. If installed, the ADCP will need to be calibrated for the transducer alignment angle. Calibration data is typically collected during transits, but may require some reciprocal lines, rapid heading changes, or ship starts/stops. Exact testing details will be coordinated with the University of Hawaii’s ADCP experts and provided to OPS. This calibration work should not significantly affect mapping transit times. Calibration of the ADCP will enable safer ROV dive operations as it will provide data on currents below the ship during ROV deployments, dives, and recoveries.

Operational weather contingency areas

In the case that weather conditions do not permit scientific operations, the mission may need to shift to one of the alternate contingency areas shown in **Figure 2**.

EX-21-07 2021 Blake Plateau Expedition (ROV and Mapping)

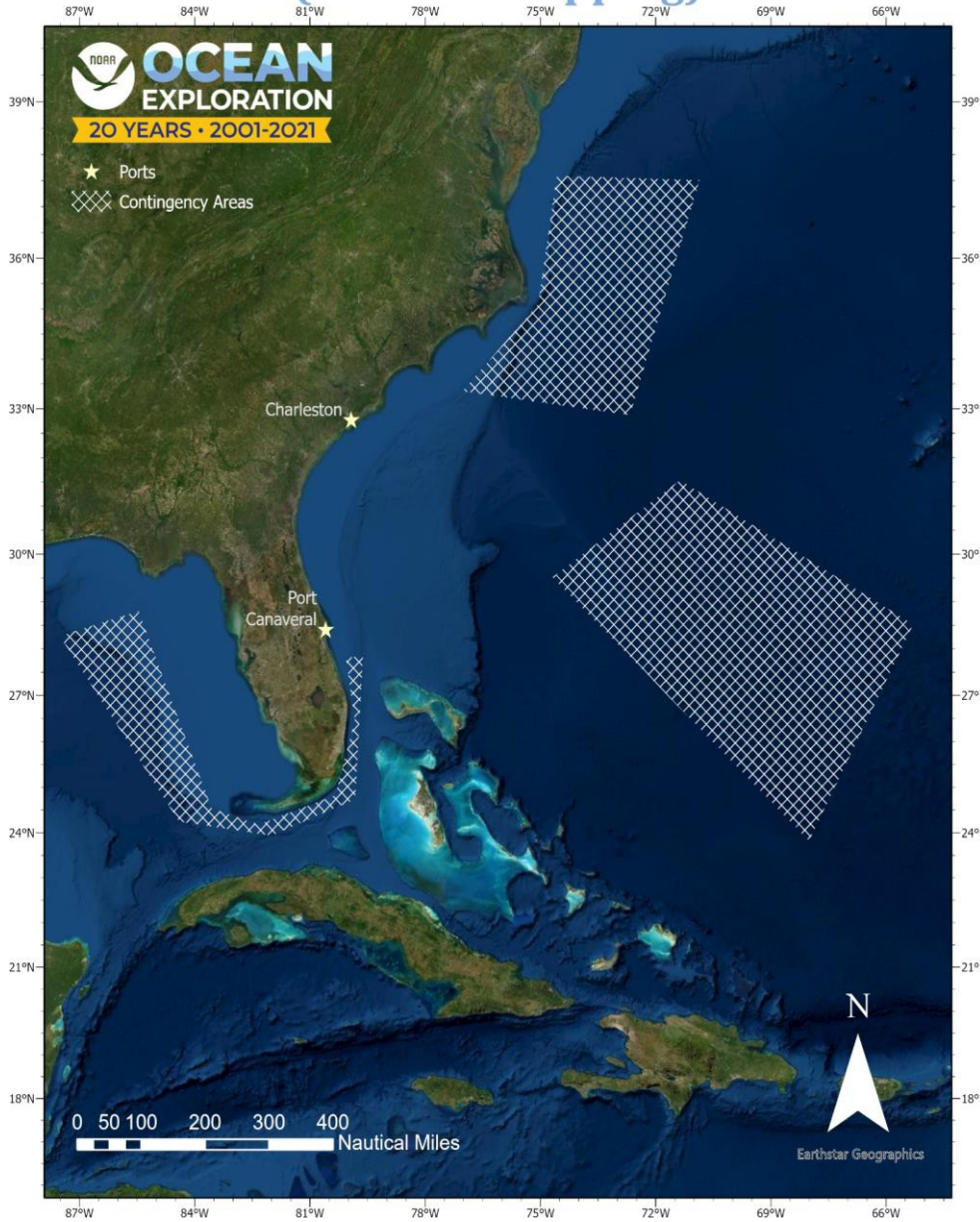


Figure 2. Map showing the alternate areas of operation in the case of weather hindering the scientific operations for EX-21-07.

Appendix B. Data Management Plan

Okeanos Explorer Mission EX2107 Data Management Plan

Report Date: 2021-09-30

1. General Description of Data to be Managed

1.1 Name and Purpose of the Data Collection Project:

EX-21-07, Windows to the Deep 2021: Southeast U.S. (ROV and Mapping)

EX2107 Operations will be conducted 24 hours per day and consist of remotely operated vehicle (ROV) dives, mapping operations (primarily overnight), and full shore-based participation via telepresence. Operations will focus on exploring deep waters (greater than 250 nm for ROV operations and greater than 200 nm for mapping operations off shore) in U.S. waters off the U.S. East Coast with a focus on the Blake Plateau.

1.2 Summary Description of the data to be collected:

EX-21-07 operations will involve a transit eastward followed by focused ocean mapping and ROV operations on and around the Blake Plateau off of the Southeast United States, in waters deeper than 250 m for ROV operations and greater than 200 m for mapping operations). This expedition will collect critical baseline information to support priority NOAA science and management needs.

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

ASPIRE, Atlantic Basin, benthic habitats, Blake Plateau, chemosynthetic communities, CTD, deep-sea coral and sponge communities, EM304, essential fish habitats, EFH, expedition, exploration, explorer, habitat areas of particular concern, HAPC, mapping survey, marine education, multibeam, multibeam backscatter, multibeam sonar, multi-beam sonar, National Marine Sanctuaries, National Ocean Mapping Exploration and Characterization, Newport, noaa, noaa fleet, NOMEAC, ocean, ocean discovery, ocean education, ocean exploration, ocean exploration and research, ocean literacy, ocean research, oceans, OER, okeanos, okeanos explorer, R337, science, scientific computing system, scientific mission, scientific research, SCS, sea, Seabed 2030, single beam sonar, singlebeam sonar, single-beam sonar, site characterization, sonar anomalies, Southeast US Continental Margin, split beam sonar, stewardship, sub-bottom profile, systematic exploration, technology, undersea, underwater, water column backscatter



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

Okeanos ROV Cruises

1.5 Planned or Actual Temporal Coverage of the data:

Start Date: 2021-10-26 and End Date: 2021-11-15

1.6 Actual or Planned Geographic Coverage of the data:

Northernmost Boundary: 33 and Southernmost Boundary: 28.4

Westernmost Boundary: -81 and Easternmost Boundary: -75.5

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

Bottom Backscatter, Cruise Plan, Cruise Summary, Dive Summary Reports, EK60 Split Beam Data, EK80 Split Beam Data, Highlight Images, Launch and Recovery Locations, Multibeam (image), Multibeam (processed), Multibeam (product), Multibeam (raw), Navigational Data, Raw Video (digital), Sample Analysis Reports, SCS Output (compressed), SCS Output (native), Seafloor Imagery, Sound Velocity Profile, Sub-Bottom Profile data, Temperature data, Water Column Backscatter, XBT (raw)

1.8 What platforms will be employed?

NOAA Ship Okeanos Explorer

2 Points of Contact for this Data Producing Project

Overall POC: Matt Dornback, Matt.Dornback@noaa.gov

Title: Expedition Coordinator

Affiliation: NOAA Office of Ocean Exploration and Research

Phone: 301-734-1013

3 Points of Contact for Managing the Data

Data POC: Megan Cromwell, Chris Wright

Data POC Title: Stewardship Data Management, Onboard and shoreside data management

Data POC Email: megan.cromwell@noaa.gov, chris.wright@tgfoe.org

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 as well as an archive-ready, documented, and compressed NetCDF3 format to NCEI-MD; 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 compressed and delivered in a bagit format to NCEI-CO.

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. CTDs are post-processed by the data management team as a quality control measure

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 at NCEI-MS for public discovery and access.

URL: https://data.noaa.gov/waf/NOAA/NESDIS/ncei/oer/iso_u/xml/

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 .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. Licenses, Permits, and Environmental Compliance

Pursuant to the National Environmental Policy Act (NEPA), the Office of Ocean Exploration and Research (OER) 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 OER expeditions on NOAA Ship *Okeanos Explorer* in 2021 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 OER and can be provided upon request. OER is preparing a programmatic environmental assessment to cover future expeditions.

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).

A CITES permit and port exemption for EX-21-07 was requested to cover the collection of Antipatharian and Scleractinian corals while operating in the high seas. This permit is currently pending. Applicable species will not be collected without an approved permit.

In addition, OER consulted with the NMFS Southeastern Regional Office (SERO) on potential impacts of operations to essential fish habitat (EFH) in the U.S. Southeast region under the Magnuson-Stevens Fishery Conservation and Management Act. OER received a letter of acknowledgement from SERO on August 25, 2021, that covers expedition activities from August 25, 2021, through December 31, 2021.

Marine Archaeology

NOAA's procedures and policies on marine archaeology are informed by the Federal Archaeology Program, U.S. legislation on the treatment of cultural remains, and the UNESCO Convention for the Protection of the Underwater Cultural Heritage. OER supports the standards for conducting marine archaeological activities enumerated in the annex rules of the UNESCO Convention on the Protection of the Underwater Cultural Heritage.

Preservation and protection of prehistoric and historic cultural resources is the policy of the federal government, and OER has a responsibility to consider the effects of its activities on these resources. If data are found to be sensitive because they reveal the location of a historically significant cultural resource, Section 304 of the National Historic Preservation Act (NHPA) provides that the head of a federal agency or other public official shall withhold from public disclosure information about the location, character, or ownership of a historic property when disclosure may cause a significant invasion of privacy, risk harm to the historic property, or impede the use of a traditional religious site by practitioners. This document uses the term underwater cultural heritage, or UCH, to refer to historic and prehistoric traces of human existence that are totally or partially underwater. For further information on NOAA Ocean Exploration UCH policies, please refer to “NOAA Ship *Okeanos Explorer* FY22 Field Season Instructions.”





UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
<https://www.fisheries.noaa.gov/region/southeast>

08/25/2021

F/SER25:FH

Rachel Medley
NOAA Office of Ocean Exploration and Research
Silver Spring, MD 20910

Dear Ms. Medley,

This letter responds to your August 3, 2021, request for a letter of acknowledgement (LOA) for scientific research activities to be carried out by researchers at NOAA's Office of Ocean Exploration and Research. This LOA recognizes the activities outlined in your request as scientific research in accordance with provisions found at 50 C.F.R. § 600.745 and 50 C.F.R. § 600.10. This LOA is effective from the date of issuance through December 31, 2021.

NOAA Fisheries understands the purpose of these activities is to conduct bottom mapping and remotely operated vehicle (ROV) operations from Port Canaveral, Florida, traveling to the South Atlantic area around the Blake Plateau and Bahamas. The research area includes waters deeper than 200 meters in the exclusive economic zone off the southeast U.S. The research cruise will take place from October 22, 2021, to November 15, 2021, dependent on weather patterns. As part of a contingency plan in case of storms, operations may occur in the Gulf of Mexico off the west coast of Florida.

Bottom mapping operations will focus on the EM304 multibeam sensor, the EK60/EK80 sonars, and the ROVs *Deep Discoverer* and *Serios*. Mapping and ROV target operations to be conducted in the Southeast region will include but are not limited to unexplored areas that are predicted to be suitable habitat for deep sea corals and sponges, inter-canyon areas, and gas seeps. The combined dives and mapping will enable scientists and managers to have a better understanding of the diversity and distribution of deep water habitats in this region, and enable informed resource management decisions.

Limited sampling of Antipatharian and Scleractinian corals (4-9 biological specimens per dive, not likely to exceed 250 total specimens) could occur during ROV dives. Sampling operations would be conducted using the ROV *Deep Discoverer's* manipulator arm and 5 chamber suction sampler. Biological specimen collections will focus on potential new species or new records for the region, the dominant morphotype animal (such as a coral or sponge) in a habitat, and samples to support connectivity studies. When possible, only a sub-sample would be taken of biological specimens (e.g., only a piece, fragment, or branch of corals and sponges would be collected, not the entire organism).

This research will be conducted aboard the NOAA Ship *Okeanos Explorer* by the following project participants: LCDR Fiona Matheson, Matthew Dornback, CDR Nicole Manning, Derek Sowers, LT Brian Pestone, Rachel Medley, Genene Fisher, and Kasey Cantwell.



Ocean Exploration
and Research

Your research will be conducted on board a scientific research vessel as defined in 50 C.F.R. § 600.10, and is determined to be scientific research under those regulations. The subject research activities are accordingly not subject to federal regulations promulgated in accordance with the Magnuson-Stevens Fishery Conservation and Management Act at 50 C.F.R. part 622. Any collection or retention of fish outside the scope of the applicable research plan are not considered scientific research and must be permitted under exempted fishing procedures.

This LOA is separate and distinct from any permit or consultation required by the Marine Mammal Protection Act, Endangered Species Act, National Marine Sanctuaries Act, or any other applicable law. If such a permit or consultation is required, it should be obtained prior to embarking on the activity. It is advised that this research follows the Best Management Practices set forth in the NOAA Fisheries Southeast Fisheries Science Center's (SEFSC) LOA application which can be found here:

<https://www.fisheries.noaa.gov/action/incidental-take-authorization-noaa-fisheries-southeast-fisheries-science-center-fisheries>

If a marine mammal is observed sick, entangled, stranded, injured, or dead, please immediately call 1-877-WHALE-HELP (1-877-942-5343) for assistance. If a marine mammal is killed or injured during this research project, please cease all research activity and remove gear from the water column until the Southeast Regional Office's Marine Mammal Branch (Laura.Engleby@noaa.gov, or Stacey.Horstman@noaa.gov) is consulted and details of the take and additional preventative measures are discussed.

The participating vessel should carry on board a copy of this LOA and research plan when conducting the collection activities previously described. Please send a copy of any cruise report or other publications resulting from this research activity to me and to the Director of the Southeast Fisheries Science Center, 75 Virginia Beach Drive, Miami, Florida 33149-1003.

Sincerely,

FAY.VIRGINIA.M.1365817320
M.1365817320

Digitally signed by
FAY.VIRGINIA.M.1365817320
Date: 2021.08.25 16:53:28
+0000

for Andrew J. Strelcheck
Regional Administrator

cc: SEFSC: Clay Porch
F/SER2: Jack McGovern
F/SER25: Rick DeVictor
F/EN3: Manny Antonaras



Appendix D. 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.



Appendix E. OER COVID-19 Guidelines and Expectations

COVID-19 Guidance Summary for OER Mission Personnel

Required Reading

Mission personnel must familiarize themselves with all the protocols in the required documents prior to traveling.

- *OMAO COVID-19 Guidance (Phase VI)*
- *NOAA Ship Okeanos Explorer Standing Orders*
- *NOAA COVID-19 Safety Orientation Course*
- *NOAA OER COVID-19 Field Operations Guidelines and Expectations*
- *OMAO COVID-19 Shipboard Safety Briefing for Marine Operations*
- *Ship Screening and Advanced Safety Measures*

Summary of Guidance and Expectations

- This summarizes what is required from mission personnel participating in NOAA Office of Ocean Exploration and Research (OER) field operations. For more detailed information, see the required documents listed above.
- At least 30 days before travel, mission personnel must take the NOAA COVID-19 Safety Orientation Course, review the Office of Marine and Aviation Operations (OMAO) COVID-19 Shipboard Safety Briefing for Marine Operations, and complete the OER Sailing Contact Form to provide a shipping address for the COVID-19 test kit(s) and KN95 mask(s) (if requested).
- Prior to travel, OER recommends that all non-vaccinated (vaccinated is defined as two weeks post final shot of COVID-19 vaccine) mission personnel shelter in place for seven days, and four days before traveling to the port, non-vaccinated mission personnel must test themselves using an OER-supplied COVID-19 test kit. OER requires that non-vaccinated mission personnel receive a negative COVID-19 test prior to travel. For instructions regarding how to request, administer, and send the self-administered COVID-19 tests, refer to the OER COVID-19 Testing Fact Sheet.
- Mission personnel must follow the Centers for Disease Control and Prevention's COVID-19 best practices, including using risk avoidance measures while traveling. Mission personnel are required to wear a two-layer cloth and/or KN95 mask during the entirety of travel. OER will provide mission personnel with a KN95 mask upon request. Individuals are also encouraged to consider current CDC recommendations to wear



more than one mask for added protection. This applies for all personnel, regardless of vaccination status.

- After mission personnel complete their travel and before they join the ship to sail on a cruise, they must shelter in place for seven days near the ship's port of call to enable daily medical screenings. While sheltering in place, mission personnel must take two (95% accuracy) COVID-19 tests provided by OMAO. Mission personnel may join the ship once they have sheltered in place for seven days and receive two negative (95% accuracy) COVID-19 tests.
- All personnel must complete daily COVID-19 screenings using the NOAA COVID-19 Screening Tool. The particular logistics of this screening will be coordinated by the Expedition Coordinator, OPS, and OOD as how an individual completes the screening will depend on if the ship is alongside, at sea or if the individual is in a shelter in place phase.
- While on the ship, mission personnel must follow the OMAO guidelines and the commanding officer's standing orders.
- At the conclusion of post-cruise/post-project travel, OER will provide mission personnel with a COVID-19 test kit upon request.



Appendix F. OER Ethanol Testing

To ensure the quality of the ethanol stored aboard NOAA Ship *Okeanos Explorer*, the NOAA Office of Ocean Exploration and Research (OER) has developed an [OER 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 O2 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.

