UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NOAA Marine and Aviation Operations
Marine Operations Center
439 W. York Street
Norfolk, VA 23510-1114

MEMORANDUM FOR: Commander Mark Wetzler, NOAA
Commanding Officer, NOAA Ship *Okeanos Explorer*

FROM: Captain Anne K. Lynch, NOAA
Commanding Officer, NOAA Marine Operations Center-Atlantic

SUBJECT: Project Instruction for EX-15-02 Leg 2
Caribbean Exploration (Mapping)

Attached is the final Project Instruction for EX-15-02 Leg 2, Caribbean Exploration (Mapping), which is scheduled aboard NOAA Ship *Okeanos Explorer* during the period of March 16 – April 3, 2015. Of the 19 DAS scheduled for this project, 19 DAS are Line Office allocation. This project is estimated to exhibit a Medium Operational Tempo. Acknowledge receipt of these instructions via e-mail to **OpsMgr.MOA@noaa.gov** at Marine Operations Center-Atlantic.

cc:

FINAL Project Instructions

Date Submitted: February 19, 2015

Platform: NOAA Ship *Okeanos Explorer*

Project Number: EX-15-02 Leg II

Project Title: Caribbean Exploration (Mapping)

Project Dates: March 16 – April 3, 2015

Prepared by: ELizabeth Lobecker Digitally signed by ELizabeth Lobecker DN: cn=ELizabeth Lobecker, o=NOAA, ou=OER, email=elizabeth.lobecker@noaa.gov, c=US Date: 2015.03.04 10:11:17 -05'00' Dated: _____

Elizabeth 'Meme' Lobecker
Expedition Coordinator
Office of Ocean Exploration & Research

Approved by: John Mcdonough Digitally signed by John Mcdonough DN: cn=John Mcdonough, o=Ocean Exploration, ou=NOAA/OAR, email=john.mcdonough@noaa.gov, c=US Date: 2015.03.04 08:23:49 -05'00' Dated: _____

John McDonough
Deputy Director
Office of Ocean Exploration & Research

Approved by: _____ CAPT USN Dated: 3/9/2015

Captain Anne K. Lynch, NOAA
Commanding Officer
Marine Operations Center - Atlantic

I. Overview

A. The ocean is 95 percent unexplored, unknown, and unseen by human eyes. Resource managers cannot manage what they do not know. To understand, manage, and protect the ocean and its resources, NOAA believes it is critical to support a systematic program of ocean exploration, using the best of ocean technology to explore, discover, inform, educate, and motivate. Exploration of our largely unknown ocean supports key NOAA, national, and international goals related to a better understanding of the ocean that will benefit current and future generations. NOAA Ship *Okeanos Explorer* is helping us to better understand the unknown ocean by targeted mapping.
The mapping areas to be pursued during this cruise have never been mapped with modern sonar before. Priority area 1 will focus on a canyonized section of the seabed just north of Puerto Rico. We will explore whether this area is similar in nature to the canyonized shelf break of the US Atlantic Shelf break, where vast communities of deepwater coral and gaseous seeps were discovered.

The survey of opportunity of the deployment of free vehicles developed at the University of Puerto Rico will provide new information to the hadal zone (below 6000 meters) of the Puerto Rico Trench, at depths for which currently very little data exists. Please see the free vehicle survey of opportunity in the appendix section for an excellent description of the value of this project to ocean exploration.

This document contains project instructions for EX-15-02 Leg II. EX-15-02 Leg II operations are expected to commence on March 16, 2015 at San Juan, Puerto Rico, and conclude on April 3, 2015 at San Juan, Puerto Rico. Multibeam and singlebeam mapping operations will be conducted 24 hours a day throughout the cruise. Sub-bottom profile mapping will be conducted 24 hours a day at the discretion of the CO.

B. Days at Sea (DAS)

Of the _19_ DAS scheduled for this project, _1_ DAS are funded by an OMAO allocation, _0_ DAS are funded by a Line Office Allocation, _18_ DAS are Program Funded,and _0_DAS are Other Agency funded. This project is estimated to exhibit a _Medium_ Operational Tempo.

C. Operating Area (include optional map/figure showing op area)

The primary survey operating area is in the Atlantic Ocean, north of the island of Puerto Rico along southern side of the Puerto Rican Trench. The secondary survey operating area is in the Atlantic Ocean, north of the island of Puerto Rico, north of the Puerto Rico Trench. Additional exploration with free vehicles will be conducted over the Puerto Rico Trench. All survey areas are within U.S. waters. See appendix for more information on free vehicle survey of opportunity project.

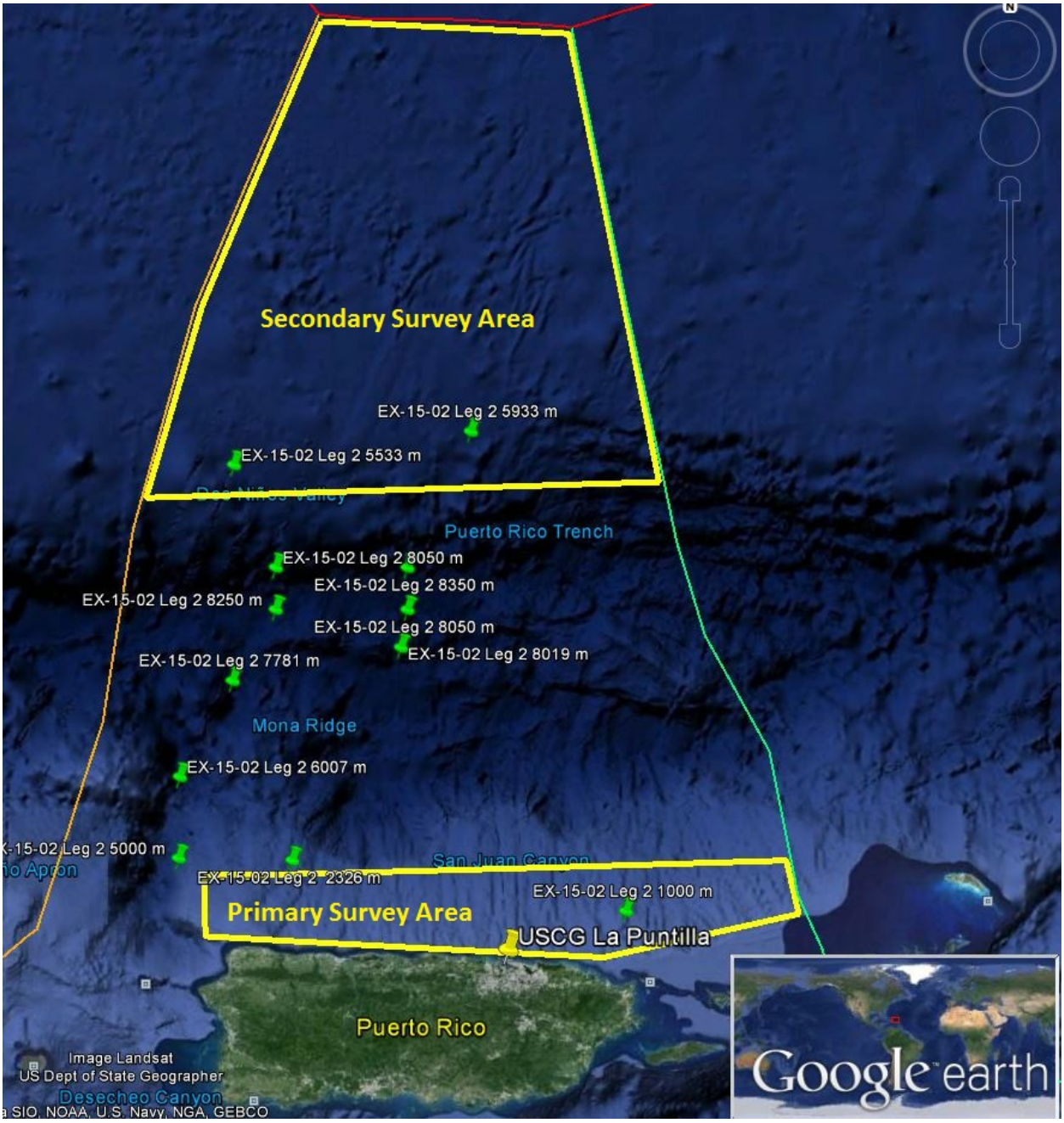

Figure 1: *Yellow priority 1 box focused on 'canyonized' area of continental shelf break north of Puerto Rico. Yellow priority 2 box north of Puerto Rico Trench. Proposed free vehicle deployments indicated with green markers, including depth information.Image created in Google Earth Pro.*

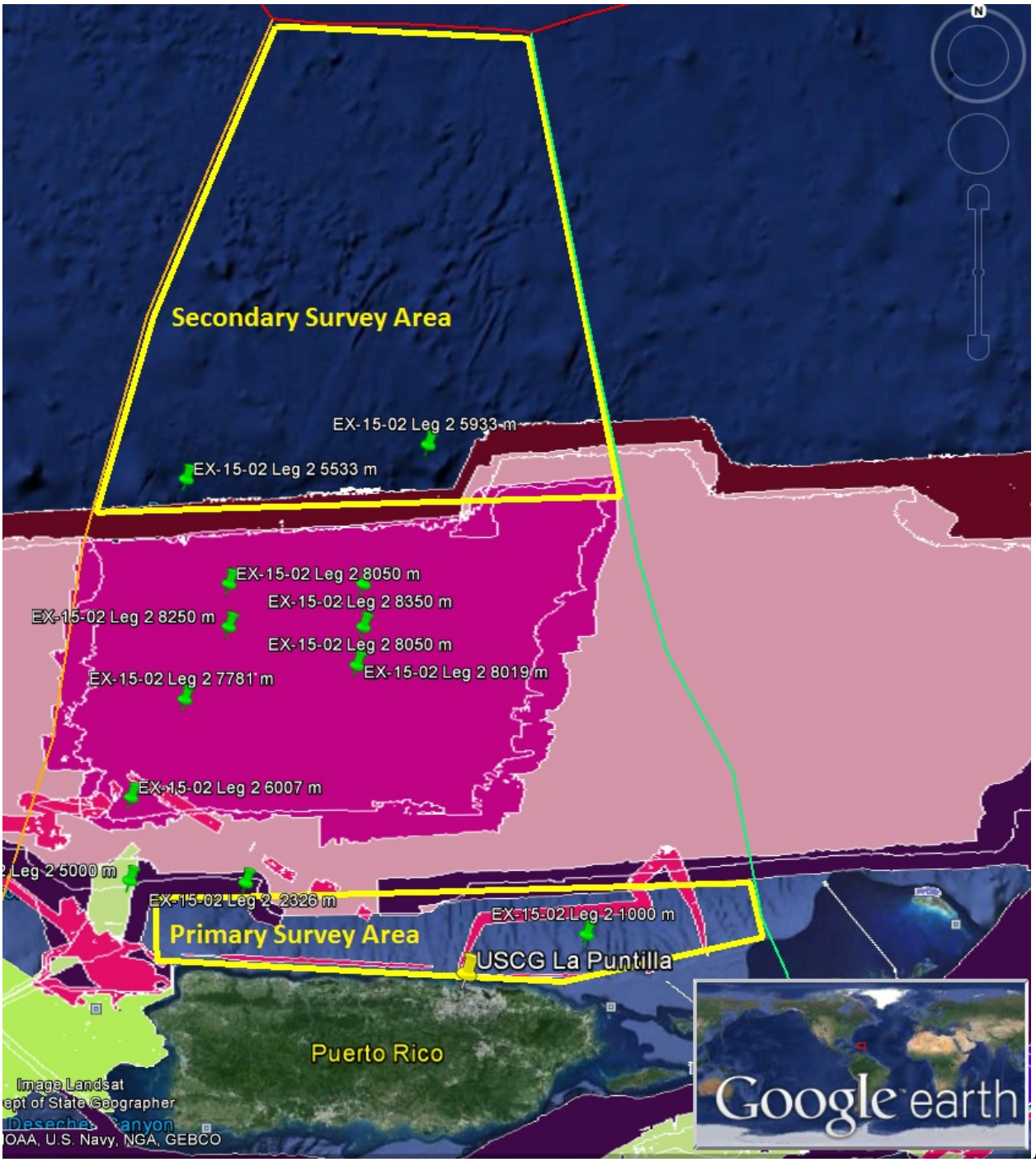

Figure 2: *Yellow priority 1 box focused on 'canyonized' area of continental shelf break north of Puerto Rico. Yellow priority 2 box north of Puerto Rico Trench. Proposed free vehicle deployments indicated with green markers, including depth information.Filled-in polygons showing existing multibeam data coverage from various surveys conducted by various platforms. The majority of deepwater data is Seabeam 150-m resolution data and some may be recollected as time allows. Image created in Google Earth Pro.*

Priority 1 Southern Survey Area Bounding Box Coordinates		Remarks
67 15.83 W	18 46.15 N	Northwest Corner
65 2.54 W	18 48.77 N	Northeast Corner
64 59.66 W	18 37.18 N	Southeast Corner
65 43.7 W	18 27.84 N	Southern extent central point
67 14.89 W	18 33.14 N	Southwest Corner

Priority 2 Northern Survey Area Bounding Box Coordinates		Remarks
66 48.8 W	21 50.26 N	Northwest Corner
65 50.69 W	21 47.47 N	Northeast Corner
65 31.26 W	20 9.589 W	Southeast Corner
67 29.38 W	20 6.29 N	Southwest Corner
67 16.58 W	20 48.0 N	Western extent central point

Table 1:*Bounding box coordinates of the three survey area boxes shown in Figure 1.*

Free Vehicle Deployment Proposed Locations	
18°35'46.74"N	65°39'56.59"W
18°47'4.30"N	66°55'59.31"W
18°47'27.69"N	67°21'40.72"W
19° 4'55.64"N	67°21'31.40"W
19°25'31.64"N	67° 9'43.45"W
19°40'48.00"N	67° 0'0.00"W
19°49'48.00"N	67° 0'0.00"W
20°11'40.68"N	67° 9'37.23"W
20°18'58.75"N	66°15'27.61"W
19°49'48.00"N	66°30'0.00"W
19°40'48.00"N	66°30'0.00"W
19°32'43.66"N	66°31'27.55"W

Table 2. *Proposed free vehicle deployment locations.*

D. Summary of Objectives

MAR 16 – APR 3 2015 (San Juan, Puerto Rico to San Juan, Puerto Rico)

During EX-15-02 Leg II, multibeam data will be collected 24 hours a day. Multibeam data will be gathered over previously unexplored regions. Data will be used to better understand the bathymetry of the Puerto Rican trench and allow reconnaissance of the region prior to the ROV cruise. Multibeam operations within 5 miles of land in priority area 1 will be conducted during daylight hours.

XBT casts will be conducted at an interval defined by prevailing oceanographic conditions, but not to exceed 6 hours. XBT data will be used to correct the sound velocity of the multibeam data. Additionally, EK 60 (single beam) and sub-bottom profile data will be collected 24 hours per day.

Two surveys of opportunity are planned for the cruise, including free vehicle deployments, and the NASA marine aerosols network study. Free vehicles will be loaded by University of Puerto Rico scientists in San Juan, Puerto Rico, after EX-15-02-Leg II. See section V and Appendix C for more detailed survey of opportunity information. The ongoing NASA project will not significantly impact cruise timing.

All multibeam data will be fully processed according to standard onboard procedures and will be archived with the National Geophysical Data Center. Splitbeam EK60 data will be archived at the National Oceanographic Data Center.The following are cruise objectives for EX-15-02 Leg I:

1. Collect deep water multibeam bathymetry sonar data (MBES)
   a. Conduct 24-hour mapping operations for the duration of the cruise
   b. Collect bathymetric, seafloor backscatter, and water column backscatter data

2. Collect ancillary sonar data
   a. EK60 single beam sonar (24 hours/day)
   b. Knudsen sub-bottom profiler (24 hours/day)

3. XBT operations
   a. XBT casts will be collected at regular intervals of no more than 6 hours

4. Deploy Free Vehicles
   a. Eight to twelve planned deployments along Puerto Rico Trench

5. Train new personnel in all data collection and processing procedures, continuous throughout cruise)
   a. Training of physical scientist new to ship
   b. Train mapping interns (UCAR)
   c. Train mapping contractor new to ship

6. Continue testing new or modified mission hardware and software
   a. Mission computers recently upgraded to Windows 7
   b. Continue testing upgrads to Caris, Fledermaus, Hypack

7. Telepresence (VSAT 5 mbps ship to shore; T1 shore to ship)
   a. Maintain single live stream video from ship to shore

8. CTD operations
   a. CTD operations may be requested to obtain sound velocity profiles, as a back up for XBT operations.

b. If a sound velocity comparison between a CTD cast and an XBT cast is not obtained during EX-15-02 Leg II, a CTD cast will be required as part of annual shakedown procedures.

E. Participating Institutions

National Oceanic and Atmospheric Administration (NOAA) - Office of Ocean Exploration and Research (OER) - 1315 East-West Hwy, Silver Spring, MD 20910 USA

National Oceanic and Atmospheric Administration (NOAA) –National Ocean Service (NOS) - 1305 East-West Hwy, Silver Spring, MD 20910 USA

NOAA, Office of Coast Survey, Hydrographic Surveys Division, Atlantic Hydrographic Branch, 439 W. York St., Bldg 2, Norfolk, VA 23510

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

NOAA, National Oceanographic Data Center, National Coastal Data Development Center, Stennis Space Center MS, 39529

University of Rhode Island, Graduate School of Oceanography's Inner Space Center, 215 South Ferry Rd. Narragansett, RI 02882 USA

University Corporation for Atmospheric Research Joint Office for Science Support (JOSS), PO Box 3000 Boulder, CO 80307 USA

University of Puerto Rico, Mayaguez Department of Marine Sciences, Call Box 9000, Mayaguez, PR 00680

F. Personnel/Science Party: name, title, gender, affiliation, and nationality

A full mapping complement is necessary for this cruise. Required mission personnel include a Mapping Lead/Expedition Coordinator as well as two qualified watchstanders for each of the three eight hour watches. The Mapping Lead is responsible forfacilitating overall mapping operations, including participating in operational meetings, providing guidance for mapping/survey troubleshooting, and communicating status of mapping sensors to personnel on shore.

Name (Last, First)	**Title**	**Date Aboard**	**Date Disembark**	**Gender**	**Affiliation**	**Nationality**
Fuentes, Zamara	Free Vehicle Scientist	March 14, 2015	April 4, 2015	F	UPRM	US
Lobecker, Elizabeth 'Meme'	Expedition Coordinator, Mapping Team Lead	March 14, 2015	April 4, 2015	F	NOAA OER (ERT Inc.)	US
Meyer, Jason	Mapping Watch Lead	March 14, 2015	April 4, 2015	M	UCAR	US

Millan, Josue	Mapping Intern	March 14, 2015	April 4, 2015	M	UCAR	US
Mello, Kristen	Mapping Intern	March 14, 2015	April 4, 2015	F	UCAR	US
Ovard, Melody	Mapping Watch Lead, FNG Host	March 14, 2015	April 4, 2015	F	NOAA Hydro	US
Schmidt, Wilford	Free Vehicle Lead Scientist	March 14, 2015	April 4, 2015	M	UPRM	US
Vieten, Rolf-Martin	Free Vehicle Scientist	March 14, 2015	April 4, 2015	M	UPRM	German
Wegner, Chelsea	Mapping Intern	March 14, 2015	April 4, 2015	F	UCAR	US
Theresa Paulsen	NOAA Teacher at Sea	March 14, 2015	April 4, 2015	F	NOAA Teacher At Sea	US

G. Administrative

1. Points of Contacts:

Ship Operations

Marine Operations Center, Atlantic (MOA)
439 West York Street
Norfolk, VA 23510-1145
Telephone: (757) 441-6776
Fax: (757) 441-6495

Chief, Operations Division, Atlantic (MOA)
LCDR Donald Beaucage
Telephone: (757) 441-6842
E-mail:chiefops.moa@noaa.gov

Mission Operations

Elizabeth 'Meme' Lobecker,
Expedition Coordinator/Mapping Team Lead
NOAA Office of Ocean Exploration
and Research (ERT, Inc)
Phone : (603) 862-1475
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CDR Mark Wetzler, NOAA

Commanding Officer

NOAA Ship *Okeanos Explorer*

Phone: Iridium - (808) 659 9179

Email: CO.Explorer@noaa.gov

LT Emily Rose, NOAA

Operations Officer

NOAA Ship *Okeanos Explorer*

Phone: (808) 659-9179

E-mail: Ops.Explorer@noaa.gov

Other Mission Contacts

John McDonough, Deputy Director
NOAA Ocean Exploration & Research
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E-mail: John.McDonough@noaa.gov

LT Brian Kennedy

Acting Deputy EX Program Manager

NOAA Office of Ocean Exploration

and Research

Phone : (401) 874-6150/ (706) 540-2664

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Wilford Schmidt, PhD

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787-832-4040 x2069
wilford.schmidt@upr.edu

Jared Drewniak, Telepresence Lead

NOAA Office of Ocean Exploration & Research
(Acentia)

Phone: (401) 874-6250 (o) / (401) 330-9662 (c)

Email: jared.drewniak@noaa.gov

2. Diplomatic Clearances

None Required.

3. Licenses and Permits

See Appendix for Categorical Exclusion documentation.

II. Operations

The Chief Scientist is responsible for ensuring the scientific staff are trained in planned operations and are knowledgeable of project objectives and priorities. The Commanding Officer is responsible for ensuring all operations conform to the ship's accepted practices and procedures.

A. Project Itinerary:

Cruise Plan Itinerary

Friday, March 13

- Possible loading of free vehicle equipment onto ship

Friday, March 13

- UPR scientists arrive to ship to load free vehicle equipment

Saturday, March 14

- Mission personnel arrive at ship in San Juan, prepare for expedition

Sunday, March 15

- Mission personnel prepare for departure, including training on survey equipment and ship introduction information

Monday, March 16

- Depart for primary survey working grounds north of Puerto Rico

Tuesday, March 17 - Wednesday March 25

- Conduct mapping operations in Priority Box 1, with operations within 5 nm of shore to be conducted during daylight hours
- Conduct 3 free vehicle deployment/recovery iterations in conjunction with mapping operations

Thursday, March 26 - Friday March 27

- Transit northward over Puerto Rico Trench towards Priority Box 2.
- Conduct up to 7 free vehicle deployments/recovery iterations in the Puerto Rico Trench in conjunction with mapping operations
- Collect strategic subbottom data collection lines while free vehicle deployed in water too deep for EM 302 multibeam data collection.
- Arrive Priority Box 2, commence exploration mapping.

Saturday March 28 - Monday April 2

- Exploration mapping of Priority Box 2.
- Conduct up to three free vehicle deployment/recovery iterationsin conjunction with mapping operations

Tuesday April 3

- Arrive San Juan sea buoy in the morning
- Arrive in port

Wednesday April 4 - Thursday April 5

- Mission personnel depart ship to make space for next mission crew to board.

Telepresence Events

There are currently no telepresence events scheduled.

In-Port Events

One to two hour long medial tours for local media will occur on April 7.

B. Staging and Destaging:

The University of Puerto Rico free vehicle survey of opportunity equipment will be brought onboard in San Juan. Two free vehicles and 12 weights will be loaded. The weights consist of a 5 gallon bucket filled with 80-100 lbs of steel chain. All will need to be secured on the fan tail and do not require interior storage.

Figure 2.Image of one free vehicle to indicate scale.

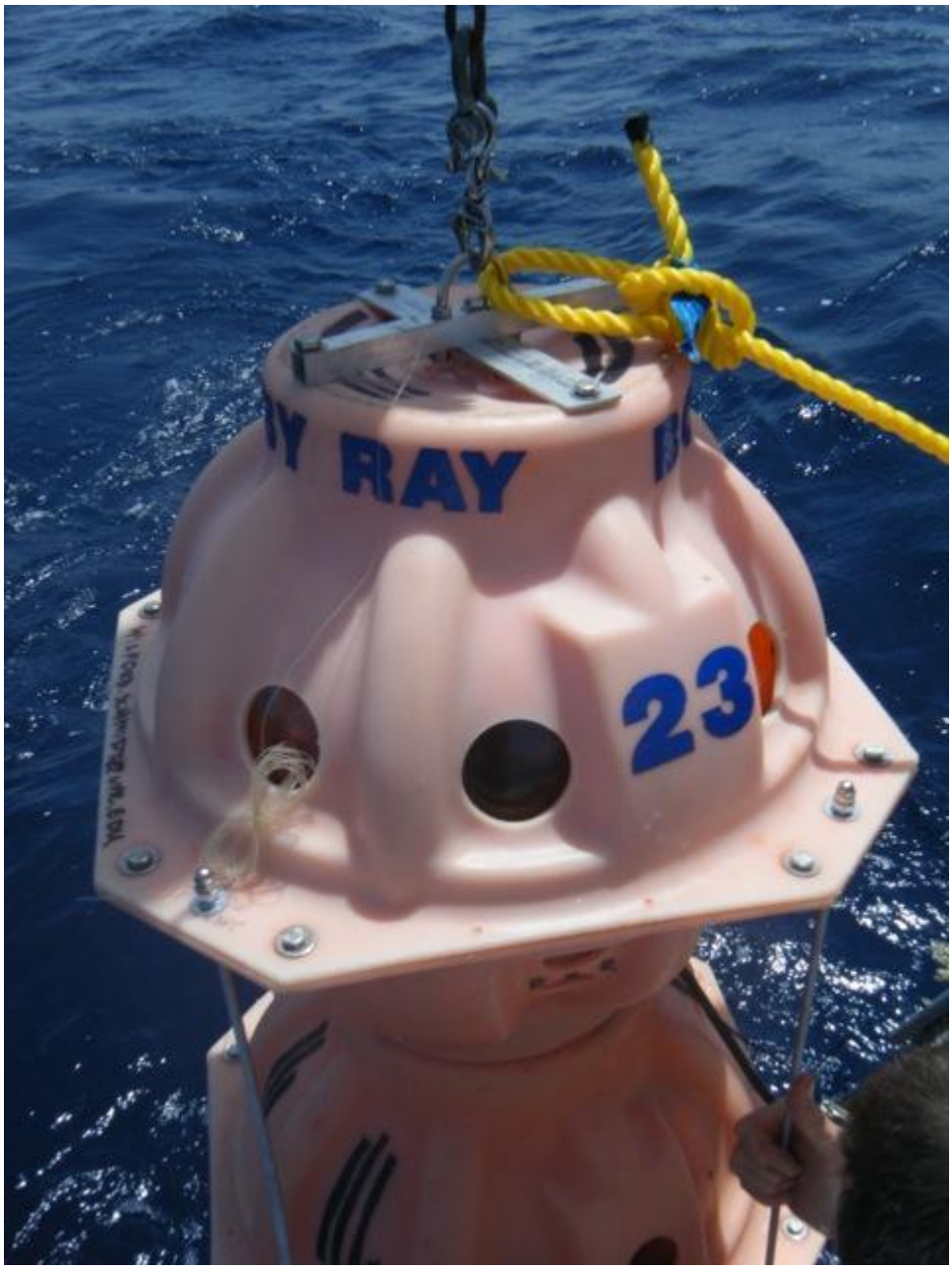

Figure 3. Close up image of free vehicle attachment mechanism.

Shipments

Send an email to *Okeanos Explorer's* Operations Officer at OPS.Explorer@noaa.gov indicating the size and number of items being shipped. All items should arrive to San Juan, PR no later than **COB March 9, 2015**.

Vessel shipping address:

Coast Guard Sector San Juan
Attn: NOAA Ship Okeanos Explorer
Operations Officer LT Emily Rose

5 Calle La Puntilla
San Juan, PR 00901
VOIP Ship: (301)-713-7772

C. Operations to be Conducted:

Sonar Operations

Multibeam,EK 60,and Knudsen sub-bottom profiler data acquisition is planned for this cruise. The mapping team will ensure that all the standard protocols, as laid out by the Commanding Officer and mapping lead directives will be followed for efficient and safe mapping operations. The final decision to operate and collect sub-bottom profiler data will be at the discretion of the Commanding Officer.

D. Dive Plan

All dives are to be conducted in accordance with the requirements and regulations of the NOAA Diving Program (http://www.ndc.noaa.gov/dr.html) and require the approval of the ship's Commanding Officer.

Dives are not planned for this project.

E. Applicable Restrictions

Conditions which preclude normal operations: At the request of the ship's CO, mapping data collection within 5 miles of shore will occur only during daylight hours.

III. Equipment

A. Equipment and Capabilities provided by the ship (itemized)

- Kongsberg Simrad EM302 MultibeamEchosounder (MBES)
- Kongsberg Simrad EK60DeepwaterEchosounder
- Knudsen Chirp 3260 Sub-bottom profiler (SBP)
- LHM Sippican XBT (Deep Blue probes)
- Seabird SBE 911Plus CTD
- Seabird SBE 32 Carousel and 24 2.5 L Niskin Bottles
- Light Scattering Sensor (LSS)
- Oxidation – Reduction Potential (ORP)
- Dissolved Oxygen (DO) sensor
- Altimeter Sensor and battery pack
- CNAV GPS
- POS/MV
- Seabird SBE-45 (Micro TSG)
- Kongsberg Dynamic Positioning-1 System
- NetApps mapping storage system
- CARIS HIPS Software
- IVS Fledermaus Software
- SIS Software
- Hypack Software

- Scientific Computing System (SCS)
- ECDIS
- Met/Wx Sensor Package
- Telepresence System
- VSAT High-Speed link (Comtech5Mbps ship to shore; 1.54 Mbps shore to ship)
- Cruise Information Management System (CIMS)

B. Equipment and Capabilities provided by the scientists (itemized)

- Microtops II Ozone Monitor -Sunphotometer and handheld GPS required for NASA Marine Aerosols Network supplementary project.

- Free Vehicles

IV. Hazardous Materials

A. Policy and Compliance

The free vehicle survey of opportunity may collect samples which need preservation in isopropyl alcohol and the ship's science freezer. The ship is working with Dr. Schmidt to bring the material onboard and already has MSDS sheets available.

The Chief Scientist is responsible for complying with FEC 07 Hazardous Materials and Hazardous Waste Management Requirements for Visiting Scientific Parties (or the OMAO procedure that supersedes it). By Federal regulations and NOAA Marine and Aviation Operations policy, the ship may not sail without a complete inventory of all hazardous materials by name and quantity, MSDS, appropriate spill cleanup materials (neutralizing agents, buffers, or absorbents) in amounts adequate to address spills of a size equal to the amount of chemical brought aboard, and chemical safety and spill response procedures. Documentation regarding those requirements will be provided by the Chief of Operations, Marine Operations Center, upon request.

Per OMAO procedure, the scientific party will include with their project instructions and provide to the CO of the respective ship 30 days before departure:

- List of chemicals by name with anticipated quantity
- List of spill response materials, including neutralizing agents, buffers, and absorbents
- Chemical safety and spill response procedures, such as excerpts of the program's Chemical Hygiene Plan o SOPs relevant for shipboard laboratories
- For bulk quantities of chemicals in excess of 50 gallons total or in containers larger than 10 gallons each, notify ship's Operations Officer regarding quantity, packaging and chemical to verify safe stowage is available as soon as chemical quantities are known.

Upon embarkation and prior to loading hazardous materials aboard the vessel, the scientific party will provide to the CO or their designee:

- An inventory list showing actual amount of hazardous material brought aboard
- An MSDS for each material
- Confirmation that neutralizing agents and spill equipment were brought aboard sufficient to contain and cleanup all of the hazardous material brought aboard by the program
- Confirmation that chemical safety and spill response procedures were brought aboard

Upon departure from the ship, scientific parties will provide the CO or their designee an inventory showing that all chemicals were removed from the vessel. The CO's designee will maintain a log to track scientific party hazardous materials. MSDS will be made available to the ship's complement, in compliance with Hazard Communication Laws.

Scientific parties are expected to manage and respond to spills of scientific hazardous materials. Overboard discharge of hazardous materials is not permitted aboard NOAA ships.

B. Inventory

Not applicable to this cruise.

C. Chemical safety and spill response procedures

Not applicable to this cruise.

D. Radioactive Materials

No Radioactive Isotopes are planned for this project

E. Inventory (itemized) of Radioactive Materials

Not applicable to this cruise.

V. Additional Projects

A. Supplementary ("Piggyback") Projects

The first survey of opportunity is exploration of the Puerto Rico Trench via un-tethered free vehicles (FV), see Figure 1. Deployment and recovery should be performed while the ship is stationary. FV assembly including payload and ballast is less than 110 pounds in weight and 8 feet high. The ship's cranes will be used for deployment and recovery. Each deployment will last between 30 minutes and 3 hours, depending on location and depth. FV do not require surface signals to return to surface, and the ship can conduct other operations while the FV is deployed. Three additional members of the science party will sail to support this effort. More information about the deployment is included in Appendix C.

The second survey of opportunity is the NASA Maritime Aerosol Network. During the cruise the marine aerosol layer observations will be collected for the NASA Maritime Aerosol Network (MAN). Observations will be made by mission personnel (mapping interns) with a sun photometer instrument provided by the

NASA MAN program. Resulting data will be delivered to the NASA MAN primary investigator Alexander Smirnov by the expedition coordinator. All collected data will be archived and publically available at: http://aeronet.gsfc.nasa.gov/new_web/maritime_aerosol_network.html. Equipment is stewarded by OER physical scientists. See Appendix C for full Survey of Opportunity Form.

B. NOAA Fleet Ancillary Projects

No NOAA Fleet Ancillary Projects are planned.

VI. Disposition of Data and Reports

Disposition of data gathered aboard NOAA ships will conform to NAO 216-101 *Ocean Data Acquisitions* and NAO 212-15 *Management of Environmental Data and Information.* To guide the implementation of these NAOs, NOAA's Environmental Data Management Committee (EDMC) provides the *NOAA Data Documentation Procedural Directive* (data documentation) and *NOAA Data Management Planning Procedural Directive* (preparation of Data Management Plans). OMAO is developing procedures and allocating resources to manage OMAO data and Programs are encouraged to do the same for their Project data.

A. Data Classifications: *Under Development*

a. OMAO Data

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

b. Program Data

- At sea
  - Daily plans of the Day (POD)
  - Daily situation reports (SITREPS)
  - Daily summary bathymetry data files
- Post cruise
  - Refined SOPs for all pertinent operational activities
  - Assessments of all activities
- Science
  - Multibeam and XBT raw and processed data (see appendix B for the formal cruise data management plan)
  - EK 60 raw data
  - Knudsen 3260 sub-bottom profiler raw data
  - Mapping data report

B. Responsibilities: *Under Development*

VII. Meetings, Vessel Familiarization,and Project Evaluations

A. Pre-Project Meeting: The Chief Scientist and Commanding Officer will conduct a meeting of pertinent members of the scientific party and ship's crew to discuss required equipment, planned operations, concerns, and establish mitigation strategies for all concerns. This meeting shall be conducted before the beginning of the project with sufficient time to allow for preparation of the ship and project personnel. The ship's Operations Officer usually is delegated to assist the Chief Scientist in arranging this meeting.

B. Vessel Familiarization Meeting: The Commanding Officer is responsible for ensuring scientific personnel are familiarized with applicable sections of the standing orders and vessel protocols, e.g., meals, watches, etiquette, drills, etc. A vessel familiarization meeting shall be conducted in the first 24 hours of the project's start and is normally presented by the ship's Operations Officer.

C. Post-Project Meeting: The Commanding Officer is responsible for conducted a meeting no earlier than 24 hrs before or 7 days after the completion of a project to discuss the overall success and short comings of the project. Concerns regarding safety, efficiency, and suggestions for future improvements shall be discussed and mitigations for future projects will be documented for future use. This meeting shall be attended by the ship's officers, applicable crew, the Chief Scientist, and members of the scientific party and is normally arranged by the Operations Officer and Chief Scientist.

D. Project Evaluation Report:Within seven days of the completion of the project, a Customer Satisfaction Survey is to be completed by the Chief Scientist. The form is available at http://www.omao.noaa.gov/fleeteval.html and provides a "Submit" button at the end of the form. Submitted form data is deposited into a spreadsheet used by OMAO management to analyze the information. Though the complete form is not shared with the ships', specific concerns and praises are followed up on while not divulging the identity of the evaluator.

VIII. Miscellaneous

A. Meals and Berthing

The ship will provide meals for the scientists listed above. Meals will be served 3 times daily beginning one hour before scheduled departure, extending throughout the project, and ending two hours after the termination of the project. Since the watch schedule is split between day and night, the night watch may often miss daytime meals and will require adequate food and beverages (for example a variety of sandwich items, cheeses, fruit, milk, juices) during what are not typically meal hours. Special dietary requirements for scientific participants will be made available to the ship's command at least seven days prior to the project.

Berthing requirements, including number and gender of the scientific party, will be provided to the ship by the Chief Scientist. The Chief Scientist and Commanding Officer will work together on a detailed berthing plan to accommodate the gender mix of the scientific party taking into consideration the current make-up of the ship's complement. The Chief Scientist is responsible for ensuring the scientific berthing spaces are left in the condition in which they were received; for stripping bedding and linen return; and for the return of any

room keys which were issued. The Chief Scientist is also responsible for the cleanliness of the laboratory spaces and the storage areas utilized by the scientific party, both during the project and at its conclusion prior to departing the ship.

All NOAA scientists will have proper travel orders when assigned to any NOAA ship. The Chief Scientist will ensure that all non NOAA or non Federal scientists aboard also have proper orders. It is the responsibility of the Chief Scientist to ensure that the entire scientific party has a mechanism in place to provide lodging and food and to be reimbursed for these costs in the event that the ship becomes uninhabitable and/or the galley is closed during any part of the scheduled project.

All persons boarding NOAA vessels give implied consent to comply with all safety and security policies and regulations which are administered by the Commanding Officer. All spaces and equipment on the vessel are subject to inspection or search at any time. All personnel must comply with OMAO's Drug and Alcohol Policy dated May 17, 2000 which forbids the possession and/or use of illegal drugs and alcohol aboard NOAA Vessels.

B. Medical Forms and Emergency Contacts

The NOAA Health Services Questionnaire (NHSQ, NF 57-10-01 (3-14)) must be completed in advance by each participating scientist. The NHSQ can be obtained from the Chief Scientist or the NOAA website http://www.corporateservices.noaa.gov/noaaforms/eforms/nf57-10-01.pdf.

All NHSQs submitted after March 1, 2014, must be accompanied by NOAA Form (NF) 57-10-02- Tuberculosis Screening Document in compliance with OMAO Policy 1008 (Tuberculosis Protection Program).

The completed forms should be sent to the Regional Director of Health Services at the applicable Marine Operations Center. The NHSQ and Tuberculosis Screening Document should reach the Health Services Office no later than 4 weeks prior to the start of the project to allow time for the participant to obtain and submit additional information should health services require it, before clearance to sail can be granted. Please contact MOC Health Services with any questions regarding eligibility or completion of either form. Ensure to fully complete each form and indicate the ship or ships the participant will be sailing on. The participant will receive an email notice when medically cleared to sail if a legible email address is provided on the NHSQ.

The participant can mail, fax, or email the forms to the contact information below. Participants should take precautions to protect their Personally Identifiable Information (PII) and medical information and ensure all correspondence adheres to DOC guidance (http://ocio.os.doc.gov/ITPolicyandPrograms/IT_Privacy/PROD01_008240).

The only secure email process approved by NOAA is Accellion Secure File Transferwhich requires the sender to setup an account.Accellion's Web Users Guideis a valuable aid in using this service, however to reduce cost the DOC contract doesn't provide for automatically issuing full functioning accounts. To receive access to a "Send Tab", after your Accellion account has been established send an email from the associated email account toaccellionAlerts@doc.gov requesting access to the "Send Tab" function. They will notify you

via email usually within 1 business day of your approval. The 'Send Tab" function will be accessible for 30 days.

Contact information:

Regional Director of Health Services
Marine Operations Center – Atlantic
439 W. York Street
Norfolk, VA 23510
Telephone 757-441-6320
Fax 757-441-3760
EmailMOA.Health.Services@noaa.gov

Prior to departure, the Expedition Coordinator must provide a listing of emergency contacts to the Operations Officer for all members of the scientific party, with the following information: name, address, relationship to member, and telephone number using the Google Form at

https://docs.google.com/a/noaa.gov/forms/d/1pcoSgPluUVxaY64CM1hJ75l1iIYirTk48G-lv37Am_k/viewform

C. Shipboard Safety

Hard hats are required when working with suspended loads. Work vests are required when working near open railings and during small boat launch and recovery operations. Hard hats and work vests will be provided by the ship when required.

Wearing open-toed footwear or shoes that do not completely enclose the foot (such as sandals or clogs) outside of private berthing areas is not permitted. At the discretion of the ship CO, safety shoes (i.e. steel or composite toe protection) may be required to participate in any work dealing with suspended loads, including CTD deployment and recovery. The ship does not provide safety-toed shoes/boots. The ship's Operations Officer should be consulted by the Chief Scientist to ensure members of the scientific party report aboard with the proper attire.

D. Communications

A progress report on operations prepared by the Expedition Coordinator may be relayed to the program office. Sometimes it is necessary for the Chief Scientist to communicate with another vessel, aircraft, or shore facility. Through various means of communications, the ship can usually accommodate the Chief Scientist. Special radio voice communications requirements should be listed in the project instructions. The ship's primary means of communication with the Marine Operations Center is via email and the Very Small Aperture Terminal (VSAT) link. Standard VSAT bandwidth at 128kbs is shared by all vessels staff and the science team at no charge. Increased bandwidth in 30 day increments is available on the VSAT systems at increased cost to the scientific party. If increased bandwidth is being considered, program accounting is required and it must be arranged through the ship's Commanding Officer at least 30 days in advance.

Specific information on how to contact NOAA Ship *Okeanos Explorer* and all other fleet vessels can be found athttp://www.moc.noaa.gov/MOC/phone.html#EXhttp://www.moc.noaa.gov/MOC/phone.html - EX
Important Telephone and Facsimile Numbers and E-mail Addresses

Ocean Exploration and Research (OER):

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

University of New Hampshire, Center for Coastal and Ocean Mapping
Phone: (603) 862-3438
Fax: (603) 862-0839

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

Okeanos Explorer Cellular: (401) 713-4114
*Okeanos Explorer*Iridium:(808) 659-9179
OER Mission Iridium (dry lab): (808) 851-3827

EX INMARSAT B
Line 1: 011-870-764-852-328
Line 2: 011-870-764-852-329

Voice Over IP (VoIP) Phone:
301-713-7772 (expect a delay once picked up by directory)

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

expeditioncoordinator.explorer@noaa.gov - For dissemination of all hands emails by Expedition Coordinator while on board. See ET for password.

E. IT Security

Any computer that will be hooked into the ship's network must comply with the *OMAO Fleet IT Security Policy*1.1 (November 4, 2005) prior to establishing a direct connection to the NOAA WAN. Requirements include, but are not limited to:

(1) Installation of the latest virus definition (.DAT) file on all systems and performance of a virus scan on each system.
(2) Installation of the latest critical operating system security patches.
(3) No external public Internet Service Provider (ISP) connections.

Completion of the above requirements prior to boarding the ship is required.

Non-NOAA personnel using the ship's computers or connecting their own computers to the ship's network must complete NOAA's IT Security Awareness Course within 3 days of embarking.

F. Foreign National Guests Access to OMAO Facilities and Platforms

All foreign national access to the vessel shall be in accordance with NAO 207-12 and RADM De Bow's March 16, 2006 memo (http://deemedexports.noaa.gov). National Marine Fisheries Service personnel will use the Foreign National Registration System (FNRS) to submit requests for access to NOAA facilities and ships. The Departmental Sponsor/NOAA (DSN) is responsible for obtaining clearances and export licenses and for providing escorts required by the NAO. DSNs should consult with their designated Line Office Deemed Export point of contact to assist with the process.

Full compliance with NAO 207-12 is required.

Responsibilities of the Chief Scientist:

1. Provide the Commanding Officer with the email generated by the Servicing Security Office granting approval for the foreign national guest's visit. (For NMFS-sponsored guests, this email will be transmitted by FNRS.)This email will identify the guest's DSN and will serve as evidence that the requirements of NAO 207-12 have been complied with.
2. Escorts – The Chief Scientist is responsible to provide escorts to comply with NAO 207-12 Section 5.10, or as required by the vessel's DOC/OSY Regional Security Officer.
3. Ensure all non-foreign national members of the scientific party receive the briefing on Espionage Indicators (NAO 207-12 Appendix A) at least annually or as required by the Servicing Security Office.
4. Export Control - Ensure that approved controls are in place for any technologies that are subject to Export Administration Regulations (EAR).

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

Responsibilities of the Commanding Officer:

1. Ensure only those foreign nationals with DOC/OSY clearance are granted access.
2. Deny access to OMAO platforms and facilities by foreign nationals from countries controlled for anti-terrorism (AT) reasons and individuals from Cuba or Iran without written approval from the Director of the Office of Marine and Aviation Operations and compliance with export and sanction regulations.
3. Ensure foreign national access is permitted only if unlicensed deemed export is not likely to occur.
4. Ensure receipt from the Chief Scientist or the DSN of theFNRS or Servicing Security Officeemail granting approval for the foreign national guest's visit.
5. Ensure Foreign Port Officials, e.g., Pilots, immigration officials, receive escorted access in accordance with maritime custom to facilitate the vessel's visit to foreign ports.
6. Export Control - 8 weeks in advance of the project, provide the Chief Scientist with a current inventory of OMAO controlled technology onboard the vessel and a copy of the vessel Technology Access Control Plan (TACP). Also notify the Chief Scientist of any OMAO-sponsored foreign nationals that will be onboard while program equipment is aboard so that the Chief Scientist can take steps to prevent unlicensed export of Program controlled technology. The Commanding Officer and the Chief Scientist will work together to implement any access controls necessary to ensure no unlicensed export occurs of any controlled technology onboard regardless of ownership.

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

Responsibilities of the Foreign National Sponsor:

1. Export Control - The foreign national's sponsor is responsible for obtaining any required export licenses and complying with any conditions of those licenses prior to the foreign national being provided access to the controlled technology onboard regardless of the technology's ownership.
2. The DSN of the foreign national shall assign an on-board Program individual, who will be responsible for the foreign national while on board. The identified individual must be a U.S. citizen and a NOAA or DOC employee. According to DOC/OSY, this requirement cannot be altered.
3. Ensure completion and submission of Appendix C (Certification of Conditions and Responsibilities for a Foreign National

VIII. Appendices

Appendix 1. Data Management Plan

Appendix 2. Categorical Exclusion

Appendix 3. Free Vehicle Survey of Opportunity Form

Appendix 4. NASA Maritime Aerosols Network Survey of Opportunity

Appendix 1. Data Management Plan

Data Management Plan

Okeanos Explorer (EX1502L2): Caribbean Exploration (Mapping)

OER Data Management Objectives

No specific data management objectives other than normal data pipelines and standard operating procedures.

1. General Description of Data to be Managed

1.1 Name and Purpose of the Data Collection Project

Okeanos Explorer (EX1502L2): Caribbean Exploration (Mapping)

1.2 Summary description of the data to be collected.

EM302 multibeam data will be collected 24 hours a day and will be gathered over previously unexplored regions. Data will be used to better understand the bathymetry of the Puerto Rican trench and allow reconnaissance of the region prior to the ROV cruise. Multibeam operations within 5 miles of land in priority area 1 will be conducted during daylight hours. XBT casts will be conducted at an interval defined by prevailing oceanographic conditions, but not to exceed 6 hours. XBT data will be used to correct the sound velocity of the multibeam data. Additionally, EK 60 (single beam) and sub-bottom profile data will be collected 24 hours per day.

1.3 Keywords or phrases that could be used to enable users to find the data.

expedition, exploration, explorer, marine education, noaa, ocean, ocean discovery, ocean education, ocean exploration, ocean exploration and research, ocean literacy, ocean research, OER, science, scientific mission, scientific research, sea, stewardship, systematic exploration, technology, transformational research, undersea, underwater, Davisville, mapping survey, multibeam, multibeam backscatter, multibeam sonar, multi-beam sonar, noaa fleet, okeanos, okeanos explorer, R337, Rhode Island, scientific computing system, SCS, single beam sonar, singlebeam sonar, single-beam sonar, sub-bottom profile, water column backscatter, oceans, Puerto Rico Trench, NASA maritime aerosol network, free vehicles, University of Puerto Rico

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.

Dates: 3/16/2015 to 3/3/2015

1.6 Planned or actual geographic coverage of the data.

Latitude Boundaries: 21.85 to 18.45

Longitude Boundaries: -67.5 to -64.95

1.7 What data types will you be creating or capturing and submitting for archive?

Cruise Plan, Cruise Summary, Data Management Plan, Highlight Images, Quick Look Report, NetCDF, Multibeam (raw), Multibeam (image), Multibeam (processed), Multibeam (product), Mapping Summary, GSF, HDCS, Floating

Point GeoTIF, EK60 Singlebeam Data, XBT (raw), Water Column Backscatter, Sub-Bottom Profile data, Expedition Cruise Report, CTD (raw)

1.8 What platforms will be employed during this mission?

NOAA Ship Okeanos Explorer

2. Point of Contact for this Data Producing Project

Overall POC:	Elizabeth Lobecker, Multibeam Mapping Expert, Contractor (ERT, Inc.), NOAA Office of Ocean Exploration and Research, elizabeth.lobecker@noaa.gov
Title:	Multibeam Mapping Expert, Contractor (ERT, Inc.), NOAA Office of Ocean Exploration and Research
Affiliation/Dept:	Center for Coastal and Ocean Mapping (CCOM) Joint Hydrography Center (JHC), University of New Hampshire (UNH)
E-Mail:	elizabeth.lobecker@noaa.gov
Phone:	401-662-9297

3. Point of Contact for Managing the Data

Data POC Name:	Susan Gottfried
Title:	OER Data Management Coordinator, NOAA National Centers for Environmental Information
E-Mail:	susan.gottfried@noaa.gov

4. Resources

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

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 NetCDF-4 format to NODC; multibeam data and metadata will be compressed and delivered in a bagit format to NGDC.

5.2 What quality control procedures will be employed?

Quality control procedures for the data from the Kongsberg EM302 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 and are not quality controlled. CTDs are processed into profiles for display only on the Okeanos Atlas.

6. Data Documentation

6.1 Does the metadata comply with the Data Documentation Directive? True

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

6.2 Where will the metadata be hosted?

Organization: An ISO format collection-level metadata record will be generated during pre-cruise planning

URL: http://www.ncddc.noaa.gov/oer-waf/ISO
discovery and access. The record will be harvested by data.gov.

Meta Std: ISO 19115-2 Geographic Information with Extensions for Imagery and Gridded Data will be the metadata standard employed; a NetCDF-4 standard for oceanographic data will be employed for the SCS data; the Library of Congress standard, MAchine Readable Catalog (MARC), will be employed for NOAA Central Library records.

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?

True

7.1.1 If the data are not to be made available to the public at all, or with limitations, provide a valid reason.

Not Applicable

7.1.2 If there are limitations to public data access, describe how data are protected from unauthorized access or disclosure.

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.

Org: NOAA National Centers for Environmental Information

URL: explore.noaa.gov/digitalatlas

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

Hold Time: no

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 FY15 Data Management Plan at NOAA's EDMC DMP Repository (EX_FY15_DMP_Final.pdf) 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.

30-90 days

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 2. Categorical exclusion

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
OCEANIC AND ATMOSPHERIC RESEARCH
Office of Ocean Exploration and Research
Silver Spring, MD 20910

January 7, 2015

MEMORANDUM FOR: The Record

FROM: John McDonough
Deputy Director NOAA Office of Ocean Exploration and Research (OER)

John Mcdonough
Digitally signed by John Mcdonough
DN: cn=John Mcdonough, o=Ocean Exploration, ou=NOAA/OAR, email=john.mcdonough@noaa.gov, c=US
Date: 2015.01.08 17:20:48 -05'00'

SUBJECT: Categorical Exclusion for NOAA Ship *Okeanos Explorer* Cruise EX-15-02 Leg 1 and Leg 2

NAO 216-6, Environmental Review Procedures, requires all proposed projects to be reviewed with respect to environmental consequences on the human environment. This memorandum addresses the NOAA Ship *Okeanos Explorer's* scientific sensors possible effect on the human environment.

This project is part of the NOAA Office of Ocean Exploration and Research's "Science Program" and entails multi-disciplinary ocean mapping and exploration activities designed to increase knowledge of the marine environment. This project is entitled "EX-15-02 Legs 1 and 2 Exploration, Caribbean (Mapping)" and will be led by Lindsay McKenna (Leg 1), and Elizabeth Lobecker (Leg 2), both Physical Scientists for the *Okeanos Explorer* program within OER. NOAA Ship *Okeanos Explorer* will depart on Leg 1 from North Kingstown, RI on February 18, 2015, and arrive in port in San Juan, Puerto Rico on March 11, 2015. Leg 2 will depart San Juan, Puerto Rico on March 16, 2015 and arrive in port in San Juan, Puerto Rico on April 3, 2015. NOAA Ship *Okeanos Explorer* will conduct sonar mapping operations at all times during the cruise. Focused mapping operations will occur along a transit path from Rhode Island to Puerto Rico, then within top priority exploration target areas in U.S. federal waters around Puerto Rico and St. Croix islands. Acoustic instruments that will be operational during the project are a 30 kHz multibeam echosounder (Kongsberg EM 302), an 18 kHz singlebeam echosounder (Kongsberg EK 60), and a 3.5 kHz sub-bottom profiler (Knudsen Chirp 3260). Additionally, expendable bathythermographs (XBTs) will be deployed at regular intervals in association with multibeam data collection.

As expected for ocean research with limited duration or presence in the marine environment, this project will not have the potential for significant impacts. Knowledgeable experts who are aware of the sensitivities of the marine environment will conduct the at-sea portions of this project.

This project would not result in any changes to the human environment. As defined in Sections 5.05 and 6.03.c.3 (a) of NAO 216-6, this is a research project of limited size or magnitude or with only short-term effects on the environment and for which any cumulative effects are negligible. As such, this project is categorically excluded from the need to prepare an environmental assessment.

Appendix 3.Free Vehicle Survey of Opportunity Form

(NOTE: deployment locations have evolved since the orginal submission of this form by the Puerto Rico scientists, and are available in Table 2 above)

Free Vehicles

Survey or Project Name

Exploration of the Muertos Trough and Puerto Rico Trench via un-tethered free vehicles

Points of Contact (POC)

Lead POC or Principle Investigator (PI & Affiliation) PI Wilford Schmidt – University of Puerto Rico, Mayaguez (UPRM) wilford.schmidt@upr.edu	*Supporting Team Members ashore* Co-PI Manuel Jimenez, UPRM Graduate students HaiboXu, Jesus Torrado, and Danilo Rojas (all UPRM)
	Supporting Team Members aboard (if required) PI and/or 1 student

Activities Description(s) *(Include goals, objectives and tasks)*

We propose to develop and extend new free vehicle (FV) technology and associated sampling packages described in NOAA OER award NA14OAR40110262 in the largely un-sampled abyssal (> 4000 m) waters south of Puerto Rico (Muertos Trough (MT)), and apply the advanced FV technology in a multi-disciplinary survey of the hadal (>6000 m) depths of the Puerto Rico Trench (PRT). Our survey of opportunity proposal consists of four synergistic parts: CTD casts Niskin casts ADCP casts Invertebrate/sediment collection Any of these activities can be performed with the same platform by simply switching payloads. Ideally, we would sample with each of these in both the MT and PRT, but are flexible in this respect due to the largely un-sampled nature of both areas, and due to the novelty of our FV technology.

List of Participating Organizations

UPRM
United States Geological Survey (USGS)
Teledyne RDI (RDI)
Aanderaa Instruments (AI)

Duration *(specific start and end dates, or expected length of survey)*

Depending on payload and depth at deployment location, each FV deployment typically lasts between 3 and 30 hr.

Area of Survey and Cruise Track Descriptions *(please attach appropriate charts and include chart reference numbers)*

Areas of interest are MT (1-3) south of La Parguera, PR and PRT (1 - 8) north of Arecibo, PR (please see attached Table 1 and Figure 1).

Conditions and Dependencies *(e.g. water depths, special sea conditions, time constraints, sample storage, etc.)*

Our FV are rated to 9000 m, so water depth is not a factor. We will have satellite transponder, RF beacon, and strobe for location determination, so sea state should not be a factor (within reason). If sediment, invertebrates, or other biota are recovered, simple freezer storage is required.

Procedures *(e.g. deployment & recovery of instrument, required ship speed, instrument max depth, etc.)*

Deployment and recovery should be performed while the ship is not underway. FV assembly including payload and ballast is less than 50 kg and 3 m. A suitable davit can be used, or the ship's A-frame, for deployment and recovery. FV do not require surface signals to return to surface, and the ship can conduct other operations during the FV deployment.

Sample Daily Operations Schedule *(e.g. deployments per day, time per deployment, data recorded, etc.)*

Our proposal consists of four synergistic parts:

CTD casts
Niskin casts
ADCP casts
Invertebrate/sediment collection

Items 1 – 2 can be accomplished in as little as approximately 2 s/m of water depth, e.g., 5 hr in full depth PRT. Items 3&4 require extended bottom time, say 24 hr, plus 2 s/m of water depth. Data collected will consist of: 1) conductivity, temperature, and pressure; 2) water samples for dissolved oxygen, nitrates, nitrites, silicates and phosphates analysis; 3) acoustic-Doppler current profiles with temperature and backscatter intensity; and 4) invertebrate and other biota/ surficial benthic sediments.

Equipment/Systems Needed

▢Dynamic Positioning ▢A-Frame ▢J-Frame ▢Multibeam (EM302) ▢EK60 (ES18) ▢Sub-Bottom Profiler (Chirp 3260) ▢Seawater flow-through system ▢CTD Rosette ▢XBT launcher ▢SCS Outputs	▢Telepresence ▢ROV ▢Sled ▢Hazardous Storage Describe: ▢Other ship's equipment(s): Describe All:

Special Equipment *(identify any PI-supplied gear that the ship will be requested to deploy)*

UPRM free vehicle, scientific payload, and ballast.

Lead Time and Long Lead Time Items*(e.g., permits, foreign nationals participation, etc)*

No permits are anticipated for this work. Of our 3 graduate students, 2 are foreign nationals but 1 is a U.S. citizen.

Shore-side support*(besides staffing, what other coordination is needed, e.g. telepresence center)*

UPRM has a functioning telepresence center.

Data, Products and Outputs *(requested shipboard data processing, archiving and product generation, such as sonar processing, GIS layer creation, mosaic, video archiving, etc)*

None

QUALITATIVE PARAMETERS

Why is this project considered "exploration"?

Although twelve people have walked on the Moon and numerous spacecraft are now exploring our solar system and beyond, very little in situ sampling of the Earth's oceanic trenches has occurred. Their general geographic remoteness and extreme bottom-pressures (>600 atmospheres) have made all sampling techniques difficult. Cable lengths needed (>6.5 km) make tethered sampling cost-prohibitive, and problematic in terms of successful data acquisition. Recent autonomous (AUV), remotely-operated (ROV), and free-vehicle sampling attempts have proved equally technically difficult and expensive (cf. EV Nautilus 2013, Deepsea Challenger, Nereus, Kaiko, and Big Alfie). However, developments in the manufacture of glass housings offer scientific investigators and engineers the opportunity to sample the Earth's deepest trenches at a fraction of the cost of previous methods.

These low-cost, untethered free vehicles (FV) can be thought of as the oceanographic analog to unmanned or small-satellite space missions, which have been shown to(Baker and Worden, 2008):

Be a cost effective method for addressing key scientific questions
Have the capability for quick response to targets of opportunity
3) Be a means for the development and demonstration of new technology and design concepts
4) Facilitate opportunity for multi-disciplinary and international collaborations

How is this survey multidisciplinary? *(Will various types of data be acquired by different user groups during the survey? Will the data products will be used by different users after the survey?)*

The proposed project consists of 4 overlapping activities and 2 UPRM Co-PIs (Marine Sciences and Electrical Engineering). Government and industry partners (USGS, RDI, and AI) will lend significant expertise and resources to the project.
The 4 activities are: 1) CTD casts 2) Niskin casts; 3)ADCP casts; and 4) Invertebrate/sediment collection.
These 4 activities encompass the fields of biology, geology, chemistry, and physics.

What is the public outreach potential for this project?

UPR is one of the largest under-represented minority serving institutions. The 2013/14 EV Nautilus Caribbean field seasons engendered enthusiastic support across the island of Puerto Rico, and UPRM in particular. Homeport activities can be scheduled and UPRM has an existing telepresence center.

What will become of the data, imagery, information and samples after this survey? *(Who is responsible for data archiving? How will the information be archived? Are there any intended publications from this survey? Will this data be used as leverage for follow-up investigation?)*

Please see below for NOAA Award NA14OAR40110262 data sharing plan (DSP).

What restrictions of confidentiality are placed on this request? *(Can this request be shared with OER partners operating in the area who might be able to acquire these data? Is any part of this intended dataset sensitive and restricted? Are you willing to work with NOAA public affairs officials to report any discoveries made by this survey?*

Please see below for NOAA Award NA14OAR40110262 data sharing plan (DSP).

If this project is maritime archeologically focused, what is the site's archaeological or historical importance?

Not applicable

If this project is maritime archeologically focused, who has jurisdiction over the site, and have the appropriate agencies been contacted?

Not applicable

Location and year	Lat (°N)	Lon (°W)	~Depth (m)	Description
La Parguera&Guanica FY1				UPRM DMS Magueyes Marine Station (MMS)
LPG 1	17.920	67.900	100	Shallow test site
LPG 2	17.840	66.900	1000	Deep test site
MuertosTrough FY1				
MT site 1	17.700	67.100	2000	25 km S UPRM DMS MMS

MT site 2	17.511	67.050	4000	52 km S UPRM DMS MMS
MT site 3	17.323	67.051	5100	75 km S UPRM DMS MMS
PRT FY1 & 2				
PRT site 1	19.68	67.000	8250	CTD/ADCP/ Niskin station
PRT site 2	19.83	67.000	8050	"
PRT site 3	19.75	66.875	8375	"
PRT site 4	19.68	66.750	8050	"
PRT site 5	19.83	66.750	8275	"
PRT site 6	19.75	66.625	8325	"
PRT site 7	19.83	66.500	8350	"
PRT site 8	19.68	66.500	8050	"

Table 1. Proposed sample sites, chronology, locations, approximate depths, and descriptions (where applicable). LPG sites serve as nearby shallow and deep test locations. MT sites serve as "sea trials" for all systems and, along with LPG sites, represent a multi-disciplinary, high-resolution sublittoral-to-abyssal transect. PRT sites represent a multi-disciplinary, 0.5° x 16 km resolution hadal PRT transect.

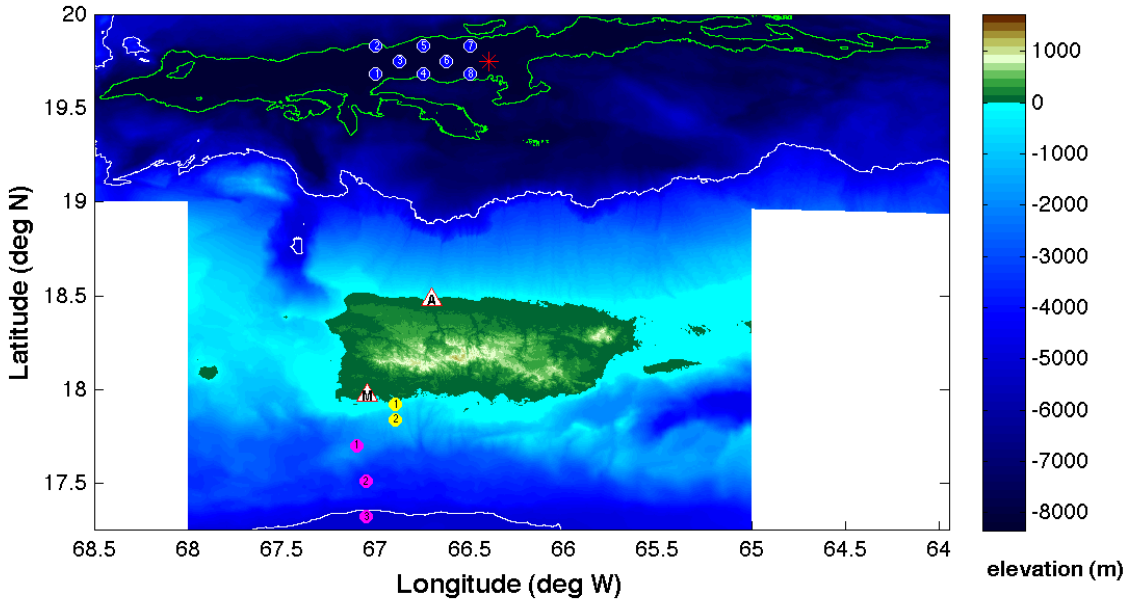

Fig. 2.Proposed sample and support sites. Triangles: UPRM DMS Magueyes Marine Station (south) and Arecibo Harbor (north). Circles: LPG test sites (yellow); MT transect (magenta); PRT stations (blue). Red asterisk denotes previous 2006/2008 sample site. Contours: -5000 m (white) and -8000 m (green). Bathymetry from USGS and NGDC.

Appendix 4.NASA Maritime Aerosols Network Survey of Opportunity

Survey or Project Name

Maritime Aerosol Network

Points of Contact (POC)

Lead POC or Principle Investigator (PI & Affiliation) **POC: Dr. Alexander Smirnov**	*Supporting Team Members ashore* *Supporting Team Members aboard (if required)*

Activities Description(s)*(Include goals, objectives and tasks)*

The Maritime Aerosol Network (MAN) component of AERONET provides ship-borne aerosol optical depth measurements from the Microtops II sun photometers. These data provide an alternative to observations from islands as well as establish validation points for satellite and aerosol transport models. Since 2004, these instruments have been deployed periodically on ships of opportunity and research vessels to monitor aerosol properties over the World Oceans.