**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: Lieutenant Commander Nicholas Chrobak, NOAA
Commanding Officer, NOAA Ship *Nancy Foster*

FROM: Captain Anita L. Lopez, NOAA
Commanding Officer, NOAA Marine Operations Center-Atlantic

SUBJECT: Project Instruction for NF-13-09
Atlantic Deep-Water Canyons – Benthic Landers

Attached is the final Project Instruction for NF-13-09, Atlantic Deep-Water Canyons (Benthic Landers), which is scheduled aboard NOAA Ship *Nancy Foster* during the period of 21 August – 28 August, 2013. Of the 8 DAS scheduled for this project, 8 DAS are program funded by OAR. This project is estimated to exhibit a High Operational Tempo. Acknowledge receipt of these instructions via e-mail to **OpsMgr.MOA@noaa.gov** at Marine Operations Center-Atlantic.

Attachment

cc:
MOA1

# Final Cruise Instructions

## NF-13-09, Deepwater Canyons (Benthic Landers)

**Date Submitted:** 14 August 2013

**Platform:** NOAA Ship *Nancy Foster*

**Cruise Number:** NF-13-09

**Project Title:** Atlantic Deep-Water Canyons (Benthic Landers)

**Cruise Dates:** 21-28 August 2013

Prepared by: _____ Dated: 14 August 2013
Michael P. Rhode
Chief Scientist

Approved by: _____ Dated: 8-15-2013
John McDonough, NOAA
Acting Director
Office of Ocean Exploration and Research

Approved by: _____ Dated: 19 Aug 13
Captain Anita L. Lopez, NOAA
Commanding Officer
Marine Operations Center - Atlantic

## I. **Overview**

### A. Summary and Project Period

This cruise is a collaborative effort between NOAA's Office of Ocean Exploration and Research (OER), the Bureau of Ocean Energy Management (BOEM), the US Geological Survey (USGS), CSA Ocean Sciences, Inc. (CSA, the BOEM contractor) and academic partners. All three federal agencies have a vested interest in the discovery and characterization of new ocean phenomena and dynamic processes that provide essential information and baseline characterizations to help better understand the Nation's ocean resources.

Submarine canyons are dominant features of the outer continental shelf and slope of the US east coast from Cape Hatteras to the Gulf of Maine. Linking the shelf to the deep sea, these conduits funnel anthropogenic pollutants, organic carbon, and sediments from shallow to deeper waters. Large canyons (e.g., Norfolk, Baltimore, Washington, Hudson) occur at regular intervals along the shelf-slope interface (Fig. 1). The geology of these features has been well studied; however, biological data are limited (particularly deeper than 200 m). Much of the biological data available for these canyons is represented by unpublished reports, unanalyzed data sets, and anecdotal observations. The canyons between Cape Hatteras and Cape Cod are the subject of potential oil exploration, intensive fisheries. This interagency study focuses on the exploration and investigation of deepwater biological communities and shipwreck sites located in and around the deep-sea canyons offshore Virginia and Maryland.

The first activity of this project was a multibeam sonar mapping and water column sampling cruise from Norfolk Canyon to Baltimore Canyon using NOAA Ship *Nancy Foster* (NF-11-04, 4-17 June 2011, Co-chief Scientists: S.W. Ross and S.D. Brooke, cruise report of 29 Aug 2011). Detailed bathymetric maps generated during this cruise were used to guide sampling activities during the 2012 and 2013 ROV cruises. The 2012 cruise using *Nancy Foster* and ROV *Kraken* (NF-12-07, 15 Aug - 2 Oct 2012, Co-chief Scientists: S.W. Ross, S.D. Brooke, R. Mather, and S. Viada, cruise report of 29 Oct 2012) concentrated on geology, biology, and oceanographic sampling during its first two legs in Baltimore Canyon with limited sampling in Norfolk Canyon. Four benthic landers and two moorings were placed in two canyons during this cruise. Leg three of the 2012 cruise conducted archaeological and biological sampling mostly around Norfolk Canyon. The first 2013 mission, consisted of two legs (30 April - 19 May and 19-27 May) and used NOAA Ship *Ronald H. Brown* and ROV *Jason II* (Woods Hole Oceanographic Inst.). *Jason II* was used for video surveys and sampling. Non-ROV sampling included bottom trawling, box coring, retrieval and re-deployment of two benthic landers, multibeam mapping, and CTD and water sampling.

NF-13-09 (Benthic Landers) on *Nancy Foster* is the final cruise of this project and its primary objective is to retrieve the four benthic landers and two moorings placed in Baltimore and Norfolk canyons during the 2012 cruise. It will depart from and return to North Charleston, SC. We will conduct 24 hour operations, and it is critical to the project to have a fully staffed and operational deck department throughout the cruise as well as one Survey Technician available at all times. We anticipate recovering landers and moorings during daylight hours, but these operations could extend into night hours. If there is time available, the science party, with appropriate ship assistance, may conduct multibeam mapping and CTD transects.

NOAA's contribution to this multi-year project involves 3 line offices. OAR's OER program provided funds for shiptime and ROV support as well as expedition coordination, educational outreach, and web coverage. The National Environmental Satellite, Data, and Information Service (NESDIS) is providing data management and long term data archival services. The Office of Marine and Aviation Operations (OMAO) has provided vessel and at-sea mission support throughout the three field seasons of the project.

Cruise Period: 21-28 August 2013 (includes transit and project days)

B. Service Level Agreements

Of the 8 Days At Sea (DAS) scheduled for this project, 0 DAS are base-funded by the Office of Marine and Aviation Operations and 8 DAS are funded by the NOAA Office of Ocean Exploration and Research. This project is estimated to exhibit a High Operational Tempo.

C. Operating Area (see Fig. 1): Region off Virginia, Maryland, and Delaware, including Norfolk and Baltimore canyons and the areas surrounding them in water depths of approximately 150-1400 m (see Fig. 1).

D. Summary of Objectives

1. Retrieve one lander from the mouth and one lander from the head of Baltimore Canyon.
2. Retrieve one mooring from the center of Baltimore Canyon.
3. As time allows, conduct CTD casts for hydrographic profiles in Baltimore Canyon. Water samples may be collected, but not on every cast. Monocore samples will be collected on most casts.
4. Retrieve one lander from the mouth and one lander from the head of Norfolk Canyon.
5. Retrieve one mooring from the center of Norfolk Canyon.
6. As time allows, conduct, multibeam mapping, and/or CTD casts (with monocore) in the Norfolk Canyon area.
7. Conduct limited education and outreach activities (internet postings, essays). No special efforts will be required by the ship for this activity. This will consist of posting regular updates via email to web coordinators on shore.
8. Limited samples will be collected from organisms which have grown on the moorings and benthic landers as well as from the corals that were deployed in experiments on the landers.

E. Participating Institutions

National Oceanographic and Atmospheric Administration (NOAA) Office of Ocean Exploration and Research (OER)
Bureau of Ocean Energy Management (BOEM)
US Geological Survey (USGS)
CSA Ocean Sciences, Inc. (CSA)
Univ. of North Carolina at Wilmington (UNCW)
Florida State Univ. (FSU)
Netherlands Institute of Sea Research (NIOZ)
NC Museum of Natural Sciences (NCMNS)
ArtWork, Inc.
Cape Fear Community College (CFCC)

F. Personnel (Science Party – subject to change)

| **Name (Last, First)** | **Title** | **Date Board** | **Date Return** | **Gender** | **Affiliation** | **Nationality** |
|---|---|---|---|---|---|---|
| Rhode, Michael | Chief scientist | 21 Aug | 28 Aug | M | UNCW | USA |
| Mienis, Furu | scientist | 21 Aug | 28 Aug | F | NIOZ | Netherlands |
| Duineveld, Gerard | scientist | 21 Aug | 28 Aug | M | NIOZ | Netherlands |
| Howard, Art | photographer | 21 Aug | 28 Aug | M | NCMNS | USA |
| Demopoulos, Amanda | scientist | 21 Aug | 28 Aug | F | USGS | USA |
| Borden, Jonathan | scientist | 21 Aug | 28 Aug | M | USGS | USA |
| Gray, Mike | scientist | 21 Aug | 28 Aug | M | USGS | USA |
| Cheriton, Olivia | scientist | 21 Aug | 28 Aug | F | USGS | USA |

| | | | | | | |
|---|---|---|---|---|---|---|
| Harris, Dacia | Teacher-at-sea | 21 Aug | 28 Aug | F | NCMNS | USA |
| Baird, Liz | Educator | 21 Aug | 28 Aug | F | NCMNS | USA |
| Nall, Sarah | student | 21 Aug | 28 Aug | F | CFCC | USA |
| Bryant, Kelly | student | 21 Aug | 28 Aug | F | CFCC | USA |
| Witt, Colby | student | 21 Aug | 28 Aug | M | CFCC | USA |
| Hogue, Gabriella | Educator | 21 Aug | 28 Aug | F | NCMNS | USA |

DAILY SCHEDULE (Tentative)

Vessel meal times: Breakfast = 0700-0800, Lunch = 1100-1200, Dinner = 1630-1730

Science crew watches:

Day (0700 – 1900): Lander & mooring retrieval, gear clean-up, data & sample archiving

Night (1900 – 0700): CTD transects, multibeam mapping, transiting

The primary activity of the day watch science crew, which is also the main purpose of the cruise, is to recall the landers and moorings to the surface while there is good visibility (daylight). In cooperation with the vessel's crew, landers and moorings will be brought on deck, stored for transport, cleaned, and equipment, data, and samples removed and stored.

The "night" watch will be 12 hrs on (1900 to 0700), 12 hrs off, and their main responsibilities will be CTD surveys, multibeam mapping and associated sound velocity measurements, data management, and sample processing. Some night hours may be used for steaming between stations, during which time the night watch will assist with other duties. Night watch crew will include: Furu Mienis (chief), Mike Gray, and CFCC students.

G. Administrative

1. Points of Contact:

NOAA Points of Contact:
John Mcdonough, Acting Director, NOAA Office of Ocean Exploration and Research, 1315 East West Highway, SSMC3/10th Floor/OER, Silver Spring, MD 20904; Office: (201)-734-1023, email: John.mcdonough@noaa.gov

Kasey Cantwell, Expedition Coordinator, NOAA Office of Ocean Exploration and Research
1315 East West Highway, SSMC3/10th Floor/OER, Silver Spring, MD 20904
Office: (301)-734-1050, Cell:214-205-3526, email: Kasey.cantwell@noaa.gov

LT Colin Kliewer, Operations Officer, NOAA ship *Nancy Foster*
843-991-6326; 808-434-5653

Non-NOAA Points of Contact:

Stephen T. Viada, Senior Scientist, CSA Ocean Sciences Inc.
8502 SW Kansas Avenue, Stuart, FL 34997 USA
Phone: 772-219-3016, Mobile: 561-254-6605, email: sviada@conshelf.com

Michael Rhode, Chief Scientist, UNCW, Center for Marine Science, 5600 Marvin Moss Ln., Wilmington, NC 28409, office 910-962-2805, email: RhodeM@uncw.edu

2. Diplomatic Clearances – None required
3. Licenses and Permits – None required

II. **Operations**

A. Cruise Plan Itinerary

We plan to transit directly from Charleston to the Norfolk Canyon, which will take about 40 hrs. The two landers and one mooring will be recovered there, then the ship will move to Baltimore Canyon (about 7 hrs) to also retrieve two landers and one mooring. If these operations go well and if weather cooperates, there may be about two days (one day for each canyon) for additional operations (mapping, CTD). The ship will return from the canyons to Charleston.

All underway work days (excluding transit days) will be 24 hr operations and transits will be minimized. Although we will attempt to keep to the schedule below, weather, changing priorities, unexpected developments, and gear issues may dictate schedule changes which will be addressed by the Commanding Officer in consultation with the Chief Scientist and Operations Officer. As much lead time as possible will be provided in the event of such changes.

**20 August** - In port, Charleston, SC. Science crew, including chief scientist, arrives in late afternoon and loads personal gear and other gear that can be hand carried onto *Nancy Foster*. Benthic lander shipping container will be arriving at FLETC port at least by this date if not earlier and will be located on the pier for the duration of the cruise.

**21 August** - Some amount of loading may continue and the science party may need access to the shipboard crane and port fork lift for about 2 hours. All science crew should be on board and available for a welcome aboard briefing by 08:00 hr. Vessel departs Charleston around 10:00 hr and steams directly to the deep lander site in the mouth of Norfolk Canyon (**37° 02.217' N, 74° 32.020' W; 1364 m**). At normal cruising speed, this run will take about 41 hrs to cover the 411 nmi. Science crew organizes/stows gear on the way. Depending on timing and logistics, first science crew meetings will be "soon" after we are underway and after ship's drills. We should arrive on station in the early morning of 23 Aug.

**22 August** – Transit

**23 August** – Arrive at mouth of Norfolk Canyon (see above) deep NIOZ (BOBO) lander site about 0200 hrs. In the time remaining before dawn, we will conduct CTD casts. As soon as daylight is sufficient, we will locate and retrieve the benthic lander (Fig. 2) via acoustic releases. The transducer used to communicate with the releases will be deployed over the side (no special mounting required) as the ship holds station over the target area. Details of lander recovery procedures are described fully in Appendix 3. If all goes well, this operation should take less than 3 hrs. After this lander is secured on deck, ship moves about 6 nmi to the head of this canyon (**37° 03.876' N, 74° 39.119' W; 630 m**) to conduct the same operation with the second NIOZ (ALBEX, Fig. 2) lander. The two landers will be brought up first because they require the least time for deck operations. After the second lander is secure, the ship moves about 3 nmi to the middle of the canyon (**37° 02.330' N, 74° 37.158' W; 917 m**) and retrieves the USGS mooring (see Appendix 4 for details of this operation). We plan for the mooring to be on the surface when there is adequate daylight for spotting it, but the operations to secure it on deck could last into the evening.

After all gear is secured, the vessel will transit to the Baltimore Canyon seep site **(~ 38° 02.95' N, 73° 49.32' W; 400-450 m**), which is about 67 nmi distance.

**24 August** – Arrive at Baltimore Canyon seep site at about 0100 hrs and conduct CTD transect until dawn. Then move about 5 nmi to the deep UNCW lander site (**38° 02.560' N, 73° 43.942'W; 1302 m**). As soon as light is sufficient, locate and retrieve the benthic lander, same process as described above. After this lander is secured, the ship moves about 8.5 nmi to the head of this canyon (**38° 09.010' N, 73° 50.929' W; 630 m**) to conduct the same operation with the second UNCW lander.

After the second lander is secure, the ship moves about 5 nmi to the middle of the canyon (**38° 04.657' N, 73° 46.957' W; 1082 m**) and retrieves the USGS, see above.
Night ops: CTD transects in and around Baltimore Canyon, depth range of 200 to 1600 m.

**25 August** – Continue CTD transects (until about 1400 hrs) in and around Baltimore Canyon (locations TBD). Stop these operations by about 1400 hrs and transit to multibeam box 8 (Fig. 3, about 50 nmi), arriving about 1900 hrs and map until about 0700 hrs on 26 Aug, starting with the western side of the box.

**26 August** – Multibeam mapping box 8 from 0000 to about 0700 hrs. If additional time has been gained during the cruise (i.e., ahead of schedule) more time can be spent mapping this box. After mapping part of this box, transit to Norfolk Canyon (about 22 nmi), arriving about 0900 hrs, and conduct two CTD transects over the deep seep site (**~ 36° 52.3' N, 74° 28.6' W; ~ 1400 m**).

Stop ops in the early evening (about 1900 hrs) and begin transit to Charleston (~410 nmi from deep seep site). Time of steam to port should take about 41 hrs at 10 kn. Science crew packs gear and cleans vessel.

**27 August** – Transit

**28 August** – Transit. Arrive Charleston, SC by 1000 hr. Crew cleans vessel & gear, packs gear for transport, moves all gear off vessel & departs as soon as possible. Science party will need use of the shipboard crane and port forklift upon arrival into port for approximately 6 hours.

B. Staging (20 Aug) and destaging (28 Aug) – Charleston, SC (both)

C. Operations to be conducted

Landers/moorings: For operational details on benthic lander and mooring recoveries, see Appendices 3 and 4.

CTD casts: These will be conducted as needed to support multibeam sonar mapping, and for collection of hydrographic data and possibly water samples (using 5L Niskin bottles). Water samples will not be collected on every CTD cast. On full water column casts the CTD will be lowered from the surface to as near the bottom as possible. As in past cruises a monocore will be suspended under the CTD on most casts to collect a sediment sample.

Mapping: Multibeam sonar mapping in predetermined areas (see Fig. 3). This will be a limited activity. In case of failure of the multibeam system, alternative operations will be CTD transects and/or time-series of vertical CTD deployments (yo-yos).

General Specimen and Data Treatment:

All specimens collected will be used for science (or education) purposes. No specimens should be removed for personal use. Specimens will be processed as soon as practical after arriving on deck. Each specimen will be logged with station # and any other pertinent metadata. It is imperative that all sample jars/bags be properly labeled. Do not leave samples sitting unattended, unlabeled or untreated. **Collaborators taking samples to their labs for analysis must provide the chief scientist with a list of samples taken before the end of the cruise.** Fishes and invertebrates caught on this cruise will be preserved on board in 10% formalin-seawater soon after capture. M. Rhode will organize and digitize data collected by each watch, but each scientist should provide and complete their own data sheets. Science crew should familiarize themselves with the flow of data and samples. CSA will work with OER data management team to develop a data management plan for this cruise. All data will be available to the science party from CSA after the cruise. The Chief

Scientist will ensure that all data needed for at sea sample processing are available to the science party.

D. Dive Plan – Not Applicable- No diving operations will take place during this cruise.

E. Applicable Restrictions – Aside from unpredictable issues such as poor weather or equipment failure, no restrictions are anticipated. In cases of poor weather the ship can move to other stations, switch to operations that are suitable for the weather or discontinue operations if weather is severe (at the discretion of the CO). In cases of equipment failure, operations will switch to other types of gear or methods. In order to maximize flexibility we require a winch operator, technician (for CTD deployments, etc.) and sufficient deck crew available during each shift to deploy gear, if necessary.

III. **Equipment**

A. Equipment and capabilities provided by the ship

Differential GPS navigation and serial data output, NMEA format
Heading and water depth instruments with serial data output
Dynamic positioning (mostly used during lander operations)
Mid-depth multibeam echo sounder (Simrad EM1002, 95 kHz, 20- about1000 m)
Shallow water multibeam echo sounder (Reson 7125, 400 and 200 kHz, 500 m max)
Shallow/deep water single beam echo sounder (Knudsen Chirp 3200, 200 kHz and 12 kHz, 7000 m max)
Split beam echo sounder (Simrad EK60, 200, 120 and 38 kHz) – may not be used
Acoustic Doppler Current Profiler (ADCP, TRDI OS150, 150 kHz, 16-350 m)
HYPACK data acquisition and navigation software
Caris HIPS/SIPS for multibeam data processing
CTDs: SBE 911plus with 12 bottle, 5 L water sampling system; SBE 19 (2), SBE 17plus, SBE 36plus with PDIM
Additional CTD sensors: SBE 43 (DO), SBE 18 (pH), Seapoint turbidity meter, Benthos altimeter (200 kHz, < 100 m)
Freezer for water samples (normal temp range, not ultracold)
Science refrigerator
Hydro-winch for CTD
Deck cranes
Wet and dry lab spaces and storage space
Use of all science berths for science crew
Deck machinery for science gear deployment and recovery
Stern-mounted articulating (hydraulic) A-frame
Email and internet services
Networked computer printers and plotter, Scientific Computing System (SCS)
PC based workstations
Crane support for all equipment during mobilization and demobilization
Uncontaminated Seawater System: SBE 38 (SS temperature), SBE 21 (TSG), SBE 45 (Micro TSG), Seapoint fluorometer
At least one functioning laboratory hood
RM Young weather suite (wind speed/direction, temperature, relative humidity and barometric pressure)
40” wide-screen video monitor in Dry Lab for presentations, navigation, or video/data

Also sufficient consumables, backup units, and on-site spares and technical support must be in place to assure that operational interruptions are minimal. All measurement instruments are expected to have current calibrations, and all pertinent calibration information shall be included in the data package. The ship is requested to provide technical expertise and assistance in the event of unexpected problems.

B. Equipment and capabilities provided by the scientists (Refer to Appendix 5 for a complete list of science party equipment)

All chemicals and containers
Any non-ship sampling devices, with associated gear
GIS and data computer
All software and computers associated with science data management

## IV. **Hazardous Materials**

### A. Policy and Compliance

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 the anticipated quantity brought aboard, MSDS and appropriate neutralizing agents, buffers, and/or absorbents in amounts adequate to address spills of a size equal to the amount of chemical brought aboard, and a chemical hygiene plan. Documentation regarding those requirements will be provided by the Chief of Operations, Marine Operations Center, upon request.

Correct procedures for handling and neutralizing (if needed) all chemicals were provided by the Univ. of NC at Wilmington Environmental Health and Safety Department. Ethanol, isopropyl, and formalin (all clear liquids) will be used for fixing/preserving fish and invertebrate samples. Materials will be stored in appropriate original manufacturer containers on deck or in lockers and until needed. When needed, these materials will be transferred to smaller plastic containers and diluted with either DI water or seawater. These transfers will be done on deck over containment (e.g., plastic trays) to prevent spills and contamination and wearing appropriate protective clothing if needed or required. Small spills can be wiped up with an absorbent material (vermiculite) and disposed of in a proper receptacle. Large spills can be diked to facilitate cleanup and can also be absorbed with vermiculite. For formalin, a Formalex Green kit can be used to neutralize large spills. Mercuric chloride spills will be handled with a portable mercury spill kit (Lab Safety Supply). After cleanup/absorption, the area of a spill will be flushed with water. These materials are flammable and larger quantities will be stored in ship's fire-rated chemical locker or on other parts of the deck as directed by the ship. Smaller quantities (generally < 4 L) will be kept in Wet Lab available for ready use to the science party.

Safety goggles, gloves and protective clothing will be worn when handling the above listed materials. Appropriate protocols will be followed by all personnel handling these chemicals.The Chief scientist (or designated staff) have the Material Safety Data Sheets for the above chemicals, and these will be provided to the ship before departure. They will be available to the Science Party during the cruise.

For all chemicals listed below the first aid procedures are as follows:
Eyes: Immediately flush eyes with plenty of water for at least 15 minutes.
Skin: Immediately flush skin with plenty of water for at least 15 minutes.
Ingestion: Seek medical attention.

Inhalation: Remove to fresh air.
Additional information is found on the MSDS for each chemical.

Upon departure from the ship, scientific parties will provide the CO or their designee an inventory of hazardous material indicating all materials have been used or 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 scientific chemicals is not permitted during projects aboard NOAA ships.

B. Radioactive Isotopes – None Used

C. Inventory: Chemicals brought aboard and sufficient appropriate material to neutralize spills.

| **Common Name** | **Concentration** | **Amount** | **Notes** |
|---|---|---|---|
| Ethanol | 95% | 1 x 20-L drum | |
| Ethanol | 99.5% pure, 200 prf | 3 L | |
| Carboy of 70% ethanol | 70% | 5 gal | |
| Isopropanol | 99.5% | 1 x 20-L drum | |
| Formaldehyde solution | 37% | 1 x 20-L drums | |
| Formalex Green | n/a | 5 gal | formalin & other spills |
| Mercuric chloride | diluted | n/a | Comes up with landers and moorings |
| Portable Hg spill kit | n/a | 1 kit | for Hg spills |
| RNAlater | 100% | 1.5 L | |
| Sodium borate | 100% | 1.8 kg | |
| Phosphate buffer | 0.2 M | 200 ml + 5L | |

## V. **Additional Projects**

A. Supplementary ("Piggyback") Projects - None
B. NOAA Fleet Ancillary Projects - None

## VI. **Disposition of Data and Reports**

A. Data Responsibilities

Spatial data are considered a national capital asset, and to that end, the National Spatial Data Infrastructure described in Office of Management and Budget (OMB) Circular No. A-16 facilitates efficient collection, integration, sharing, and dissemination of spatial data among all levels of government institutions, academia, and the private sector.

NOAA provides specific guidance for all parties engaged in ocean data collection activities aboard NOAA ships. The NAO 216-101 establishes policies to ensure NOAA data collection activities support multiple uses of data for purposes other than what they were originally intended. The NAO 212-15, Management of Environmental Data and Information, and Public Law 111-11 (Title XII, Subtitle B), Ocean and Coastal Mapping Integration Act, both require proper stewardship of the Nation's environmental and oceanographic data.

B. Responsible Parties for Data Disposition

Data Management POCs for NF-13-09 are listed below:

1. ***CSA PM*:** Project Manager: Continental Shelf Associates (CSA) International, Steve Viada, sviada@conshelf.com
2. ***DCR*:** NOAA Data Center Representative and OER Data Management Team (DMT) Lead: Sharon Mesick, NOAA/NESDIS/NODC/NCDDC, sharon.mesick@noaa.gov
3. ***OER DMT*:** OER DMT Representative: Susan Gottfried, contractor for NOAA/NESDIS/NODC/NCDDC, susan.gottfried@noaa.gov
4. ***CS/PI:*** Chief Scientists/Principal Investigators: Steve Ross, UNC-W, rosss@uncw.edu; Sandra Brooke, FSU Coastal and Marine Lab, sbrooke@fsu.edu

C. Data Restrictions

In compliance with guidance, NOAA is responsible for making all "underway" data (digital data generated by sensor systems permanently installed on the vessel and routinely maintained by the operator (see Rolling Deck to Repository (R2R) definition at http://www.rvdata.us/about/underway) collected with public funds available to the public within one(1) year of data collection. Data documented as having homeland/national security, cultural heritage, or protected resources value shall be assigned an indefinite date for public release by the proper authorities.

For this mission (NF-13-09), no documentation has been provided to justify non release of data.

All parties for this mission have agreed on a courtesy hold of the research data (data collected during the cruise/project used by the CS/PI to conduct research and/or develop derivative products) until September 30, 2015.

D. NOAA Responsibilities

In response to NAO 216-101 Section 6.0, NOAA OER has established a broad based DMT to ensure that the provisions of the Order are followed. The OER DMT will be responsible for management of underway data.

As soon as practical and not to exceed 15 days post cruise, the vessel's Commanding Officer (CO) shall transmit the underway data to the OER DMT lead via OER provided hard-drives and a NOAA Office of Marine and Aviation Operations (OMAO) Form 61-29. The OER DMT will develop and publish ISO standard metadata for this collection, and will submit the data to the appropriate NOAA Data Centers for long term preservation and for public release in accordance with NOAA Guidance and specific restrictions.

Upon completion of metadata and after submission of the data to the appropriate NOAA Data Center, the OER DMT will return to the CO, to the CSA PM and to the mission CS/PI(s) the metadata UUID (unique identifier), the data Digital Object Identifier (DOI) if assigned, and acknowledgement of receipt from each data center.

E. Project Manager Responsibilities

OER and CSA PM have developed a joint DMP. As soon as practical and not to exceed 15 days post cruise, the CSA PM will submit a complete data inventory to OER DMT. Upon

completion of the CSA contract in September 30, 2014, CSA will submit the complete, documented data collection (inclusive of research/ ancillary project data, derived products and final cruise reports) to OER DMT, who will assume custody of the data until agreed upon public release in September 2015.

F. Science Party Responsibilities

Each scientist participating will provide the co-CS/PIs and the CSA PM with a list of collections made or data taken for their respective objectives by the end of the cruise. Video and still photo data will be archived by the co-CS/PIs and the CSA PM. UNCW will archive all original hard copy station data sheets. Individual scientists will be responsible for their own data sheets (station logs, etc.), sample analyses and reporting as required.

The CO is responsible for all data collected for ancillary projects until those data have been transferred to the co-CS/PIs and the CSA PM. Data transfers will be documented on NOAA Form 61-29. Reporting and sending copies of ancillary project data to NESDIS is the responsibility of the OER DMT in conjunction and in agreement with the CSA/PM.

The science party is responsible for the collection and organization of all data (other than shipboard underway data) relative to meeting the goals and objectives of their projects. This includes working with the appropriate ship's personnel, under direction of the CS/PI, to obtain relevant data collected by the Scientific Computer System (SCS), and compilation of metadata records associated with physical samples.

The following data products will be included in the cruise data package (recorded on appropriate media) delivered to CS/PIs and the CSA PM:

- Marine Operations Abstracts
- CTD data (on CD's or DVD's) and CTD data notebook, including CTD cast logs
- Salinity sample analysis floppy
- ADCP digital recordings
- All sonar data on appropriate media
- Multibeam digital data (raw and processed), including bathymetry (x,y,z) data as well as backscatter (reflectivity) data on CD, DVD, or hard drive
- Hard copy maps and digital geotifs of multibeam surveys
- Calibration information for ship's science instruments
- SCS data CDs
- Cruise operations spreadsheet w/ actual speed/dates made good along trackline

G. References

- Public Law 111-11 (Title XII, Subtitle B), Ocean and Coastal Mapping Integration Act http://www.nauticalcharts.noaa.gov/ocs/hsrp/archive/sept2009/2009_PL111-11_SubtitleB_OCMIA.pdf
- OMB Circular A-16, Coordination of Surveying, Mapping, and Related Spatial Data Activities http://www.whitehouse.gov/omb/circulars_a016/
- OMAO Marine Operations Center Procedure 1102-25 Shipboard Geophysical Data Stewardship http://www.ngdc.noaa.gov/mgg/aboutmgg/shipboard_gds.htmlhtm
- NAO 212-15, Management of Environmental Data and Information
  - http://www.corporateservices.noaa.gov/ames/administrative_orders/chapter_212/212-15.html
- NAO 216-101, Ocean Data Acquisitions
  http://www.corporateservices.noaa.gov/ames/administrative_orders/chapter_216/216-101.html

E. Pre and Post Cruise Meeting

Pre-Cruise Meeting: Prior to or soon after departure, the co-Chief Scientists will conduct a meeting of the scientific party to train them in cruise procedures and inform them of cruise objectives. Safety and vessel protocols (e.g., meals, watches, etiquette, etc.) will be presented by the ship's Operations Officer.

A daily safety meeting will be held at ~07:50 on the bridge to review any observed safety issues. The ship's officers, department heads and the Chief Scientist will be in attendance.

A daily science meeting will be held (tentatively 16:00 hrs) to discuss the science objectives for the following day.

Post-Cruise Meeting: Upon completion of the cruise, a meeting will be arranged and attended by the Operations Officer, the Commanding Officer and the Chief Scientist. Concerns regarding safety, efficiency, and suggestions for improvements for future cruises should be discussed.

F. Ship Operation Evaluation Report

A Ship Operation Evaluation form is to be completed by the Chief Scientist and submitted to the Office of Ocean Exploration and Research within one week of the expedition. OER will finalize and transmit the evaluation to OMAO (omao.customer.satisfaction@noaa.gov) within 7 days of the completion of the cruise. The preferred method of transmittal of this form from the Science Party is via email to John.Mcdonough@noaa.gov. If email is not an option, a hard copy may be forwarded to:

John McDonough
Acting Director, OER
1315 East West Highway
SSMC3/10th Floor/OER
Silver Spring, MD 20904

## VII. **Miscellaneous**

### A. Meals and Berthing

Meals and berthing are required for up to 15 scientists. Meals will be served 3 times daily beginning one hour before scheduled departure, extending throughout the cruise, and ending two hours after the termination of the cruise. 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 survey. At least one scientist is a vegetarian.

Berthing requirements, including number and gender of the scientific party, will be provided to the ship by the Chief Scientist. The Chief Scientist and Operations 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 cruise 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 7, 1999 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 (NOAA Form 57-10-01, Revised: 12-11) must be completed in advance by each participating scientist. The NHSQ can be obtained from the Chief Scientist or the NOAA website at http://www.corporateservices.noaa.gov/~noaaforms/eforms/nf57-10-01.pdf. The completed form should be sent to the Regional Director of Health Services at Marine Operations Center. The participant can mail, fax, or scan the form into an email using the contact information below. The NHSQ should reach the Health Services Office no later than 4 weeks
prior to the cruise to allow time for the participant to obtain and submit additional information that health services might require before clearance to sail can be granted. Please contact MOC Health Services with any questions regarding eligibility or completion of the NHSQ. Be sure to include proof of tuberculosis (TB) testing, sign and date the 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. All medical forms for members of the science party for this cruise must be sent to NOAA Health Services prior to July 19th. Forms should be directed to:
CDR Les Cruise, USPHS
Regional Director of Health Services
NOAA MOC-Atlantic
439 West York Street
Norfolk, VA 23510
Ph: 757-441-6320, Fax: 757-441-3760, Email: MOA.Health.Services@noaa.

Prior to departure, the Chief Scientist must provide an electronic listing of emergency contacts on the form provided by *Nancy Foster* to the Operations Officer for all members of the scientific party, with the following information: contact name, address, relationship to member, email and telephone number.

C. Shipboard Safety

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. The ship does not provide steel-toed boots. 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.

D. Communications

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 e-mail 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 it must be arranged at least 30 days in advance.

E. IT Security

Any computer that will be hooked into the ship's network must comply with the *NMAO 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 these 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 (FRNS) 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 NMFS Deemed Exports point of contact to assist with the process.

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

Responsibilities of the Chief Scientist:

1. Provide the Commanding Officer with the e-mail generated by the FRNS granting approval for the foreign national guest's visit. This e-mail will identify the guest's DSN and will serve as evidence that the requirements of NAO 207-12 have been complied with.
2. Escorts – NOAA may provide escorts from the *Nancy Foster* crew, if needed, 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 Regional Security Officer.
4. Export Control - *The NEFSC currently neither possesses nor utilizes 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 NMAO approval 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 the FRNS e-mail 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 cruise, 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 Regional Security Officer.

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, 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

The two foreign nationals participating in this cruise are Furu Mienis and Gerard Duineveld. Per Wendy Bradfield-Smith's email dated 16 July 2013, CO MOC Atlantic has agreed to allow *Nancy Foster* personnel to serve as proxy escort for the two FN guests for NF-13-09, Atlantic Deep-Water Canyons, 21-28 August 2013.

**Appendices**

1. Figures (Figures 1-5)
2. Station/Waypoint List (Coordinates in Latitude, Longitude: degree-minutes)
3. Lander recovery plan
4. USGS mooring recovery plan
5. Gear lists

## Appendix I: Cruise plan figures

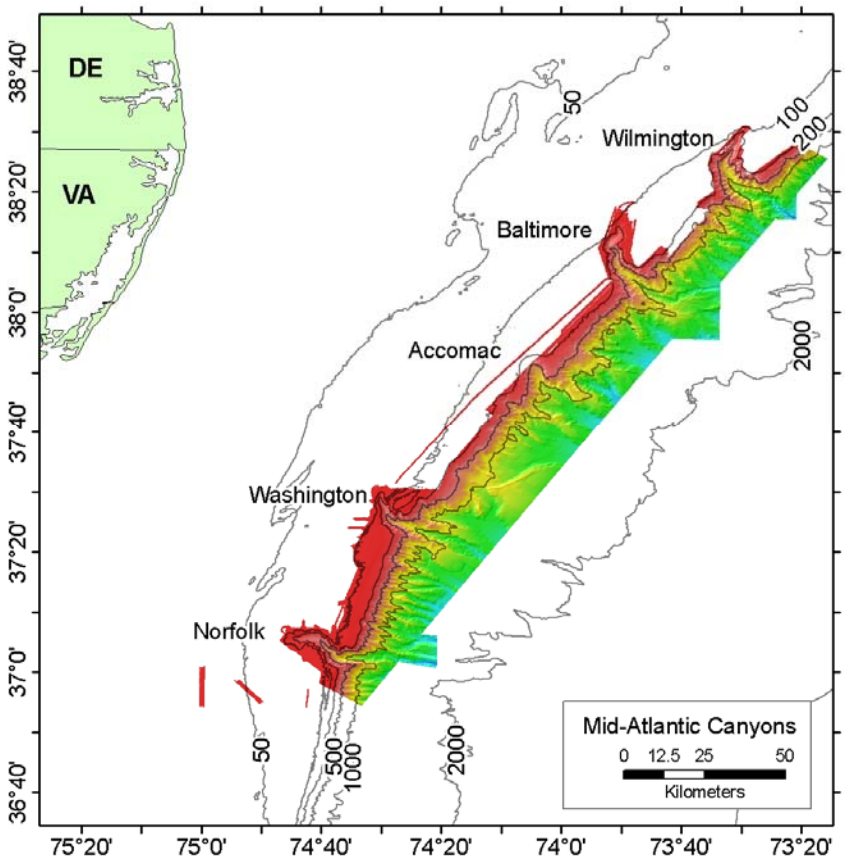



Figure 1. Major middle Atlantic study area canyons. Multibeam sonar data are represented by color shaded areas.

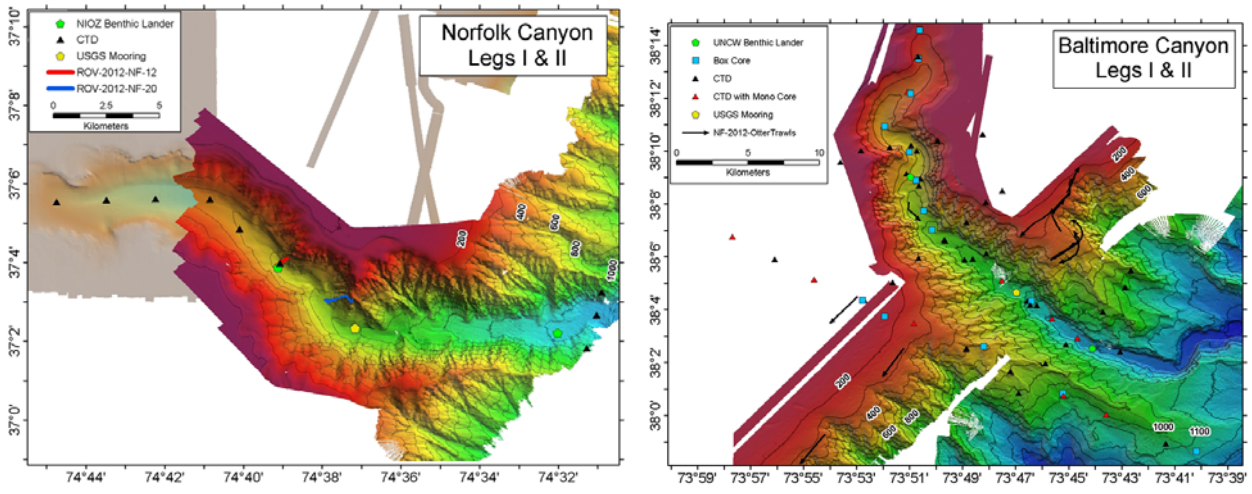
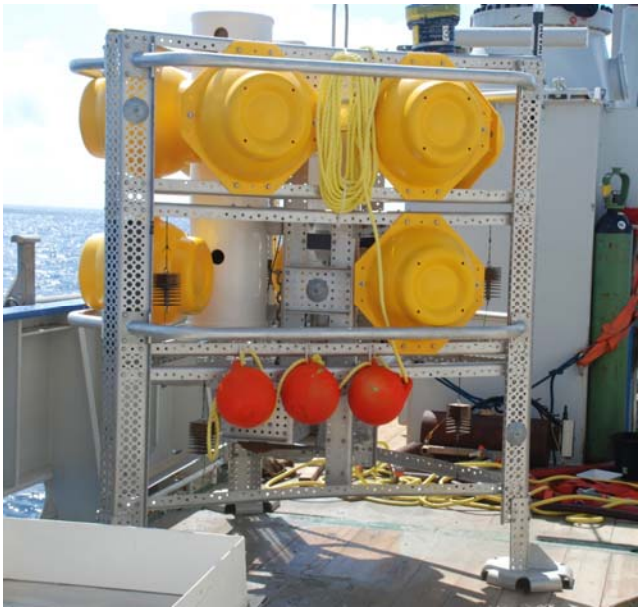



Figure 2. Maps showing lander and mooring locations in Norfolk and Baltimore canyons from the 2012 cruise. Some of the CTD transects on these maps may be repeated in this cruise if time allows.



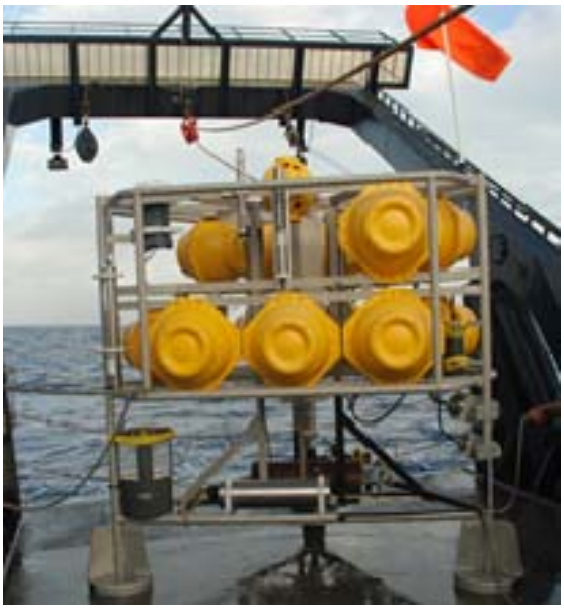


Figure 3. UNCW benthic lander (left, in air weight about 1000 lb without drop weight and about 1700 lb with drop weight; dimensions about 6 ft per side). NIOZ ALBEX lander (right, ~1200 kg [2646 lb] in air, 2.35 m wide and 2.25 m tall).

Figure 4. NIOZ monocore which will be suspended under the CTD carousel by a 10 m line. The mono-core weighs about 40 kg (= 88 lbs).

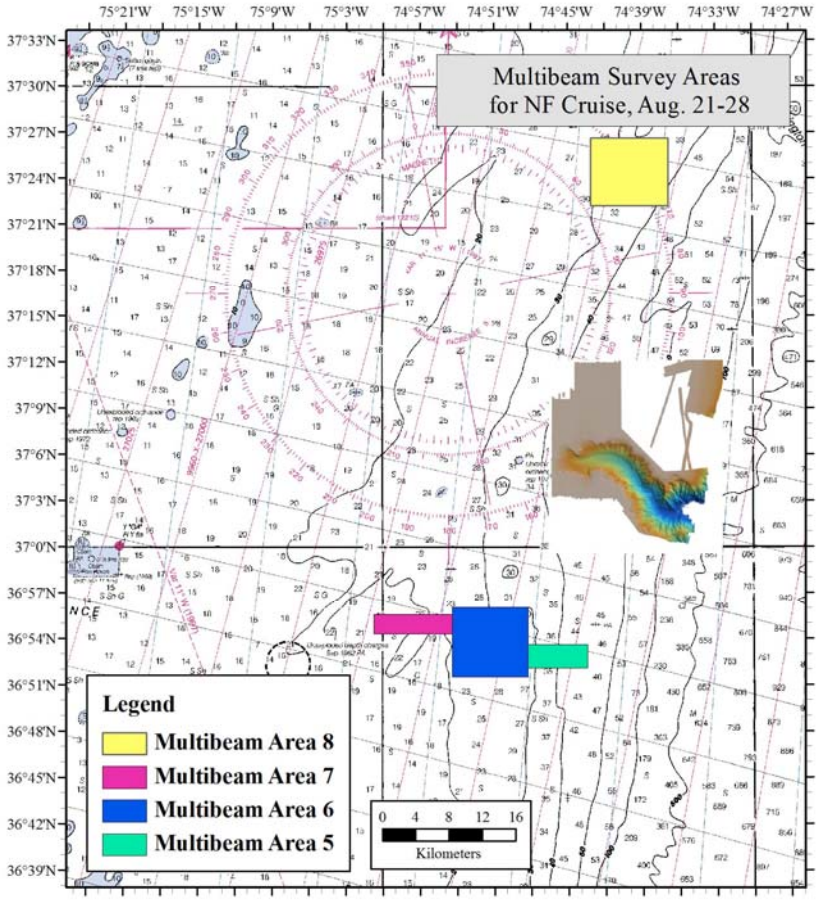



Figure 5. Polygons (above) and coordinates (below) of potential target areas to map with multibeam sonar in the Norfolk Canyon area during this cruise as time allows.

| Multibeam Survey Areas - Coordinates in Decimal Degrees | | | |
|---|---|---|---|
| Multibeam Area 5 | | Multibeam Area 6 | |
| West: | -74.805073 | West: | -74.906832 |
| East: | -74.724631 | East: | -74.80493 |
| North: | 36.894018 | North: | 36.933998 |
| South: | 36.868129 | South: | 36.858702 |
| | | | |
| Multibeam Area 7 | | Multibeam Area 8 | |
| West: | -75.012949 | West: | -74.718922 |
| East: | -74.906749 | East: | -74.614109 |
| North: | 36.926467 | North: | 37.444124 |
| South: | 36.905241 | South: | 37.370192 |

<u>Priority Ranking</u>

1 - Area 8
2 - Area 6
3 - Area 7
4 - Area 5

**Appendix 2 Station/Waypoint List**
(Coordinates in Latitude, Longitude: degree-minutes)

Multibeam polygons to be mapped are above.

Baltimore Canyon Lander and mooring sites:
UNCW#1 (deep, mouth): 38° 02.560’ N, 73° 43.942’W; 1302 m
Mooring (mid-canyon): 38° 04.657’ N, 73° 46.957’ W; 1082 m
UNCW#2 (shallow, head): 38° 09.010’ N, 73° 50.929’ W; 630 m

Norfolk Canyon Lander and mooring sites:
BOBO (deep, mouth): 37° 02.217’ N, 74° 32.020’ W; 1364 m
Mooring (mid-canyon): 37° 02.330’ N, 74° 37.158’ W; 917 m
ALBEX (shallow, head): 37° 03.876’ N, 74° 39.119’ W; 630 m

CTD transect stations (as time allows)
Stations will be renamed chronologically at sea as needed. Additional stations or transects will be added as time allows.

| Gear | Longitude | Latitude | Longitude | Latitude | Station |
|---|---|---|---|---|---|
| Baltimore seep | | | | | |
| CTD | -73 49.803 | 38 02.940 | -73.8301 | 38.049 | A |
| CTD | -73 49.632 | 38 02.940 | -73.8272 | 38.049 | B |
| CTD | -73 49.461 | 38 02.940 | -73.8244 | 38.049 | C |
| CTD | -73 49.290 | 38 02.940 | -73.8215 | 38.049 | D |
| CTD | -73 49.120 | 38 02.940 | -73.8187 | 38.049 | E |
| CTD | -73 48.949 | 38 02.940 | -73.8158 | 38.049 | F |
| CTD | -73 48.776 | 38 02.940 | -73.8129 | 38.049 | G |
| Norfolk deep seep | | | | | |
| CTD | -74 30.817 | 36 53.097 | -74.5136 | 36.88495 | H |
| CTD | -74 30.238 | 36 52.802 | -74.504 | 36.88003 | I |
| CTD | -74 29.614 | 36 52.502 | -74.4936 | 36.87503 | J |
| CTD | -74 29.029 | 36 52.240 | -74.4838 | 36.87067 | K |
| CTD | -74 28.462 | 36 51.952 | -74.4744 | 36.86587 | L |
| CTD | -74 27.890 | 36 51.669 | -74.4648 | 36.86115 | M |
| CTD | -74 27.317 | 36 51.386 | -74.4553 | 36.85643 | N |
| CTD | -74 30.775 | 36 51.397 | -74.5129 | 36.85662 | O |
| CTD | -74 30.191 | 36 51.681 | -74.5032 | 36.86135 | P |
| CTD | -74 29.613 | 36 51.964 | -74.4936 | 36.86607 | Q |
| CTD | -74 28.474 | 36 52.519 | -74.4746 | 36.87532 | R |
| CTD | -74 27.901 | 36 52.814 | -74.465 | 36.88023 | S |
| CTD | -74 27.341 | 36 53.121 | -74.4557 | 36.88535 | T |

**Appendix** 3
LANDER-MOORING RECOVERY PLAN, AUGUST 2013

All gear recovery will be scheduled so that gear arrives on the surface during daylight hours.
All landers will be recovered in essentially the same way as follows:

Vessel remains stationary over or near lander site (see Table).
Hydrophone is lowered and contact with one or both lander acoustic releases is established.
Acoustic releases are triggered to drop the lander weight, and lander should begin ascent.
All hands stand by to watch for lander to surface. Once the lander is spotted, recovery could extend into hours of darkness, if needed.
Vessel moves near to the lander and begins retrieval. This procedure will vary due to vessel equipment and deck operations preferences, and weather. The landers are self-contained units, and the only trailing attachment is a buoy line on the top of the lander, either 75 or 150 ft. long. Generally the ship would grapple the lander or its buoy line and bring it on board using either a crane or the aft A-frame. Once the lander is secured on deck, the vessel moves to the next pick-up location.

The two moorings will be recovered in much the same way except that they are linear strings of gear (see Appendix 4 for details).

Proposed schedule: Gear recovery should start in Norfolk Canyon followed by gear recovery in Baltimore Canyon. In each canyon, the ship would pick up one of the landers (starting with the deepest lander), then transit to the second lander in that canyon and retrieve it. After retrieval of the second lander, the ship moves to mid-canyon to retrieve the mooring. The moorings will take longer than landers to bring on deck, so would either be brought to the surface in daylight with retrieval continuing into darkness, or be recovered the following day. It is approximately a seven hour steam between canyons, and this would be done at night, if possible. At least four days should be allowed for the entire recovery process.

Deployment data for four benthic landers and two moorings in Norfolk (stations 3, 5, 8) and Baltimore (stations 12, 31, 32) canyons during *Nancy Foster* cruise NF-12-07.

| Station | Gear | Date Out | Lat | Long | Depth (m) |
|---|---|---|---|---|---|
| NF-2012-003 | BOBO Lander | 17-Aug-12 | 37° 02.217’ | 74° 32.020’ | 1364 |
| NF-2012-005 | Mooring | 17-Aug-12 | 37° 02.330’ | 74° 37.158’ | 917 |
| NF-2012-008 | ALBEX Lander | 17-Aug-12 | 37° 03.876’ | 74° 39.119’ | 630 |
| NF-2012-012 | Mooring | 18-Aug-12 | 38° 04.657’ | 73° 46.957’ | 1082 |
| NF-2012-131 | UNCW Lander* | 05-Sep-12 | 38° 02.560’ | 73° 43.942’ | 1302 |
| NF-2012-132 | UNCW Lander* | 06-Sep-12 | 38° 09.010’ | 73° 50.929’ | 630 |

*The two UNCW landers were recovered, serviced and redeployed during the May 2013 canyons cruise. Positions above are the new, current lander locations.

**Appendix 4**
**USGS mooring recovery plan**

BOEM Honjo Moorings, Norfolk and Baltimore canyons, Recovery Plan

Minimum ship requirements

600 sq. Feet of deck space for storage and work space
Stern A-Frame with 12 feet deck clearance at stern
Trawl winch with access to the stern A-Frame, for recovery, ¼" to ½" wire is fine or
Crane with reach over stern or aft quarter
If using the A-Frame, rig with Fatboy Block before leaving dock.

As can be seen by the drawing (below), this is a fairly simple mooring and recovery should be straight forward. It is anticipated that the Top Float and the top two strings of 5 Glass Balls will be visible on the surface. The two instrument packages (ADCP and Microcat) and Honjo should be suspended underneath and upright.

Upon reaching the mooring location, it is important to first establish contact with the mooring and confirm it is upright and communicating. If the mooring is OK, next triangulate its location and allow the ship to establish current and drift directions. Once moorings location is established, position ship 200 to 300 meters upstream from mooring and rig for recovery.

Once permission has been obtained from the bridge for release, inform all active parties and send release command. The bridge should be able to provide an anticipated direction and distance to look for floats. Once floats are on the surface, ship can now maneuver downstream and set up approach to floats.

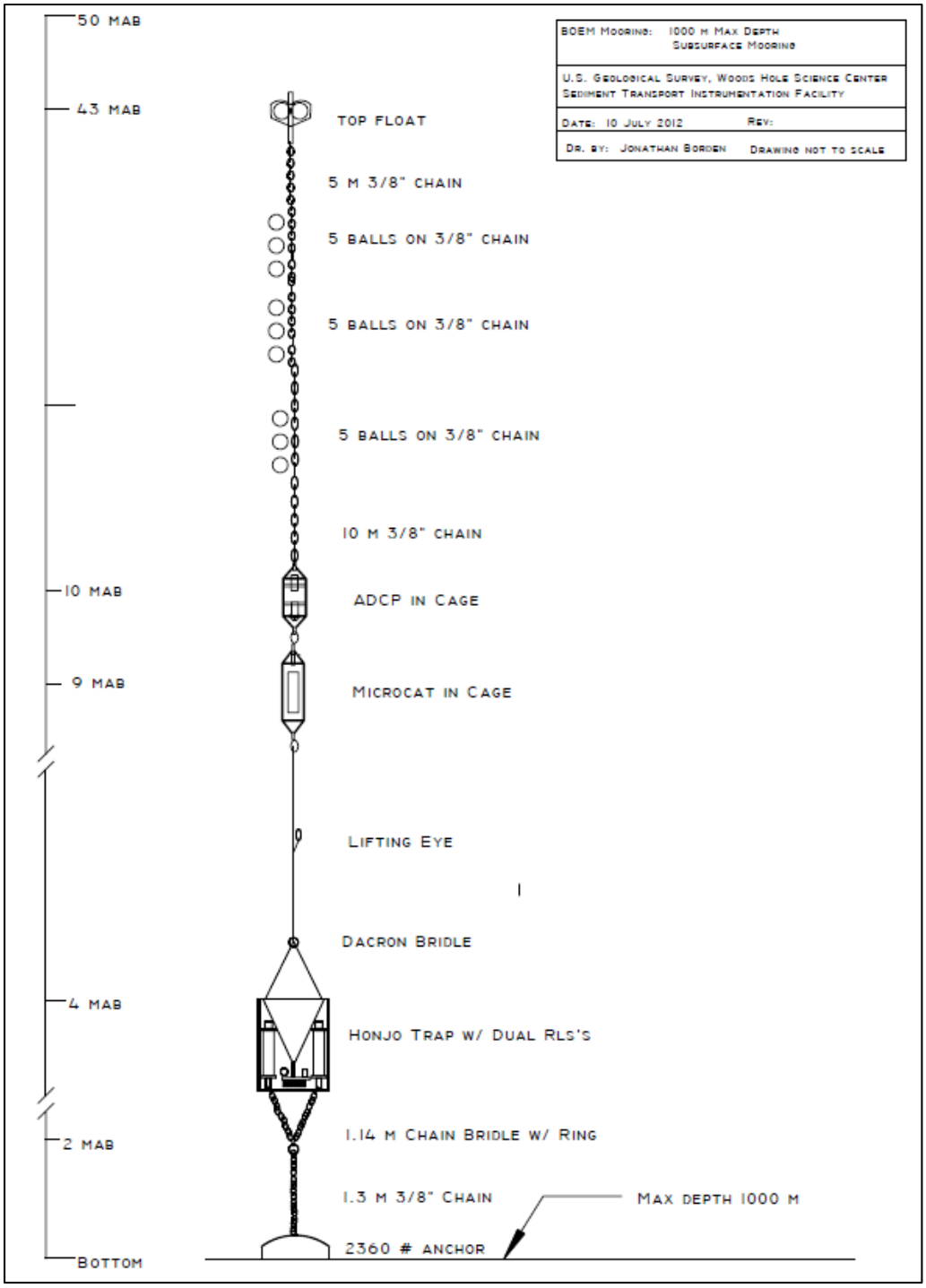
The working side will have been established, typically Starboard, but either is fine. If using the A-Frame, trawl wire is brought around to working side and rigged to pick up pole. The Top Float will be brought down the w.s. and trawl wire attached. Ship should be moving at barely forward speed and mooring allowed to stream astern. Once ship is clear and mooring has more or less positioned itself astern, stop forward movement (if possible, otherwise as little as possible). We want to avoid towing the Honjo sediment trap.

Start recovery immediately. Top float and 5 Glass Ball strings are recovered in piecemeal fashion, pick, stopper, remove, pick, stopper etc. Once the instrument cages have been reached, the Honjo should be hanging directly below and care must be taken to keep it below the stern until it can be recovered in one final pick.

A crane recovery would be essentially the same just over the aft quarter and the ship alee. Though a crane recovery would require a fairly calm sea.

If ship's crew is running machinery, then a science crew of 4 should be sufficient. If ship's crew is not available for all machinery, then sufficient bodies will need to be provided.

Since a drag operation is a fairly complex operation, and even in the best of times a canyon drag is an iffy proposition, I would not recommend such an attempt in the case of the mooring failing to release.


BOEM Mooring: 1000 m Max Depth Subsurface Mooring
U.S. Geological Survey, Woods Hole Science Center Sediment Transport Instrumentation Facility
Date: 10 July 2012
Rev:
Dr. by: Jonathan Borden
Drawing not to scale
50 mab
43 mab
10 mab
9 mab
4 mab
2 mab
Bottom
Top float
5 m 3/8" chain
5 balls on 3/8" chain
5 balls on 3/8" chain
5 balls on 3/8" chain
10 m 3/8" chain
ADCP in cage
Microcat in cage
Lifting Eye
Dacron Bridle
Honjo Trap w/ Dual RLS's
1.14 m Chain Bridle w/ Ring
1.3 m 3/8" Chain
2360 # anchor
Max depth 1000 m

## Appendix 5: Gear Lists

| Gear | Bringing | Total Wt (lbs) | Notes |
|---|---|---|---|
| | | | |
| UNCW Landers: | | 1970 | Each lander weighs 985 lbs w/all instruments, no drop wt. |
| Frame | 2 | | 6'8" (triangle base) x 7' (h), will be loaded on sites |
| Acoustic transceiver deck unit & transducer | 1 | 50 | |
| NIOZ landers & core: | | | |
| ALBEX lander & gear | 1 | 2,000 | About 2,000 lbs, no drop wt. |
| BOBO lander & gear | 1 | 2,000 | |
| Transceiver & transducer | 1 | 50 | |
| Monocore | 1 | 88 | 40 kg |
| | | | |
| USGS Mooring/Trap | | | |
| Wire cages of glass balls | 4 | 2800 | USGS bringing (upon recovery); 4' (l) x3'5" (w) x3' (h), 700 lbs each |
| Honjo traps | 2 | 600 | USGS bringing (upon recovery); 3' (dia.) x 5' (h), 300 lbs each |
| Deck box | 1 | 700 | USGS bringing; 3'11" (l) x 2'6" (w) x 2'8" (h) |
| Fish box | 1 | 500 | USGS bringing; 4' (l) x 3'8" (w) x 2'7" (h) |
| Release box | 1 | 150 | USGS bringing; 4'2" (l) x 1' (w) x 1'1" (h) |
| Floats | 2 | 72 | USGS bringing (upon recovery); 4'2" (dia.)x4'7" (h), 36 lbs each |
| | | | |
| Misc. deck, fishing, repair gear: | | | |
| Large blue gear tub | 1 | 100 | 3'8" (l) x 4' (w) x 3' (h), 50 lbs each |
| Seacatch retrieving hook | 2 | | |
| Duct tape | 4 | | |
| Electrical tape | 8 | | |
| Gorilla Tape | 1 | | |
| Work gloves | X | | 1 small, 3 medium |
| Cable ties (assorted sizes) | X | | 4"x100, 8"x322, 11"x74, 14"x53, 24"x28, 36"x20 |
| Wire cutters | 3 | | Various sizes |
| WD-40 | 6 | | |
| Socket wrench and sockets | X | | |
| Rubber mallet | 1 | | |
| Screwdrivers | X | | 7 flat, 8 phillips, 3 star bit |
| Wrenches | X | | Set of sockets, 1- adj. wrench |
| Loctite thread locker | X | | |
| Allen wrenches | 13 | | Various sizes |
| Utility knife & blades | X | | w/5 blades |
| Pliers | 10 | | Needle-nose, groove joint & slip joint |
| Tape measure | 1 | | |
| Hack saw and blades | 1 | | |
| | | | |
| Safety gear: | | | |

| | | | |
|---|---|---|---|
| Foul weather gear | 2 | | 1 pr extra pants |
| Hard hats | 1 | | |
| Work vest (w/strobes) | 1 | | |
| Plastic aprons | 1 | | |
| Respirators | 1 | | |
| Goggles | 1 | | |
| Rubber gloves-heavy duty | 1 | | |
| Rubber gloves-latex/nitrile | 1 | | large |
| | | | |
| Chemicals/Chemical Clean-Up: | | | |
| Ethanol-95% (20 L drum) | 1 | 20 | S. Ross |
| Ethanol-95% (4 L bottle) | 1 | | A. Demopolous |
| Ethanol-99.5% pure 200 proof (40L) | 1 | | A. Demopolous |
| Isopropanol-99.5% (20 L drum) | 1 | | S. Ross |
| Vermiculite | X | | S. Ross; alcohol, RNAlater, and acetone clean up |
| Formaldehyde solution-37% (20 L drum) | 1 | 20 | S. Ross |
| Formaldehyde solution-37% (12 L drum) | 1 | | A. Demopolous |
| Formalex green (5gallon) | 1 | | S. Ross; formaldehyde clean up |
| Mercuric chloride-100% | n/a | | Comes up with landers & moorings |
| Mercury (Hg) spill kit | 1 | | S. Ross; mercury clean up |
| RNAlater-100% (1.5 L) | 1 | | C. Kellogg |
| Sodium borate-100% | 1.8 kg | | A. Demopolous |
| Large carboy of 70% ethanol (5 gallon) | 1 | 20 | S. Ross |
| | | | |
| Containers: | | | |
| Large carboy for 10% formaldehyde (6 gal) | 1 | | |
| Nalgene-½ gallon | | | |
| Nalgene-1000 ml | | | |
| Nalgene-500ml | | | |
| Nalgene-250 ml | | | |
| Nalgene-125 ml | | | |
| Squirt bottle | | | 1-500 ml, 1-250 ml |
| Glass jar-16 oz | | | |
| Glass jar-4 oz | | | |
| | | | |
| Misc lab gear: | | | |
| Small plastic sorting tray | 1 | | |
| Syringes (10cc & 60cc) | X | | 3-60cc, 4-10cc, 13 needles |
| Cheesecloth | 1 roll | | Have more |
| Ziploc bags | X | | 111 gal, 150 qt, 144 sandwich, 38 snack, 525 small |
| Buckets w/gamma lids (5 gal) | 2 | | not including gear buckets |
| Sawtooth 1.5 gal buckets | 2 | | |
| Funnels (assorted sizes) | 1 | | |
| Large dissecting scissor | 1 | | |
| Small dissecting scissor | 1 | | |
| | | | |
| Data/record keeping/office gear: | | | |

| | | | |
|---|---|---|---|
| Charts and maps | | | |
| Pencils (regular and mechanical) | | | |
| Pencil sharpener, electric & manual | | | |
| Pens & Sharpies & highlighters | | | |
| Forms/data sheets | | | |
| Labels | | | |
| Resist-all paper | | | |
| Xerox paper | | | |
| Paper clips | | | |
| Rubber bands | | | |
| Stapler & staples | | | |
| Scotch tape | | | |
| Erasers | | | |
| Calculator | | | |
| Clip boards | 2 | | |
| 3-ring binders | 1 | | |
| 3-hole punch | | | |
| Sticky pads | | | |
| | | | |
| Electronics: | | | |
| Pentium PC computer | 1 | | In office |
| APC battery backup | 1 | | |
| External HD | 1 | | |
| Flash drive | 1 | | |
| Keyspan (serial to USB) | 1 | | 1 with Seabird 39, 1 with Seabird 19 |
| Instrument software | X | | In office |