



**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 Robert Kamphaus, NOAA  
Commanding Officer, NOAA Ship *Okeanos Explorer*

FROM: Captain David A. Score, NOAA  
Commanding Officer, NOAA Marine Operations Center-Atlantic

SUBJECT: Project Instruction for EX-12-02  
Gulf of Mexico Exploration, Legs 2 and 3

Attached is the final Project Instruction for EX-12-02, GoM Exploration Legs 2 and 3, which is scheduled aboard NOAA Ship *Okeanos Explorer* during the period of 19 March - 29 April 2012. Acknowledge receipt of these instructions via e-mail to [OpsMgr.MOA@noaa.gov](mailto:OpsMgr.MOA@noaa.gov) at Marine Operations Center-Atlantic.

Attachment

cc:  
MOA1





**NOAA OFFICE OF OCEAN EXPLORATION AND RESEARCH**

**FINAL Project Instructions**

**Date Submitted:** March 09, 2012

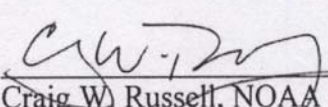
**Platform:** NOAA Ship *Okeanos Explorer*

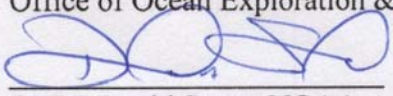
**Cruise Number:** EX-12-02 Leg II and Leg III

**Project Title:** Gulf of Mexico Exploration

**Cruise Dates:** Leg II (ROV, mapping/CTD ops) March 19 - April 07, 2012  
Leg III (ROV, mapping/CTD ops) April 11 - April 29, 2012

Prepared by: Jeremy Potter, Expedition Manager  
Kelley Elliott, Leg III Expedition Coordinator  
Office of Ocean Exploration & Research

Approved by:  Dated: 3/9/12  
Craig W. Russell, NOAA  
Program Manager  
Office of Ocean Exploration & Research

Approved by:  Dated: 3/12/12  
CAPT David Score, NOAA  
Commanding Officer  
Marine Operations Center – Atlantic

## I. OVERVIEW

### A. Cruise Period

This document contains project instructions for EX1202 Legs II and III of NOAA Ship *Okeanos Explorer's* (EX) exploration of the northern Gulf of Mexico. EX1202 Leg II operations will commence on March 19, 2012 from Tampa, FL and conclude on April 7, 2012 in Pascagoula, MS. EX1202 Leg III operations will begin on April 11, 2012 in Pascagoula, MS and conclude on April 29, 2012 in Galveston, TX. Combined, 24-hour multibeam mapping, remotely operated vehicle (ROV) and CTD/rosette operations will be conducted during both cruise legs, and will include telepresence and shore-side participation.

### B. Operating Area

The operating area is the northern region of the Gulf of Mexico. Operations will focus on 1) DeSoto, Mississippi, and Green Canyon areas; 2) areas in the vicinity of the Deepwater Horizon site; and 3) the West Florida Shelf Break and Slope. Mapping and ROV operations will focus in depths  $>500$  m. All operations including transit will be conducted entirely within the 200nm exclusive economic zone (EEZ) maritime boundary of the United States of America.

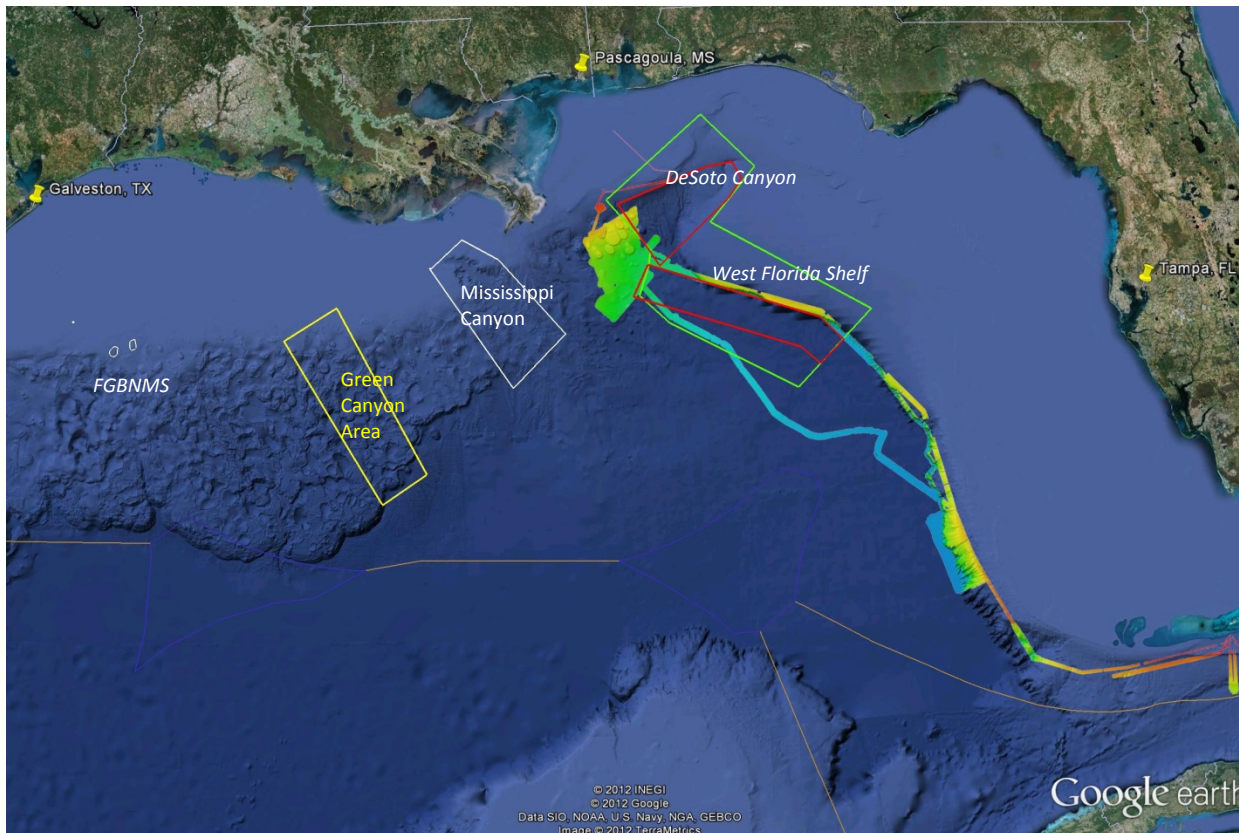


Figure 1: Google earth map showing general priority areas for 2012 operations. Partial mapping was completed in red boxes during EX1202 Leg I. The Green Canyon area (yellow

box) is a priority area for testing the multibeam system’s ability to detect gaseous seeps. The red, yellow, and Mississippi Canyon boxes will be explored during Legs II and III. Other Leg II and III targets are expected in areas surveyed in the fall of 2011 by the Okeanos Explorer in the vicinity of the Deepwater Horizon site (see existing bathymetry in this figure) and deepwater areas near the Flower Garden Banks National Marine Sanctuary (FGBNMS). National 200nm EEZ boundaries are shown in blue and brown at the bottom of the image. Image created in Google Earth.

<b>Exploration area coordinates</b>			
<b>Longitude</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Latitude</b>
<b>Green Polygon</b>			
-88.3145	29.15689	-85.5064	27.95821
-87.8598	28.65632	-87.1912	28.88899
-87.8912	28.5023	-86.6647	29.40115
-88.0088	28.22295	-87.2225	29.93578
-87.7007	27.94604	-88.3145	29.15689
-86.3576	27.25536		
<b>White Polygon (Mississippi Canyon)</b>			
-89.4180	27.3981	-90.2541	28.5812
-88.8277	27.8947	-90.2664	28.5822
-89.5191	28.6354	-90.2787	28.5831
-89.9119	28.8422	-89.4180	27.3981
<b>Yellow Polygon (Green Canyon)</b>			
-90.8777	26.3281	-91.903	27.9321
-90.3870	26.6068	-90.8777	26.3281
-91.3102	28.2344		

Table 1: Exploration area coordinates. Refer to Figure 1. Boundaries are approximate; exploration activities can occur outside these boxes.

The choice of mapping areas was synthesized from OER/Ocean Exploration Advisory Working Group (OEAWG) Atlantic Basin workshop results (held in May 2011). The workshop identified high priority target areas for exploration (Figure 2). OER received additional input from participating Bureau of Ocean Energy Management (BOEM) and University of New Hampshire (UNH) scientists.

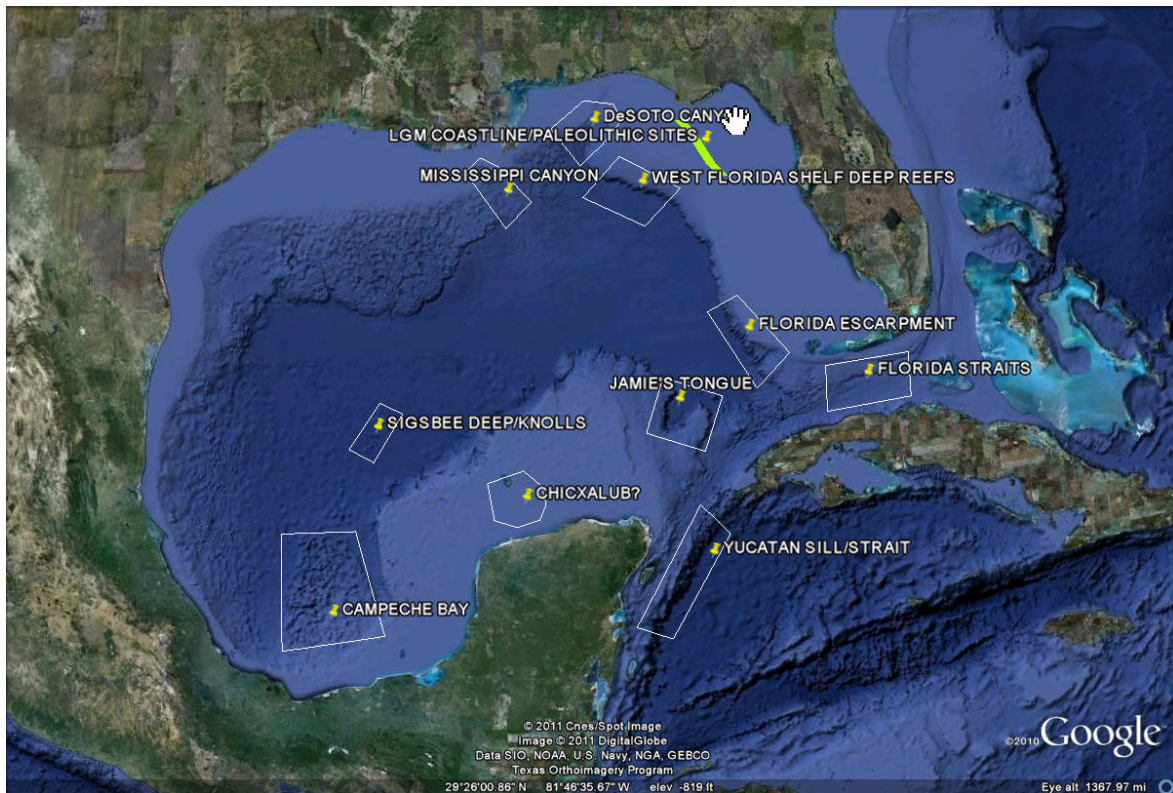


Figure 2: Priority exploration targets identified during Atlantic basin workshop held in May 2011. Image created in Google Earth.

Sites in the southern part of the Gulf of Mexico (Figure 2) were excluded from consideration for EX1202 as they are primarily outside the US EEZ and the time frame for this cruise was considered too short to pursue any foreign clearances / permits.

EX1202 efforts are complementary to previous OER and partner efforts in the northern Gulf of Mexico (e.g. Gulf of Mexico Exploration 2002-05; Deep Sea Medicines, Gulf of Mexico Habitats, U-166 2003; WWII Shipwreck Survey 2004; Operation Deep Scope 2004-05; Expedition to the Deep Slope 2006-07; Lophelia II 2008-12).

### C. Summary of Objectives

#### **Leg II: MAR 19– APR 7 (Tampa to Pascagoula) Mapping, ROV, and Telepresence**

Primary operations are expected to include areas off the West Florida Shelf, around DeSoto Canyon, vicinity of the Deepwater Horizon site and Mississippi Canyon. Daily schedule will usually be split between daytime ROV operations (<4000m) and nightly multibeam surveys. Night operations may include occasional CTD casts. Limited activities to prepare for Leg III water-column experiments are expected

#### **Leg III: APR 11– APR 29 (Pascagoula to Galveston) Mapping, ROV, and Telepresence**

The initial portion of Leg III will focus on water-column flux experiments using the ROV to

ground-truth acoustic data. The length of time for this work is to-be-determined but is expected to take at least several days. Primary areas of operations include the vicinity of the Deepwater Horizon site, Mississippi Canyon and Green Canyon. Deepwater areas in the vicinity of the Flower Garden Banks are likely. The daily schedule will usually be split between daytime ROV operations (<4000m) and nightly multibeam surveys. Night operations may include occasional CTD casts.

Mission objectives for EX1202 Legs II and III include a combination of operational, science, education, outreach and data management objectives. They are:

1. Science
  - A. Identify and explore the diversity of benthic habitats in the region (e.g. seeps, deep corals, canyons);
  - B. Locate and characterize underwater cultural heritage (UCH), e.g. shipwrecks (data will be used to assess their eligibility for the National Register of Historic Places);
  - C. Expand tests of acoustic methods to detect gas seeps and measure flux (see Appendix C); and
  - D. Improve capabilities to explore the water column.
  
2. ROV
  - A. Daytime ROV dives on exploration targets;
  - B. Experiment with the ROV's ability to ground-truth acoustic seep data (see Appendix C);
  - C. Ongoing training of pilots; and
  - D. Ongoing system familiarization and training.
  
3. Telepresence (VSAT 20 mb/sec ship to shore; T1 shore to ship)
  - A. Turn on and test terrestrial and high-speed satellite links;
  - B. Test and refine ship-to-shore operations and communications with what OER plans to be a new Exploration Command Center (ECC) at Stennis Space Center;
  - C. Test and refine ship-to-shore communications and operations procedures that engage multiple ECCs during the course of each cruise;
  - D. Test and refine operating procedures and products;
  - E. Engage a broad spectrum of the scientific community and public in telepresence-based exploration; and
  - F. Expand use of the 'Doctors-on-Call' model.
  
4. Stennis Exploration Command Center
  - A. Tests at the Stennis Space Center ECC, expected to be operational during legs II and III; and
  - B. Prepare for and assess expectation of sporadic participation from multiple ECCs. For example, we expect science participation from ECCs in Silver Spring and UNH to 'blink' on and off depending upon daily objectives of the expedition; and

- C. Test and assess capability of delegating Science Team Lead for ROV operations to shore. For example, dives associated with Maritime Archaeology targets may be a good opportunity to test this; and
  - D. Train scientists on how to use online collaboration tools and technologies to conduct remote science; refine SOPs; and
  - E. Ongoing system familiarization and training.
5. Mapping Operations
    - A. Acquire water-column data with EK 60 and EM 302;
    - B. Acquire sub-bottom data as appropriate/required;
    - C. Conduct mapping operations during transit, with possible further development of exploration targets; and
    - D. Conduct training of new mapping interns and watchstanders.
  6. Collect data from ancillary sonar systems as permitted by staffing / operational paradigm
    - A. EK60 single beam; and
    - B. Knudsen sub-bottom profiler
  7. CTD operations
    - A. Conduct CTD/rosette casts as needed to guide science operations; and
    - B. Collection of water samples is being considered pending appropriate staff availability.
  8. XBT operations
    - A. During mapping operations, XBT casts will be collected at regular intervals of 2-4 hours or more often as data quality requires.
  9. Data Management
    - A. Provide a foundation of publicly accessible data and information products to spur further exploration, research, and management activities, as detailed in the 2012 post-cruise product list; and
    - B. Provide daily cumulative multibeam products to shore for operational decision making purposes, as detailed in the 2012 field products list; and
    - C. Test data pipeline for daily transfer of raw sonar data to shore; and
    - D. Test data pipeline for daily transfer of high definition video to shore.

#### **D. Participating Institutions**

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

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

**E. Personnel (Science Party)**

Leg II: MAR 19– APR 7 (Tampa to Pascagoula) Mapping, ROV, and Telepresence

	NAME	AFFILIATION	ROLE	M/F	NATIONALITY
1	Jeremy Potter	OER	Expedition Coordinator	M	US Citizen
2	Tim Shank	WHOI	Science Team Lead	M	US Citizen
3	Pen Hsing	Penn State	Scientist	M	FNG-Taiwan
4	Dave Lovalvo	OER	ROV Ops Manager	M	US Citizen
5	Elizabeth “Meme” Lobecker	OER	Mapping Team Lead	F	US Citizen
6	Webb Pinner	OER	Telepresence Lead	M	US Citizen
7	Dave Wright	UCAR	ROV Pilot/Co-pilot	M	US Citizen
8	Jeff Williams	UCAR	ROV Pilot/Co-pilot	M	US Citizen
9	Bob Mohr	UCAR	ROV Technician/ Engineer	M	US Citizen
10	Karl McLetchie	UCAR	ROV Technician/ Engineer	M	US Citizen
11	Tom Kok	UCAR	ROV Intern Technician/Engineer	M	US Citizen
12	LTJG Brian Kennedy?	UCAR	ROV Navigator	M	US Citizen
13	Roland Brian	UCAR	ROV Video Engineer	M	US Citizen
14	Art Howard	UCAR	ROV Video Engineer	M	US Citizen
15	Ed McNichol	UCAR	ROV Video Engineer	M	US Citizen
16	Gregg Diffendale	UCAR	Video/Data Engineer	M	US Citizen
17	Christopher Pinero	UCAR	Mapping Watch Lead	M	US Citizen
18	Tara Smithee	UCAR	Mapping Watch Stander	F	US Citizen
19	TBD		Mapping Watch Stander		
20	John Doroba	OMAO Augmenter	Survey Technician	M	US Citizen

**Table 1:** Full list of the science party and their affiliation



**Shore-side Participants (Location and duration of participation will vary):**

<b>ECC</b>	<b>NAME</b>	<b>AFFILIATION</b>	<b>ROLE</b>	<b>NATION</b>	<b>REGION OF INTEREST</b>	<b>LEVEL PARTICIPATION</b>
Stennis	Brendan Reser	OER	Stennis Support	US Citizen	N/A	Core
Stennis	TBD		Web Coordinator		N/A	Core
Stennis	Chuck Fisher	Penn State	Biologist	US Citizen	DWH	Partial/On-Call
Stennis	Jack Irion	BOEM	Archaeologist	US Citizen	Marine Archaeology	Partial/On-Call
Stennis	Amanda Evans	Tesla Offshore	Archaeologist	US	MA	Partial/On-Call
UNH	Larry Mayer	UNH	Geologist/Geophysicist	US Citizen	DWH	On-Call
UNH	Tom Weber	UNH	Geologist/Geophysicist	US Citizen	DWH	On-Call
URI	Catalina Martinez	OER	RI Regional Manager	US Citizen	N/A	Core
URI	LTjg Brian Kennedy?	OER	Operations Support	US Citizen	N/A	As needed
URI	Dwight Coleman	URI/ISC	Technical support	US Citizen	N/A	Core
URI	Bob Sand	URI/ISC	Technical support		N/A	As needed
URI	Bob Knott	URI/ISC	Technical support		N/A	As needed
SS	Mike Vecchione	NOAA	Biologist	US Citizen	Mid-water	Partial/On-Call
SS	Bob Haddad	NOAA	ORR Manager	US Citizen	DWH	Partial Observer
SS	Topher Lewis	NOAA	NRDA Contractor	US Citizen	DWH	Partial Observer
SS	Evelyn Nackman	NOAA	NRDA Lawyer	US Citizen	DWH	Partial Observer
SS	Frank	Cantelas	NOAA	US Citizen	Marine Archaeology	Partial/On-Call
SS	Jim	Delgado	NOAA	US Citizen	Marine Archaeology	Partial/On-Call

*Table 2 Continued on next page.*

Table 2 continue...

REMOTE	NAME	AFFILIATION	ROLE	NATION	REGION OF INTEREST	LEVEL PARTICIPATION
WHOI	Santiago Herrera	WHOI	Biologist/Grad Student	FNG-Columbia		Core
WHOI	Cat Munro	WHOI	Biologist/Grad Student	US Citizen		Core
WHOI	Taylor Heyl	WHOI	Biologist/Grad Student	US Citizen		Core
Temple	Erik Cordes	Temple	Biologist	US	DeSoto, DWH, Mississippi	Partial
UNC-W	Steve Ross	UNC-W	Biologist	US	West FL Slope	Partial
FAU	Shirley Pomponi	FAU	Biologist	US		Partial
FAU	John Reed	FAU	Biologist	US		On-Call
TBD	Dan Warren	C&C Technologies	Archaeologist	US Citizen	Marine Archaeology	Partial/On-Call
TBD	Kim Faulk	Geoscience Earth and Marine Services	Archaeologist	US Citizen	Marine Archaeology	Partial/On-Call
UT	Jamie Austin	Univ. Texas-Austin	Geologist/Geophysicist	US		Core
UT	John Goff	Univ. Texas-Austin	Geologist/Geophysicist	US		?
UT	Mead Allison	Univ. Texas-Austin	Geologist	US		?
UT	Sean Gulick	Univ. Texas-Austin	Geologist/Geophysicist	US		?
LSU	Bob Carney	LSU	Biologist	US	Green Canyon	
LSU	Harry Roberts	LSU	Geologist/Geophysicist	US	Green Canyon	
BOEM	Bill Shedd	BOEM	Geologist/Geophysicist	US	DWH	
?	Sarah Fangman	NOAA/ONM		US		
?	Emma Hickerson	NOAA/ONM				
?	Bill Kiene	NOAA/ONM				
?	Marissa Nuttall	NOAA/ONM				

**Table 2:** List of the shore-side program and science participants to be based at ECC's during Leg II. An individual's location and level of participation is likely to change during the expedition. Not all will participate for the entire duration of the cruise. 'Remote' refers to non-ECC shore-side locations where we expect some robust participation.

**Leg III: APR 11– APR 29 (Pascagoula to Galveston) Mapping, ROV, and Telepresence**

	<b>Name</b>	<b>Affiliation</b>	<b>Position</b>	<b>M/F</b>	<b>Status</b>
1	Kelley Elliott	OER	Expedition Coordinator	F	US Citizen
2	TBD		Senior Scientist		
3	TBD		Scientist		
4	Dave Lovalvo	OER	ROV Team Lead	M	US Citizen
5	Adam Skarke	OER	Mapping Team Lead	M	US Citizen
6	Webb Pinner	OER	Telepresence Lead	M	US Citizen
7	Dave Wright	UCAR	ROV Pilot/Co-pilot	M	US Citizen
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14	Art Howard	UCAR	ROV Video Engineer	M	US Citizen
15	Ed McNichol	UCAR	ROV Video Engineer	M	US Citizen
16	Gregg Diffendale	UCAR	Video/Data Engineer	M	US Citizen
17	Brian Brinckman	UCAR	Video Engineer	M	US Citizen
18	TBD		Senior Survey Technician		
19	TBD		Mapping Intern/ Watch Stander		

*Table 3: Full list of the science party and their affiliation*

**Shore-side Participants (Location and duration of participation will vary):**

<b>ECC</b>	<b>NAME</b>	<b>AFFILIATION</b>	<b>ROLE</b>	<b>NATION</b>	<b>REGION OF INTEREST</b>	<b>LEVEL OF PARTICIPATION</b>
Stennis	Jeremy Potter	OER	Shore-side ECC Coordinator	US Citizen		Core
Stennis	Brendan Reser	OER				Core
Stennis	TBD		Web Coordinator			Core
Stennis	Chuck Fisher	Penn State	Biologist	US Citizen	DWH	Partial/On-Call
Stennis	Jack Irion	BOEM	Archaeologist	US Citizen	MA	Core/On-Call
Stennis	Amanda Evans	Tesla Offshore	Archaeologist	US	MA	Partial/On-Call
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SS	Jim	Delgado	NOAA	US Citizen	Marine Archaeology	Partial/On-Call

*Table 4 Continued on next page.*

*Table 4 Continue...*

REMOTE	NAME	AFFILIATION	ROLE	NATION	REGION OF INTEREST	LEVEL PARTICIPATION
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WHOI	Cat Munro	WHOI	Biologist/Grad Student	US Citizen		Core
WHOI	Taylor Heyl	WHOI	Biologist/Grad Student	US Citizen		Core
Temple	Erik Cordes	Temple	Biologist	US	DeSoto, DWH, Mississippi	Partial
UNC-W	Steve Ross	UNC-W	Biologist	US	West FL Slope	Partial
FAU	Shirley Pomponi	FAU	Biologist	US		Partial
FAU	John Reed	FAU	Biologist	US		On-Call
??	Dan Warren	C&C Technologies	Archaeologist	US Citizen	Marine Archaeology	Partial/On-Call
??	Kim Faulk	Geoscience Earth and Marine Services	Archaeologist	US Citizen	Marine Archaeology	Partial/On-Call
T	Jamie Austin	Univ. Texas-Austin	Geologist/Geophysicist	US		Core
UT	John Goff	Univ. Texas-Austin	Geologist/Geophysicist	US		?
UT	Mead Allison	Univ. Texas-Austin	Geologist	US		?
UT	Sean Gulick	Univ. Texas-Austin	Geologist/Geophysicist	US		?
LSU	Bob Carney	LSU	Biologist	US	Green Canyon	
LSU	Harry Roberts	LSU	Geologist/Geophysicist	US	Green Canyon	
BOEM	Bill Shedd	BOEM	Geologist/Geophysicist	US	DWH	
?	Sarah Fangman	NOAA/ONMS		US		
?	Emma Hickerson	NOAA/ONMS				
?	Bill Kiene	NOAA/ONMS				
?	Marissa Nuttall	NOAA/ONMS				

**Table 4:** List of the shore-side program and science participants to be based at ECC's during Leg II. An individual's location and level of participation is likely to change during the expedition. Not all will participate for the entire duration of the cruise. 'Remote' refers to locations non-ECC shore-side locations where we expect some robust participation.

## F. Administrative

Key Points of Contact:

*Ship Operations*

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### *Mission Operations*

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### *Other Mission Contacts*

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Catalina Martinez, Regional Manager  
NOAA Office of Ocean Exploration & Research  
Phone: (401) 874-6250 (o) / (401) 330-9662 (c)  
Email: [Catalina.Martinez@noaa.gov](mailto:Catalina.Martinez@noaa.gov)

## Shipments

Shipments to the ship for her inport in Tampa, FL should be addressed to:

NOAA Ship *Okeanos Explorer*  
c/o Flight Ops: LT Daniels / LTJG Nick Morgan  
7917 Hangar Loop Drive, Hangar 5  
MacDill AFB FL, 33621

Please send an e-mail with package (size and quantity) and tracking information to LT Megan Nadeau at [Ops.Explorer@noaa.gov](mailto:Ops.Explorer@noaa.gov)

Shipping information for the inport periods in Pascagoula, MS and Galveston, TX are pending.

### G. Diplomatic Clearances

***NOT APPLICABLE TO THIS CRUISE***

### H. Licenses and Permits

See Appendix D for categorical exclusion documentation

## II. OPERATIONS

**A. Cruise Plan Itinerary** (*All times and dates are subject to prevailing conditions and the discretion of the commanding officer*)

### **Leg II: MAR 19– APR 7 (Tampa to Pascagoula) Mapping, ROV, and Telepresence**

Primary operations are expected to include areas off the West Florida Shelf, around DeSoto Canyon, vicinity of the Deepwater Horizon site and Mississippi Canyon. Daily schedule will usually be split between daytime ROV operations (<4000m) and nightly multibeam surveys. Night operations may include occasional CTD casts. Limited activities to prepare for Leg III water-column experiments are expected

Date	Operations	Remarks
3/12	Telepresence/VSAT Turn up and Test Operations Begin	Pending VSAT bandwidth and terrestrial link established.
03/15/12 - 03/17/12	Mission party arrives on the ship	
03/19/12	Ship transits from Tampa, FL to working grounds	Acquire data during transit
03/20 – 03/23	Conduct operations in vicinity	May include wreck sites.

	of the West Florida Slope	First ROV dive expected on 03/20.
03/24- 03/28	Conduct operations in and around the DeSoto Canyon	May include wreck sites
03/29 – 04/02	Conduct operations in and around the Mississippi Canyon	May include wreck sites
04/03- 04/06	Conduct operations in the vicinity of the deepwater horizon site	May include wreck sites
*04/03/12	Conduct operations at deep sea coral location  <i>~2-hr early ROV launch may be requested</i>	~30min Telepresence event with 5 <sup>th</sup> International Symposium: Deep Corals 2012 in the Netherlands. I2 connection at conference venue unlikely. 6-hr time difference with ship.
*04/06/12	Following ROV dive, depart working grounds and transit toward Pascagoula, MS	Acquire data during transit
04/07/12	Arrive Pascagoula, MS	
04/07-04/09/12	De-staging	

*Table 5: Approximate schedule of Leg II operations.*

**Leg III: APR 11– APR 29 (Pascagoula to Galveston) Mapping, ROV, and Telepresence**

The initial portion of Leg III will focus on flux experiments using the ROV to ground-truth acoustic data. The length of time for this work is to-be-determined but is expected to take at least several days. Primary areas of operations include the vicinity of the Deepwater Horizon site, Mississippi Canyon, Green Canyon. Deepwater areas in the vicinity of the Flower Garden Banks are likely. Daily schedule will usually be split between daytime ROV operations (<4000m) and nightly multibeam surveys. Night operations may include occasional CTD casts.

Date	Operations	Remarks
04/09/12	Mission party arrives on the ship	
04/11/12	Ship transits from Pascagoula, MS to working grounds	Acquire data during transit
04/11/12 – 04/18/12	Conduct flux experiment in DeSoto canyon/Deepwater Horizon area	This will take several days. Telepresence connectivity with UNH ECC expected.
04/19/12 – 04/24/12	Conduct operations in and	May include wreck sites



	around the Mississippi and Green Canyon areas	
04/25 – 04/28	Conduct operations west of Green Canyon area, and in deepwater areas south of FGBNMS	May include wreck sites
04/28 - 04/29/12	Transit to Galveston, TX	
04/29/12	Arrive Galveston, TX	
04/29 - 05/01 /12	De-staging	

**Table 6:** Approximate schedule of Leg III operations. Note that the two-year anniversary of the deep-water horizon event will occur during Leg 3

### **B. Telepresence Events**

Live telepresence events with VIP/media availability at the Silver Spring and Stennis Space Center ECC are likely. Live feeds would be streamed to shore, and someone on the ship may speak to shore-side participants from the control room.

### **C. In-Port Events**

No port events are anticipated at this time

### **D. Staging and Destaging**

***NOT APPLICABLE TO THIS CRUISE***

### **E. Sonar Operations**

#### *Mapping Operations*

EM 302 and EK 60 data acquisition are planned for this cruise. The mapping team will ensure that all the standard protocols as laid out in the commanding officer and mapping lead directives will be followed for efficient and safe mapping operations round the clock.

The Knudsen sub-bottom profiler has been synchronized with the EM 302 but round the clock operations are not anticipated due to excessive noise within the living quarters. As a compromise, it is anticipated that Knudsen sub-bottom profiler will be operated during day times to minimize impact of excessive noise on the crew. The final decision to operate and collect sub-bottom profiler data will be at the discretion of commanding officer.

### **F. Dive Plan**

***NOT APPLICABLE TO THIS CRUISE***

## **G. Applicable Restrictions**

***NOT APPLICABLE TO THIS CRUISE***

### **III. EQUIPMENT**

#### **A. Equipment and capabilities provided by the ship**

- Kongsberg Simrad EM302 Multibeam Echosounder (MBES)
- Kongsberg Simrad EA600 Deepwater Echosounder
- Knudsen Chirp 3260 Sub-bottom profiler (SBP)
- LHM Sippican XBT (various probes)
- Seabird SBE 911Plus CTD
- Light Scattering Sensor (LSS)
- Oxidation – Reduction Potential (ORP)
- Dissolved Oxygen (DO) sensor
- Altimeter Sensor and battery pack
- Seabird SBE 32 Carousel and 24 2.5 L Niskin Bottles
- 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
- Cruise Information Management System (CIMS)
- VSAT High-Speed link (20mbps ship to shore; T1 shore to ship)
- *Little Hercules* ROV
- *Seirios* Camera Platform

#### **B. Equipment and capabilities provided by the scientists**

- Optical quality acrylic cylinder (tentative)
- Broad-band hydrophone (with autonomous signal conditioning and data recording package), 2000m rated (tentative)

### **IV. HAZARDOUS MATERIALS**

## **A. Policy and Compliance**

The Expedition Coordinator is responsible for complying with MOCDOC 15, Fleet Environmental Compliance #07, Hazardous Material and Hazardous Waste Management Requirements for Visiting Scientists, released July 2002. Documentation regarding those requirements will be provided by the Chief of Operations, Marine Operations Center, upon request.

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. The amount of hazardous material arriving and leaving the vessel shall be accounted for by the Expedition Coordinator.

## **B. Radioactive Isotopes**

*NOT APPLICABLE TO THIS CRUISE*

## **C. Inventory**

*NOT APPLICABLE TO THIS CRUISE*

# **V. ADDITIONAL PROJECTS**

## **A. Supplementary Projects**

Feasibility Testing of Additional Water Column Exploration Capabilities - Seep Flux Measurement Experiment (Appendix C)

**Objective:** Develop a methodology/protocol for developing a seep flux measurement using: a) acoustic backscatter collected with the EM302 multibeam echosounder and EK60 single beam echosounder, and b) groundtruth data (bubble size, discharge rate, flux rate, gas composition) collected with the ROV.

**General strategy (suggested):** Acoustically map seeps 1-2 days in advance to identify a seep(s) of interest. Repeat acoustic measurement immediately prior and immediately following the ROV mission (one short transect each).

Please see Appendix C for more information.

## **B. NOAA Fleet Ancillary Projects**

*NOT APPLICABLE TO THIS CRUISE*

## VI. DISPOSITION OF DATA AND REPORTS

### A. Data Responsibilities

All data acquired on *Okeanos Explorer* will be provided to the public archives without proprietary rights. All data management activities shall be executed in accordance with NAO 212-15, Management of Environmental and Geospatial Data and Information [[http://www.corporateservices.noaa.gov/ames/NAOs/Chap\\_212/naos\\_212\\_15.html](http://www.corporateservices.noaa.gov/ames/NAOs/Chap_212/naos_212_15.html)].

#### *Ship Responsibilities*

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.

#### *NOAA OER Responsibilities*

The Expedition Coordinator will work with the *Okeanos Explorer* Operations Officer to ensure data pipeline protocols are followed for final archive of all data acquired on the EX without proprietary rights.

#### *Deliverables*

- a. At sea
  - Daily plans of the Day (POD)
  - Daily situation reports (SITREPS)
  - Daily summary bathymetry data files
  - ROV tracklines
  - Raw video clips from ROV dives, onboard cameras
  - Still image frame grabs from underwater video; topside still images
  - Daily “eventlog” files, including hourly updates detailing ongoing ship operations
  - Regular cruise logs providing the context of a given day at sea or at an ECC
- b. Post cruise
  - Refined SOPs for all pertinent operational activities
  - Assessments of all activities
- c. Science
  - Multibeam and XBT raw and processed data (see Appendix B for the formal cruise data management plan)
  - ROV dive site maps
  - ROV dive summaries
  - CTD/rosette operation summaries
  - HD footage archived of the NOAA Central Library
  - Video products
  - Highlight images with descriptive captions

- Raw CTD data
- Quick Look Report
- Mapping data report
- Cruise Report

#### *Archive*

- The Program and ship will work together to ensure documentation and stewardship of acquired data sets in accordance with NAO 212-15. The Cruise Information Management System is the primary tool used to accomplish this activity.

### **B. Pre and Post Cruise Meeting**

#### *Pre-Cruise Meeting*

Prior to departure, the Operation's Officer will conduct a meeting of the scientific party to inform them of cruise objectives and vessel protocols, e.g., meals, watches, etiquette, etc.

#### *Post-Cruise Meeting*

Upon completion of the cruise, a meeting will be held by the Operation's Officer and attended by the ship's Survey Technicians, the Expedition Coordinator and members of the scientific party to review the cruise. Concerns regarding safety, efficiency, and suggestions for improvements for future cruises should be discussed.

#### *Shipboard Meetings*

Daily Operations Briefing meetings will be held at 1530 in the forward lounge to review the current day, and define operations, associated requirements and staffing needs for the following day. A Plan of the Day (POD) will be posted each evening for the next day in specified locations throughout the ship. A safety brief and overview of POD will occur on the Bridge each morning at 0800. Daily Situation Reports (SITREPS) will be posted as well and shared daily through e-mail and/or the EX PLONE site ( <http://tethys.gso.uri.edu/OkeanosExplorerPortal> ).

### **C. Ship Operation Evaluation Report**

Within seven days of the completion of the cruise, a Ship Operation Evaluation form is to be completed by the Expedition Coordinator and lead scientist. The preferred method of transmittal of this form is via email to [OMAO.Customer.Satisfaction@noaa.gov](mailto:OMAO.Customer.Satisfaction@noaa.gov). If email is not an option, a hard copy may be forwarded to:

Director, NOAA Marine and Aviation Operations  
 NOAA Office of Marine and Aviation Operations  
 8403 Colesville Road, Suite 500

## **VII. MISCELLANEOUS**

### **A. Meals and Berthing**

Meals and berthing are required for up to 19 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 twenty-one days prior to the survey (e.g., Expedition Coordinator is allergic to fin fish). Berthing requirements, including number and gender of the scientific party, will be provided to the ship by the Expedition Coordinator. The Expedition Coordinator 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 Expedition Coordinator 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 Expedition Coordinator 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 Expedition Coordinator will ensure that all non NOAA or non Federal scientists aboard also have proper orders. It is the responsibility of the Expedition Coordinator 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 (NHSQ, Revised: 08/08) must be completed in advance by each participating scientist. The NHSQ can be obtained from the Expedition Coordinator or the NOAA website at [NOAA HEALTH SERVICES QUESTIONNAIRE](http://www.oma.noaa.gov/medical/NHSQ_Final_wi_Instructions_fill.pdf) found at [http://www.oma.noaa.gov/medical/NHSQ\\_Final\\_wi\\_Instructions\\_fill.pdf](http://www.oma.noaa.gov/medical/NHSQ_Final_wi_Instructions_fill.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. Clearances are valid for 2 years for personnel under age 50 and 1 year for age 50 and over. All PPD's expire after one year from the date of administration. The participant will receive an email notice when medically cleared to sail if a legible email address is provided on the NHSQ.

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  
E-mail: [MOA.Health.Services@noaa.gov](mailto:MOA.Health.Services@noaa.gov)

Please make sure the [medicalexplorer@noaa.gov](mailto:medicalexplorer@noaa.gov) email address is cc'd on all medical correspondence.

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.

Emergency contact form is included as Appendix A.

### **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. Steel-toed shoes are required to participate in any work dealing with suspended loads, including CTD deployments and recovery. The ship does not provide steel-toed boots. Hard hats are also 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.

Operational Risk Management: For every operation to be conducted aboard the ship (NOAA-wide initiative), risk management procedures will be followed. For each operation, risks will be identified and assessed for probability and severity. Risk mitigation strategies / measures will be investigated and implemented where possible. After mitigation, the residual risk will have to be assessed to make Go-No Go decisions for the operations. Particularly with new operations, risk

assessment will be ongoing and updated as necessary. This does not only apply to over-the-side operations, but to everyday tasks aboard the vessel that pose risk to personnel and property.

- CTD, ROV (and other pertinent) ORM documents will be followed by all personnel working on board the EX.
- All personnel on board are in the position of calling a halt to operations/activities in the event of a safety concern.

#### **D. Communications**

A daily situation report (SITREP) on operations prepared by the Expedition Coordinator will be relayed to the program office. Sometimes it is necessary for the Expedition Coordinator to communicate with another vessel, aircraft, or shore facility. Through various modes of communication, the ship is able to maintain contact with the Marine Operations Center on an as needed basis. These methods will be made available to the Expedition Coordinator upon request, in order to conduct official business. 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.

Specific information on how to contact the NOAA Ship *Okeanos Explorer* and all other fleet vessels can be found at: <http://www.moc.noaa.gov/phone.htm>

#### **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](mailto: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:

EX Cellular: (401) 378-7947

EX Iridium: (808) 659-9179

OER Mission Iridium (dry lab): (808) 851-3827

EX INMARSAT B



Line 1: 011-872-764-852-328  
Line 2: 011-872-764-852-329

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

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

[expeditioncoordinator.explorer@noaa.gov](mailto: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 NMAO Fleet IT Security Policy 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**

*Request for Foreign national Guest access to NOAA Ship Okeanos Explorer for scientists that might sail has been submitted to Yolanda Cooper. Approval is pending.*

All foreign national access to the vessel shall be in accordance with [NAO 207-12](#) and [RADM De Bow's March 16, 2006 memo](#).

The following are basic requirements. Full compliance with [NAO 207-12](#) is required.

Responsibilities of the Expedition Coordinator:

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 – The Expedition Coordinator 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. Ensure all non-foreign national members of the scientific party receive the briefing on Espionage Indicators ([NAO 207-12](#)) at least annually or as required by the servicing Regional Security Officer.
3. Export Control - The NEFSC currently neither possesses nor utilizes technologies that are subject to Export Administration Regulations (EAR).

The Commanding Officer and the Expedition Coordinator 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 Expedition Coordinator 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 Expedition Coordinator 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 Expedition Coordinator of any OMAO-sponsored foreign nationals that will be onboard while program equipment is aboard so that the Expedition Coordinator can take steps to prevent unlicensed export of Program controlled technology. The Commanding Officer and the Expedition Coordinator 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](#)) 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 the Certification of Conditions and Responsibilities for a Foreign National Guest as required by [NAO 207-12](#) Section 5.03.h.

Appendix A

**EMERGENCY DATA SHEET  
NOAA OKEANOS EXPLORER**

PRINT CLEARLY

**NAME:** \_\_\_\_\_  
(Last, First, Middle)

Mailing Address \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
(Other than the ship address)

Phone (Home) \_\_\_\_\_

(Cell) \_\_\_\_\_

Date of Birth \_\_\_\_\_

Emergency Contact: \_\_\_\_\_  
(Name and Relationship)

Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Phone (Home) \_\_\_\_\_

(Work) \_\_\_\_\_

(Cell) \_\_\_\_\_

Email: \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_

## **Appendix B: EX 1202 Leg II & Leg III Data Management Plan**

All data collected during this expedition is expected to be archived at the National Geophysical Data Center (NGDC) in accordance with the NOAA / OER data management protocols specific to Legs 2 and 3 of the EX-12-02 mission entitled “Gulf of Mexico Exploration.” For more detailed information on the data management effort for the Okeanos Explorer in FY12, please refer to that document.

### **SECTION A**

#### **General Description of the Data to be Managed**

- Name of Dataset
  - “EX1202 Legs II & III: Gulf of Mexico Exploration”
- Mission Specific Keywords:
  - Tampa
  - Desoto Canyon
  - Mississippi Canyon
  - Green Canyon
  - West Florida Shelf Break
  - West Florida Shelf Slope
  - West Florida Shelf
  - Deepwater Horizon
  - Flower Garden Banks
  - National Marine Sanctuary
  - Pascagoula
  - Galveston
  - Water-column flux
  - Ground-truth acoustic
  - Gas seeps
  - Deep corals
- Summary description:
  - During Legs II and III of the *Okeanos Explorer (EX)* mission EX1202, the vessel will perform ROV, CTD, and mapping operations in the northeastern region of the Gulf of Mexico around DeSoto, Mississippi, and Green Canyons.
  - Data management procedures are fully documented in the data management plan for the Okeanos Explorer for the FY12 field season (EX\_FY12\_DMP.pdf)
- Temporal Bounds:
  - Leg II: March 19, 2012 – April 7, 2012
  - Leg III: April 11, 2012 – April 29, 2012
- Spatial Bounds:
  - Legs II and III:
    - Northern – 30
    - Southern – 26
    - Western – -92
    - Eastern – -85

- Data Type Collections for Preservation/Stewardship:
  - Multibeam Bathymetry – continuous collection during the entire duration of the expedition
  - Bottom Backscatter – continuous collection during the entire duration of the expedition
  - Water Column Backscatter – continuous collection during the entire duration of the expedition
  - Scientific Computing System (SCS) output – continuous collection of navigational, meteorological, integrated oceanographic sensor data
  - XBT – continuous casts approx. 2-4 hours apart collecting water temperature at depth for sound velocity calculations
  - CTD – test casts with Rosette firings collecting conductivity, temperature, depth and water samples at targeted depths
  - Knudsen CHIRP 3260 –sub-bottom profiler data as deemed appropriate by the ship
  - EK60 – single beam sonar for water column features during the entire duration of the expedition
  - Low and medium-resolution video clips
  - Video framegrabs
- Data Product/Product Collections for Preservation/Stewardship:
  - Gridded bathymetry (.txt)
  - Gridded bathymetric image (.tif)
  - Fledermaus gridded bathymetry imagery (.sd)
  - Fledermaus gridded backscatter imagery (.sd)
  - Google Earth gridded bathymetry (.kml)
  - ArcView gridded bathymetry (.asc)
  - SCS data output in NetCDF
  - CTD data output in NetCDF
  - Final Mapping Summary document
  - Final Cruise Summary document
  - Dive Planning Reports
  - Dive Summary Reports
  - ROV Tracklines
  - Dive Trailers
  - Highlight Images
  - Cruise Summary Report
- Volume of Data Expected
  - Approximately 150 GB of data is expected to be collected on this mission.
- Personally Identifiable Information (PII) concerns
  - No PII will be included in these data.

### **Points of Contact**

- Overall Point of Contact (POC) for the data:
  - Data Acquisition: Jeremy Potter ([Jeremy.Potter@noaa.gov](mailto:Jeremy.Potter@noaa.gov))
  - Data Management: Susan Gottfried ([Susan.Gottfried@noaa.gov](mailto:Susan.Gottfried@noaa.gov))

- Responsible for Data Quality:
  - Seafloor mapping and water column data: Elizabeth Lobecker
  - SCS data: Office of Marine and Aviation Operations (OMAO): LT Megan Nadeau, Okeanos Explorer Operations Officer ([Ops.Explorer@noaa.gov](mailto:Ops.Explorer@noaa.gov))
  - Imagery and Video data: Webb Pinner ([Webb.Pinner@noaa.gov](mailto:Webb.Pinner@noaa.gov))
  - Video products: Jeremy Potter
- Responsible for data documentation and metadata activities:
  - National Coastal Data Development Center (NCDDC); Susan Gottfried, OER Data Management Coordinator
- Responsible for the data storage and data disaster recovery activities:
  - NOAA National Data Centers; National Oceanographic Data Center (NODC), National Geophysical Data Center (NGDC), NOAA Central Library (NCL)
- Responsible for ensuring adherence to this data management plan, including resources are made available to implement the DMP:
  - Data Acquisition: Jeremy Potter, OER, Expedition Manager
  - Data Acquisition: Lt. Megan Nadeau, OMAO, Okeanos Explorer Operations Officer
  - Video data: Webb Pinner, OER, Okeanos Explorer Systems Architect
  - Data Management: Susan Gottfried, OER Data Management Coordinator

### **Data Stewardship**

- 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 and converted to a variety of products.
  - Data from sensors monitored through the SCS are archived in their native format and are not quality controlled.
  - Data from the unmanned vehicles are archived in their native format and are not quality controlled.
- What is the overall lifecycle of the data from collection or acquisition to making it available to customer?
  - All data from this mission is expected to be archived and accessible within 60-90 days post-mission.
  - METOC data from the SCS are converted in a post-mission model into archive-ready compressed NetCDF3 format and stored within the NODC/NCDDC THREDDS open-access server.

### **Data Documentation**

- An ISO format metadata record to document the mission will be generated during pre-cruise planning and published in an OER catalog for public discovery and access. Data collections and products will be documented with ISO, FGDC CSDGM, or MARC metadata and published at the appropriate NOAA Data Center.
- ISO 19115-2 Geographic Information with Extensions for Imagery and Gridded Data will be the metadata standard employed.

## **Data Sharing**

- All data recorded, observed, generated or otherwise produced on the Okeanos Explorer are considered non-proprietary and will be made available to the public as soon as possible after a period of due diligence in performing quality assurance and data documentation procedures. Special consideration will be made to data availability in the case where submerged cultural resources are targeted or inadvertently discovered.

## **Initial Data Storage and Protection**

- Data are recorded and stored on NOAA shipboard systems compliant with NOAA IT procedures. Data are moved from ship to shore using a variety of standard, documented data custody transfer procedures. Data are transferred to NOAA data centers using digital and physical data transfer models depending upon data volume.

## **Long-Term Archiving and Preservation**

- Data from this mission will be preserved and stewarded through the NOAA National Data Centers. Refer to the Okeanos Explorer FY12 Data Management Plan (EX\_FY12\_DMP.pdf) for detailed descriptions of the processes, procedures, and partners involved in this collaborative process. Section B has an excerpt from EX\_FY12\_DMP.pdf that illustrates the data and product pipelines that will be employed for this mission.

## **Data Management Objectives**

The DMT's objectives for this mission are:

- Provide personnel to man the potential ECC at Stennis Space Center; provide escort for Foreign Nationals, if necessary.
- Develop ISO collection-level and dataset-level metadata records for multibeam, singlebeam sonar, and sub-bottom profiler data.
- Develop ISO metadata for individual survey track lines.
- Develop ISO metadata for multibeam survey products.
- Develop FGDC metadata for XBT, CTD, and METOC data.
- Develop FGDC metadata for each video clip, both medium and low-resolution.
- Develop MARC metadata for each ROV dive operation video collection.
- Develop MARC metadata for each ROV dive operation image collection.
- Develop MARC metadata for each video or image product and for each report or summary generated.
- The Expedition Coordinator will be notified to direct someone onboard to copy all SCS, EK60, CTD, XBT, and multimedia data (native, low, and medium resolutions) to hard-drive supplied by the data management team to bring back for post-processing.
- Ensure the near real-time update of the *Okeanos Atlas* with
  - Ship track and hourly observations received via email.
  - Daily logs pulled from URI through RSS feeds and links to related images on oceanexplorer.noaa.gov website.



- CTD cast locations with thinned profiles to be compared to the World Ocean Atlas historical profiles for the general location and month.
- Daily cumulative bathymetric image overlays received via URI SRS.
- ROV tracklines with representative image, if available
- Execute multibeam, oceanographic, and video data pipelines according to the FY12 DMP (EX\_FY12\_DMP.pdf).

### **Expedition Principals for Data Management**

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### **SECTION B: Data and Product Pipelines (excerpt from EX\_FY12\_DMP.pdf)**

#### *Oceanographic/Meteorological/Navigational Data Archive Pipeline*

Data from hull-mounted and off-board oceanographic and meteorological (METOC) sensors; integrated oceanographic sensors from the submersibles; and navigational instrumentation on both the vessel and its submersibles are monitored through the ship's Scientific Computer System (SCS). Some of these data will be used in a near real-time mode to update the *Okeanos Atlas*. All of these data will be archived at the National Oceanographic Data Center (NODC) Marine Data Stewardship Division (MDSD) in Silver Spring, MD. A collection level metadata record describing the data inventory to be archived at the NODC/MDSD will be included with the data submission.

# Oceanographic/Meteorological/Navigational Data/Products Pipeline

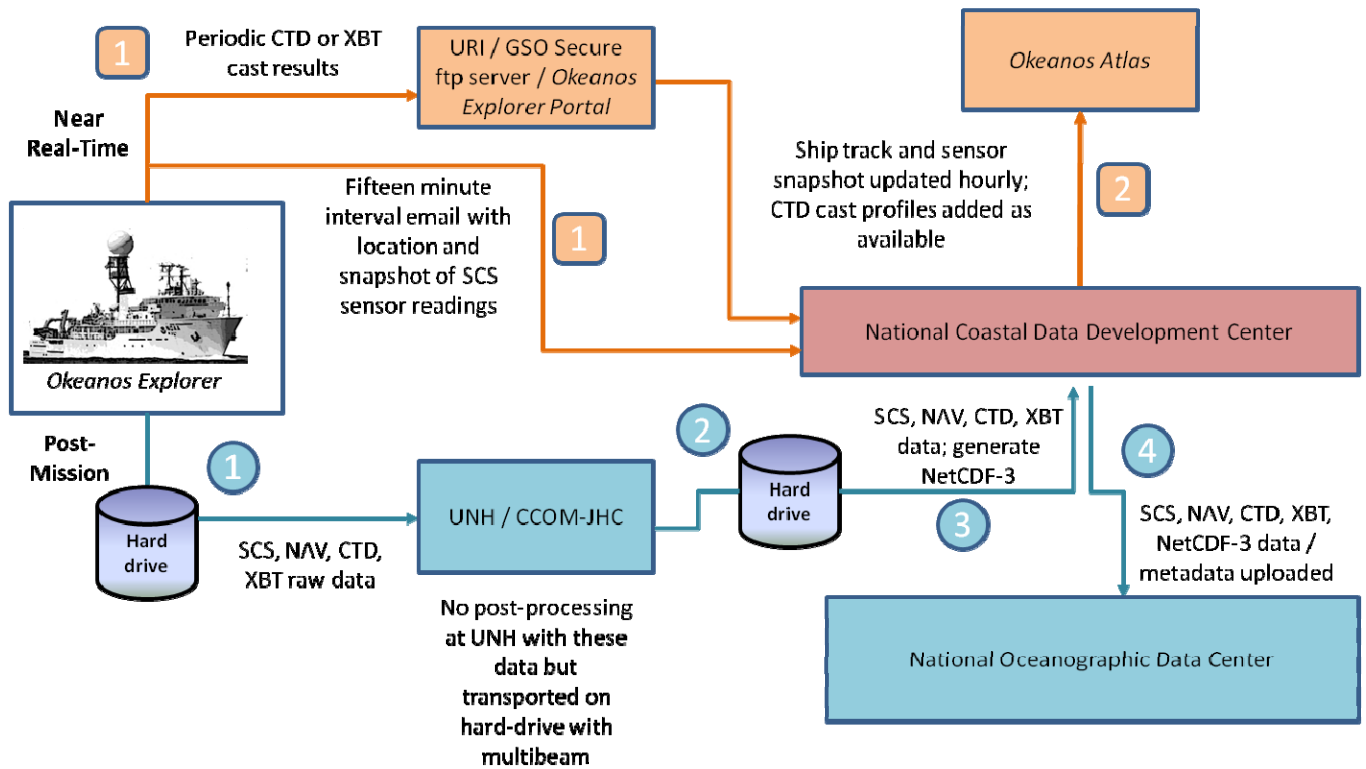


Fig 1: Oceanographic/Meteorological/Navigational Data Archive Pipeline

1

At periodic (currently twenty minutes) intervals, an email from the ship to NCDDC is delivered with the ship’s position and a snapshot of the SCS sensor suite.

As CTD or XBT casts are deployed, the results of the cast are included in the hourly synchronizations to the SRS.

2

The GIS team at NCDDC processes CTD cast data into thinned profiles for comparison to World Ocean Atlas historical profiles in the same region and month. The thinned profiles are geo-located on the Okeanos Atlas. Ship track and sensor snapshot readings are geo-located on the Okeanos Atlas.

1 All SCS data, including navigation and CTD/XBT cast data are saved to a hard-drive. This hard-drive is the same that will hold the multibeam survey raw data and products generated on-board. This hard-drive will be either brought back or shipped to the University of New Hampshire Center for Coastal and Ocean Mapping (UNH CCOM) for post-processing, after which it will be shipped to NCDDC.

2 The Data Management team will post-process the SCS, NAV, CTD, and XBT raw data files, adding ASCII headers to each file and generating NetCDF-3 formatted files for the entire cruise for both SCS/NAV data and CTD/XBT data. FGDC CSDGM metadata will be generated for the navigational data and for the METOC sensor data.

3 The ASCII files, and the metadata will be uploaded to the National Oceanographic Data Center (NODC), where they will be accessioned and archived.

4 The NetCDF3 files will be stored within an NCDDC hosted Thematic Real-time Environmental Distributed Data Services (THREDDS) server for user discoverability and access.

Data Class	Instrument	Data Type	Format	Metadata Granularity	Archive Center
OCN/ MET	All SCS monitored sensors	Meteorological and Oceanographic data sensors	ASCII	1 meta rec	NODC/MDS
NAV	DGPS, CNAV	EX, ROV, and sled navigation	ASCII	1 meta rec	NODC/MDS
ALL	All	Archive Ready	NetCDF-3	1 meta rec	NODC/MDS

*Table 4: Oceanographic/Meteorological/Navigational Metadata Granularity and Target Archive*

## Appendix C:

### Seep Flux Measurement Experiment

Objective: Develop a methodology/protocol for developing a seep flux measurement using a) acoustic backscatter collected with the EM302 multibeam echosounder and EK60 single beam echosounder b) groundtruth data (bubble size, discharge rate, flux rate, gas composition) collected with the ROV.

General strategy (suggested): Acoustically map seeps 1-2 days in advance to identify a seep(s) of interest. Repeat acoustic measurement immediately prior and immediately following the ROV mission (one short transects each).

ROV missions fall in one of the four following categories (these can be combined where reasonable), with missions 1 and 2 appearing to be the simplest and missions 3 and 4 possibly requiring more expensive pieces of equipment as well as additional involvement of personnel:

#### 1. ROV Mission Type A: Optical Measurements of Bubble Size

The objective here is to get an accurate estimate of the bubble size distribution in a seep, starting from the seabed and following the seep up toward the surface as far as is practically possible. The *a priori* range of bubble sizes 1-10 mm (based on reported bubble sizes in the literature). Measuring how the bubble size distribution changes with depth, the depth at which hydrate coatings form, the stability of bubble size (presumably with a hydrate coating) as it rises through the water column, the depth at which hydrate coatings disappear, and the rate at which the bubble sizes decrease above the hydrate stability zone are all of great interest. Note that the depth range for acoustically observable seeps can extend many 100's of meters above the bottom.

This objective could conceivably be met with the high definition cameras on Little Herc or Seirios. What will be important to add is a methodology for sizing the bubbles, which could possibly be achieved by placing an object of known size near the bubble plume when collecting imagery. This object could be attached to Little Herc and placed in the camera field of view using a rigid pole.

The orientation of the lighting could play a key role in collecting successful bubble size distributions. Lighting the bubbles from behind has been suggested as a useful technique when attempting to make these measurements.

#### 2. ROV Mission Type B: Direct Flux Estimate

The objective here is to get a direct estimate of the gas flux rate by capturing some measured volume of gas over a known interval of time. This might be done by filling a closed acrylic (optical quality) cylinder with volume markings and a funnel on the input. The volume of gas could be measured by optically monitoring the acrylic cylinder using the high definition cameras on Little Herc.

Assuming this methodology to be feasible, and assuming that the bubble plume could be followed upwards toward the surface, it would be highly desirable to make these flux

measurements at different (known) depths, allowing us to determine the depths at which the methane is dissolved into aqueous solution.

### **3. ROV Mission Type C: Water Sampling**

Knowledge of the gas constituents both within the bubble and in aqueous concentration near the bubble plume is important for being able to predict/understand the rate at which gas transfers between the bubble and the surrounding seawater. To this end, it is proposed to attach Niskin bottles to Little Herc that could be tripped by the movement of a camera, both within the plume and adjacent to the plume. Gas constituents could be measured using GC either aboard the EX (if trained personnel were present) or in preserved samples.

### **4. ROV Mission Type D: Hydrophone Monitoring**

An alternative, complimentary method to using the high-def cameras for optically sizing bubbles is to record their acoustic signature as they exit the seep. Presumably the bubbles will oscillate at their natural frequency which can be matched to their size. This requires the use of a broad-band hydrophone (I suspect 0-30kHz would do) along with an autonomous signal conditioning and data recording package, all with a depth rating of up to 2000 m. A pressure housing containing these electronics and with an attached hydrophone could then be mounted in a fixed location on Little Hercules.

## Appendix D:



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

February 29, 2012

MEMORANDUM FOR: The Record

FROM: John McDonough

Deputy Director NOAA Office of Ocean Exploration and Research (OER)

SUBJECT: Categorical Exclusion for NOAA Ship *Okeanos Explorer* cruise EX1202, Legs 2 & 3

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 affect on the human environment.

### Description of Projects

This project is part of the Office of Ocean Exploration and Research's "Science Program". It will conduct remotely operated vehicle (ROV) operations and ocean mapping activities designed to increase knowledge of the marine environment. This project is entitled "EX1202 Northern Gulf of Mexico Expedition" and will be led by Jeremy Potter, an Expedition Manager for NOAA OER. The work will be conducted in March and April at various locations in the Northern Gulf of Mexico. A tandem 4,000 meter ROV system will be deployed and CTD rosette casts may be conducted during the expedition. The Kongsberg EM 302 multibeam (30 kHz) and the Kongsberg EK 60 singlebeam (18 kHz) will be operated during the project. A Knudsen 3260 Sub-Bottom Profiler may also be operated. Additionally, expendable bathythermographs (XBTs) will be conducted in conjunction with multibeam data collection. Multibeam mapping operations will be conducted at all times during the transit.

### Effect of Projects

As expected with ocean research with limited time 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.

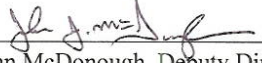
### Categorical Exclusion

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.



Printed on Recycled Paper



Signed:   
John McDonough, Deputy Director

Date: 2/29/2022