OBSIC Instrument Use Policies and Procedures

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V. 2019_10

This next version of this policy can be subject to approval by the OBSIC Oversight Committee.

1. General Information

The Ocean Bottom Seismic Instrument Center (OBSIC) provides and operates seismic instruments to support research on the structure and tectonics of the ocean basins, their margins, and the dynamics and structure of the Earth's interior. Funded through the National Science Foundation Division of Ocean Sciences (NSF-OCE), OBSIC makes ocean bottom seismographs (OBS) available to NSF-sponsored investigators, and to investigators at other research or educational institutions with government, private, or industry funding. The OBSIC is housed at Woods Hole Oceanographic Institution (WHOI) under a 5-year cooperative agreement that commenced in 2018. OBSIC replaces the Ocean Bottom Seismograph Instrument Pool (OBSIP) that was created by NSF in 1999 and jointly operated and managed by WHOI, SIO, and LDEO until 2011, and thereafter operated by these three institutions but managed by the Incorporated Research Institutions for Seismology (IRIS). The policies and procedures described in this document define the OBSIC instrument request and funding process, provide proposal and cruise-planning information, and state the responsibilities of both principal investigator (PI) and OBSIC from the proposal preparation to data archive stages. The complexity of OBS experiments means that efficient use of OBSIC instruments requires close cooperation among all parties involved. Although significant information is provided on this website, prospective users are strongly encouraged to contact the OBSIC Management Office during the proposal development phase for more information about OBSIC procedures and instrument capabilities. This is essential if instrument modifications are being considered. *OBSIC treats instrument-request specifics, e.g. P.I. names, experiment location, dates, numbers and types of OBS, etc., as confidential until the experiment is either funded or recommended for funding.*

1.1 NSF Funded Projects

For NSF-funded projects, all OBS costs are supported through a cooperative agreement between NSF-OCE and OBSIC. Thus, OBS costs are not included in science budgets proposed to NSF. However, for NSF planning purposes, an Informational Budget that summarizes the anticipated costs of supporting the experiment, both ashore and at sea, must be included in the proposal. The general procedure for requesting and using OBSIC instrumentation is summarized in this section and expanded upon in later sections:

1.1.2 Requesting OBSIC Instrumentation

a. The PI submits an instrument request to OBSIC.
b. OBSIC provides the PI with a 1-page Informational Budget (Appendix 1).
c. The PI's proposal to NSF includes the Informational Budget in the "Supplementary Documentation" section of the proposal.

1.1.3 Planning and Conducting the OBS Experiment

a. OBSIC Management Office schedules OBS availability in consultation with the P.I. and with the research vessel provider, e.g. University-Nationals Oceanographic Laboratory System (UNOLS).
b. PI should develop a comprehensive Cruise Plan for at-sea OBS operations (e.g. Appendix 2).
c. OBSIC, in collaboration with the PI, develops a Science Support Plan that lays out the commitments and responsibilities of both parties (Appendix 3).
d. OBSIC personnel participate in the experiment cruises and conduct OBS operations in conformance with the Science Support and Cruise Plans.

1.1.4 Post Experiment

a. Upon completion of an experiment, OBSIC will provide one data set to the project PI. All data collected using OBSIC instrumentation will be archived at the IRIS Data Management Center (DMC).
b. The PI will complete Cruise and Data Evaluation forms and return to OBSIC Management.
c. The experiment science team acknowledges OBSIC on all publications.

2. Instrument Request Form and Informational Budget

Requests for OBSIC instruments are submitted using the online instrument request form available at the OBSIC website: OBSIC Instrument Request This form is automatically emailed to the OBSIC Management Office, which will then generate a one-page Informational Budget (pdf format) that will be sent to the PI, and which must be included with the PI's science proposal. Depending on the complexity of the experiment, it may take some time to generate an Informational Budget, *so budget requests are best made at least two weeks before a proposal deadline*.

In order to ensure an accurate Informational Budget, all relevant information should be included on the request form. Instrument types should be chosen based on the OBS specifications. Deployment times can be estimated using the information below. Risks to instruments should be understood and stated in the form. Other special circumstances (e.g., simultaneous land deployments; hazardous location) should be included. If the OBS are to be deployed/recovered using a UNOLS vessel, cruise dates and durations should be consistent with the PI's UNOLS shiptime request. If a non-UNOLS vessel is to be used, then the vessel and/or its operator should be stated. Additional questions should be addressed to the OBSIC Management Office.

The OBSIC Management Office will provide a one-page Informational Budget that will include a summary of instrument mobilization and demobilization costs, instrument modification costs (if any), instrument drop charges, technical and engineering support costs, and travel and shipping costs.

3. NSF Proposal

3.1 Proposal submission

The OBSIC Informational Budget must be included with the NSF science proposal submission and should be uploaded to Fastlane in the "*Supplementary Documentation*" section. OBSIC costs identified in the Informational Budget should *not* be included in the NSF science proposal budget (NSF Form 1030). OBSIC will provide complete engineering and technical support, both ashore and at sea, through its cooperative agreement with NSF. The PI's science proposal budget must, however, include all costs for non-OBSIC personnel and any other costs not specifically covered in the OBSIC Informational Budget, such as miscellaneous cruise fees, communications charges, etc.

For proposal resubmissions, a new request form should be completed and a new Informational Budget should be used.

3.2 NSF Proposal Funding

Upon acceptance of the PI's proposal, NSF will provide the PI funding for non-OBSIC related expenses. OBSIC will receive direct funding to provide instrumentation and technical support for the experiment and will begin planning for and scheduling the project in conjunction with ship operators, usually the University-National Oceanographic Laboratory System (UNOLS).

3.3 Instrument Scheduling

The OBSIC Management Office, in consultation with the PI, NSF and the ship operator (usually UNOLS), is responsible for scheduling OBSIC instruments. The OBSIC Management Office participates in UNOLS ship-scheduling meetings (typically in June or July of each year) to schedule experiments for the following calendar year. Only experiments with confirmed funding and ship time will be entered into the schedule. Scheduling priorities will be set in the following order:

- 1. Programs funded by the Ocean Sciences Division of NSF
- 2. Programs funded by other divisions of NSF
- 3. Programs funded by other US government agencies
- 4. Other funded programs

Instruments are allocated on a "first funded — first priority" basis. (USGS will have first priority for use of the 17 USGS OBS instruments at OBSIC; USGS will be the highest priority non-NSF user for other instruments at OBSIC.)

All other conditions being equal, the highest scheduling priority will go to experiments with the earliest funding dates, then to the earliest request dates. The scheduling goal is to optimize the use of the instruments, and to accommodate as many experiments as possible. Therefore, it will sometimes be necessary to negotiate with the PI the exact type and number of instruments, or to modify the time of an experiment.

The OBSIC Management Office will allocate projects based on instrument requirements and availability. Funded programs that cannot be scheduled will be placed on a waiting list for scheduling at the earliest possible date consistent with the scheduling criteria outlined above. In some cases, especially for work in remote areas, ship scheduling may drive OBS scheduling. Requests can be made for OBSIC instruments at any time of the year. Instruments will be made available to users for rapid response studies as the schedule permits.

4. Cruise Planning Information

The PI should develop and/or finalize a comprehensive Cruise Plan (e.g. Appendix 2) that outlines the specific series of steps to complete OBSIC instrument deployment and recovery. The following information should be used in planning the cruise operations.

4.1. Deployment and Recovery Times

The maximum deployment time (without recovery) will be ~12-15 months depending on sampling rate and instrument type. The maximum deployment water depth is 5,000-6,000 m, depending on OBS type.

The following estimates should be used as a guideline for planning the duration of a cruise, as well as for estimating the time required for OBS shipboard operations:

Cruise Planning Duration Guidelines

h= water depth in km

Activity	Time (hours)	h = 1 km	h = 3 km	h = 6 km
Deploy	1	1	1	1
Fall	h/1.8	0.6	1.7	3.3
Survey	0.6+0.2h	0.8	1.2	1.8
Rise	h/1.8	0.6	1.7	3.3
Recover	1	1	1	1

These times do not include the transit time between instrument sites. Active-source experiments may not require "Fall" or "Survey" times. Assumptions include a rise/sink rate of 30 m/min, and 10-min surveys at four points each at a lateral distance from the drop location of one half the water depth. The instrument locations should be surveyed directly after deployment. Multiple-deployment experiments with a fast turn-around time may require slightly more time between deployments for data recovery and instrument preparation. We strongly encourage that PI's talk to the OBSIC Management Office to discuss additional questions or concerns regarding cruise logistics.

4.2 Instrument Surveying

Seafloor instrument locations can often be determined for active-source experiments using airgun-generated water-wave arrival times, in which case the PI should provide them to OBSIC Management Office before the data are submitted to IRIS DMC. Otherwise, instruments need to be surveyed by acoustic ranging, in which case the onboard OBSIC technical staff will determine locations and provide them to the PI.

It is preferable to do the instrument survey immediately after deployment. If the ship has a hull-mounted transducer, a minimum survey pattern is a 3/4 circle at a lateral distance of one half the water depth and at a ship speed of 5 knots. If an "over-the-side" transducer only is available, the minimum survey procedure is to range to the OBS from a few locations with good azimuthal coverage at a lateral distance from the drop point of about one half the water depth.

The azimuths of horizontal seismometer components can be measured by the PI after instrument recovery using air-gun shots or Rayleigh surface-wave data. In both cases they are not the responsibility of OBSIC and are not included in the data headers submitted to the IRIS DMC.

5. PI Responsibilities

The responsibilities of the PI in seagoing operations utilizing OBSIC equipment are:

1. Request sufficient ship time for all OBS operations. Although guidelines for estimating ship time are given above, it is strongly recommended that each PI consult with the OBSIC Management Office to ensure that adequate ship time for OBS operations has been requested.
2. Plan and run the cruise, which may include marine mammal permitting, foreign and NAVY clearances, port locations, schedule changes and personnel issues. Many of these issues are dealt with by the research vessel operators, but the PI should take overall responsibility for coordination and communication among OBSIC, the ship operator, the science party, and in some cases, other organizations (e.g., PASSCAL, foreign ship operators). It is expected that OBS operations will normally take place from UNOLS vessels; use of a non-UNOLS vessel requires prior approval of the OBSIC Management Office and possibly certification in writing from the Captain that the vessel meets UNOLS safety standards (e.g. Appendix 4). A vessel inspection may be required.
3. Provide support personnel for instrument recoveries and deployments. Although OBSIC engineers and technicians handle most of the deployment/recovery responsibilities, two or three additional people per shift from the science party are needed. Prior to the cruise, OBSIC will provide a deployment/recovery check-sheet for a science party watch-stander to complete. These check-sheets should be used to record OBS deployment/recovery locations and times, station names and OBS identification numbers, and anything of importance bearing on OBS deployment/recovery. The mapping between station names (provided by the PI) and OBS identification numbers (provided by OBSIC) is critical. OBSIC requests this information from

the science party even if the OBSIC technicians also record some or all of these values. Independent information sources help identify inconsistencies and mistakes. Often, the ship's officers also record station deployment/recovery locations and times, and are happy to provide these data to the science party on request. A second person from the science party is needed to assist with deck operations; in extreme conditions two deck support people may be required. If instrument locations need to be surveyed, then these personnel may also be responsible for operating the acoustic ranging equipment. The optimal plan is to bring enough people to handle a two-person shift on a rotating schedule. This typically requires 4-6 cruise participants in addition to the PI and OBSIC personnel, although the involvement of more people is always encouraged. Certain cruise scenarios may require more or fewer personnel; we recommend contacting the OBSIC Management Office to discuss cruise logistics before proposal submission.

4. Calculate seafloor instrument locations from airgun data (if active-source experiment) and provide them to OBSIC as soon as they are available. This is often a post-cruise activity.

6. OBSIC Responsibilities

OBSIC will be responsible for all operations and equipment relevant to seagoing operations involving OBSIC instrumentation. This includes:

1. Provide ocean bottom seismic instrumentation and related equipment.
2. Provide expendables (e.g. anchors, batteries, etc.) for instrument operations.
3. Provide technical and engineering support personnel for instrument operation.
4. Transport instruments and ancillary equipment to and from ship.
5. Arrange travel of OBSIC personnel to and from ship.
6. Calculate seafloor instrument locations for passive experiments (but not the orientation of the seismometers' horizontal components).

OBSIC will provide everything needed to collect seismic data, exclusive of the PI responsibilities defined in the PI Responsibilities above. In consultation with the PI, OBSIC will develop a Science Support Plan (Appendix 3) describing in detail OBSIC's plan to support the PI's experiment.

7. PI and OBSIC Authority

The Principal Investigator has ultimate responsibility for the safety of OBSIC personnel and the return of all OBSIC instruments and equipment. The PI should consult with the senior OBSIC engineer/technician on the cruise regarding all OBS operations. If the senior OBSIC staff member (Expedition Leader) determines that conditions represent undue risks to OBSIC personnel or instrumentation, or if there is not an adequate plan for instrument recovery, he/she may terminate OBS operations.

All OBS operations are under the control of the senior OBSIC engineer/technician, the OBSIC Expedition Leader (Appendix 4). OBSIC technicians and engineers will NOT normally be available for other shipboard duties (e.g. watch standing) during non-OBS operational periods. If OBSIC personnel are needed for other operations, written approval must be obtained from the OBSIC Management Office prior to the cruise and additional costs (e.g. overtime) must be paid by the PI.

Appendix 1 of the Science Support Plan lays out guidelines for OBSIC at-sea operations.

8. Instrument Loss Risks

OBSIC has suffered instrument losses as a result of deployment in risky locations. PIs planning OBS operations in areas with unusual risks (e.g., severe weather, currents or seas; unusually shallow (<1000 m) or deep (> 5000 m) water depths; intensive bottom trawling activity; ice; foreign waters in areas of political unrest; probable volcanic activity or debris flows) should include this information in the online instrument request form, and should be prepared to work with OBSIC in identifying and mitigating these risks. The OBSIC Management Office will be able to advise on proposed high-risk instrument locations.

9. Post-Cruise Information

9.1 Instrument Responses

Instrument responses for passive-source instruments are included in the SEED headers that are submitted to IRIS by OBSIC. SEGY data headers do not include instrument responses, however, and they can be obtained from OBSIC.

9.2 Data Policy

All data collected using OBSIC instrumentation or with non-OBSIC OBS operated via a sub-award from OBSIC will be archived at the IRIS Data Management Center (DMC). To ensure accurate metadata, the PI must provide all necessary ancillary data (station names, instrument deployment and recovery locations and times, shot times if appropriate, OBS locations if available, etc.) to the OBSIC Expedition Leader prior to the end of the recovery cruise. Much of this information should be recorded in the deployment/recovery check-sheets completed by the science party,

Upon completion of a cruise, OBSIC will provide one data set to the project PI. Depending on cruise logistics and quantity of data collected, this may occur some weeks after the ship has reached port. Requests for additional copies should be made at the time the instruments are requested in order to allow for the additional costs to be budgeted.

All data will be archived in SEED format; in addition, active-source data will be archived in SEG-Y format. Data will be submitted to IRIS within six months of the end of the last recovery cruise.

In accordance with NSF requirements, the IRIS DMC data can be restricted to the PIs for 24 months from the date of data delivery to the PI. However, for long-term broadband experiments, data from one instrument (selected by the PI) may be made publicly available immediately. After this 24-month period, all data will be available to any interested investigator.

9.3 Evaluation Forms

Evaluation forms provide crucial feedback to the OBSIC Management Office, NSF and the OBSIC Oversight Committee. The PI is expected to complete and return the OBSIC cruise evaluation form and data assessment form after the end of a cruise. These forms are both available on the OBSIC website under Forms.

9.4 Post Cruise PI Interview

OBSIC Management Office will conduct a post-cruise PI interview to assess the OBSIC performance in supporting PIs's proposed scientific objectives.

9.5 OBSIC Acknowledgement

In any publications or reports resulting from the use of OBSIC instruments, please include the following statement in the acknowledgements section:

“Data used in this research were provided by instruments from the Ocean Bottom Seismic Instrument Center (https://obsic.whoi.edu), which is funded by the U.S. National Science Foundation. OBSIC data are archived at the IRIS Data Management Center (www.iris.edu)."

Please provide the OBSIC Management Office with copies of any publications related to your experiment or complete the Submit a Publication form on the OBSIC website.

APPENDIX 1. An Example of Informational Budget

This form is generated based on PIs Instrument Request

U.S. National Ocean Bottom Seismic Instrumentation Center

This is an informational budget provided to prospective users of instruments in the U.S. National Ocean Bottom Seismic Instrumentation Center. OBSIC will provide complete engineering and technical support for OBS operations at sea. The cost of providing this support (e.g., instrument charges, personnel support, shipping and travel) will be funded directly through the Center; these costs do not need to be included in individual NSF science proposals. NSF does, however, require PIs to provide an informational budget estimating these costs in any proposal requesting OBSIC instruments. For more information on OBSIC, see https://obsic.whoi.edu.

Project Title: *Western Pacific Old Crust and Mantle Structure*

Principal Investigator(s): *John Collins*

Funding Agency: *NSF/OCE/MGG*
Submission deadline: *April 30th, 2019*

Instruments:

18	*Short Period*	*1 deployments*
0	*Short Period Long Deployment*	*0 deployments*
20	*Long Period*	*1 deployments*
0		*0 deployments*

Date of prop. experiment: *12/1/2020; 11/1/2021*

The cruise dates and durations in the Instrument Request should be consistent with the PI's ship-time request (typically UNOLS).

Logistics:

1	-	*45 day leg*
1	-	*14 day leg*
0	-	*0 day leg*
0	-	*0 day leg*

Ports: Guam *to* Guam

The following is an estimate of the cost of supporting the OBS operations requested in this proposal. These costs are subject to change depending on factors such as the scheduling of this project, and the lengths and ports of the deployment and recovery legs. This budget includes inflationary costs for experiments scheduled in outlying years. A final budget for OBS support operations for this project will be negotiated as part of the annual cooperative agreement between NSF and OBSIC.

Baseline Facility Costs		
On-Shore Labor		$xxx,xxx
At-Sea Regular Labor		$xxx,xxx
	Total Baseline Facility Costs	**$X**
Experiment Specific Costs		
At Sea Labor Uplift		$yyy,yyy
Instrument Costs		$yyy,yyy
Shipping		$yyy,yyy
Travel		$yy,yy
Instrument Modifications		$0
	Total Experiment Specific	**$Y**
	Total:	**$X+Y**

OBSIC provides these numbers based on PIs Instrument Request

Notes:

OBSIC Management Office
January 20th, 2019
OBSIP Experiment Estimate Number: - 24014.xx_John Collins western Pacific expediment

Appendix 2. An Example of Cruise Plan

PIs can establish and optimize cruise plan that can be a foundation for the PIs UNOLS Ship Time Request.

Site Name	WHOI OBS I.D.	Site Latitude (deg)	Site Latitude (min)	Site Latitude (hemi)	Site Longitude (deg)	Site Longitude (min)	Site Longitude (hemi)	Station Depth (m)	Site Latitude (decimal degrees)	Site Longitude (decimal degrees)	Site Co-Latitude (radians)	Site Longitude (radians)
Seward		60	7.1340	N	149	25.6760	W		60.11890	-149.42793	0.52152358	-2.60800943
WP-01		59	58.2730	N	149	21.1150	W		59.97122	-149.35192	0.52410114	-2.60668269
WP-02		59	49.6120	N	149	28.6640	W		59.82687	-149.47773	0.52662052	-2.60887861
WP-03		59	45.1690	N	149	22.7560	W		59.75282	-149.37927	0.52791294	-2.60716004
WD46		55	31.2	N	149	42	W	4393	55.52000	-149.70000	0.60178953	-2.61275789
WD47		54	57	N	150	27	W	3952	54.95000	-150.45000	0.61173790	-2.62984786
WD49		54	24	N	151	54	W	4090	54.40000	-151.90000	0.62133721	-2.65115513
WD53		53	46.8	N	153	25.2348	W	4656	53.78000	-153.42058	0.63215826	-2.67769426
WD58		53	54.3708	N	155	2.2536	W	4505	53.90618	-155.03756	0.62995600	-2.70591589
WD59		53	22.8158	N	155	48.441	W	4482	53.38026	-155.80735	0.63913503	-2.71939126
WD60		52										

Distance to Following Site (nm)	Ship Speed (knots)	Time to Following Site (decimal hrs)	On_site Prep. Time (hours)	OBS Fall Time (hours)	OBS Survey Time (hours)	Time On Site (hours)	Site Departure Date and Time (local)	Arrival Time Next Site (local)	Cumulative Time to Next Station (hrs)	Cumulative Time (days)
9	5	1.8	0.0	0.0	0.0	0	7/11/18 10:00	7/11/18 11:48	1.8	0
10	6	1.7	0.0	0.0	0.0	0	7/11/18 11:48	7/11/18 13:30	3.5	0
5	6	0.8	0.0	0.0	0.0	0	7/11/18 13:30	7/11/18 14:18	4.3	0
254	10.5	24.2	0.0	0.0	0.0	0	7/11/18 14:18	7/12/18 14:30	28.5	1.2
43	10.5	4.1	1.0	2.4	1.5	4.9	7/12/18 19:24	7/12/18 23:30	37.5	1.6
60	10.5	5.7	1.0	2.2	1.5	4.7	7/13/18 4:12	7/13/18 9:54	47.9	2.0
65	10.5	6.2	1.0	2.3	1.5	4.8	7/13/18 14:42	7/13/18 20:54	58.9	2.5
58	10.5	5.5	1.0	2.6	1.5	5.1	7/14/18 2:00	7/14/18 7:30	69.5	2.9
42	10.5	4.0	1.0	2.5	1.5	5.0	7/14/18 12:30	7/14/18 16:30	78.5	3.3
52	10.5	5.0	1.0	2.5	1.5	5.0	7/14/18 21:30	7/15/18 2:30	88.5	3.7
51	10.5	4.9	1.0	2.5	1.5	5.0	7/15/18 7:30	7/15/18 12:24	98.4	4.1
54	10.5	5.1	1.0	2.6	1.5	5.1	7/15/18 17:30	7/15/18 22:36	108.6	4.5
42	10.5	4.0	1.0	2.6	1.5	5.1	7/16/18 3:42	7/16/18 7:42	117.7	4.9
55	10.5	5.2	1.0	2.6	1.5	5.1	7/16/18 12:48	7/16/18 18:00	128.0	5.3
60	10.5	5.7	1.0	2.6	1.5	5.1	7/16/18 23:06	7/17/18 4:48	138.8	5.8
45	10.5	4.3	1.0	2.6	1.5	5.1	7/17/18 9:54	7/17/18 14:12	148.2	6.2
30	10.5	2.9	1.0	2.6	1.5	5.1	7/17/18 19:18	7/17/18 22:12	156.2	6.5
38	10.5	3.6	1.0	2.8	1.5	5.3	7/18/18 3:30	7/18/18 7:06	165.1	6.9
24	10.5	2.3	1.0	2.2	1.5	4.7	7/18/18 11:48	7/18/18 14:06	172.1	7.2
32	10.5	3.0	1.0	0.7	1.5	3.2	7/18/18 17:18	7/18/18 20:18	178.3	7.4
19	10.5	1.8	1.0	1.4	1.5	3.9	7/19/18 0:12	7/19/18 2:00	184.0	7.7
29	10.5	2.8	1.0	0.7	1.5	3.2	7/19/18 5:12	7/19/18 8:00	190.0	7.9
59	10.5	5.6	1.0	1.1	1.5	3.6	7/19/18 11:36	7/19/18 17:12	199.2	8.3
85	10.5	8.1	1.0	1.2	1.5	3.7	7/19/18 20:54	7/20/18 5:00	211.0	8.8

Appendix. 3

OBSIC Science Support Plan

OBSIC Identifier:	24014.07
PI:	
Project:	Hawaii-Emperor Seamount Chain Seismic Experiment, Leg 2
Location:	Hawaii-Emperor Seamount Chain
At Sea Dates:	04/19/2019 - 06/01/2019
Port Stops:	Honolulu, HI to Kodiak, AK
OBS Providers:	WHOI (20), GEOMAR (25)
Vessel:	R/V Marcus G. Langseth
Funding Agency:	NSF-OCE-MCG
UNOLS Cruise #:	MGL1902

Nota Bene
This cruise will support Leg 2 of the Hawaii-Emperor Seamount experiment, including deployment, recovery, and data delivery.

Table of Contents

Document Change History

Version	Author	Description	Date
1.0		Draft	2019-02-25
1.1		Draft	2019-03-12
2.0		Final	2019-03-15

Distribution

Copy	Receiver	Email
1	OBSIC ( )	
2	Principal Investigator ( )	
3	Vessel Operator ( )	
4	NSF ( )	
5	NSF ( )	
6	NAVY ( )	

1. Cruise Overview

Ocean-Bottom Seismographs (OBS) will be used to acquire two 2-D active-source refraction profiles along and across the Hawaiian-Emperor seamount chain. Thirty-two (32) OBS will be deployed along each line. The shooting ship will be the R/V Marcus G. Langseth. In addition to acquiring refraction data, the Langseth will deploy its 15 km streamer to collect ~1300 km of MultiChannel Seismic (MCS) reflection lines. This is the second leg of a two-leg cruise. (Leg 1 took place in September/October 2019.)

2. Outstanding Issues

There are no outstanding issues

3. OBSIC Schedule

Activity	Date
Ship 7 WHOI short-period OBS plus laboratory van from Woods Hole to Honolulu, HI	25/03/2019
Fly to Honolulu, HI	04/15/2019
Mobilize OBS in Honolulu	04/16/2019 – 04/18/2019
Deploy 7 OBS, shoot, recover OBS during cruise. Repeat once.	04/19/2019 – 06/01/2019
Return home from Kodiak, AK	06/03/2019
WHOI Lab Van and OBS shipped home from a Pacific Northwest port.	07/03/2019

OBSIC Information

PIs are expected to understand and plan their experiment according to the OBSIC Instrument Use Policies and Procedures that have been approved by the OBSIC Oversight Committee. The instrument use policy contains detailed planning information and is available on the OBSIC website:

http://www.obsic.org/experiment-planning/obsip-instrument-use-policies-and-procedures/

This experiment will be serviced by WHOI and GEOMAR. The following table summarizes the instruments to be provided:

Table 1 - Instrumentation Summary

Quantity	OBS Type	Provider	Sample Rate	Max. Deployable Depth
15	SPOBS (WHOI D2)	WHOI	200 Hz	5000 m
17	LOBSTER	GEOMAR	250 Hz	6000 m
8	Ultradeep LOBSTER	GEOMAR	250 Hz	8000 m
32	<<Total			

3.1. Instrument Modifications

None.

3.2. Pre-Cruise

OBSIC will perform functional testing all instruments prior to shipping. This testing verifies instrument operation.

3.3. Mobilization

3.3.1. Shipping

The 7 WHOI OBS to be used on the Shillington experiment will be shipped to the Honolulu port for mobilization aboard the R/V Langseth.

3.3.2. Port Call

The port stops are Honolulu and Kodiak. Mobilization for the cruise aboard the Langseth will be according to the schedule stated in Section 3. OBSIC personnel will use this time to configure OBS instrumentation in preparation for the cruise.

3.4. Cruise

3.4.1. Technical Support

OBSIC will provide technical support in port and at sea to load, prepare, deploy, recover and unload OBS's. Assistance to OBSIC personnel by the science team is generally encouraged for both instrument preparation and deck operations, although the specific inclusion of the science team is up to OBSIC personnel.

OBSIC personnel will provide support for 24-hour vessel operations (12 hours per tech). Some groups operate in shifts while some groups work on and off as needed to cover the required operations.

OBSIC technical support at sea will be provided by XXXX. OBSIC technician XXXX will provide port-side support in Honolulu only; he will not sail.

3.4.2. Instrument Configuration

The OBSIC OBS will be configured as follows:

Table 2 – WHOI OBS Configuration

Instrument	Short-period OBS
OBS Provider	WHOI
Sensors	Ground Motion: Geospace GS-11D 3-component 4.5 Hz geophone; Hydrophone (High Tech HTI-90-U)
Sample Rate	200 samples per second
FIR Filter	Linear Phase
Max. Deployable Depth	~5000 m
Endurance	2 months
Modifications	None
Quantity	7

Table 3 – GEOMAR OBS Configuration

Instrument	Short-period OBS
OBS Provider	GEOMAR
Sensors	Ground Motion: Input/Output SM-6 3-component 4.5 Hz geophone; Hydrophone: High Tech HTI-90-U or HTI-4-PCA/ULF
Max. Sample Rate	250 samples per second
Max. Deployable Depth	6000 m (LOBSTER); 8,000 m (Ultradeep LOBSTER)
Endurance	
Quantity	25 total (17 LOBSTER; 8 Ultradeep LOBSTER)

3.5. Demobilization

3.5.1. Port Call

This cruise terminates in Kodiak, AK. OBSIC personnel will use this time to complete decommissioning of OBS instrumentation.

3.5.2. Return Shipping

The Marcus Langseth is scheduled to return to Astoria, OR on July 1. The WHOI laboratory van and OBS will remain on the Langseth until then. At that time, the van and OBS will be shipped back to WHOI.

3.6. Post-Instrument Recovery

OBSIC will make every effort to provide the PI with clock-corrected SEG-Y data during the cruise. The PI is responsible for specifying the time slices that make up the SEG-Y files by providing personnel with appropriately formatted shot tables. OBSIC uses a variant of the SEG-Y Rev 1 format. OBSIC also has a standard shot-table format. Both of these formats are available from OBSIC on request.

Post-cruise, OBSIC will format the data in preparation for archiving at the IRIS Data Management Center (DMC). OBSIC will perform a quality check of the data to ensure that the number of stations and channels is correct and will validate the metadata. The complete, continuous data set will be archived in SEED format, while the shot data will be archived as "Assembled Data" in SEG-Y format. The data will then be officially released to the P.I.s for download. The data will be restricted for two years after archival at the IRIS DMC. The FDSN network code assigned to this experiment is: ZU:2018-2019. The assembled data set number assigned to this experiment is: 18-015. The PI is responsible for choosing station names. To conform to the SEED standard, station names cannot exceed 5 alphanumeric characters.

4. PI Information

4.1. Cruise Plan

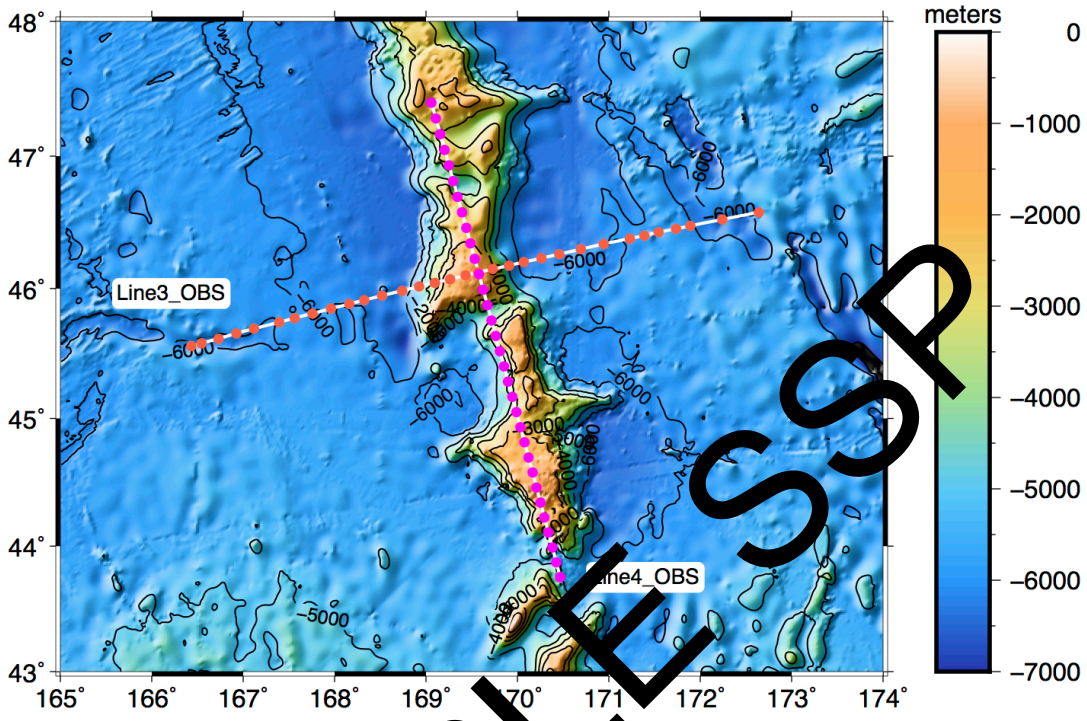
The scientific objectives of the planned data acquisition and analysis of this project are to examine controls on magmatic addition along the Hawaiian-Emperor seamount chain, provide fundamental constraints on rheological properties of oceanic lithosphere, address the origin of the hotspot swell, and assess implications for earthquakes and tsunamis from plate deformation in response to flexure. The plan is to acquire coincident 2D, deep-penetration seismic reflection data as well as wide-angle reflection/refraction data using ocean bottom seismometers spaced at 15 km along four 500-km-long transects across the Hawaiian-Emperor seamount chain during two cruises. The first cruise focused on the Hawaiian Islands and took place in September-October 2018. The second cruise is focused on the Emperor seamount chain and is the focus of this document. The locations of these transects will encompass wide variations in the timing of magma emplacement and volume flux, the age of the lithosphere at the time of loading and the presence/absence of a topographic swell. The transects are sufficiently long to capture the flexural response of the lithosphere to volcano loading out to the flexural bulge. The processed seismic reflection profiles and velocity models created from wide-angle seismic data will constrain the volume and distribution of magmatic addition to the crust as well as faulting within the volcanic edifice and within the loaded oceanic plate. New seismic constraints will be combined with gravity, magnetic, bathymetric and geochemical data and used as the basis for flexural analysis and numerical modeling to gain fundamental new insights into crustal and lithospheric dynamics.

Table 4. Nominal OBS deployment locations and depths. Planned positions of OBSIC instruments are limited to water depths <~5000 m and are indicated below with station names US-#. Planned positions of GEOMAR LOBSTER and ultradeep LOBSTER instruments indicated with G-# and GD-#, respectively. Final positions, as well as the disposition of OBSIC and German OBS will be determined based on multibeam bathymetry data acquired during the cruise.

Line	Station	Lat.	Lon.	Elev. (m)	Line	Station	Lat.	Lon.	Elev. (m)
Line3_OBS	G-15	45.5600	166.4314	-6060	Line4_OBS	XX	47.4	169.059	-2529
Line3_OBS	G-14	45.5812	166.5465	-6043	Line4_OBS	XX	47.2827	169.108	-2758
Line3_OBS	GD-10	45.6162	166.7306	-6114	Line4_OBS	XX	47.1653	169.156	-3107
Line3_OBS	G-13	45.6577	166.9261	-5898	Line4_OBS	XX	47.0479	169.204	-2498
Line3_OBS	G-12	45.6929	167.1184	-5957	Line4_OBS	XX	46.9305	169.252	-3188
Line3_OBS	G-11	45.742	167.3948	-5960	Line4_OBS	XX	46.81	169.299	-4163
Line3_OBS	G-10	45.7744	167.5642	-5968	Line4_OBS	XX	6.6	169.346	-3246
Line3_OBS	G-09	45.8088	167.7582	-5980	Line4_OBS	XX	46.	169.394	-2268
Line3_OBS	G-08	45.8464	167.9626	-6003	Line4_OBS	XX	4 4606	169.441	-2183
Line3_OBS	G-07	45.8815	168.1615	-6001	Line4_OBS	XX	6.3431	169.487	-1999
Line3_OBS	GD-09	45.9118	168.327	-6224	Line4_OB	X	46.2256	169.534	-1390
Line3_OBS	GD-08	45.9463	168.5212	-6236	Line4_OBS	XX	46.108	169.58	-1475
Line3_OBS	GD-07	45.9829	168.7406	-629	Line4_OBS	XX	45.9904	169.626	-1811
Line3_OBS	US-01	46.016	168.925	-54	Line4_OBS	XX	45.8729	169.672	-3742
Line3_OBS	US-02	46.0434	169.0988	-3524	Line4_OBS	XX	45.7553	169.718	-4080
Line3_OBS	US-03	46.0704	169.2632	-1561	Line4_OBS	XX	45.6376	169.764	-2631
Line3_OBS	US-04	46.1002	169.335	-8	Line4_OBS	XX	45.52	169.809	-3750
Line3_OBS	US-05	46.1232	16 712	-1415	Line4_OBS	XX	45.4023	169.854	-4256
Line3_OBS	US-06	46.1484	9.73	-2118	Line4_OBS	XX	45.2846	169.899	-4021
Line3_OBS	US-07	4 1745	69. 88	-5054	Line4_OBS	XX	45.1669	169.944	-3860
Line3_OBS	GD-01	46.2 4	1 0702	-6221	Line4_OBS	XX	45.0492	169.989	-2566
Line3_OBS	GD-02	46.2309	170.2641	-6264	Line4_OBS	XX	44.9315	170.033	-1986
Line3_OBS	GD-33	2608	170.4581	-6248	Line4_OBS	XX	44.8138	170.078	-1871
Line3_OBS	D-04	46.3002	170.6965	-6217	Line4_OBS	XX	44.696	170.122	-1662
Line3_OBS		46.3391	170.9441	-6042	Line4_OBS	XX	44.5782	170.166	-1198
Line3_OBS	G-01	46.3794	171.2317	-5952	Line4_OBS	XX	44.4604	170.209	-1205
Line3_OBS	G-02	46.4025	171.3909	-5888	Line4_OBS	XX	44.3426	170.253	-1684
Line3_OBS	G-03	46.4281	171.5444	-5975	Line4_OBS	XX	44.2248	170.296	-1995
Line3_OBS	G-04	46.4531	171.7365	-5771	Line4_OBS	XX	44.1069	170.34	-2713
Line3_OBS	G-05	46.4765	171.8931	-5932	Line4_OBS	XX	43.989	170.383	-3855
Line3_OBS	GD-06	46.5242	172.2416	-6325	Line4_OBS	XX	43.8712	170.426	-5125
Line3_OBS	G-06	46.5787	172.6413	-5926	Line4_OBS	XX	43.7533	170.468	-4469

4.2. Cruise Map

The OBS will be deployed and recovered in two transects along and across the Hawaiian-Emperor seamount chain.



Map showing the location of Leg 2 of the Hawaii-Emperor Seamount Chain experiment. Deployed OBS are indicated by red and magenta colored triangles.

4.3. Known Instrument Risks

Many of the proposed OBS sites are in water depths >~ 5,900 m. These sites will be occupied by the GEOMAR OBS, which are capable of operating at depths of up to 7,300 m. The OBSIC OBS will be deployed at depths <~5,000m.

4.4. Other Science

OBS operations constitute only a portion of the anticipated 2019 fieldwork. 2-D seismic reflection will be acquired along a series of profiles with the 15-km streamer of the Langseth. Multibeam bathymetry, gravity, and magnetics data will also be collected.

5. Vessel Information

All operations will be performed on the R/V Langseth, operated by UNOLS. The PI is responsible for coordinating all vessel logistics.

6. Contacts

Role	Person	Phone	email
OBSIC			
PI			
Vessel Op			
NSF			

7. Cruise/Experiment Photo Request

The OBSIC Management Office would like to make a request for 25 (or more) high quality photos from the field portion of your experiment. Experiment photos are invaluable for promoting OBSIC activities through reports, educational materials, presentations, and the OBSIC website. In the month prior to your cruise(s) we will send instructions that can be handed over to one or more cruise participants to complete. Included in the instructions will be a one-pager that describes the photo request and explains the additional metadata needed, a pre-formatted Excel spreadsheet for recording the photo metadata, and a photo release form to collect signatures. We also welcome video footage, blogs, written documentation, preliminary figures, and other materials in addition to the photos.

8. Feedback

Evaluation forms provide crucial feedback to OBSIC, NSF, and the OBSIC Oversight Committee. The P.I. is expected to complete and return OBSIC evaluation forms. Two evaluation forms are available on the OBSIC website, a cruise evaluation, which should be completed at the conclusion of a cruise, and a data evaluation form, which should be completed after the P.I. has evaluated the OBS data.

The evaluations forms are available on the OBSIC website at:

http://www.obsic.org/experiment-planning/cruise-evaluation-form/
http://www.obsic.org/experiment-planning/data-assessment-form/

9. Acknowledgement

In any publications or reports resulting from the use of OBSIC instruments, please include the following statement in the acknowledgements section:

"*The data used in this research were acquired using instruments from the Ocean Bottom Seismometer Instrument Center (https://obsic.whoi.edu), which is funded by the U.S. National Science Foundation. OBSIC data are archived at the IRIS Data Management Center (www.iris.edu).*"

Please provide the OBSIC Management Office with copies of any publications related to your experiment.

Appendix 4:

OBSIC At-Sea Operations Guidelines

The OBSIC sea-going team involves a combination of personnel of varying experience and expertise. Some members will be permanent OBSIC staff, while others may be temporary team members from the UNOLS Technician Pool. The OBS Expedition Leader and Deck Boss are the primary interfaces with the science party.

OBSIC Expedition Leader (EL)

- Has overall responsibility for the safety of OBSIC personnel and the OBS instrumentation. The EL may terminate OBS operations if conditions or schedule represent undue risk to OBSIC personnel or instrumentation.
- Throughout the cruise, the EL coordinates with the PI, science party, and ship's crew on all aspects of OBS operations to ensure the success of the OBS component of the cruise.
- Draws up and manages the watch schedule for the OBSIC team to ensure efficient and timely OBS operations including OBS programming, debriefing, and data offload and backup.
- Assigns an experienced OBSIC team member to be the OBSIC on-deck lead or deck boss.
- Ensures that science deliverables are provided to the PI in a timely fashion during the cruise and that any deliverables not completed by the end of a cruise due to extenuating circumstances have a clear plan for being completed that is also communicated to the operations manager onshore.
- Sends regular status updates to the OBSIC Management Office.

OBSIC Deck Boss

- In coordination with the ship's Bosun and officers, develops a plan for OBS deployments and recoveries that prioritizes the safety for all personnel involved in deck operations and ensures no damage to the OBS.
- Leads OBS deployment and recovery operations. Assigns tasks, such as tag-line duties, OBS snagging, to OBSIC personnel and science party personnel as necessary. Ensures all personnel wear hard-hats, appropriate footwear, and personal floatation devices. Ensures common hand signals are understood by all before commencing operations.
- In coordinating with the Expedition Leader delegates deck leadership to other OBSIC team members as appropriate if OBS operations are being conducted 24/7.

Other OBSIC Technician(s)

All OBSIC team members support OBS assembly/disassembly, OBS programming and debriefing, deck operations, record keeping, data offloading and data backup.

The OBSIC at-sea operations safety policy adheres 100% with the UNOLS Research Vessel Safety Manual (https://www.unols.org/document/research-vessel-safety-standards-rvss) regardless whether the cruise is supported on a UNOLS on non-UNOLS vessel. In addition, OBSIC personnel comply with the policies described in *Maintaining an Environment of Respect Aboard Ships* (https://www.unols.org/what-unols/maintaining-environment-respect-aboard-ships).