

**National Science Foundation
Geosciences Directorate
Division of Ocean Sciences
Arlington, Virginia**

**FINDING OF NO SIGNIFICANT IMPACT (FONSI)
PURSUANT TO THE NATIONAL ENVIRONMENTAL POLICY ACT (NEPA),
42 U.S.C. 4321, *et seq.*
and DECISION DOCUMENT**

Marine Seismic Survey in the Atlantic Ocean off of Cape Hatteras, 2014

OCE 1348454

Principal Investigators/Institution: Harm Van Avendonk, G. Christeson (Co-PI), University of Texas Institute for Geophysics

Project Title: Collaborative Research: A community seismic experiment targeting the pre-, syn-, and post-rift evolution of the Mid Atlantic U.S. margin

COLLABORATIVE PROPOSALS:

OCE 1348228

Principal Investigators/Institution: B. Dugan, Rice University

OCE 1348124

Principal Investigators/Institution: B. Magnani; M. Hornbach, Southern Methodist University

OCE 1347024

Principal Investigators/Institution: S. Harder, University of Texas – El Paso

OCE 1348342

Principal Investigators/Institution: D. Lizarralde, Woods Hole Oceanographic Institution

OCE 1347498

Principal Investigators/Institution: D. Shillington, A. Becel, Columbia University Lamont-Doherty Earth Observatory

A Final Environmental Assessment (Final EA) was prepared pursuant to the National Environmental Policy Act, 42 U.S.C. 4321, *et seq.* and Executive Order 12114, “Environmental Effects Abroad of Major Federal Actions” (EO 12114) for a collaborative research proposal received by the National Science Foundation (NSF) entitled, “A community seismic experiment targeting the pre-, syn-, and post-rift evolution of the Mid Atlantic U.S. margin.” The collaborative research proposal includes land based activities and a marine seismic survey proposed to be conducted on board the research vessel *Marcus G. Langseth* (R/V *Langseth*) in

the Atlantic Ocean off of Cape Hatteras (herein referred to as the "project" or "proposed activities"). Another component of the collaborative research proposal was determined to have independent utility and was analyzed separately for environmental compliance and is not discussed further herein, although it is considered in the Cumulative Effects section of the Final EA. Dr. Harm Van Avendonk is the scientific lead for the proposed project, making University of Texas Institute for Geophysics the lead institution. Collaborators on the proposed project with Dr. Van Avendonk include: B. Dugan, Rice University; B. Magnani and M. Hornbach, Southern Methodist University; S. Harder, University of Texas – El Paso; D. Lizarralde, Woods Hole Oceanographic Institution; and, D. Shillington, Columbia University Lamont-Doherty Earth Observatory (LDEO).

The Final EA entitled, "Environmental Assessment of a Marine Geophysical Survey by the R/V *Marcus G. Langseth* in the Atlantic Ocean off Cape Hatteras, September-October 2014" (Report # TA8350-1) (Attachment 1), was prepared by LGL Limited environmental research associates (LGL) on behalf of NSF and analyzed the potential impacts of the proposed activities on the human and natural environment, including a marine geophysical survey. The Final EA tiers to the Programmatic Environmental Impact Statement/Overseas Environmental Impact Statement for Marine Seismic Research Funded by the National Science Foundation or Conducted by the U.S. Geological Survey (June 2011) and the Record of Decision (June 2012) (jointly referred to as PEIS). The conclusions from the Final EA were consistent with the conclusions of the PEIS and were used to inform the Division of Ocean Sciences (OCE) management of potential environmental impacts of the proposed activities. OCE has reviewed and concurs with the Final EA findings. The Final EA is incorporated into this Finding of No Significant Impact (FONSI) by reference as if fully set forth herein.

Public Involvement and Coordination with Other Agencies and Processes

NSF posted a Draft Environmental Assessment (Draft EA) on the NSF website for a 30 day public comment period, but received no direct public comments during the open comment period. As the Draft EA included information regarding marine mammals and threatened and endangered species in the proposed survey area, it was used for consultations with other regulatory agencies. Additionally, when preparing the Final EA, NSF took into consideration public comments (Attachment 1, Appendix F) received by the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) during a 30 day public comment period for the Incidental Harassment Authorization (IHA) process and public comments received during the Coastal Zone Management Act (CZMA) process. During MMPA and ESA consultations with NMFS, technical revisions were made to proposed survey track lines, reductions in energy source levels on certain track lines (multichannel seismic (MCS) lines, Figure 1, Attachment 1), and take estimates; these changes were reflected in the Final EA. Additionally, after consideration of public comments received during the NMFS IHA and CZMA public comment periods, updates to information were made in the NSF Final EA, such as more detail on alternative survey timing and other research activities within the proposed survey area and additional material was included, such as on artificial reef sites. The new information included in the NSF Final EA, however, did not alter the overall conclusions of the Draft EA and remained consistent with the PEIS.

Endangered Species Act (ESA)

NSF engaged in formal consultation with NMFS and informal consultation with U.S. Fish and Wildlife Service (USFWS), pursuant to Section 7 of the Endangered Species Act (ESA). NSF received concurrence with USFWS that the proposed activities “may affect” but “are not likely to adversely affect” species under their jurisdiction (Attachment 1, Appendix E). NSF met every two weeks with NMFS and sometimes more frequently during the Section 7 consultation process. NMFS issued a Biological Opinion and an Incidental Take Statement for the proposed activities and consultation was concluded (Attachment 1, Appendix B).

Marine Mammal Protection Act (MMPA)

Columbia University’s Lamont-Doherty Earth Observatory (LDEO) submitted to NMFS an IHA application pursuant to the Marine Mammal Protection Act (MMPA). NSF communicated regularly (often several times per week) by phone and email with NMFS as part of the consultation. As noted above, public comments were received by NMFS on the Notice of Intent to Issue an IHA (Attachment 1, Appendix F). NMFS will respond to the public comments in a Notice in the Federal Register. NMFS issued an IHA on September 12, 2014 (Attachment 1, Appendix A). The IHA includes a description of the required monitoring and mitigation measures which would serve as conditions for conducting the proposed seismic surveys.

NMFS Marine Mammal Stranding Program

Although marine mammal strandings are not anticipated as a result of the proposed activities, during ESA Section 7 and MMPA consultation with NMFS it was recommended that the NMFS Regional Marine Mammal Response Coordinator be contacted regarding the proposed activity. Both NMFS and NSF made contact with the NMFS headquarters Stranding Coordinator and Southeast Fisheries Science Center Marine Mammal Response Coordinator. Per the IHA, should any marine mammal strandings occur during the survey, NMFS, NMFS Greater Atlantic Region Marine Mammal Stranding Network and NMFS Southeast Region Marine Mammal Stranding Network would be contacted.

NOAA Office of National Marine Sanctuaries (ONMS)

The Monitor National Marine Sanctuary (MNMS) would be located outside of the survey area, with a closest approach of ~24km. In accordance with the National Marine Sanctuary Act (NMSA) Section 304(d), a federal agency is expected to consult with a Sanctuary if the proposed agency action is, “likely to destroy, cause the loss of, or injure a sanctuary resource.” Based on the proposed activities, the information and analysis in Attachment 1 Chapters III and IV, the distance of the survey to the sanctuary, and amount of time the vessel would be at its closest points to the sanctuary, NSF would not anticipate injury to any sanctuary resources. NSF contacted ONMS and MNMS staff about the project. ONMS staff confirmed that unless the proposed federal activities were anticipated to cause the destruction, loss, or injury to sanctuary resources, consultation for the proposed activities was not necessary.

Magnuson-Stevens Fishery Conservation and Management Act - Essential Fish Habitat (EFH)

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires that a Federal action agency consult with NMFS for actions that “may adversely affect” Essential Fish Habitat (EFH), including a reduction in quantity or quality of EFH. Information about EFH and

Habitat Areas of Particular Concern (HAPC) were identified within the survey area and were described in the Draft EA and potential effects were also considered. Although the proposed activities may affect EFH and HAPC, the Draft EA concluded that any adverse effects would be localized and transitory and therefore would not likely be significant. Although NSF anticipated no significant impacts to EFH and HAPC, as the proposed activities may affect EFH and HAPC, in accordance with the MSA, NSF requested consultation. NSF contacted the EFH Regional Coordinator of the NMFS Southeast Regional Office (SERO) regarding the program. The SERO EFH Regional Coordinator concluded that the proposed activities may have an adverse effect on EFH. To be consistent with other proposals for seismic activities directly affecting areas of the seafloor within a hardbottom EFH-HAPC, the SERO recommended a 500-meter buffer from coral/hardbottom habitats be maintained for placement of any anchors or anchoring systems (Attachment 1, Appendix D). No other project specific EFH conservation recommendations were provided. NSF agreed to implement the EFH conservation recommendations, and in accordance with Section 305(b)(4)B of the MSA and the implementing regulations at 50CFR 600.920(k), provided a written response to SERO describing how the EFH conservation recommendation would be implemented (Attachment 1, Appendix D). SERO determined the proposed implementation measures to be consistent with the EFH recommendations (Attachment 1, Appendix D). NMFS Office of Protected Resources also consulted for EFH.

Coastal Zone Management Act

NSF considered its obligations for the proposed activities pursuant to the Coastal Zone Management Act (CZMA) (16 USC §1451, *et seq.*). NSF reviewed the Federal Consistency Listings for the states near the survey, North Carolina (NC) and Virginia (VA), and determined that the proposed activities were not listed. Given the proposed land and marine research activities, including the size of the source level for the marine seismic survey and proximity to the NC coastal zone, NSF anticipated that there could be effects to NC coastal resources. Given the proposed activities and distance to the Virginia coastal zone, NSF did not anticipate effects to VA coastal resources. NSF contacted the VA Department of Environmental Quality (DEQ) regarding the project and the VA DEQ concurred that there would be no effect to VA coastal resources and the state of VA did not seek review of the unlisted activities. NSF did not receive a request from any other state for a consistency review of the unlisted activities. NSF also discussed the proposed project with the NOAA Office of Ocean and Coastal Resource Management (OCRM) to confirm the agencies responsibilities under CZMA for the proposed unlisted activities.

NSF submitted a Consistency Determination to the North Carolina DCM on June 18, 2014 (Attachment 1, Appendix G), concluding that the proposed activities would be consistent to the maximum extent practicable with the enforceable policies of North Carolina's federally approved coastal management program (CMP). The CZMA federal consistency process included a public comment period; although not received as part of the NSF NEPA process, NSF took into consideration comments received when preparing the Final EA. On September 8, 2014 the DCM concurred that the proposed activities would be consistent to the maximum extent practicable with NC enforceable policies. DCM requested additional monitoring and mitigation measures identified in the Final Programmatic Environmental Impact Statement issued by the Bureau of Ocean Energy Management in February 2014 (Attachment 1, Appendix G). NSF provided a response to the NC DCM noting that, although not linked to the enforceable policies of the NC

federally approved CMP, NSF would comply with the additional monitoring and mitigation measures to the maximum extent practicable (Attachment 1, Appendix G).

Project Objectives and Context

The purpose of the proposed activities is to collect data along the mid-Atlantic coast of the Eastern North American Margin (ENAM). The study area covers a portion of the rifted margin of the eastern U.S., from unextended continental lithosphere onshore to mature oceanic lithosphere offshore. The data set would therefore allow scientists to investigate how the continental crust stretched and separated during the opening of the Atlantic Ocean, and what the role of magmatism was during continental breakup. The study also covers several features representing the post-rift modification of the margin by slope instability and fluid flow. The proposed activities would continue to meet NSF's critical need to foster a better understanding of Earth processes.

The project is proposed to be a collaborative research effort, supporting scientists and graduate students.

Summary of Proposed Action and Alternatives

Proposed Action

The proposed research activities would include a marine seismic survey (or "survey") and associated land-based activities. The survey procedures would be similar to those used during previous seismic surveys conducted by LDEO, using conventional seismic methodology. The survey location is proposed for the Atlantic Ocean off of Cape Hatteras, within the Exclusive Economic Zone of the U.S. and international waters, and outside of state waters (Attachment 1, Figure 1). The survey would consist of approximately (~) 5320 km of transect lines (including turns) in water depths of ~20 m to ~5300 m deep. The survey would involve the R/V *Langseth* as the source vessel which is proposed to deploy an array of 36 or 18 airguns with a total discharge volume of ~6600 in³ or ~3300 in³. The receiving system is proposed to consist of hydrophone streamers and ocean bottom seismometers (OBSs). The OBSs would be deployed and retrieved by a second vessel, the R/V *Endeavor*. As the airgun array is towed along the survey lines, the hydrophone streamers or OBSs would receive the returning acoustic signals; the hydrophone streamer would transfer the data to the on-board processing system while the OBSs would record the returning acoustic signals internally for later analysis. In addition to the operations of the airgun array, a multibeam echosounder (MBES), sub-bottom profiler (SBP), and acoustic Doppler current profiler (ADCP) are proposed to be operated from the R/V *Langseth* continuously throughout the cruise, but not during transit.

The survey is proposed to be a ~38 day survey, taking place during the period allowable under the IHA, September 15, 2014 to October 31, 2014. Seismic operations would be carried out for ~33 days, with the balance of the cruise occupied in transit (~ 2 days) and equipment set-up and retrieval (~3 days). Some deviation in the length of the survey may be required, depending on logistics and weather; however, seismic operations would only occur during the timeframe allowable under the IHA.

Land-based research activities would involve passive and active components. Small, passive Reftek seismometers would be placed at or just under the soil surface along two 200-km SE-NW

transects, primarily beside state roads. Trillium sensors deployed at coastal sites would be buried in three coastal communities, well above the high-tide line and not on the beach. The active source component would be limited to 14 small detonations along the 200-km transects in pre-disturbed areas with easy access, such as along the edges of agricultural fields and along logging roads, buried ~25 m deep and sealed over the upper 15 m. No activities would occur in any protected lands, preserves, sanctuaries, or Critical Habitat for ESA-listed species.

Alternatives to Proposed Action

One alternative to the proposed action would be to conduct the marine seismic survey and associated land-based activities at an alternative time. Constraints for vessel operations and availability of equipment (including the vessel) and personnel would need to be considered for alternative survey times. Additionally, weather constraints would inhibit vessel operations during certain times of year, such as winter. Avoiding critical time periods for sensitive species, such as North Atlantic right whale migration periods, is another factor for consideration in survey timing. Limitations on scheduling the vessel include the additional research studies planned on the vessel in 2014 and beyond. Other activities, including research activities, planned within the region also would need to be considered if the survey were scheduled for an alternative time.

Another alternative to conducting the proposed activities would be the “No Action” alternative, i.e., do not issue an IHA and do not conduct the operations. If the planned research were not conducted, the “No Action” alternative would result in no disturbance to marine species attributable to the proposed activities, but geological data of considerable scientific value and relevance increasing our understanding of how the continental crust stretched and separated during the opening of the Atlantic Ocean, and the role of magmatism and the project objectives as described above would not be met.

Alternative technologies to conduct marine geophysical surveys were considered in the PEIS (Chapter 2). At the time of the publication of the PEIS, however, none of the alternative technologies investigated were fully developed and available to meet the purpose and need of marine geophysical research. NSF and LDEO have re-investigated alternative technologies, and have verified that currently no other technologies are commercially available to conduct the proposed action and meet the purpose and need. For these reasons, this alternative was eliminated from further analysis.

Conducting the proposed activity at an alternative location would not meet the purpose and need of the research activities as the proposed location is the most ideal to study the rifted margin along the mid-Atlantic coast of the Eastern North American Margin. Although considered, this alternative was eliminated from further analysis.

Summary of environmental consequences

Proposed Action

The potential effects of sounds from airguns on marine species, mammals and sea turtles of particular concern, are described in detail in Attachment 1 (Chapter IV and PEIS Chapters 3 & 4) and might include one or more of the following: tolerance, masking of natural sounds, behavioral disturbance, and at least in theory, temporary or permanent hearing impairment, or

non-auditory physical or physiological effects. It is unlikely that the proposed action would result in any cases of temporary or especially permanent hearing impairment, or any significant non-auditory physical or physiological effects. Some behavioral disturbance is expected, if animals are in the general area during seismic operations, but this would be localized, short-term, and involve limited numbers of animals. The potential effects from the other proposed acoustic sources were also considered, however, they would not be likely to have a significant effect on the environment (Attachment 1, Chapter IV and PEIS Sections 3.4.7, 3.6.7, and 3.7.7).

The action includes an extensive monitoring and mitigation program to further minimize potential impacts on the environment. Mitigation efforts include pre-cruise planning activities and operational activities (Attachment 1, Chapters II and IV). Pre-cruise planning mitigation activities included consideration of energy source optimization/minimization; survey timing (i.e., environmental conditions: seasonal presence of animals and weather; and, scientific personnel and equipment availability); and calculation of mitigation zones. The operational mitigation program would further minimize potential impacts to marine species that may be present during the conduct of the research to a level of insignificance. As detailed in Attachment 1 (Chapters II and IV), the IHA (Attachment 1, Appendix A), Biological Opinion (Attachment 1, Appendix B), operational monitoring and mitigation measures would include: ramp ups; two dedicated observers maintaining a visual watch during all daytime airgun operations; two observers monitoring before and during ramp-ups during the day; passive acoustic monitoring (PAM) during the day and night to complement visual monitoring (unless the system and back-up systems are damaged during operations); and, power downs (or, if necessary, shut downs) when marine mammals or sea turtles are detected in or about to enter designated exclusion zones. The fact that the airgun array, as a result of its design, directs the majority of the energy downward, and less energy laterally, would also be an inherent mitigation measure. In accordance with the NMFS EFH conservation recommendation, a 500m buffer would be maintained for placement of OBSs within any designated HAPCs. In their consistency concurrence letter, the NC DCM requested that NSF employ the monitoring and mitigation measures identified in the BOEM PEIS for seismic surveys. NSF has agreed that it would implement those to the maximum extent practicable (Attachment 1, Appendix G)

With the planned monitoring and mitigation measures, unavoidable impacts to marine species that could be encountered would be expected to be minimal, and limited to short-term, localized changes in behavior and distribution near the seismic vessel. At most, effects on marine mammals may be interpreted as falling within the U.S. Marine Mammal Protection Act (MMPA) definition of "Level B Harassment" for those species managed by NMFS. No long-term or significant effects would be expected on individual marine mammals, sea turtles, seabirds, fish or the populations to which they belong or on their habitats.

Recreational and commercial fisheries activities would not be precluded in the survey area. LDEO would coordinate with local SCUBA diving organizations and shops to avoid space-use conflicts. LDEO would also work with the local USCG Office to issue Notices to Mariners to coordinate and provide updates on operations in the area. Given the short duration of the survey and the temporary nature of potential environmental impacts, impacts to the local economy, such as to commercial/recreational fisheries and SCUBA diving industry would not be anticipated.

Impacts to land-based endangered or threatened species would not be anticipated. Land-based endangered or threatened species would be avoided during research activities. Only four of the potential 12 ESA-listed species would be anticipated to be encountered during land-based activities due to their potential habitats (i.e., along roadsides): rough-leaved loosestrife, Michaux's sumac, American chafseed, and Cooley's meadowrue. Because of the nature of their habitat, the other ESA-listed species would not be anticipated to be encountered. Researchers would inspect areas prior to deploying any equipment, thereby avoiding disturbance of any of the critical species. Therefore, no significant direct or indirect impacts on terrestrial endangered or threatened species would be anticipated from the proposed activities.

Alternatives to Proposed Action

Conducting a survey with associated land-based activities at an alternative time would result in few net benefits. Marine mammals and sea turtles are expected to be found throughout the proposed survey area and throughout the time during which the project would occur. Some marine mammal species are expected to occur in the area year-round, so altering the timing of the proposed project likely would result in no net benefits for those species. Some migratory species are expected to be farther north at the time of the survey, such as the North Atlantic right whale, so the survey timing is beneficial for those species. Weather (i.e., operational safety of crew and vessel when deploying seismic gear, such as during winter months) and availability of vessel, equipment, and personnel are also factors that need to be considered when scheduling the activities. Through inspection, avoidance, and relocation of activities, impacts to land-based endangered species would not be anticipated regardless of the timing of research activities.

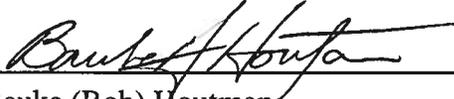
The "No Action" alternative would remove the potential of the limited direct and indirect environmental consequences as described. However, it would preclude important scientific research from going forward that has distinct potential to address important environmental concerns related to earth processes. The "No Action" alternative would result in a lost opportunity to obtain important scientific data and knowledge relevant to a number of research fields and to society in general. The collaboration, involving PIs and students from a number of universities, would be lost along with the collection of new data, interpretation of these data, and introduction of new results into the greater scientific community and applicability of this data to other similar settings. Loss of NSF support often represents a significant negative impact to the academic infrastructure. The "No Action" alternative would not meet the purpose and need of the proposed action.

Conclusion and Decision

NSF has reviewed and concurs with the conclusions of the Final EA (Attachment 1) that implementation of the proposed activity will not have a significant impact on the environment. Consequently, implementation of the proposed activity will not have a significant direct, indirect or cumulative impact on the environment within the meaning of the National Environmental Policy Act (NEPA) or Executive Order 12114. Because no significant environmental impacts will result from implementing the proposed action, an Environmental Impact Statement is not required and will not be prepared. Therefore, no further study under NEPA or Executive Order 12114 is required. NSF's compliance with the Marine Mammal Protection Act, Endangered Species Act, Coastal Zone Management Act, and Essential Fish Habitat under the Magnuson-Stevens Fishery Conservation and Management Act has been completed. Accordingly, on behalf

of NSF, I authorize the issuance of a Finding of No Significant Impact for the proposed research activities which include a marine seismic survey proposed to be conducted on board the Research Vessel *Marcus G. Langseth* in the Atlantic Ocean off of Cape Hatteras during the effective time period of the IHA. I hereby approve the Proposed Action to commence.

Due to personnel and logistical issues, however, the active land-based activities will be deferred to a later time, most likely spring 2015. If there are any changes to the proposed implementation of the active land-based activities that would cause impacts to endangered or threatened species within the land-based action area, consultation will be reinitiated with any regulating agencies, such as the USFWS, at that time.



Bauke (Bob) Houtman
Integrative Programs Section Head
Division of Ocean Sciences

9/12/14

Date

