National Science Foundation
Geosciences Directorate
Division of Ocean Sciences
Alexandria, Virginia

FINDING OF NO SIGNIFICANT IMPACT (FONSI) PURSUANT TO THE NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) AND EXECUTIVE ORDER 12114 AND DECISION DOCUMENT (DD)

Marine Geophysical Research by R/V *Marcus G. Langseth* off North Carolina, Northwest Atlantic Ocean, 2023

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Project Title: Collaborative Research: Neogene history of mass transport deposits offshore North Carolina

A Final Environmental Assessment (Final EA) was prepared for the above noted proposed research project funded by the National Science Foundation (NSF) (Proposed Action). The Proposed Action would involve marine geophysical surveys (or "seismic surveys") and retrieval of cores containing seafloor sediment in the Northwest Atlantic Ocean within International Waters and the U.S. EEZ, but entirely outside of state waters. The Proposed Action would involve the Principal Investigators (PI) noted above, as well as collaborators not funded by NSF, including other academic participants, a USGS researcher and technical staff. The Proposed Action would involve R/V *Marcus G. Langseth (Langseth)* which is owned and operated by Columbia University's Lamont-Doherty Earth Observatory (LDEO).

The Final EA entitled, "*Draft Environmental Assessment/Analysis of Marine Geophysical Surveys by R/V Marcus G. Langseth off North Carolina, Northwest Atlantic Ocean*" (Attachment 1) analyzed the potential impacts on the human and natural environment associated with the Proposed Action pursuant to the National Environmental Policy Act (NEPA) and Executive Order 12114, "Environmental Effects Abroad of Major Federal Actions" (EO 12114). Due to their involvement with the Proposed Action, the USGS requested to be a Cooperating Agency. The Draft EA tiers to an EA prepared for a similar seismic survey funded by NSF in 2014, "Environmental Assessment of a Marine Geophysical Survey by the R/V *Marcus G. Langseth* in the Atlantic Ocean off Cape Hatteras, September–October 2014", and an EA for a USGS seismic survey, "Final Environmental Assessment for Seismic Reflection Scientific Research Surveys During 2014 and 2015 in Support of Mapping the US Atlantic Seaboard Extended Continental Margin and Investigating Tsunami Hazards". The EA also 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 Record of Decision (June 2012), referred to herein as PEIS. This Finding of No Significant Impact/Decision Document (FONSI/DD) also incorporates by reference the analyses and conclusions set forth in the IHA and BiOp/Incidental Take Statement (ITS) issued by the U.S. National Oceanic and Atmospheric Administration's National Marine

Fisheries Service (NMFS) for this Proposed Action. The conclusions from the Final EA, and other federal regulatory processes, were consistent with the conclusions of the PEIS and were used to inform the Division of Ocean Sciences (OCE) management and management of the U.S. Geological Survey of potential environmental impacts of the surveys. OCE has reviewed and concurs with the Final EA findings. The Final EA is incorporated into this FONSI/DD by reference as if fully set forth herein.

Project Objectives and Context

The primary goal of the seismic surveys is to collect data and measurements to examine large submarine landslide behavior over the past 23 million years in a region offshore North Carolina that has experienced large, recent submarine landslides. Submarine landslides threaten large population centers along the coasts with possible tsunamis and move material from the shallow to the deep-sea during margin evolution. To achieve the project goals, the researchers propose to conduct seismic surveys utilizing the airgun capabilities of R/V *Langseth*, along with echosounders, piston cores, and magnetic, gravity, and heat flow measurements. Representative seismic survey tracklines are shown in Attachment 1, Figure 1; however, the tracklines could occur anywhere within the defined survey area. No land-based activities are proposed.

Summary of Proposed Action and Alternatives

The procedures of the Proposed Action would be similar to those used during previous 2-D seismic surveys carried out by NSF and would use conventional seismic methodology. The seismic surveys would involve one source vessel, R/V *Langseth*, which would deploy an array of 18 airguns as an energy source with a total volume of ~3300 cubic inch (in^3). The receiving system would consist of a 5-kilometer (km) or 600-m solid-state hydrophone streamer. As the airgun array is towed along the survey lines, the hydrophone streamer would receive the returning acoustic signals. In addition to the operations of the airgun array, other acoustic sources, including a split beam echosounder (SBES), multibeam echosounder (MBES), sub-bottom profiler (SBP), and an Acoustic Doppler Current Profiler (ADCP), would be operated continuously from R/V *Langseth* during the seismic surveys; acoustic pingers would also be used at times during the survey. The proposed seismic surveys would occur in water depths ranging from approximately (~) 200–5500 meters (m).

Approximately 10–20 cores would be collected via R/V *Langseth* throughout the survey area above locations where strong Bottom Simulating Reflectors have been imaged and/or near the locations of seafloor gas seeps; the locations would be determined during the cruise based on the seismic data collected. Coring operations would include collection of gravity and piston cores at coring sites. Thermal data would be collected with outrigger temperature probes mounted to the outside of a piston core barrel. The core data would allow for the documentation of sediment physical properties and pore fluids. Depending upon logistics, availability of staff, and other considerations, coring activities may take place in a separate, future cruise. Coring activities would not be conducted in Cape Lookout HAPC.

The proposed surveys would take place in spring and/or summer 2023 (May–September) for a period of approximately 33 days, including 28 days of seismic operations, 3 days of piston coring and heat flow measurements, and 2 days of transit. Some deviation in the duration of the surveys and ports of call may be required, depending on logistics, weather, COVID-19, etc.; however, seismic survey operations would only occur in the area noted and timeframe allowable under the IHA and other relevant documentation.

Another alternative to conducting the Proposed Action would be the "No Action" alternative (i.e., the proposed research operations would not be conducted). The "No Action" alternative would result in no disturbance to marine species attributable to the Proposed Action, but geological data of scientific value and relevance increasing our understanding of tsunami hazards associated with submarine landslides in the Northwest Atlantic Ocean would not be collected. The purpose and need for the proposed activity would not be met through the "No Action" alternative.

Summary of environmental consequences

The Final EA includes analysis on the affected environment (Chapter III) and the potential effects of the Proposed Action on the environment (Chapter IV). Potential impacts of the Proposed Action on the environment would be primarily a result of the operation of the airgun array. The potential effects of sounds from airguns on marine species, including 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 Chapter 3). Any bottom disturbances from coring activities are anticipated to be minor and temporary.

The Proposed Action includes an extensive monitoring and mitigation program to minimize potential impacts on the environment. Mitigation efforts include pre-cruise planning activities and operational activities (Attachment 1, Chapters II and IV; and PEIS Section 2.4.1.1). 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 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 proposed research to a level of insignificance. As detailed in Attachment 1 (Chapters II and IV), the IHA and BiOp/ITS issued by NMFS, the Proposed Action would include operational monitoring and mitigation measures, such as, but not limited to: visual observations; passive acoustic monitoring; enforcement of exclusion and buffer zones; pre-clearance and ramp ups, shutdowns of the airguns; monitoring and reporting. 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. The acoustic source would also be powered down (or, if necessary, shut down) in the event Endangered Species Act (ESA)-listed sea turtles and seabirds (diving/foraging) were observed within a designated EZ. Observers (and vessel crew) would monitor for any impacts the acoustic sources may have on fish. Per the IHA, LDEO would also notify NMFS Southeast Regional Office via email the start and end date of seismic operations in the survey area. LDEO and its contractors are committed to applying these measures in order to minimize any effects on marine mammals, sea turtles, seabirds, and fish, and other potential environmental impacts.

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. Although NSF calculated predicted distances to the Level A thresholds based on current NMFS Technical Acoustic Guidance[1], per the IHA, NMFS instead established a fixed operational 500 m exclusion zone and 1,000 m buffer zone for the surveys. Level A takes were requested for the remote possibility of low-level physiological effects; however, because of the characteristics of the Proposed Action and proposed monitoring and mitigation measures, in addition to the general avoidance

[1] 2018 Revision to: Technical guidance for assessing the effects of anthropogenic sound on marine mammal hearing (version 2.0). Underwater thresholds for onset of permanent and temporary threshold shifts. Office of Protected Resources, NMFS, Silver Spring, MD.

by marine mammals of loud sounds, Level A takes are considered highly unlikely. The predicted distances for the Level B zones are based on the 160 dB re 1 μPa SPL isopleth, per current NMFS approach on Level B harassment.

In the Final EA, it was noted that the acoustic source would be shut down for any large whale with a calf and aggregation of large whales (defined as six or more) observed at any distance from the vessel during operations. In the IHA, however, rather than a shutdown, NMFS required an extended 1500-m EZ to be established for beaked whales, dwarf and pygmy sperm whales, a large whale with a calf, and groups of six or more large whales encountered during the survey effort. During operations, the IHA requirement (extended 1500-m EZ) would be followed for these special conditions and species. Per the IHA, the shutdown requirement would be waived for small dolphins including *Delphinus, Lagenodelphis, Stenella, Steno, and Tursiops*.

Mitigation, monitoring, and reporting requirements were incorporated into the Final EA, the FONSI/DD, and/or the LDEO Science Support Plan; Protected species observers (PSOs) would take the lead in ensuring compliance with all monitoring and mitigation measures. NMFS included vessel strike avoidance measures in the IHA; however, as noted in the Final EA, R/V *Langseth* (and other vessels in the U.S. Academic Research Fleet) have no history of marine mammal strikes. No long-term or significant effects from the Proposed Action would be expected on individual marine mammals, sea turtles, seabirds, fish, the populations to which they belong, or their habitats.

The results of the cumulative impacts analysis in the PEIS indicated that there would not be any significant cumulative effects to marine resources from the proposed NSF-funded marine seismic research, including the combined use of airguns and other acoustic sources (e.g., multibeam echosounders, etc.). However, the PEIS also stated that cruise-specific cumulative effects analysis would be conducted, "allowing for the identification of other potential activities in the area of the proposed seismic surveys that may result in cumulative impacts to environmental resources." The potential cumulative effects of the Proposed Action were evaluated in Section 4.1.6 of the Final EA. Due to the location of the Proposed Action, activities in the area around the survey vessel would be anticipated to include other research, military, offshore energy development, vessel traffic, fisheries, and whale watching activities. Although there are a number of shore-accessible SCUBA diving sites along the coast of North Carolina (Draft EA, Section 3.9), the proposed activities would occur in water depths >100 m, outside the range for typical recreational SCUBA diving. Most whale watching activities are conducted close to the coast. Given the distance from shore to the survey area, the likely distance from any marine mammal watching activities, and the short and temporary duration of the surveys, it would be unlikely that the marine mammal watching industry would be affected by the Proposed Action. Fisheries activities would not be precluded in the survey area; however, a safe distance would need to be kept from R/V *Langseth* to avoid possible entanglement with the towed airgun array and coring activities. No fish kills or injuries were observed during any previous NSF-funded seismic survey activities. Any potential conflicts with ocean users would be avoided through Notice to Mariners and direct radio communications during the surveys. Considering the limited time that the planned seismic surveys would take place close to shore, the brief period of operations, and the temporary nature of potential environmental impacts, the proposed project is not expected to have any significant impacts on other activities in the area.

The "No Action" alternative would remove the potential for the limited direct and indirect environmental consequences as described above. However, the "No Action" alternative would preclude important scientific research from going forward that would provide new constraints for examining tsunami hazards associated with submarine landslides. The "No Action" alternative would result in a lost opportunity to obtain important scientific data and knowledge relevant to the geosciences and to society in general. The collaboration, involving academic researchers, students, and a cooperating federal agency, would be lost, as would the opportunity to collect and interpret new data and provide new results to the greater scientific

community. Loss of NSF support often represents a significant negative impact to the academic infrastructure, including the professional and academic careers of the researchers, students, ship technicians and crew who are part of the U.S. Academic Research Fleet. The "No Action" alternative would not meet the purpose and need of the Proposed Action.

Coordination with Other Agencies and Processes

Based on discussions with NMFS during MMPA and ESA processes, minor refinements to the information provided in the Draft EA were made. The new information, which was included in the Final EA, did not alter the overall conclusions of the Draft EA and remained consistent with the PEIS. NSF, acting also on behalf of the USGS as a cooperating agency, coordinated with NMFS to complete the Final EA prior to issuance of the IHA and BiOp/ITS.

Compliance with other federal statutes and regulatory processes are summarized below and in further detail in the Final EA, Section 4.1.8.

(a) Endangered Species Act (ESA)

On 7 October 2022, NSF submitted a formal ESA Section 7 consultation request, including the Draft EA, to NMFS for the proposed activity on behalf of itself and USGS. On 5 May 2023, NMFS issued a BiOp and ITS (Attachment 2).

(b) Marine Mammal Protection Act (MMPA)

On 12 October 2022, on behalf of the action proponents, including NSF, PI Institutions, and USGS, LDEO submitted to NMFS an IHA application pursuant to the U.S. MMPA for "taking by harassment" (disturbance) of small numbers of marine mammals during the proposed seismic surveys. On 23 March 2023, NMFS issued in the Federal Register a notice of intent to issue an IHA for the surveys and a 30-day public comment period. NMFS issued an IHA for the proposed activity on 5 May 2023 (Attachment 3).

(c) Essential Fish Habitat (EFH) (Magnuson-Stevens Act)

NSF submitted, on behalf of itself and USGS, an EFH consultation request on 7 November 2022 to NMFS. On 5 December 2022, NMFS concurred the seismic surveys were unlikely to directly or indirectly reduce the quantity or quality of EFH and determined the effects on EFH from approximately 20 gravity and piston cores in the proposed survey area would be minimal, and accordingly, provided no EFH conservation recommendations for the Proposed Action.

(d) Coastal Zone Management Act (CZMA)

NSF submitted, on behalf of itself and USGS, a Negative Determination to the state of North Carolina on 16 December 2022. NSF received concurrence from the state that the Proposed Action was consistent with North Carolina's approved coastal management program to the maximum extent practicable on 16 March 2023.

Conclusion and Decision

NSF has reviewed and concurs with the conclusions of the Final EA (Attachment 1) that implementation of the Proposed Action will not have a significant impact on the environment. Consequently, implementation of the Proposed Action will not have a significant direct, indirect or cumulative impact on the environment within the meaning of NEPA or EO 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 EO 12114 is required. As described above, NSF's compliance with the ESA, MMPA, EFH, and CZMA is completed.

In sum, NSF concludes that implementation of the Proposed Action will not result in significant impacts after full consideration of the Final EA; the PEIS; the IHA and BiOp/ITS issued by NMFS; and the entire environmental compliance record. Accordingly, on behalf of NSF, I authorize the issuance of a Finding of No Significant Impact for the Proposed Action, the marine seismic surveys and coring activities proposed to be conducted on board Research Vessel *Marcus G. Langseth* in the Northwest Atlantic Ocean, during the effective time period of the IHA, and hereby approve the Proposed Action to commence.

James McManus May 7, 2023

James McManus Date
Division Director
Division of Ocean Sciences

Attachment 1: Draft Environmental Assessment/Analysis of Marine Geophysical Surveys by R/V *Marcus G. Langseth* off North Carolina, Northwest Atlantic Ocean
Attachment 2: NMFS Biological Opinion/Incidental Take Statement
Attachment 3: NMFS Incidental Harassment Authorization