

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

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

Marine Seismic Survey in the Southwest Pacific Ocean, January - February 2009

OCE # 0426408

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Institution: Washington University

Project Title: Collaborative Research: Crustal Accretion and Mantle Processes Along the Subduction-Influenced Eastern Lau Spreading Center

This constitutes a final environmental assessment (EA) by the National Science Foundation (NSF) for a marine seismic survey proposed to be conducted on board the research vessel (R/V) *Marcus G. Langseth* in the Southwest Pacific Ocean in January – February 2009. This EA is based, in part, on an Environmental Assessment report prepared by LGL Limited environmental research associates (LGL) on behalf of NSF, entitled, “Environmental Assessment of a Marine Geophysical Survey by the R/V *Marcus G. Langseth* in the Southwest Pacific Ocean, January-February 2009” (Report #TA4686-1) (Attachment 1). The conclusions from the LGL report were used to inform the Division of Ocean Sciences (OCE) management of potential environmental impacts of the cruise. OCE has reviewed and concurs with the report’s findings. Accordingly, the LGL report is incorporated into this EA by reference as if fully set forth herein.

Project Objectives and Context

This study is part of NSF’s RIDGE 2000 program Lau ISS initiative, an interdisciplinary research program focused on understanding the combined mass, fluid, thermal, and biological processes interacting within the Eastern Lau Spreading Center (ELSC). The proposed survey’s main purpose is to image the magmatic systems and thermal structure at the ELSC. These images would increase our understanding of the magma supply and volcanic processes along the ridge and the source of heat for the hydrothermal systems that support the biological communities. This information could in turn be used to understand how mid-ocean ridges influence global climatic conditions, and to obtain improved locations and source properties of regional earthquakes. The information is vital to understanding plate tectonic processes and their effects on earthquake occurrence and distribution.

Summary of Proposed Action and Alternatives

The seismic survey will be conducted in the EEZ of Tonga (See Attachment 1, Figures 1 and 2) and will not approach land closer than 42 kilometers. Water depths in the survey area range from 1000 meters to 2600 meters. The survey will involve one source vessel, the R/V *Marcus G. Langseth*, which will deploy an array of 36 airguns as an energy source and a receiving system consisting of approximately 55–64 Ocean Bottom Seismometers (OBSs). A relatively short (up to 6 kilometer) hydrophone streamer may also be used. The planned seismic survey will consist of approximately 3650 kilometers of survey lines. To understand the ridge magma plumbing system and thermal structure of the ELSC, the delineation of lateral heterogeneity in physical properties at scales of several hundred meters to a few kilometers is needed. To achieve this, the proposed seismic transects will allow the tomographical imaging in three-dimensions of the physical properties of the crust and uppermost mantle of this area.

One alternative to the proposed action would be to conduct the survey at an alternative time. Constraints for vessel operations and availability of equipment (including the vessel) and personnel would need to be considered for alternative cruise times. Limitations on scheduling the vessel include the additional research studies planned on the vessel for 2009 and beyond. Other national and international research activities planned within the region also would need to be considered. Alternative survey times offer minimal advantages in this location. Given the limited weather window for the operations, and the fact that few baleen whales are expected to occur in Lau Basin in austral summer, altering the timing of the proposed project likely would result in no net benefits.

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 mammals or sea turtles attributable to the proposed activities, but geological data of considerable scientific value and relevance in understanding earthquake potential and global climate would not be acquired and the project objectives as described above would not be met. 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 institutions, investigators, students, and technicians involved would lose collection of new data, thus halting support of the greater effort to process and interpret these data, and introduce new results into the greater scientific community. Loss of NSF support often represents a significant negative impact to the academic infrastructure.

Summary of environmental consequences

The potential effects of sounds from airguns on marine species, mammals and turtles of particular concern, are described in detail in Attachment 1 (pages 39-69 and Appendices B-E) 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 project will result in any cases of temporary or especially permanent hearing impairment, or any significant nonauditory physical or physiological effects. Some behavioral disturbance is expected, if animals are in the general area during seismic operations, but this will be localized, short-term, and involve limited numbers of animals.

The proposed activity will include a mitigation program to further minimize potential impacts on marine mammals that may be present during the conduct of the research to a level of insignificance. As detailed in Attachment 1 (pages 8-16; and 53), mitigation measures that will be adopted, include: ramp ups, minimum of one dedicated observer maintaining a visual watch during all daytime airgun operations, two observers 30 minutes before and during ramp ups during the day and at night (and when possible at other times), no start ups during poor visibility or at night unless at least one airgun has been operating, passive acoustic monitoring (PAM) via towed hydrophones during both day and night to complement visual monitoring (when practicable), 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 relatively wide spacing of the shots, in time and space, is an inherent mitigation measure relative to more typical seismic surveys with closer shotpoints.

With the planned monitoring and mitigation measures, unavoidable impacts to each species of marine mammal and turtle that could be encountered are expected to be limited to short-term, localized changes in behavior (such as brief masking of natural sounds) 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 the National Marine Fisheries Service. No long-term or significant effects are expected on individual marine mammals, sea turtles, or the populations to which they belong or on their habitats.

The proposed project will have little impact on fish resources, and the only effect on fish habitat would be short term disturbance that could lead to temporary relocation of pelagic fish species or their food. Impacts of seismic sounds on some pelagic seabirds are possible, although none are expected to be significant to their populations. Impacts on benthic invertebrates are unlikely.


Marine mammals are expected to be found throughout the proposed study area. However, baleen whales are migratory in this area. During the proposed period of January–February, most of the baleen whales will be on summer feeding grounds in or near the Antarctic. Thus, the seismic survey is proposed for a period when marine mammal numbers (especially baleen whales) in the area are expected to be reduced (see Attachment 1, Section 1 and pages 68-69). A survey at an alternative time therefore may be disadvantageous.

The “no action” alternative would remove the potential of the limited direct environmental consequences as described. However, it would preclude important scientific research from going forward that has distinct potential to address environmental processes/concerns.

Conclusions

NSF has reviewed and concurs with the conclusions of the LGL environmental assessment report (Attachment 1) that supports the conclusion that implementation of the proposed activity will not have a significant impact on the environment. Consequently, implementation of the proposed activity is not a major federal action having a significant impact on the environment within the meaning of NEPA, and an environmental impact statement will not be prepared. Therefore, on behalf of NSF, I authorize the issuance of a Finding of No Significant Impact for the marine

seismic survey proposed to be conducted on board the research vessel *Marcus G. Langseth* in the Southwest Pacific Ocean in January – February 2009.



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Date