

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

**DRAFT ENVIRONMENTAL ASSESSMENT (DEA)
PURSUANT TO THE NATIONAL ENVIRONMENTAL POLICY ACT,
42 U.S.C. 4321, *et seq.***

**Marine Geophysical Survey by the R/V *Thompson*
in the western tropical Pacific Ocean
November - December 2011**

OCE# 1029965

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Project Title: Collaborative research: a deep-AUV magnetic and seismic study of the Hawaiian Jurassic crust - the global significance of Jurassic magnetic anomalies

This constitutes a draft environmental assessment prepared by the National Science Foundation (NSF) for a marine seismic survey proposed to be conducted in November – December 2011 on board the research vessel (R/V) *Thompson* in the western tropical Pacific Ocean. This analysis 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 *Thompson* in the Western Tropical Pacific Ocean, November – December 2011” (Report #TA8009-1) (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 analysis by reference as if fully set forth herein.

This environmental assessment also serves to support National Marine Fisheries Service (NMFS) NEPA compliance associated with its proposed issuance of an Incidental Harassment Authorization (IHA).

Project Objectives and Context

The purpose of the proposed study is to conduct a seismic survey in the western tropical Pacific Ocean as part of an integrated magnetic and seismic study of the Hawaiian Jurassic crust. The variations in intensity and direction of the Earth’s magnetic field during the Jurassic time period (~145–180 million years ago) will be studied using a near-bottom marine magnetic field survey using the autonomous underwater vehicle (AUV) SENTRY. A subsequent seismic reflection and refraction survey over the magnetic profiles will assess the amount of Cretaceous volcanic overprint of the Hawaiian Jurassic crust.

Summary of Proposed Action and Alternatives

The procedures to be used for the survey would be similar to those used during previous seismic surveys and would involve conventional seismic methodology. The proposed survey would take place from November through December 2011 within the western tropical Pacific Ocean, in international waters and within the Exclusive Economic Zone of the Wake Island, United States, and possibly in the EEZ of the Republic of the Marshall Islands (See Attachment 1, Figure 1). The seismic survey would consist of approximately 1600 km of transect lines (including turns) in water depths ranging from 2000 meters to 6000 meters. During the survey, two Generator-Injected (GI) airguns would be deployed from the R/V *Thompson* as an energy source; it would be operated as a single array consisting of 2 airguns, with a maximum discharge volume of ~210 cubic inches (in³). The GI airguns would be operated along two parallel lines 10 km apart and 800 km long that are also the lines along which magnetic profiles would be acquired using the Autonomous Underwater Vehicle (AUV) SENTRY. A towed hydrophone streamer would receive the returning acoustic signals and transfer the data to the on-board processing system. In addition, 50 Ultra Electronics AN/SSQ-53D(3) directional, passive sonobuoys would be deployed in order to record seismic refraction data. A Multibeam Echosounder (MBES) and a Sub-Bottom Profiler (SBP) would be used continuously throughout the cruise. Acoustic Doppler Current Profilers (ADCP) may also be used during the cruise. Magnetic and seismic data acquisition would alternate on a daily basis; seismic surveys would take place while the AUV used to collect magnetic data is on deck to recharge its batteries. Seismic operations would be carried out for approximately 16 days. Some minor deviation from proposed cruise dates may be required, depending on logistics, weather conditions, and the need to repeat some lines if data quality is substandard.

One alternative to the proposed action would be to issue an IHA at an alternative time and conduct the survey at that alternative time. Constraints for vessel operations, especially weather, 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 2011 and beyond. Other research activities planned within the region also would need to be considered.

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 attributable to the proposed activities, but geophysical data of considerable scientific value that would increase our understanding of the geologic structure and history in the region and the formulation of new tectonic models 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 and to society in general. The collaboration, involving investigators, students, and technicians, 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.

Summary of environmental consequences

The potential effects of sounds from airguns on marine species, including mammals and turtles of particular concern, are described in detail in Attachment 1 (pages 34-65 and Appendices A-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 would 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 would be localized, short-term, and involve limited numbers of animals.

The proposed activity would 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 6-11; and 49) monitoring and mitigation measures would include: ramp ups; typically two, however a minimum of one dedicated protected species observer maintaining a visual watch during all daytime airgun operations; a minimum of one, but typically two observers on watch for 30 minutes before and during ramp ups during the day and at night; no start ups during poor visibility or at night unless at least one airgun has been operating; and shut downs when marine mammals are detected in or about to enter designated exclusion zones. The fact that the airguns, as a result of their design, direct the majority of the energy downward, and less energy laterally, would also be an inherent mitigation measure.

With the planned monitoring and mitigation measures, unavoidable impacts to each species of marine mammal that could be encountered would be expected to be 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 the National Marine Fisheries Service. No long-term or significant effects would be expected on individual marine mammals, or the populations to which they belong or on their habitats.

A survey at an alternative time would result in few net benefits. As described in Attachment 1, marine mammals are expected to be found throughout the proposed region of study. A number of marine mammal species are year-round residents in the western tropical Pacific Ocean, so altering the timing of the proposed project likely would result in no net benefits for those species. The survey is scheduled near the beginning of the tropical breeding season of many baleen whales, but there is no evidence that any mysticete species breeds near the proposed survey area. The proposed survey is also scheduled after the end of the peak summer nesting period for the two sea turtles (green and hawksbill) that nest in the area, so few hatchlings would be encountered at sea. In addition, the proposed period for the cruise is the period when the ship and all of the personnel and equipment essential to meet the overall project objectives are available. Postponing or changing the project period will delay this and potentially other projects scheduled for the R/V *Thompson* during the rest of 2011 and in 2012.

The “No Action” alternative would remove the potential for disturbance to marine mammals or sea turtles attributable to the proposed activities as described. It would, however preclude

important scientific research from going forward that has distinct potential to address geological processes of concern.

Conclusions

NSF has reviewed and concurs with the conclusions of the LGL report (Attachment 1) that implementation of the proposed activity will not have a significant impact on the environment.