# Final Technical Report, N00014-92-J-1426
# "Hawaii MR1 Support for Geophysical Site Surveys: ONR Acoustic Reverberation Special Research Program (ARSRP)"



**Alexander Shor, Principal Investigator**
**Margo H. Edwards, Stanley H. Zisk, Co-Principal Investigators**
**all at:**
**School of Ocean and Earth Science and Technology (SOEST)**
**University of Hawaii at Manoa**
**Honolulu, HI 96822**



## Summary

Studies carried out under this grant from ONR Code 1125AO were part of a collaborative effort with Woods Hole Oceanographic Institution and other investigators to characterize the ocean floor in a corridor of the Western North Atlantic Ocean which has been designated an "ONR Natural Laboratory." The region is the site of a broad array of studies related to ocean acoustics at various frequencies and spatial scales. The University of Hawaii's primary involvement under the present award was to acquire, process and display seafloor sonar and bathymetric data from the region, which was acquired under this grant during a 1-month field program on R/V *Maurice Ewing* in July 1992, and to provide these data to other ARSRP investigators to incorporate into their own, separately funded, studies.

## Specific tasks and results

Three specific tasks were identified in the grant application, as follows:

1. Standard data acquisition and processing of HAWAII MR1 acoustic backscatter and bathymetric data, which will be provided to ARSRP investigators ..... for analysis and planning for future program components;
2. Detailed analysis of acoustic properties of raw sonar data; and
3. Software development for processing and display of backscatter imagery and bathymetry.

The ARSRP field program was the third field effort using a newly-developed seafloor imaging instrument (HAWAII MR1) developed by University of Hawaii. Shipboard operations went quite smoothly, under the field direction of co-PI Edwards, and the standard processing and analysis were begun post-cruise. Shortly after completion of the field work, however, the Woods Hole investigators determined that they desired a number of non-standard processing techniques applied to the data, some of which had yet to be developed (or were not planned by Hawaii). Following discussions, we agreed to carry out several specific non-standard processing techniques and development to meet their requirements, and further, that for deliverable product, we would provide them with digital data files in unique formats of their specification rather than hard copy plots and digital data files of our standard form. The principal extra processing effort involved the development of a technique for removal of electronic cross-talk from the data, which



overprinted side-scan sonar data from regions of extremely low backscatter. Co-PI Zisk led the investigation into the source of the spurious signals, which involved a detailed examination and analysis of the raw sonar data, and once the character of the problem was identified, he developed a technique for its removal from the acoustic data.

Software development and testing were completed during fall '92, and these techniques are now incorporated into the standard University of Hawaii seafloor imagery data processing software, which is widely available for use by investigators throughout the academic and Navy communities. Data processing was completed in time to provide data to the WHOI team prior to their subsequent field program, which began in May '93.

**Publications:**

The following publications report on work undertaken by University of Hawaii under N00014-92-J-1426:


Zisk, S.H., A. Shor, M. Edwards and M. Rognstad, 1992. *HAWAII MR1: Regional-scale mapping for the ARSRP Natural Lab*. Acoustic Reverberation Special Research Program Research Symposium, Scripps Institution of Oceanography, La Jolla, 7-9 April 1992.

Edwards, M.H., and S.H. Zisk, 1992. Shore-based post-processing of ARSRP HAWAII MR1 data. Acoustic Reverberation Special Research Program Research Symposium, Woods Hole Oceanographic Institution, 18-20 November 1992.

Tucholke, B.E., M.C. Kleinrock, W.K. Stewart, J. Lin, J. Goff G. Jaroslow, B. Brooks, P. Lemmond, J. Howland, M. Marra, T. Reed, M. Edwards, J.R. Fricke, V. Herzfeld, 1992. *Geological and geophysical survey of the Mid-Atlantic Ridge flank at 25°25'N to 27°10'N.* Eos Trans. American Geophysical Union, v. 73, p. 552 (abstract).

Zisk, S.H., R.B. Davis, C. de Moustier, and J. Hughes Clarke, 1992. *Signal processing and noise sources in the HAWAII MR1 bathymetric sonar mapping system.* Eos Trans. American Geophysical Union, v. 73, p. xxx (abstract).

Davis, R.B., S. Zisk, M. Simpson, M. Edwards, A. Shor and E. Halter, 1993. *Hawaii Mapping Research Group bathymetric and sidescan data processing.* Proceedings, Oceans '93, Victoria, British Columbia, v. II, p. 449-453.

Davis, R.B., M.H. Edwards, and W.B.F. Ryan, submitted (1994). *Improved methods for processing swath sonar data.* Marine Geophysical Researches.