

Marine Physical Laboratory

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Program in Marine Physics Applied to Navy Undersea Missions

Kenneth M. Watson / Fred H. Fisher
Principal Investigator(s)

Final Report to the
Naval Research Laboratory
Contract N00014-88-K-2040
for the Period 10-01-88 - 09-30-91

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Introduction

The objective of this program has been the development and testing of innovative sensor technology and experimental techniques. Over the course of this program, the following tasks were carried out:

- * Slack Line Arrays
- * Real-Time Transmission of Freely Drifting VLF Sensor Data
- * Noise Environment for Buried, Bottom-Mounted, and Tethered VLF Sensors
- * Vertical DIFAR Array

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Task Descriptions

Slack Line Arrays

The objective of this task was to develop an inexpensive complement or alternative to conventional fixed geometry acoustic arrays with self-focussing capability (no active localization of array elements). Realized as an expendable, large-aperture string of sensors, such a slack line array might be a high gain alternative to a conventional sonobuoy or VLAD.

Real-Time Transmission of Freely Drifting VLF Sensor Data

The objective of this task was to develop an acoustic real-time data transmission capability between an array of freely drifting VLF sensors and a surface-coupled relay buoy. Establishing a several kb/s communicative link with the sensors satisfies a desirable system capability of real-time data retrieval while at the same time capable taking advantage of the low self-noise characteristics of freely drifting sensors.

Noise Environment for Buried, Bottom-Mounted, and Tethered VLF Sensors

The objective of this task was to measure the noise environment for various VLF sensor configurations in-situ on the deep seafloor. These measurements help provide information on the optimal placement of sensors from a signal-to-noise stand point.

Vertical DIFAR Array

The objective of this task was to develop a vertical array of DIFAR elements to provide high resolution in the vertical along with at least some resolution in the horizontal. In the context of ambient noise studies, by adding discrimination capabilities to a vertical line array, a single array deployment can provide information on the two-dimensional distribution of ambient noise. In the context of signal propagation studies, the range/depth estimation capabilities of a vertical array combined with the bearing estimation capabilities of DIFAR sensors can provide complete source localization estimation from a single array.

Summary

This program has emphasized the development and testing of innovative ocean acoustic sensor technology and experimental techniques. A detailed discussion of the results from these tasks will not be repeated here. These results are available in the several technical reports, conference papers, and journal articles listed in the reference section, generated under this program.

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