

THE MARINE LABORATORY

UNIVERSITY OF MIAMI

52-7

QUARTERLY REPORT

For

**Study of Oceanic Ambient Noise and  
Scattering Layer Effects**

January-March, 1952

U. S. Navy Department, Bureau of Ships  
Contract Number Nobsr-57146

Coral Gables, Fla.  
ML 2784

F. G. Walton Smith  
Director

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1. PURPOSE

1.1 Oceanic ambient noise study -

The investigation of oceanic ambient noise in tropical waters for the purpose of supplementing existing cold water ambient sound data affecting underwater sound transmission. This includes:

- (a) The measurement and recording of ambient sound levels.
- (b) Identification of the sources of sound.
- (c) Correlation of sound intensities with other pertinent variables.
- (d) Survey of transmission characteristics of sounds under various local conditions.

1.2 Scattering layer study -

The investigation of the deep scattering layer with the aim of predicting the occurrence and behavior of layers. This includes:

- (a) Frequency of occurrence of the layers.
- (b) Seasonal and other variation in the layers.
- (c) Identification of separate layers.
- (d) Identification of individual scatterers and study of them in relation to environmental conditions.

2. FACTUAL DATA, GENERAL

2.1 Expenditure -

Salaries	\$ 3,032.60
Supplies and services	1,279.77
Open orders	91.40
Overhead	1,425.32
Total	\$ 5,829.09

2.2 Personnel and manhours -

J. Lewis	320
H. B. Moore	160
D. O'Berry	320
C. Rainwater	64
H. Robertson	80
F. Stephens	320
A. Verhoeven	180
Total	1,444 hours

2.3 Equipment -

At the commencement of this project most time has necessarily been devoted to the assembly and testing of the necessary equipment. There has been inevitable delay in procurement of materials, but considerable progress has been made as follows:

(a) Vessels. The "T-19" has been in operation throughout the period. The "Megalopa", which will be required for work in shallow water, has also been in operation, but will soon be replaced by a somewhat larger vessel. Five single-day cruises have been made with the T-19, in addition to several joint trips with other projects.

(b) Winches. The power winch previously in use on the T-19 was inadequate for present needs and the cable old and not heavy enough. Cable failure on a rough day resulted in the loss of an experimental net, closing mechanism, and the depth-distance gauge. It was decided to postpone further net hauls until heavier equipment was available.

An "American Hoists" winch has been obtained and a "Wisconsin" V.P.-4, 20 H.P., 2000 engine to drive it. This will carry 5500 feet of 7/3211 galvanized cable with a breaking strain of 5600 lbs. and bring in a load of 1800 lbs. at 275 ft. per minute. Work on the rebuilding of the winch is in progress. We are also building an A-frame and accumulator for installation with the winch.

The BT winch is being converted from electric drive to run on a 7 1/2 H.P. "Wisconsin" one-cylinder gasoline engine. This was necessitated by the already heavy load of radar, fathometer, etc. on the existing generators. This winch should be in operation in a few weeks.

(c) Nets, etc. After wind tunnel tests, a new type of experimental net has been built and is undergoing tests. This is designed to work at somewhat higher than normal speeds and to catch the active scattering organisms more effectively. The existing depth-distance recorder was lost when the cable parted. The design appeared to be satisfactory and a new one will be built to the same plans as soon as lathe and other power tools, now on order or being supplied by the Navy, are available.

(d) Electronic recording equipment. The NMC-1 fathometer has been installed but proved to have deteriorated in storage prior to delivery. It suffers self-oscillation, apparently through maladjustment. It also emits an extremely irregular shaped signal. Steps are being taken to correct both these failings. It has, however, already produced fairly good bottom records.

A single-sweep oscilloscope has been completed for use in conjunction with the fathometer. This has a variable depth-range of 50, 150s 300, 600 and 1200 fathoms, and gives automatic time marker traces equivalent to depth intervals of 50, 100, 200 or 400 fathoms. Limited tests have been made at sea and while not yet perfected, the instrument appears to be satisfactory. Final calibration has not yet been made.

The "land" camera, for use with the oscilloscope, proved to be out of adjustment, but this has been corrected and satisfactory photographic records obtained.

Hydrophones, models C.B.D. 51036 (two) and C.B.D. 51038-E (three) are available here and have been used in preliminary tests. It is probable that other types, giving a wider response, will be called for.

A "Magne recorder" tape recorder has been obtained and tested. its background noise is serious, and possibilities of correcting this are being explored.

For laboratory analysis of recorded ambient sounds, a "Panoramic Sonic Analyzer" is being considered. This has not yet been obtained.

(e) Radar. This has been installed as far as possible, but we are still awaiting the necessary cable for completion of the wiring.

### 3. FACTUAL DATA

3.1 As most of the work to date has concerned instrumentation, there is naturally little to report on observations at this time.

#### 3.2 Plankton -

Euphausiid identification and counting has been completed for two 24-hour diurnal migration series. These results are accompanied by temperature and illumination data, but not by sonic records, since the material was collected before the inception of the present project. However, they give valuable information on the behavior of some of the organisms most probably responsible for the scattering phenomenon. This series is being extended to include other material already in hand. Similar examination of the fishes and squid in these hauls has been commenced, since both have been postulated as possible scattering organisms. We already have evidence of a marked concentration of euphausiids near the surface at night.

3.3 Ambient sound recordings have been made on one occasion in a fresh water lake and on one at sea, 10 miles off Miami, in water approximately 150 fathoms deep. Some ambient noises were recorded in the latter, but bad weather prevented the ship from being hove to, so engine noises were serious.

3.4 The development of several of the instruments already referred to constitutes an important advance, but their technical description should wait until they have been more fully tested.

#### PROGRAM FOR NEXT QUARTER

Instrumentation will continue and some sections will be completed in this period. Fathometer records, both on paper recordings and with the oscilloscope, should be obtained unless unforeseen difficulties develop. One difficulty that we foresee, but cannot assess at present, is the seriousness of interference from ship noises. Another is the fluctuations in voltage in the present system. It may prove necessary to build or obtain a voltage regulator for the system. The extent to which full analysis of records will be possible depends on how far we can go in obtaining absolute calibration of the sound equipment. We have already discussed this with WHOI and we hope to make use of the Orlando laboratory facilities, when our instruments are further advanced.

Ambient sound recordings should be commenced in the next quarter, although this is partly dependent on the availability of hydrophones with suitable characteristics. The suitability of the present ones remain to be seen.

Collection of further plankton samples will commence as soon as the new winch is available. This may take another week or two, depending on the availability of materials. In the meantime, analysis of existing samples will be continued and we should have a picture of the more

abundant species of possible scatterers, euphausiids, fish and squid, together with some information as to their seasonal and vertical distribution.

Both instrumentation and analysis will have to be carried further before any actual data can be usefully presented.