

ANALYSIS OF INTERNAL-WAVE MEASUREMENTS USING A VERTICAL ACOUSTIC ARRAY

FINAL TECHNICAL REPORT

March 1, 1988 to February 28, 1989

Contract No. N00014-88-K0263

Principal Investigator: Stanley M. Flatté

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The objective of this contract was to provide supplemental funds to enable the P.I. and his group to assist H. Deferrari of the University of Miami in planning and carrying out an ocean acoustic experimental program. During the contract period, the P.I., Drs. Timothy Duda and Jan Martin, and graduate student Ramsey Harcourt carried out calculations of several types. Programmer Galina Rovner helped with some of the calculations as well.

Expected internal-wave-induced fluctuations were calculated for numerous possible experimental configurations involving a source and receiver placed near the Bahamas in the Atlantic Ocean. Ranges up to 400 km were treated. The source and receiver depths were varied from the sound-channel axis (at about 1300 meters) up to the surface. Fluctuations in arrival time and arrival angle were particularly investigated for all the geometrical optics rays for each configuration.

Simulation of signal processing schemes were extensively carried out to be sure that internal-wave fluctuations would not degrade signal-to-noise to any significant degree.

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Investigations of whether two or four samples per cycle are required were carried out. Concerns as to whether 1.1 seconds of coding (128 bits, with each bit four cycles long) would be adequate were addressed carefully with simulations including realistic signal-to-noise ratios. Issues of wrap-around because ray arrival times might be extending over more than 1.1 seconds were also investigated.

Tim Duda and Stanley Platté traveled to Miami to assist in preparations for the experiment that took place in August of 1988. Extensive building and testing of electronic devices were carried out, and apparatus assembly and checkout were carried out at the RSMAS facility. Duda went to sea for both the deployment and recovery cruises, and Platté was on the deployment cruise. During the cruise, eight CTD casts were made, and the data is archived at U.C.S.C.

Unfortunately, the equipment was lost due to defective cables, so no data analysis was possible. Instead, similar tasks have been carried out to prepare for a repeat of the experiment during May, 1989. Despite the failure, much was learned about planning and carrying out the experiment. The upcoming May experiment will have tape recorders with much higher capacity, so that amount of data to be stored will be much less limiting on the design. Also, we expect to gather data for a considerably longer period of time (nearly three weeks instead of about 12 days) than was planned for the last experiment. We also expect to be able to choose the ocean location to have a better sound-speed profile for our purposes.

During this contract period, both Tim Duda and Stanley Platté reported on the progress of the experimental planning, and on the results of numerical simulations, at a

Meeting of the Acoustical Society of America (Hawaii, November, 1988) and a Meeting of the American Geophysical Union (San Francisco, December, 1988).



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