Continued Development of Advanced Marine Vehicles

Garth A. Jensen
Executive Director
South Florida Ocean Measurement Center
9500 MacArthur Boulevard
West Bethesda, MD 20817-5600
Phone: (301) 227-2926 Fax: (301) 227-5425 Email: JensenGA@nswccd.navy.mil

Document #: N0001402WX21304

Manhar Dhanak
Head, Department of Ocean Engineering
Florida Atlantic University
101 North Beach Road
Dania Beach, FL 33004
Phone: (954) 924-7241 Fax: (954) 924-7270 Email: dhanak@oe.fau.edu

Grant #: N00014-98-1-0861

LONG TERM GOAL

The US Navy has identified the enhancement of its littoral war fighting capability as a major priority. Clandestine rapid environmental assessment and mine reconnaissance are two significant capability enhancements where AUV's play a crucial role. SFOMC is developing a mature capability to conduct AUV experiments in an efficient and economical manner. The primary goal of this project is to provide additional AUV capabilities resident at SFOMC and to support specific analyses and experiments that further Navy objectives. The secondary goal is to provide the Navy and scientific community with a natural ocean laboratory that is environmentally exceedingly well characterized. This secondary goal is to have infrastructure for sustained ocean observations, flexible interfaces to new and emerging systems, a geographical information database, and real time as well as archived data reporting system.

OBJECTIVES

The primary objective was to conduct an FAU lead experiment entitled “ACOMMS and Modeling: SFOMC – Acoustic Gateway”. This collaborative marine vehicle research report is submitted in partial fulfillment for FY 03 work conducted at the South Florida Ocean Measurement Center (SFOMC). The report combines the individual SFOMC partners' efforts and serves as an introduction to separate reports on key support elements or experiments conducted under this grant. Additionally, the report details infrastructure upgrades and support provided by the South Florida Testing Facility, a detachment of NSWC Carderock Division, and a partner in SFOMC. The over all objectives to be met were the conduct of a long-term underwater shallow water and very shallow water acoustics communications experiment. Towards this end a secondary objective was to develop an advanced network of sub-sea cable and multiplexer systems for sustained use in the conduct of similar and branching experiments.

Report Documentation Page

Form Approved
OMB No. 0704-0188

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1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
30 SEP 2003		**00-00-2003 to 00-00-2003**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Continued Development of Advanced Marine Vehicles	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **South Florida Ocean Measurement Center,,9500 MacArthur Boulevard,,West Bethesda,,MD, 20817**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

The US Navy has identified the enhancement of its littoral war fighting capability as a major priority. Clandestine rapid environmental assessment and mine reconnaissance are two significant capability enhancements where AUV's play a crucial role. SFOMC is developing a mature capability to conduct AUV experiments in an efficient and economical manner. The primary goal of this project is to provide additional AUV capabilities resident at SFOMC and to support specific analyses and experiments that further Navy objectives. The secondary goal is to provide the Navy and scientific community with a natural ocean laboratory that is environmentally exceedingly well characterized. This secondary goal is to have infrastructure for sustained ocean observations, flexible interfaces to new and emerging systems, a geographical information database, and real time as well as archived data reporting system.

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**Same as Report (SAR)**	**4**	

APPROACH

This report consolidates scientific experiments with specific goals and objectives and capabilities upgrades that were carried out on the SFOMC Range. In order to comply with report size and format constraints, the following experiments are reported in more detail by the individual PIs. The overall approach was to conduct the following experiments.

- ACOMMS and Modeling: SFOMC – Acoustic Gateway
- Multi-User Autonomous Underwater Vehicle Docking Systems
- Multiplexers (FAU and NSWCCD) Upgrade, Repair, and Integration
- Data Management
- Industrial and Facility Support
- BOSS Litton
- VLF Transmitter Array
- Oceanographic and Environmental Measurements
- Sub Bottom Survey
- Software for BOSS and DPAM Integration
- Cyclesonde (Automatic Profile Observations to Support Acoustic Objectives)

WORK COMPLETED

The work completed this year brings to fruition the goals for the South Florida Ocean Measurement Center Continued Development of Advanced Marine Vehicles. With the exception of an AUV docking station, the work for which has just begun, the experiments are now underway and the infrastructure is in place to continue enhancement of its littoral warfare RDT&E capability through experimentation and research. The details of the work completed follow. In summary, ongoing acoustic communications experiments are underway with the full support of environmental measurements including rapid through water (acoustic modem) and fiber linked sub-sea cabled telemetry systems.

RESULTS

Detailed results are documented by the respective PI's.

IMPACT/APPLICATIONS

AUV capabilities are currently resident at SFOMC to support specific analyses and experiments that further Navy objectives. A natural ocean laboratory that is environmentally well characterized with continuous observations has been created and is synergistically supporting a wide variety of RDT&E activities. Another impact of the work funded by ONR on this project is that SFOMC will likely become an observing station in the Integrated Ocean Observing System (IOOS). The scientific experiments and legacy infrastructure provide the type of depth, breadth, and scope of observing systems necessary to merit inclusion as an observing system within a IOOS regional observatory.

RELATED PROJECTS

Applications to government projects other than ONR projects include establishing remote observing ground truth capability. This is evidenced by real time environmental support of the Joint Airborne Lidar Bathymetry Technical Center of Expertise (JALBTCX) Compact Hydrographic Airborne Rapid Total Survey (CHARTS) acceptance testing. The JALBTCX is based out of the US Army Engineer District, Mobile and combines it's extensive operational capabilities with the international hydrographic and nautical charting capabilities of the U.S. Naval Meteorology and Oceanography Command and the Naval Oceanographic Office, and with the research and development (R&D) expertise of the US Army Engineer Research and Development Center (ERDC). Use of real time environmental data and existing high resolution SFOMC bathymetry in GIS format contributed to the success of the CHARTS acceptance testing. Applications to other ONR projects include direct support for GIS archiving and oceanographic measurement and archiving of data for the planned Acoustic Observatory (AO).

Of particular impact is the synergy being created at SFOMC by multiple users and the legacy of data each project leaves that is useful to the next project. An example of this is the ONR sponsored UM acoustic array. The acoustic data acquired from this array and NAVO supplied bathymetric data taken to support this experiment was eventually mined to support choosing SFOMC in the AO site selection process. Similarly the ONR sponsored SFOMC optical tracking systems and AO radar tracking systems have been used successfully to support the SPAWAR installation of the Deployable Autonomous Distributed System (DADS) and the ranging of a diesel electric Peruvian submarine.

Other ONR projects taking advantage this project include “An Air Deployable Self-Mooring A-Sized Navigation and Communication GATEWAY Buoy for Support of Littoral AUV Missions”.