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a. REPORT	b. ABSTRACT	c. THIS PAGE			Joe Coburn
UC	UC	UC	SAR	2	19b. TELEPHONE NUMBER (include area code) 508-289-2624

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**FINAL PROJECT REPORT
N00014-93-1-0571**

Ship Time, Submersible and Technician Support for ONR Funded Programs

**For the period:
1 January 1993 – 31 December 2001**

This grant supported 38 Chief Scientists funded through the Office of Naval Research (ONR) for a total of 956 days aboard the Woods Hole Oceanographic Institution (WHOI) research vessels from 1 January 1993 to 31 December 2001. Of the total days supported by ONR, 60 days were for the *R/V Atlantis II*, 33 days for the *R/V Atlantis*, 452 days for the *R/V Knorr*, and 411 for the *R/V Oceanus*. The Deep Submergence Vehicle was used 79 days of the time on *R/V Atlantis II* and *R/V Atlantis*.

Support for non-WHOI vessels for ONR research was also provided from this grant. The vessels were the:

R/V Cape Henlopen
R/V Columbus Iselin
R/V Edwin Link
R/V Argo Maine
R/V Wecoma
R/V Robert Sproul
R/V Endeavor
R/V Seward Johnson
R/V Cape Hatteras

The following projects were also supported by this grant:

R/V Atlantis-DSV Alvin Special Project

A port visit in Alexandria, Virginia, during the sea trials was arranged to allow for a demonstration of the mission capabilities of the *R/V Atlantis* and *DSV Alvin*.

Protective Shelter for DSV-4 Sea Cliff

A protective cover was fabricated to protect the *DSV-4 Sea Cliff* during the New England winter months. Vertical temporary structures were placed to provide some security to the vehicle, which was stored under "shrink wrap".

Upgrades to R/V Atlantis (AGOR 25)

R/V Atlantis (AGOR 25) was delivered to WHOI in March 1997. During trials and missions undertaken since delivery, defects and omissions in ship construction of equipment were discovered. The Post Shakedown Availability (PSA) period from January to March 1998 provided time and funding to resolve

many major problems. Work items yet to be accomplished, or areas where improvements could be made, were documented in the *R/V Atlantis* Turnover Book presented to ONR at the end of the contract period. Funds were provided to accomplish four of the more pressing items, and to solve a problem with the potable water.

Upgrades to R/V Atlantis – 2000

Additional funds were received to continue the *R/V Atlantis* upgrades.

NR-1 Survey of the Egypt Air 990 Crash Site

Dr. Singh and Mr. Howland provided advice to the crew of the NR-1 prior to the survey, and will accompany the *NR-1/Carolyn Chouest* during their survey of the wreckage. After the survey, existing mosaic software was modified and improved to enhance the *NR-1* survey capabilities.

Field Testing Support for TOSS II (Towed Optical Search System)

The Oceanographic Systems Laboratory of the Woods Hole Oceanographic Institution (WHOI) participated in an instrumentation upgrade and an associated field-testing program for the existing *TOSS II* vehicle. *TOSS II* is a deep ocean towed imaging system, which was developed by the Oceanographic Systems Laboratory of the WHOI for use by the Naval Oceanographic Office. The system includes sophisticated acoustic and optical imaging sensors, allowing for detailed surveys of the sea floor at great depths. Funding was received to perform the following tasks:

- a) Upgrade the capabilities of the TOSS system by integrating the Advanced Sediment Classification System (ASCS) into the vehicle's fiber-optic telemetry and electrical power sub-systems.
- b) Perform hardware and software upgrades to the existing Relative Acoustic Tracking System (RATS) to improve its overall performance.
- c) Perform testing and evaluation of the existing Acoustic Doppler Current Profiler (ADCP)