

Report Documentation Page

Form Approved
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE 1998		2. REPORT TYPE		3. DATES COVERED 00-00-1998 to 00-00-1998	
4. TITLE AND SUBTITLE AOSN MURI: A Collaboration for Autonomous Oceanographic Observations				5a. CONTRACT NUMBER	
				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) University of California at San Diego, Scripps Institution of Oceanography, La Jolla, CA, 92093				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 See also ADM002252.					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 2	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

AOSN MURI: A Collaboration for Autonomous Oceanographic Observations

Russ E. Davis
Scripps Institution of Oceanography,
La Jolla CA 92093-0230
619-534-4415
email: rdavis@ucsd.edu
Award # N00014-95-1-1316

LONG-TERM GOAL

Our overall goal in this effort is to develop autonomous instruments to expand the ability of oceanographers to affordably observe the ocean.

OBJECTIVES

The objective of this collaboration with Breck Owens of WHOI is to develop a small autonomous glider capable of extended operation using GPS navigation and satellite communication when the glider surfaces. The instrument should be capable of maintaining station for months or occupy an upper ocean section of O(1000 km) in length.

APPROACH

The approach is to adapt the technology of autonomous profiling floats to develop a vehicle that changes its buoyancy and glides forward while changing depth. The main challenge of this approach is to reduce drag to the point where a reasonable speed can be maintained for long periods with realistic battery power.

WORK COMPLETED

This year we have accomplished the first step toward our objective by field demonstrating a prototype glider that included all operational systems save navigation and communication systems to be provided by WHOI. The hull shape, selected from a series of tow-tank drag measurements, is a relatively conventional cylindrical form with a relatively fine forebody. The hull, which relies on stiffening rings, was tested to 1500 dbar. Buoyancy control is provided by an electric motor and a modified well-logging pump with overall efficiency over 40%. The following table describes the vehicle which we call "Spray" to make clear its intellectual connection to Henry Stommel's Slocum concept.

Length	2.0 m	Wing Span	0.9 m
Hull Diameter	0.2 m	Volume	51.8 liters
Weight in-air	48.2 kg	Hull Weight	19.2 kg
Battery Mass	12 kg	Available Energy	13 MJ

RESULTS

Sea trials local to San Diego confirm the performance predictions based on laboratory tests. Course control and maneuverability were demonstrated and there was no sign of trapped air delaying diving

from the surface. Based on these tests, the following table describes anticipated performance diving to 100 m using two different buoyant volume changes and various glide angles

Volume change	300 cc	200 cc
Average buoyancy/g	100 gm	67 gm
Lifetime in cycles	700	900
Horizontal velocity, 20 deg dive	21 cm/s	17 cm/s
Distance made good, 20 deg dive	3850 km	4900 km
Horizontal velocity, 30 deg dive	25 cm/s	20 cm/s
Distance made good, 30 deg dive	2450 km	3150 km
Horizontal velocity, 40 deg dive	26 cm/s	20 cm/s
Distance made good, 40 deg dive	1650 km	2100 km

IMPACT/APPLICATION

We imagine three general classes of mission by which instrument platforms of this type can impact ocean observations. In coastal environments gliders could execute repeated sections establishing relatively inexpensive time series. In deep ocean environments gliders could maintain a time series of profiles much less expensively than a mooring. Gliders could also operate around research vessels, expanding the observation area at minimal cost and without impacting ship operations.

For statistical information, there are no students or post docs involved in this program.