Small Business Technology Transfer (STTR) Program
Phase II
An Autonomous Gliding Vehicle for the Distributed Observation of the Littoral Environment

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LONG-TERM GOAL

My goal is to bring into widespread use a fleet of gliding AUVs as important participants in littoral operations. I plan to exploit the profiling and navigational advantages of gliders together with simple robust and inexpensive design and operation, and demonstrate their substantial capabilities for coastal AOSN operations.

OBJECTIVES

Establish the utility and refine the performance of littoral gliders making them an obvious, proven, and economical component of AOSN programs, doing this by making observational runs of progressively increasing range and endurance aimed at consolidating and debugging the design of the first complete prototype. Demonstrate and quantify both the performance and robustness of the basic vehicle, and the ability to serve as platforms for observations, communication, and AOSN operations.

APPROACH

The core vehicle propulsion, gliding, and control, is working well. I am making a substantial software advance from a prototype simple vehicle controller to a powerful microcontroller using the complete Odyssey code intended for AOSN operations, as well as integrating the required subsystems for communication, measurement, navigation, and steering.

WORK COMPLETED

The 1999 goals have been to complete the first vehicle construction, carry out local trials, and participate in the field operations of LEO15.

The vehicle construction and integration of propulsion, steering, GPS, ARGOS, 2-way RF LAN and their antennas, CTD, and altimeter has worked out well, the schedule left a minimal period for integration of the Odyssey code and the vehicle microcontroller. After brief local trials, we operated at the LEO15 site during July 1999, where the basic gliding and all subsystem performance was satisfactory. We had, however, underestimated our readiness and capabilities for using the software and control systems.

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RESULTS

A glider was operated during the LEO15 July, 1999 operation. The quantity of results obtained were less than planned. This was due to our incomplete and insufficiently tested on-board software. The risk of vehicle loss limited our program to approximately 25 dives. Although our long-range operations were reduced, we had an opportunity to exercise many subassemblies with satisfactory results. The CTD compared well to other measurements made nearby. The two-way communications worked well to 20 nm, the GPS reception was very satisfactory, the internal dead reckoning navigation and vehicle steering satisfactory, handling and operations by two people excellent.

IMPACT

This littoral glider technology is expanding many plans and concepts about coastal observation and assimilation. It is a powerful and complimentary addition to the coastal toolbox, in particular,

1) Regular surfacing means simple GPS and communications, frequent data transfer and no requirement for acoustic transponder net.
2) 2000 km range, 30 days endurance provides long term patrols.
3) Logistically and operationally simple, adaptable, agile, and inexpensive to operate with a small team.

RELATED PROJECTS

The littoral glider is being realized along side the SLOCUM environmentally powered glider. They share all major components, subassemblies, hardware, and test resources except the main buoyancy changing propulsion system.

PUBLICATIONS

Webb, D.C., and P. J. Simonetti (1997). A simplified Approach to the Prediction and Optimization of Performance of Underwater Gliders. Proceedings of the 10th International Symposium on Unmanned Untethered Submersible Technology, September 7-10, 1997, Document Number: 97-9-01, published by the Autonomous Undersea Systems Institute. pp 60-68.

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