

Topic: N181-012

## MRV Systems, LLC

### Low Cost Persistent Environmental Measurement System

The advantages of large numbers of low-cost, air-deployed ocean property sensors have been recognized for decades, as shown by the use of sonobuoys and Air-eXpendable BathyThermographs (AXBTs) in Anti-Submarine Warfare (ASW). The MRV Systems ALAMO-2 retains many of the advantages of that concept, but provides greater persistence, does not require a patrol aircraft nearby for data telemetry, and operates at a lower-cost per ocean profile than a typical sonobuoy or AXBT. The concept of operation is “launch once, profile many times”, and can be deployed from Maritime Patrol and ASW aircraft. ALAMO-2 is an enhancement of MRV’s commercially proven A-sized ALAMO float, which has operated in conditions ranging from hurricanes to ice-covered Arctic seas. Our technology allows the Navy to monitor ocean temperature, salinity, and sound-velocity from the surface to 1500 feet, over periods of weeks or months. The addition of sensors for diffuse optical attenuation and acoustic ambient noise measurements, will improve the Navy's understanding of ocean conditions to improve ocean modeling, sonar performance prediction, and increase maritime domain awareness.

### Technology Category Alignment:

Sensors

Battlespace Environments

Command, Control, Communications, Computers, & Intelligence (C4I)

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**SYSCOM:** NAVAIR

**Contract:** N68335-20-C-0078

 Corporate Brochure: [https://navystp.com/vtm/open\\_file?type=brochure&id=N68335-20-C-0078](https://navystp.com/vtm/open_file?type=brochure&id=N68335-20-C-0078)

Department of the Navy SBIR/STTR Transition Program

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NAVAIR 2020-848

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WHO

**SYSCOM:** NAVAIR

**Sponsoring Program:** PMA-264, Air Anti-Submarine Warfare Systems

**Transition Target:** The ALAMO-2 is intended as a payload for any type of aircraft launching sonobuoys including Maritime Patrol & Reconnaissance Aircraft and H-60 Multi-Mission Helicopters.

**TPOC:**  
(301)342-2034

**Other transition opportunities:** Other groups are interested in the ALAMO platform for various purposes, including use as an air-launched expendable tide-gauge (NAVOCEANO NP22).

**Notes:** Buoyancy-driven profilers are already in wide use by NAVOCEANO and the scientific community for monitoring physical ocean properties. This project adds specific sensors for the ASW community and adapts this particular MRV profiling platform to aircraft that use pressurized Sonobuoy Launch Canister systems.

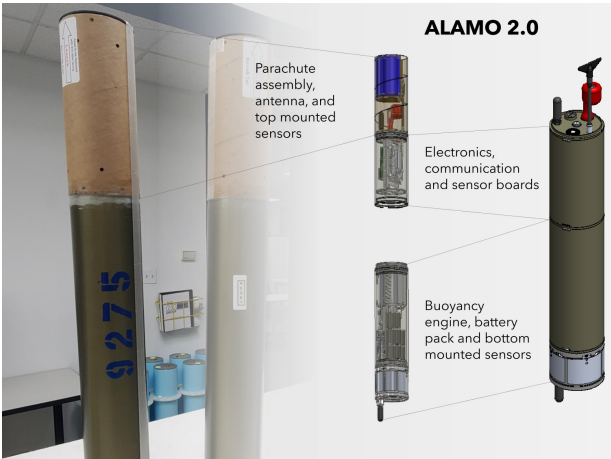


Photo of current ALAMO floats with parachute & sensors inside cardboard at top, plus inset of ALAMO-2 design model. (Copyright 2020, MRV Systems, LLC)

WHAT

**Operational Need and Improvement:** An air-certified, A-sized, persistent environmental monitoring device with the ability to continuously measure multiple ocean properties from surface to 1500 feet for several months will fill a capability gap that exists beyond the relatively short-duration sonobuoys in use today. Designed for launch specifically from Sonobuoy Launch Canister systems, this version of the MRV Systems ALAMO-2 will meet both current and future Navy needs. Understanding the ocean environment as it evolves over time, whether as a basis for subsequent direct observations (e.g., LIDAR imaging, active acoustics), or for improving predictive battle-space preparation, is a high priority.

**Specifications Required:** The overall system must include an optical diffuse attenuation coefficient sensor, an acoustic ambient noise sensor system, and temperature, pressure, and salinity sensors. It must telemeter data ashore and accept mission modifications via Iridium satellite, and persist in the environment for weeks to months.

**Technology Developed:** The existing MRV Systems ALAMO is enhanced by multiple improvements for modularity and ease of launch, and the addition of two new sensor systems. Additional design considerations were incorporated for increased production rate.

**Warfighter Value:** The power of ALAMO-2 for the warfighter is providing tactically important measurements (sound velocity profiles, optical properties, and ambient acoustic noise) in areas of interest for weeks or months at low cost. With only one or two flights a month, data density will increase enormously over the current single-profile snapshots, and the increase in tactical value will be as dramatic.

WHEN

**Contract Number:** N68335-20-C-0078 **Ending on:** November 18, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Mechanical Redesign of existing ALAMO	Low	Critical design and assembly review.	7	July 2020
Revision of CPU and communication electronics	Low	Board designs complete and submitted to fabrication house.	7	August 2020
Integration of optical and acoustic sensor systems	Med	Optical and acoustic sensors can collect valid data.	7	November 2020
Software enhancements for additional sensor integration	Med	Working software delivered on prototype hardware.	7	October 2020
In-situ field testing with fully-functional floats.	Low	Completion of tests, data returned.	7	February 2021
Final Report and 4 prototypes complete & delivered.	Med	Report submitted and prototypes delivered to NAVAIR.	7	November 2021

HOW

**Projected Business Model:** In follow-on Phase-II.5 SBIR, support air certification for ALAMO-2 and demonstrate operations from appropriate Navy aircraft. Become a standard air-launched environmental measurement device. Adapt modular sensor section to emerging Navy needs. Scale manufacturing to meet Navy needs, and identify a partner for large-scale orders.

**Company Objectives:** Produce oceanographic sensing systems that are high-quality, low-cost, energy-efficient, long-lasting, and useful to the Navy and broader scientific community. Design and manufacture a full-range of buoyancy-driven profilers to meet a variety of customer requirements and mission profiles. Be the preferred provider for buoyancy-driven profilers for the U.S. Navy.

**Potential Commercial Applications:** Ocean environmental monitoring in all regions, particularly those where air-deployment is the only feasible option. The ALAMO-2 will be particularly useful in marine protected zones, open-ocean commercial fisheries, and for hazardous weather forecasting (e.g., hurricanes, typhoons, etc.). The addition of acoustic ambient noise measurements will be useful in the offshore industry where monitoring of man-made noise is increasingly required.

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