

SUCCESS STORY

TOPIC NUMBER:
N101-089, N00-107

SBIR INVESTMENT:
\$5,267,272

PHASE III FUNDING:
\$8,907,345



Photo credit: Daniel Eleuterio

LIGHT WEIGHT COASTAL TOPOGRAPHIC/ BATHYMETRIC CHARTING SYSTEM FOR NAVAL UNMANNED AIRBORNE VEHICLES

Areté Associates has made coastal geospatial intelligence gathering faster, cheaper, and safer than ever with its Pushbroom Imaging Lidar for Littoral Surveillance (PILLS) technology.

Areté Associates

POC: Jeff Mercer
877-888-4170
California, Northridge 91324

<https://arete.com/>

THE CHALLENGE

Naval operations around the world require highly detailed and accurate environmental intelligence. Collecting topographic and bathymetric data for safety of navigation and ingress in contested littoral environments can be costly, time consuming, and dangerous. Existing airborne bathymetric lidar systems with sufficient depth penetration are used to collect this data, but exceed the size, weight, and power (SWaP) limits of unmanned aerial vehicles (UAVs). As a result, these systems must be deployed on large manned aircraft that risk detection or interception, potentially putting Sailors' lives at risk. To address these challenges, the Office of Naval Research (ONR) sought a lightweight lidar system that could be installed on smaller unmanned aircraft.

THE TECHNOLOGY

Pushbroom Imaging Lidar for Littoral Surveillance (PILLS) technology projects a wide line of light that enables onboard sensors to collect both topographical and bathymetric data. UAVs equipped with PILLS can fly over coastal areas and generate highly detailed maps of the shoreline and shallow sea areas quickly and without risk to personnel. Previous coastal lidar imaging systems relied on multiple moving parts, making them significantly heavier and requiring large manned aircraft for operation. PILLS performs the same functions as legacy lidar systems with no moving parts, making it compact and light enough to be installed onboard UAVs.

THE TRANSITION

On May 10, 2010, ONR awarded Areté Associates a firm-fixed-price Phase I contract to develop the initial PILLS design. ONR recognized the value of a lightweight lidar system that could be operated from UAVs to support timely and cost-effective hydrographic, terrain, and urban mapping. Before the Phase I contract expired on June 15, 2011, Areté successfully developed an integrated design fully compatible with the Navy's selected UAV. On July 7, 2011, ONR awarded Areté a cost-plus-fixed-fee Phase II contract for fabrication, integration, and flight demonstration of PILLS.

During this period, Areté adapted the PILLS system to further improve system resolution and performance and evaluate its potential as a real-time submerged navigational hazard detector for things such as wrecks and potentially moored mines. These successful developments and demonstrations led ONR to award a cost-plus-fixed-fee Phase III contract for PILLS on March 17, 2022. Under this contract, Areté will transition PILLS into active Navy deployment while continuing to support and mature the technology.

THE NAVAL BENEFIT

Geospatial intelligence is critical to Naval mission success. Gathering this intelligence using bulky manned aircraft in contested littoral environments is not only expensive but also highly risky. PILLS enables faster and cheaper data collection while minimizing the risk of detection and eliminating the risk of casualty. ONR found PILLS to be 20 times smaller in volume, 10 times lighter, and five times more energy efficient than current systems.

THE FUTURE

Continued maturation of PILLS for Navy use will include deployment across a wider range of UAV platforms, continued testing to support amphibious missions, improvements to sensor performance and processing speed, and exploration of broader applications. PILLS has already achieved commercial success for hydrographic mapping in collaboration with Fugro, USA, with three systems currently in the field under the name Rapid Airborne Multibeam Mapping System (RAMMS).