

Topic: N131-050

## Adaptive Methods

### LFA and CFLA Acoustic Sensors

Adaptive Methods' technology uses adaptive signal processing to reject unwanted active sonar clutter and interference. Established in 1973, Adaptive Methods is a lead provider of adaptive signal processing technology to the US Navy, and has considerable experience providing advanced signal processing solutions. The technology developed is targeted for the Compact Low Frequency Active (CLFA) application on the AN/UQQ-2 Surveillance Towed Array Sensor System (SURTASS). Adaptive Methods' Anti-Submarine Warfare (ASW) active sonar experience on fielded systems provides unique practical insight to provide continued improvements and upgrades. Initial algorithm Transition Readiness Level (TRL) 5/6 prototypes have demonstrated proof-of-concept and algorithm robustness. Adaptive Methods' goal is to transition this technology to CLFA/LFA systems, providing improved performance to sonar operators.

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**SYSCOM:** NAVSEA

**Contract:** N00024-15-C-4032

 Corporate Brochure: [https://navystp.com/vtm/open\\_file?type=brochure&id=N00024-15-C-4032](https://navystp.com/vtm/open_file?type=brochure&id=N00024-15-C-4032)

# Department of the Navy SBIR/STTR Transition Program

Statement A: Approved for Release. Distribution is unlimited.

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LFA and CLFA Acoustic Sensors

Adaptive Methods, Inc

## WHO

**SYSCOM:** NAVSEA

**Sponsoring Program:** PEO-IWS-5A Advanced Systems and Technology Office

**Transition Target:** ASB-17/19

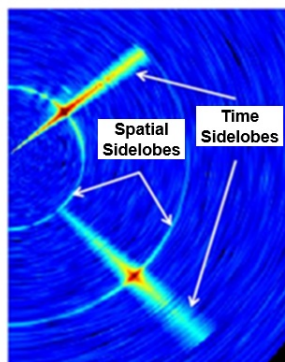
**TPOC:**  
(703)367-3735

### Other transition opportunities:

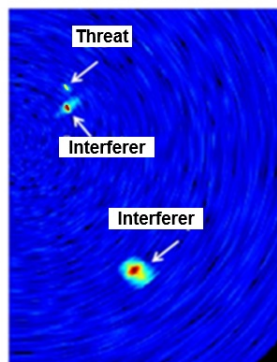
Submarine towed TB-34 array; AN/SQQ89 Multi Function Towed Array (MFTA); Other towed array systems

**Notes:** Linear arrays are commonly used in underwater acoustic applications. The confluence of acoustic interference, failed sensors, and array gain/phase errors leads to degraded performance and increased operator workload. Adaptive Methods' adaptive signal processing algorithms mitigate these effects to provide improved system performance.

**Current Capability:** Loud interferers result in corruptive sidelobes



**New Capability:** Adaptive signal processing mitigates sidelobes



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## WHAT

**Operational Need and Improvement:** The Low Frequency Active (LFA) and Compact Low Frequency Active (CLFA) acoustic sensor arrays are used for both active and passive Anti-Submarine Warfare (ASW). The systems were originally conceived for, and designed for use in a deep-water, low-clutter environments. Active clutter has increased as deployment of these systems have moved from deeper water to littoral combat environments. As more sonar systems employ active sensors, share the same battle space, and their missions expand into a wider range of operating environments, system performance impacts require changes in the current LFA/CLFA sonar signal processor. Sources of active clutter currently degrading LFA and CLFA performance in the littoral environment include active emitters, strong bathymetric returns, oil exploration sources, volume and boundary interaction scattering, and marine life.

**Specifications Required:** Active clutter degrades the operator's ability to detect contacts of interest, and overloads automated processes that detect, classify, and track contacts. Technology is needed to improve LFA/CLFA sensor processing performance to enhance operator capabilities in the littoral environment.

**Technology Developed:** Adaptive Methods has developed an active adaptive beamformer (ABF) for LFA and CLFA that reduces active clutter and provides improved Signal to Interference plus Noise (SINR) levels. Adaptive Methods has also applied its approach to Robust Adaptive Matched Filtering to beamformed data to improve the detection of weak signals of interest that have previously been masked by loud interference sources.

**Warfighter Value:** The advanced sensor signal processing techniques produced by Adaptive Methods reduce operator workload and lower false alert rates. Operational displays are decluttered and enable more accurate detection, tracking, and classification of threat submarines.

## WHEN

**Contract Number:** N00024-15-C-4032 **Ending on:** February 20, 2018

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Develop and tune algorithms	Med	Suppression of sidelobes	4	May 2016
Process data	Low	Statistical clutter reduction	5	February 2017
Develop Software Prototype	Med	Real time processing	6	February 2018

## HOW

**Projected Business Model:** Adaptive Methods' is developing advanced signal processing algorithms for use on tactical LFA/CLFA systems. Adaptive Methods intends to integrate capabilities developed under this SBIR for fleet use.

**Company Objectives:** Adaptive Methods is a developer of advanced sensor processing and computing architecture products. Based in Centreville, Virginia, Adaptive Methods' technology transition programs deliver increased product value through improved sensor performance, operability, and user flexibility

**Potential Commercial Applications:** The technologies being researched could be leveraged by other government agencies that field systems employing active sonar. This technology could provide benefit in homeland security applications. Port security is becoming increasingly important, and operation in cluttered near-shore environments will be improved by Adaptive Methods' technology. Likewise, the improved sidelobe discrimination and spatial resolution of ABF and the improved range-resolution provided by R-AMF could be used to improve the products of government bottom-mapping activities.

Although the research being proposed is primarily targeted to transition to Undersea Warfare/ASW systems, there are commercial applications. Active systems are marketed to commercial security applications for oil rigs, large yachts and the cruise ship industry. Adaptive Methods' technology would declutter displays of systems to improve their effectiveness.

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