Topic: N151-055

Marine Acoustics, Inc.

Multi-ship Sonar Bistatic Automatic Active Localization

The overall scope of this SBIR effort is the design, development, test and evaluation of a bistatic sensor processing system, to include Tactical Decision Aids (TDA's) and Mission Planning Tools (MPT's), implemented as an adaptation to existing monostatic processing capability and for ultimate transition to established Navy SONAR system builds. The ability to localize threat submarine forces in a battlefield scenario by judicious application of bistatic capability in surface ship, submarine, and fixed SONAR systems provides important collaborative benefits to the Full Spectrum Anti-Submarine Warfare (ASW) kill chain. The approach taken then, as well as the Concept of Operations (CONOPS) documented as part of this approach, would minimize localization error as well as maximize target confidence by mitigation of understood limiting factors inherent in bistatics.

Technology Category Alignment:

Advanced Computing/Software Development
Synthesis/Analytics/Decision Tools
Acoustic, Seismic and Magnetic

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SYSCOM: NAVSEA
Contract: N00024-17-C-4005

Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N00024-17-C-4005

Department of the Navy SBIR/STTR Transition Program

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NAVSEA #17-554

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Multi-ship Sonar Bistatic Automatic Active Localization
Marine Acoustics, Inc.

WHO

SYSCOM: NAVSEA

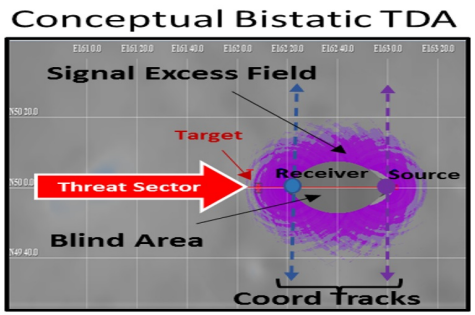
Sponsoring Program: IWS-5A

Transition Target: Surface SONAR System Advanced Capability Build (ACB) as part of 4-Step Test and Evaluation Process (lowest transistion risk)

TPOC:
(202)781-4233

Other transition opportunities: The same technology can be transitioned to Submarine SONAR System Advanced Processing Build (APB) once matured through the ACB 4-Step Test and Evaluation Process

Notes: TRL-6 target of Q2 FY-19 as Seminal Transition Event (STE) for inclusion into ACB-21 Step 3 planning process



WHAT

Operational Need and Improvement: The Navy needs improved performance when multiple surface ships are transmitting simultaneously in a strike group and when submarines utilize active sonar capability in coordinated operations. Bistatic reception and processing of active transmissions provides the capability for a single receiver to increase the amount of opportunities it has to exploit active acoustic transmissions, allows for stealthy receivers to process active transmissions without giving away its location, and decreases interference from many ships transmitting simultaneously.

Specifications Required: Successful application of multi-ship bistatic active sonar processing requires information exchange or inference of certain source transmitter parameters to achieve optimal processing and localization accuracy. A solution to the source information exchange problem within a communications implementation framework will allow for a cost-effective implementation approach to take advantage of the strike group and multi-ship coordination benefits.

Technology Developed: The technology leverages existing Navy SONAR architecture as well as developing technologies such as Digital Acoustic Communications that will enable “bistatic” reception of Mid-Frequency Active (MFA) reflected detections from a source platform to a (non-collocated) receiver platform, as well as Tactical Decision Aids (TDA’s) and Mission Planning Tools (MPT’s) that would visualize the (potential) bistatic SONAR search coverage from the source/receiver pair.

Warfighter Value: The approach taken during this Phase II SBIR, as well as the Concept of Operations (CONOPS) documented as part of this approach, will minimize localization error in the detection of threat submarine forces and maximize target confidence in the classification, tracking, and prosecution of phases of the Anti-Submarine Warfare (ASW) kill-chain by mitigation of understood limiting factors inherent in bistatics.

WHEN

Contract Number: N00024-17-C-4005 **Ending on:** January 31, 2020

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Bistatic CONOPS	Low	Satisfactory simulation and documentation of the theoretical performance of bistatics against targets and environments of interest	4	January 2018
Standalone Bistatic TDA/MPT	Med	Demonstration of the standalone Bistatic TDA/MPT using identical ACB Geo Display software using simulated data	5	January 2019
ACB Bistatic Processing	Med	Demonstration of bistatic processing capability with existing ACB architecture and At-Sea data	6	March 2019
ACB-21 System Integration	Med	Successful tranistion to ACB-21 Step 3 development process	6	January 2020

HOW

Projected Business Model: Our business model is to directly develop software and associated documentation, as well as provide services to the government. Ultimately, the same software and documentation can be utilized by a Prime Integrator in transition to Navy SONAR Programs of Record and/or Foreign Military Sales (FMS) applications.

Company Objectives: We anticipate the Navy SBIR/STTR Transition Program (STP) Forum will facilitate connections with current and future Navy program sponsors that could utilize this capability across multiple Anti-Submarine Warfare (ASW) communities. Our short term objective is to develop and demonstrate TRL-6 capability for inclusion into ACB-21 Step 3 planning process, possibly with Rapid Innovation Funding (RIF) in order to assist transition to Navy Surface SONAR Systems. Our long term goal is to leverage advertisement of a successful SBIR transition (and lessons learned from this SBIR) as a stepping stone to future similar opportunities across the ASW communities.

Potential Commercial Applications: There has been significant development work in the research community for improving signal recognition and correlation process relative to accurate identification and tracking of vocalizing marine mammals. The opportunity presented by this SBIR is one of further cross-fertilization of these very same processes, including the potential for using active bistatic monitoring of specific animals that may not be vocalizing, or where an additional active sonar detection technique (beyond passive monitoring) can be utilized without subjecting the animals to the same levels of active energy needed for standard 2-way transmission loss monostatic detection systems.

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