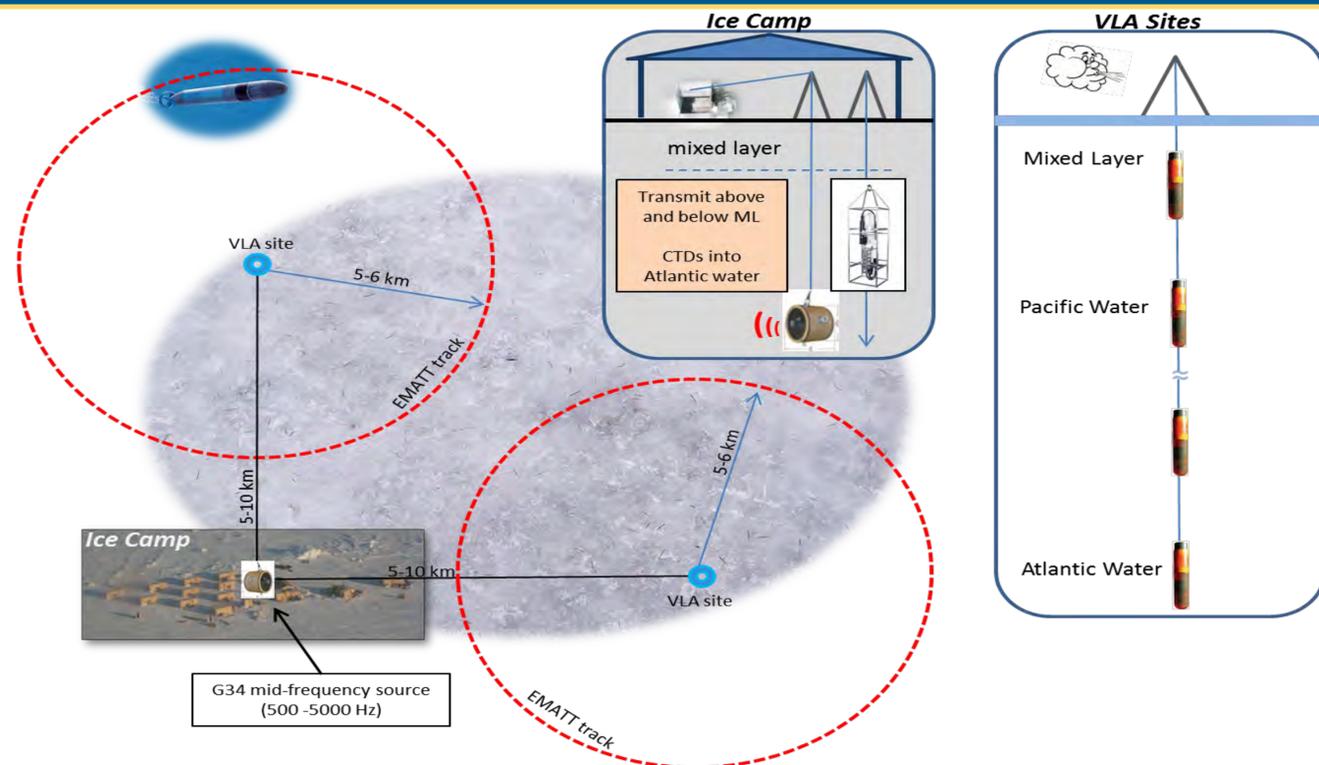


# Characterization of the Arctic acoustic environment using unmanned mobile sources in ICEX-16



NAVAL  
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Unmanned mobile sources provide critical data on radial dependence of under-ice acoustic propagation

## Execution

- NPS will deploy up to four Expendable Mobile Acoustic Training Targets (EMATTs) as **unmanned mobile acoustic sources during ICEX-16**
- Mobile sources will run programmed patterns around a pair of vertical line array (VLA) receivers deployed several kilometers from the Ice Camp and transmit a series of custom acoustic signals that **provide a 3D look at acoustic propagation under the ice**
- Ancillary data sets such as sound speed profiles and local ice condition observations will be collected to help interpret the **effects of the Arctic environment on acoustic propagation** including the impacts of changes in (1) under-ice roughness (first year ice vs multi-year ice), (2) under-ice thermohaline structure, (3) ice content and structure, and (4) marginal ice zone dynamics.

## Background & Objectives

- Recent **changes in the Arctic environment** mean that operational databases are becoming more uncertain and operational TDAs **will be expected to perform poorly** in the “new” Arctic due to poor environmental input and lack of understanding of the acoustic phenomena. Poor acoustic predictions lead to improper placement of assets and potential exposure of undersea assets to shorter-than-expected counter-detection ranges.
- Understanding this new environment and the physical processes at work will **identify the acoustically-relevant environmental factors** which are critical to successful future deployment of assets in the Arctic
- Use of unmanned systems as mobile acoustic sources is critical to observation-based research in extreme environments. Our objective is to use such a source collect and analyze 3D (depth, range, azimuth) propagation data to improve understanding of environmental impacts on acoustics in the changing Arctic.

## Relevance

- ICEX-16 supports the goals of the **USN Arctic Roadmap 2014-2030** which includes updating fleet guidance on Arctic operations, increased training participation and visibility during Arctic exercises, developing CONOPS for naval platforms and update as new capabilities are developed and integrate testing of sensors/systems during Arctic exercises
- Use of unmanned systems in extreme environments provides critical **data sets that may be otherwise unattainable** due to cost or human safety considerations. In our application, a mobile acoustic source demonstrate the capability to collect 3D under-ice propagation information using unmanned assets.
- Use of the EMATT as a research tool in ICEX-16 will pioneer the way for use of other more sophisticated mobile sources (such as our modified REMUS-100 mobile source currently in development) that can carry a complementary suite of sensor packages to make measurements in challenging environments