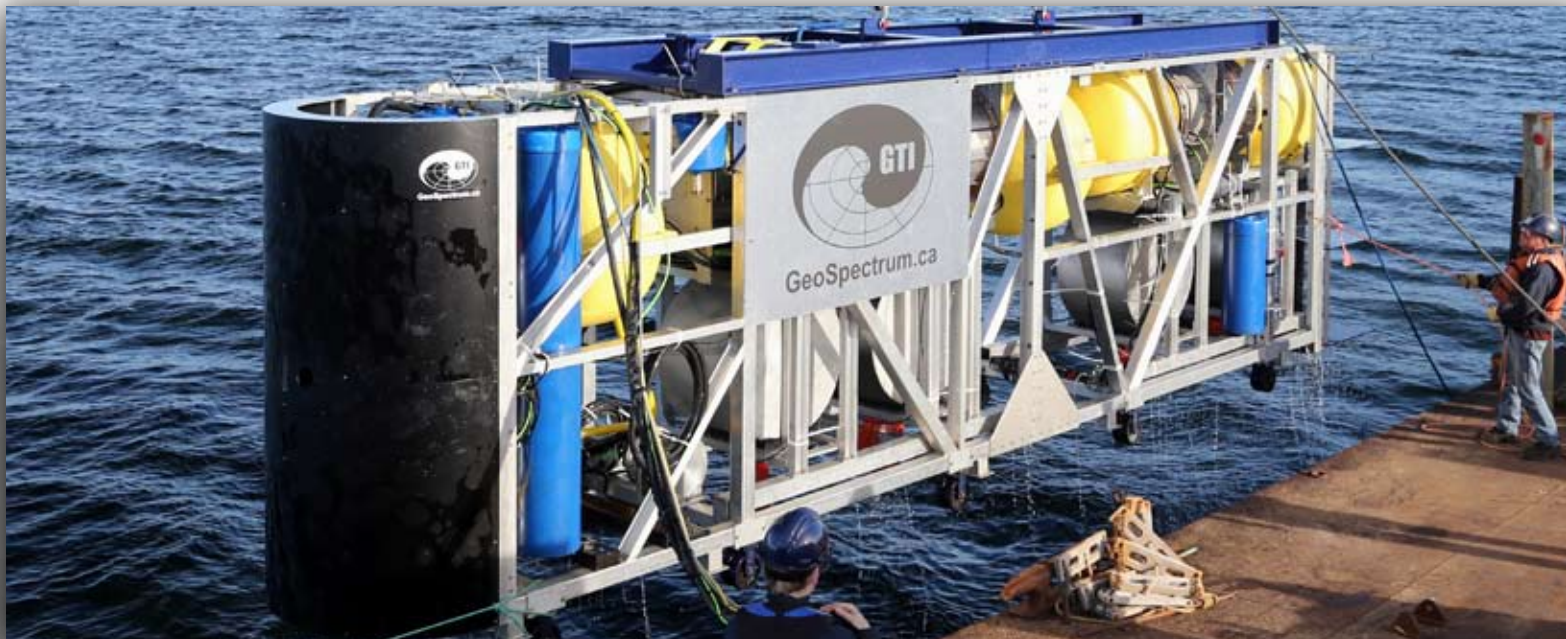




GeoSpectrum Technologies Inc
Optimizing Underwater Acoustics

Cetus VLF Sonar

Very Low Frequency for Very Long Ranges



Strategic ASW Surveillance and Long Range Communications

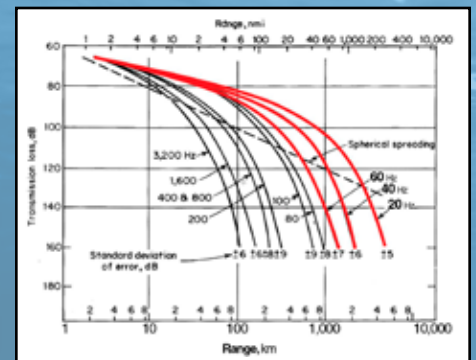
The Cetus Very Low Frequency (VLF) Sonar system from GeoSpectrum leverages the ability of low frequency underwater sound to travel very long distances, thereby enabling long distance detection of submarines. This provides the ability to apply active sonar to detect even the quietest submarines at extended ranges. VLF active sonar has the potential to allow detection from both reflection and resonance, effectively undermining submarine concealment measures. Cetus can also be used for long range communications with submarines, UUVs and other underwater assets.

Early Warning and Protection of Territorial Waters & EEZ

Our VLF sonar technology, developed originally for oil & gas applications, provides high power levels at frequencies as low as 1 Hz. These sound sources, coupled with optimized receive arrays and cutting edge processing, yields an effective long-range anti-submarine warfare sonar system. In a static deployment, the system can be combined/interfaced with long range radar, SIGINT, AIS, and mobile surveillance assets such as maritime patrol aircraft or UAVs to implement a holistic and integrated cross-domain EEZ defense suit. The system can also be deployed in a towed configuration for a strategic ASW surveillance

Turn Key Solution

GeoSpectrum experts will work with clients to analyze the required operating arena and relevant scenarios to define an optimal deployment configuration for both shore based and at-sea configurations, including installation and interoperability with existing navy infrastructures and assets.



Only VLF signals can attain ranges
in excess of 1,000 km*

**Dual purpose system can
be used for detection and
communications**

NAVAL

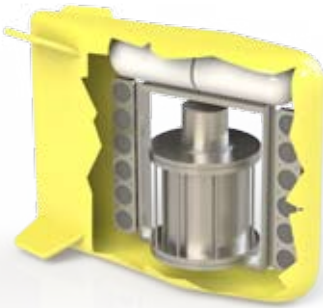
GeoSpectrum.ca

Cetus VLF Sonar

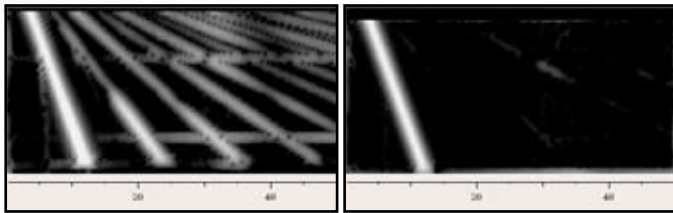
Very Low Frequency for Very Long Ranges

Features

- Moored or towed configurations
- Active sonar frequency of 1 Hz – 200 Hz
- Coherent & non-impulsive
- Ranges of 1,000 km possible
- Rugged transducers designed for continuous use, with 1000s of hours of high-power robustness testing
- Inter-operable with long-range radar, SIGINT, AIS, and maritime patrol systems



Next generation variable depth ASW sonar includes VLF source (<100 Hz) for long-range detection and surveillance, and low frequency (~2 kHz) transducers for tracking once target is detected with VLF subsystem



Before

After

Software-controlled distortion reduction removes harmonics for cleaner signal and improved detection



Full coverage of the EEZ is possible with the VLFS system

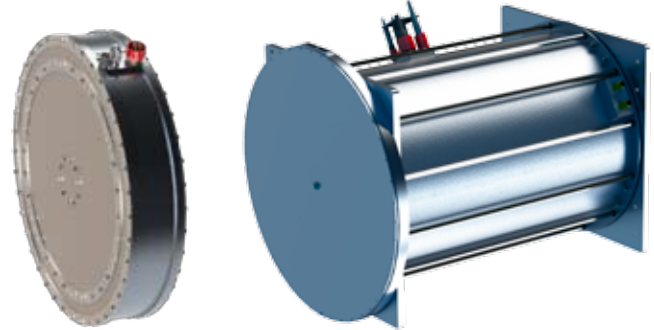
*Ref: *Urick, Principles of Underwater Sound, 3rd Ed, Fig 6.20*

Components

- VLF acoustic source
- Receive array
- Mooring hardware & shore cable for fixed installations
- Winch, cable, towbody & deployment/recovery system for shipboard installation
- Rackmount control & power station consisting of computer, user interface, control electronics, and high-voltage power supplies
- RecView processing software with advanced displays, analysis tools, and intuitive workflow to aid operations and reduce training requirements



Operator Console (Optional)



A family of ruggedized modular acoustic sources are available that can be readily configured and scaled to suit the application



GTI has been contracted by the Canadian Navy to demonstrate the ability of our VLF sonars to provide long range detection and communications in the Arctic