

ESTCP MR24-8267: Extending the Operational Envelope of the UltraTEM Marine System

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Supporting Organization
SeaView Geophysical, Inc.

Past Performance

Working as a team since 2024, SeaView Geophysical (acquisition) and Black Tusk Geophysics (processing and QC) have achieved the project's goals by completing multiple underwater digital geophysical mapping projects (AGC and Amplitude Detection), supported by acoustic surveys in shallow and confined waterways.

- Initial efforts have been in water depths ranging from 0.1m to 3.3m.
- Before performing an electromagnetic survey, the Areas of Concern are acoustically surveyed (bathy and Side Scan Sonar) for obstacles.
- Both 100% coverage and transect surveys have been performed
- UltraTEM data has been processed for both Advanced Geophysical Classification and Amplitude Detection.
- All data collected and processed to rigorous quality control standards

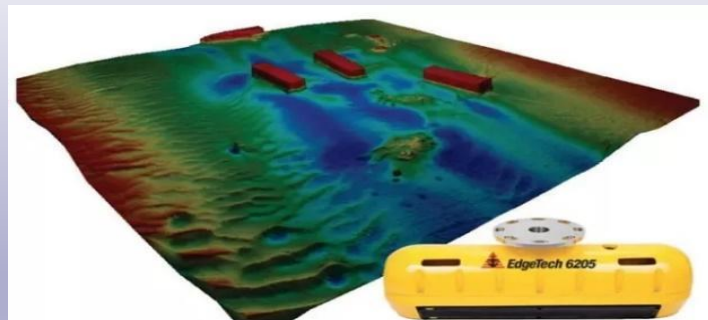
Survey Type	Area (acres)	Coverage Type	Coverage Achieved	Water Depth (m)
UWAGC	168	Full 100%	99.2%	0.1 – 3.2
UWAGC	92	Transect	100%	0.2 – 3.0
UW Amplitude Detection	16	Transect	100%	1.6 – 3.3
UW Amplitude Detection	5	Grid	100%	1.6 – 3.3

Phase 1: Acoustic combined SSS and bathymetric survey

Acoustic Survey Equipment



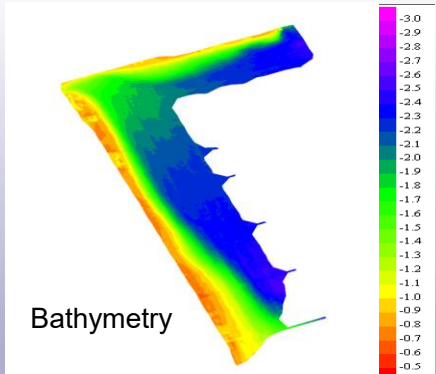
Automated Surfaced Vessel



EdgeTech 6205 Combined SSS and MBES



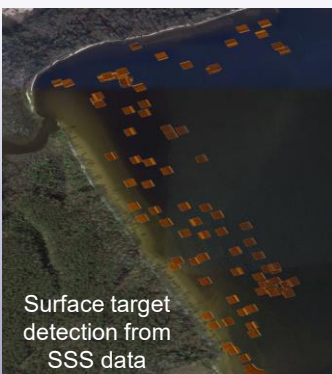
Shallow Draft Acoustic Survey Boat



Bathymetry



High resolution Sidescan Sonar Mosaics



Surface target detection from SSS data



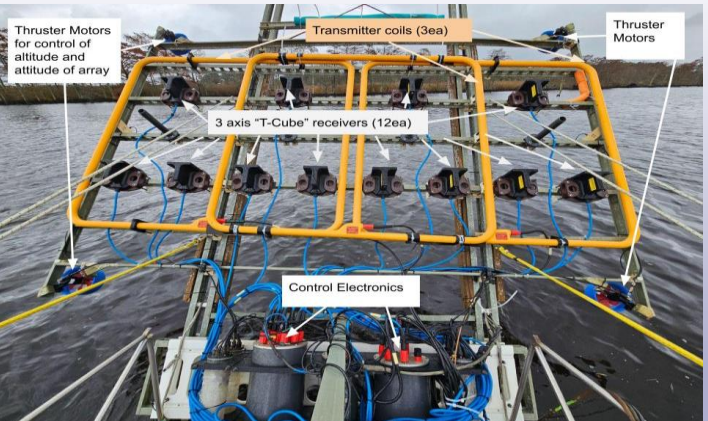
Acoustic Survey Report

Acoustic Survey Data Processed by SeaView Geophysical

Phase 2: Marine UltraTEM Survey (AGC or Amplitude Detection)



AGC or Amplitude Detection Data Acquired by SeaView Geophysical under BTG Supervision



Transect Stations for control of attitude of array



Control Electronics



Coverage Map



EM Survey Reports

- Target of Interest Report
- IVS Tech Memo
- Data Usability Assessment

AGC or Amplitude Detection Processed by Black Tusk Geophysics

Shore, Swash, Surf and Littoral

Some of the most challenging zones are in the shore, near shore regions where ocean energy is focused due to shoaling seabed. SVG personnel originally developed the SurfROVER for an earlier ESTCP demonstration but have improved the system and equipped it with automated functionality. Complementing the SurfROVER, GapEOD has developed a towed array to house the Marine UltraTEM IV that can be towed either on wheels or skids.

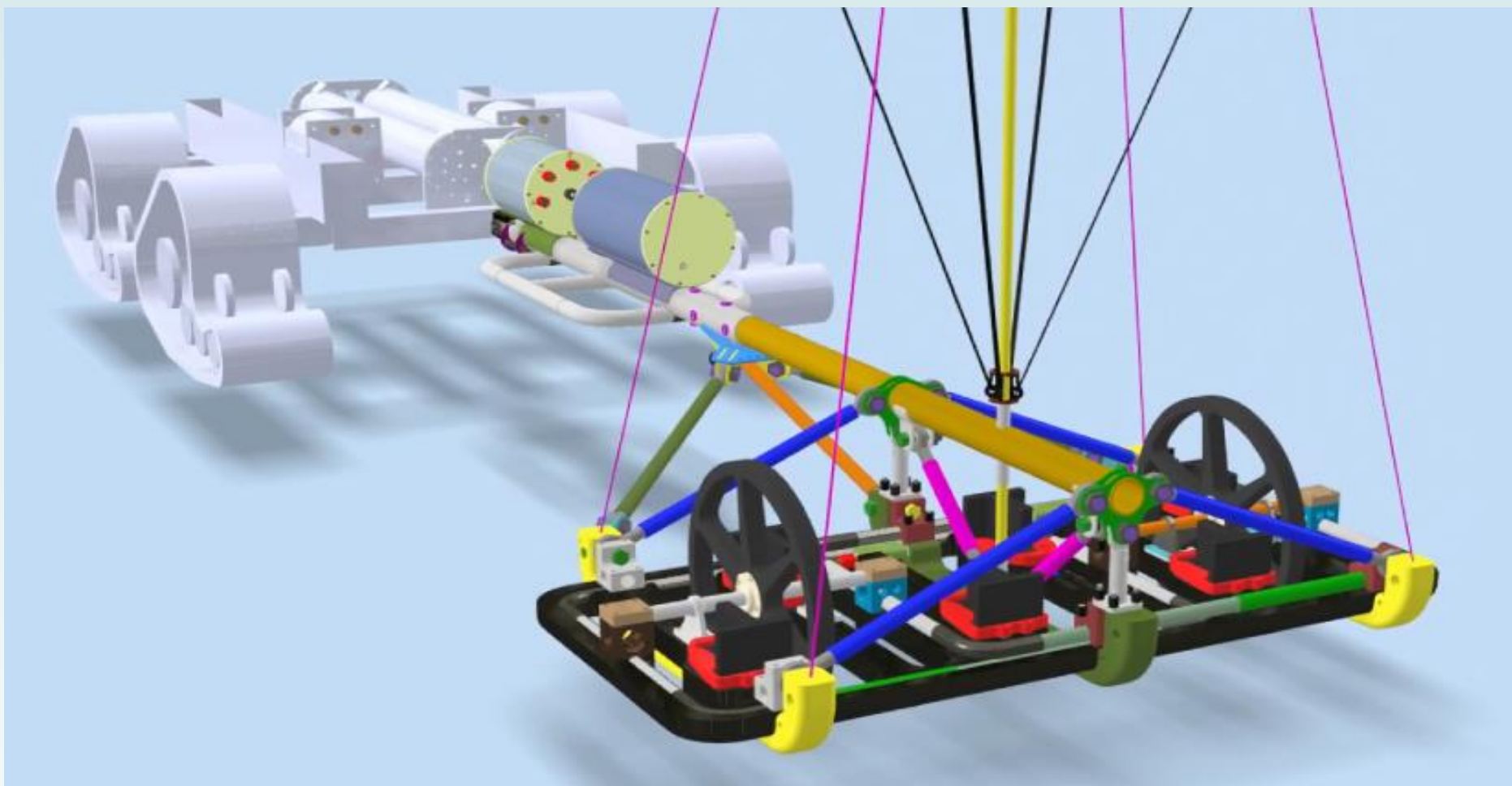
Automated control system will be integrated into SurfROVER Q1 2026 and Engineering Trials are scheduled for Q2 2026 at USACE Field Research Facility, Duck, NC.

SurfROVER Specifications:

- Max operating depth: 300msw
- Dimensions: 2.6m L x 2m W x 0.8m H
- Mass: 680+Kg
- Track ground pressure: 3.5 kpa (0.5psi)
- Battery life: 8-12hrs
- Current conditions: 3kts
- Wave Action: 2m plunging waves

Marine UltraTEM IV Towed Array Specifications:

- Two Transmitter coils
- 6 x 3 axis receiver "T-cubes"
- Operates on either wheels or skids
- Direct position and attitude from RTK GNSS compass mounted on mast
- Power and Telemetry from SurfROVER
- Capable of operating on land or in water



Shallow water (0.2m -10m)

The production work that the team has performed to date has been in inshore waters at depths ranging from 0.2m to 10m. This depth range presents challenges with weeds and submerged natural obstructions, such as sunken logs and both active and abandoned fishing gear. SVG developed a number of strategies to overcome these challenges and is now operating a mature service where EM data can be efficiently and safely recorded.

Survey Vessel Design Goals:

- Small enough to be road transported and stay within the USCG uninspected vessel size limit.
- Low conductive signature
- Shallow draft while still able to operate without disturbing the seabed
- Able to steer a transect with +/-0.5m accuracy
- Able to maintain control at slow tow speed
- Weather-proof workstation for surveyors
- Able to provide UltraTEM with clean power

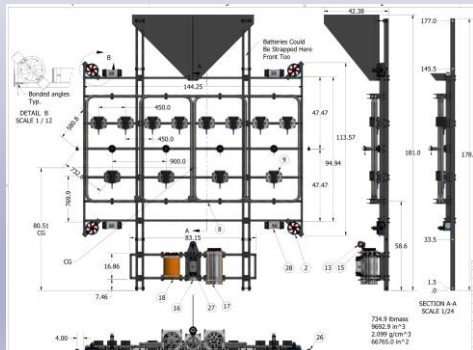
Design and Fabricate Custom Survey Vessel for Performing Electromagnetic Surveys with the Marine UltraTEM IV.



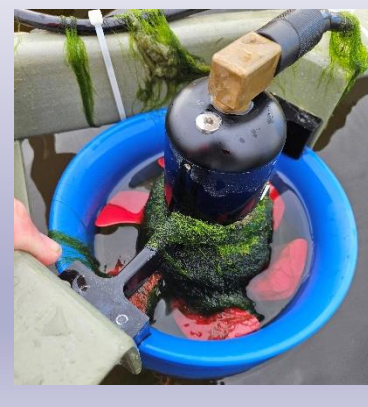
To operate efficiently in shallow waters with many obstacles, the array needed to be dynamically stabilized with onboard depth control, enabling it to maneuver over obstacles and rapidly resume recording. For these reasons, the SVG developed the Active Towed Array:

- Lightweight frame able to be broken down for road transport
- Electromagnetic Swath: 3.15m
- Stabilized with four 500w (13kgf) Brushless DC thruster motors
- 3ea x 2m square Marine UltraTEM IV transmitter coils (50amp)
- 12ea 3-axis receiver "T-cubes"
- Positioned with RTK GNSS Compass with integral INS

Design and Fabricate an Active Towed Array to deploy the Marine UltraTEM IV at a nominal height above seabed of 0.5m



Weed in water depths of <1m required a survey vessel propelled by an air-drive, which operates alongside SV GeoSearch for ultra-shallow ops.



Deepwater (10m-200m)

Deepwater operations present two major challenges:

- Management of vessel heave
- Positioning of array

To manage the issue of vessel heave, SVG developed a relatively small and portable Heave Compensated Winch able to compensate for vessel heave in sea states of at least 2m sig wave height. It is designed to be installed on a suitable vessel of convenience. Initial sea trials were successfully performed on Thunder Bay, Alpena, MI, in summer 2025.

Heave Compensated Winch Specifications:

- Weight: 1200kgs
- Dimensions: 1.8m H x 1.5m W x 1.15m D
- Power: 220Vac -260Vac, 5kw, single or three phase, 50-60hz
- 1200m hybrid electrical and fiber optic cable.

Positioning:

- Subsonus USBL with integrated MEMS-based INS
- Waterlinked A50 Doppler Velocity Log
- 500Khz altimeter

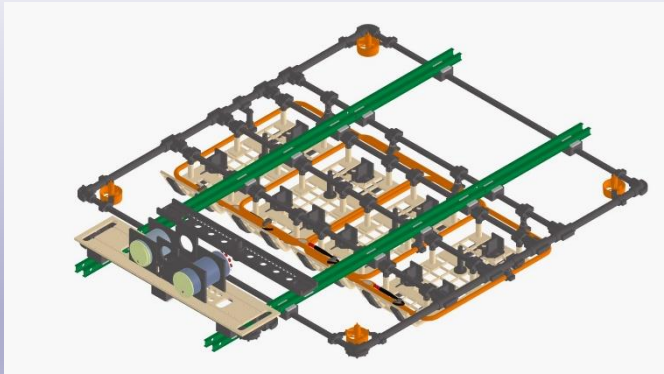
Active Heave Compensated Winch with "fly away" Active Towed Array.



Heave Compensated Winch



GeoSearch laden with 1200kg winch during sea trials



SVG's "Fly Away" Active Towed Array

Active Heave Compensated Winch with "fly away" Active Towed Array.



Waterlinked A50 Doppler Velocity Log



Subsonus USBL/INS Transceiver



500Khz Altimeter

Engineering Trials of the Heave Compensated Winch will be performed off San Juan in Q2 2026. Pending successful Engineering Trials, a live site demonstration will be performed in Vieques, PR, in Q3 2026.

Research Vessel "Blue Manta" will be chartered for both Engineering Trials and the Live Site Demonstration.

