

UltraTEM-V and UltraTEM-XC Pathway to DAGCAP Validation.

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SAGEEP
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Presentation Overview

SAGEEP 2025

01 Introduction
UltraTEM Technology

03 XC Classifier
Platform design

02 UltraTEM-V
Motivation & Improvements

04 Validation
APG & Actions

Introduction

UltraTEM[®] Technology

01



UltraTEM History Timeline

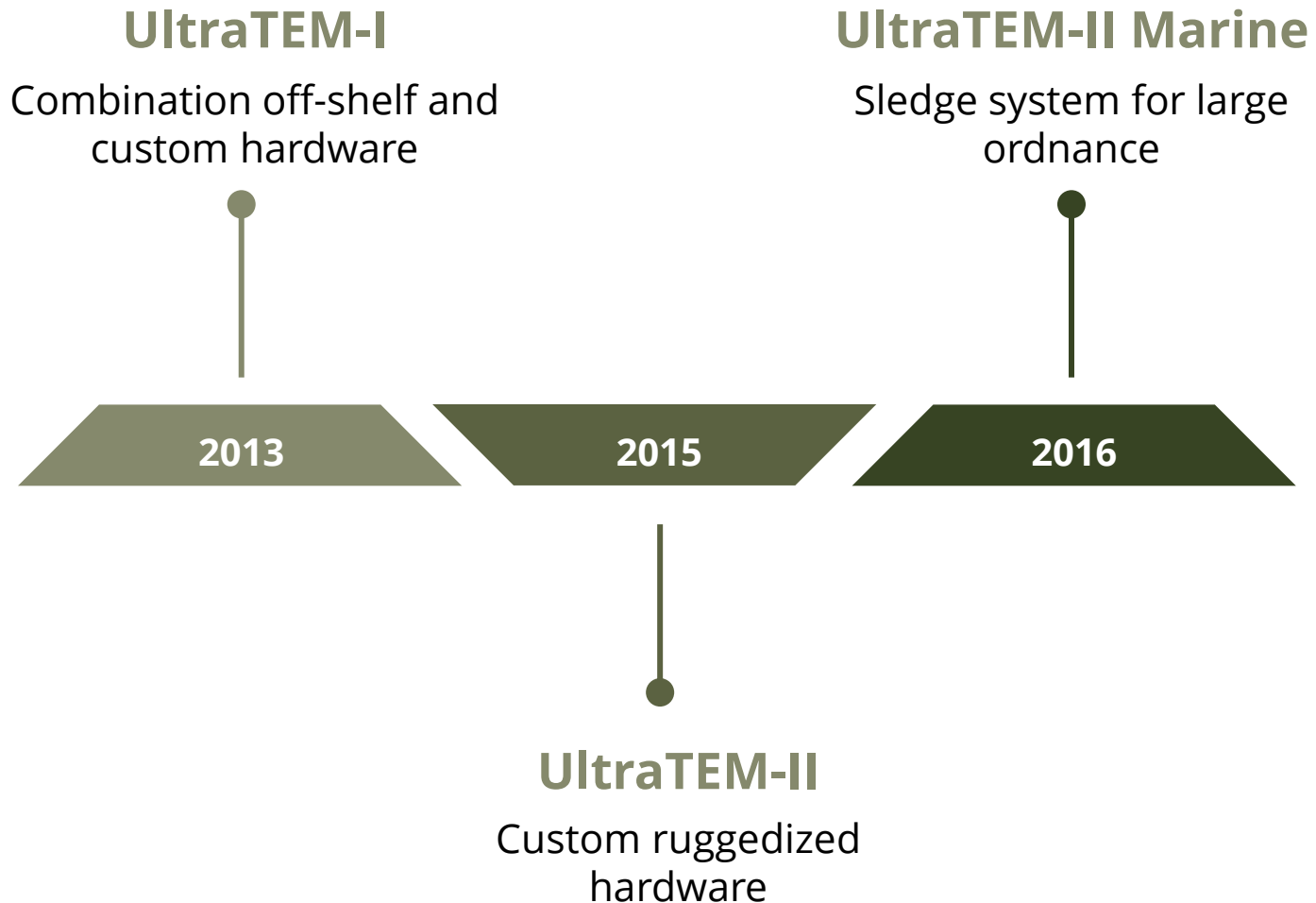
UltraTEM-I

Combination off-shelf and
custom hardware

2013



UltraTEM History Timeline



UltraTEM History Timeline



UltraTEM-IV

Increased frequency
modes, DAGCAP Validated



2017

2019



UltraTEM-III

Improved enclosure
New Transmitter

UltraTEM® Platforms 2019 - Now

UltraTEM Platforms Developed:

- Towed-Array Classifier (2.4 m) 11Rx/5Tx
- Towed-Array Screener (2.2 m) 6Rx/2Tx
+ 3 Tx Deep Detection variant

UltraTEM Classifier Towed Array V2



UltraTEM Screener Towed Array

UltraTEM® Platforms 2019 - Now

UltraTEM Platforms Developed:

- Towed-Array Classifier (2.4 m) 11Rx/5Tx
- Towed-Array Screener (2.2 m) 6Rx/2Tx
+ 3 Tx Deep Detection variant
- Portable Classifier/Screener (1.8 m) 6Rx/2Tx
3 Form Factors: Pushed, Carried & hybrid
- Marine Classifier (3.6 m) 12Rx/4Tx



UltraTEM Classifier Hybrid Push-Carry



UltraTEM Marine

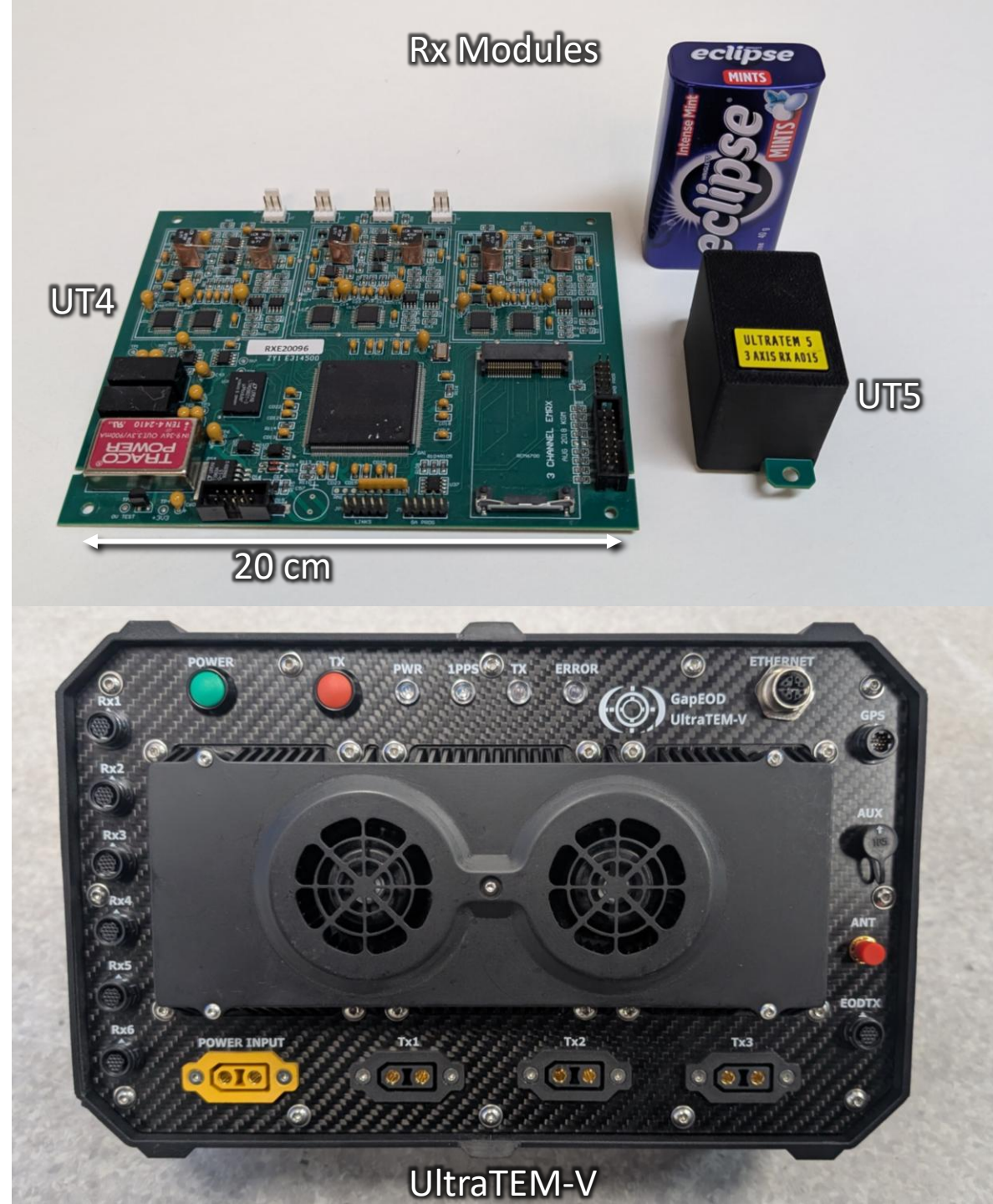
UltraTEM-V

Motivation & Technology

02

UltraTEM-V Motivation

- Enhance the quality of EMI data acquired
- Miniaturize system & modernize componentry
- 10-year manufacturing life
- High-speed ethernet communications



UltraTEM-V Specifications

- 6 x 3 Component Rx Modules
- 3 x 25 Amp Transmitter Drivers
- Reduced volume and weight
- Less interconnect cables and batteries



UltraTEM-IV + EODTx50-2

UltraTEM-V

UltraTEM[®] XC Classifier

Platform Development

03



XC Platform Design Requirements

- Single person operation
- 0.8 m swath
- 3 Survey Modes:
 - Dynamic One-Pass
 - Dynamic Cued
 - Static Cued
- Ruggedized, Light weight & Balanced
- Detachable 3rd Y-Comp. Tx Loop for Static Cued

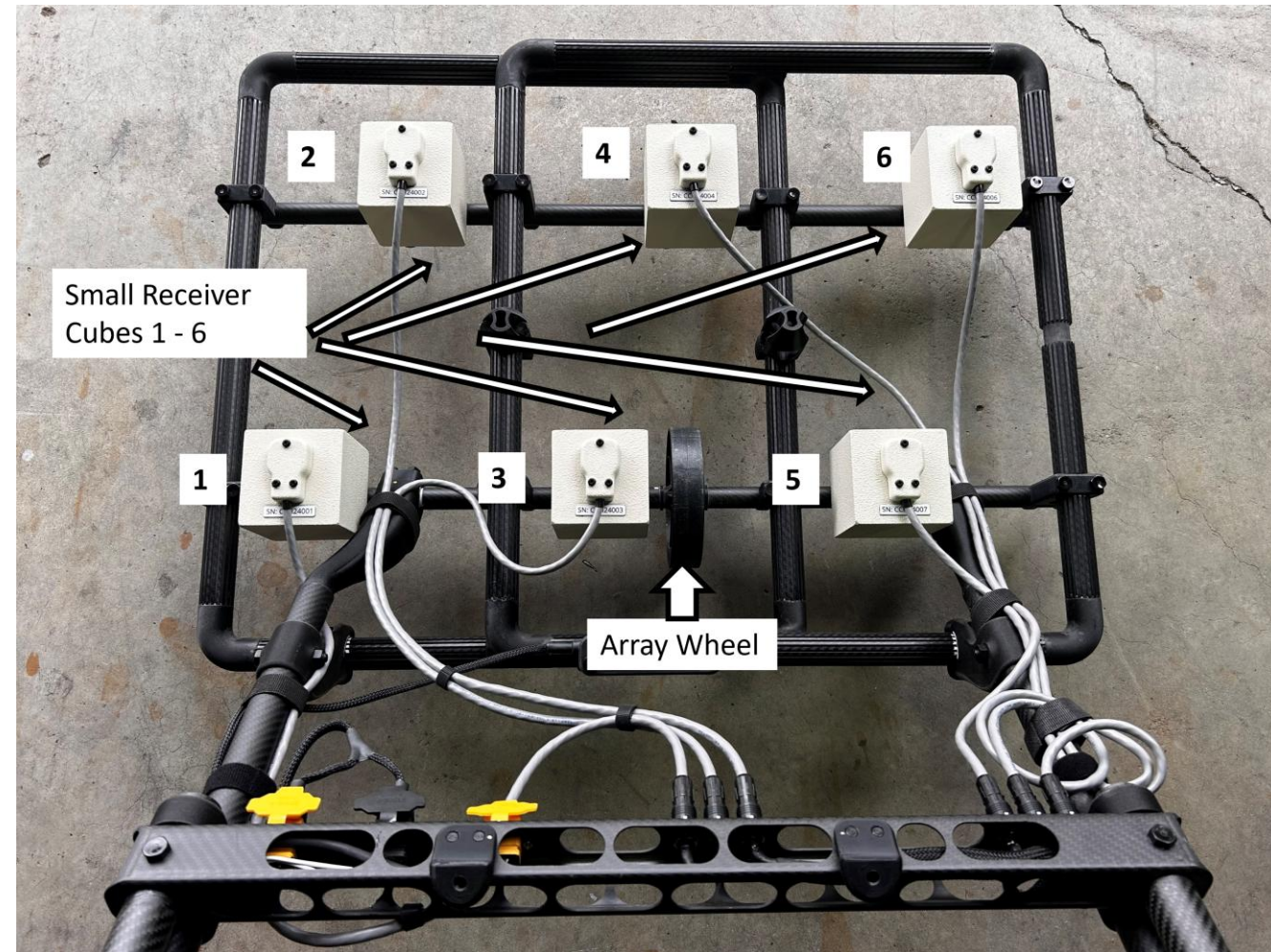


UltraTEM-V on Prototype XC

XC Platform Components

UltraTEM-V plus:

- 8 cm Receiver Cubes
- Light weight transmitter loops
- Accurate Heading Sensor (AHRS)
- DGPS and SLAM
- Lightweight LiFePO4 Batteries



UltraTEM-XC Sensor Head

UltraTEM-V AHRS Testing

- Lord Microstrain 3DM-GX4-25 vs SBG Ellipse E
- Tests along IVS :

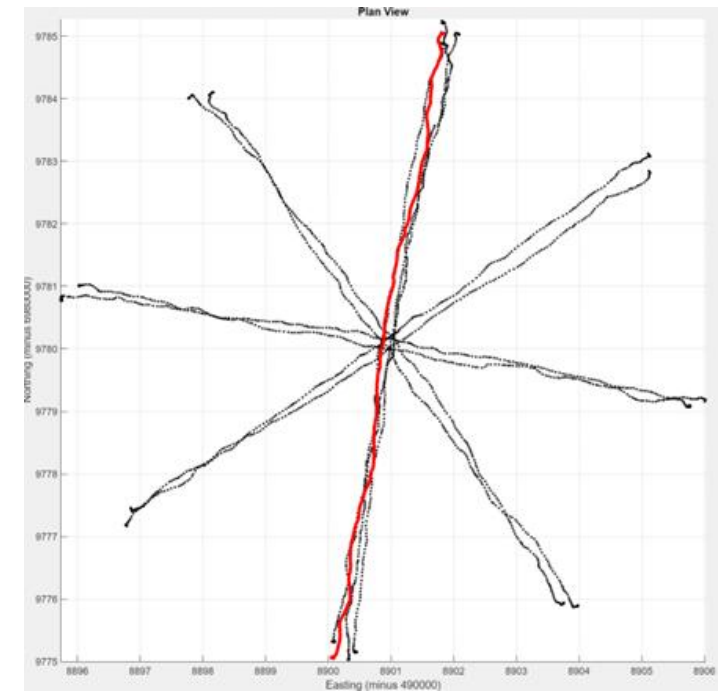


Prototype XC Testing

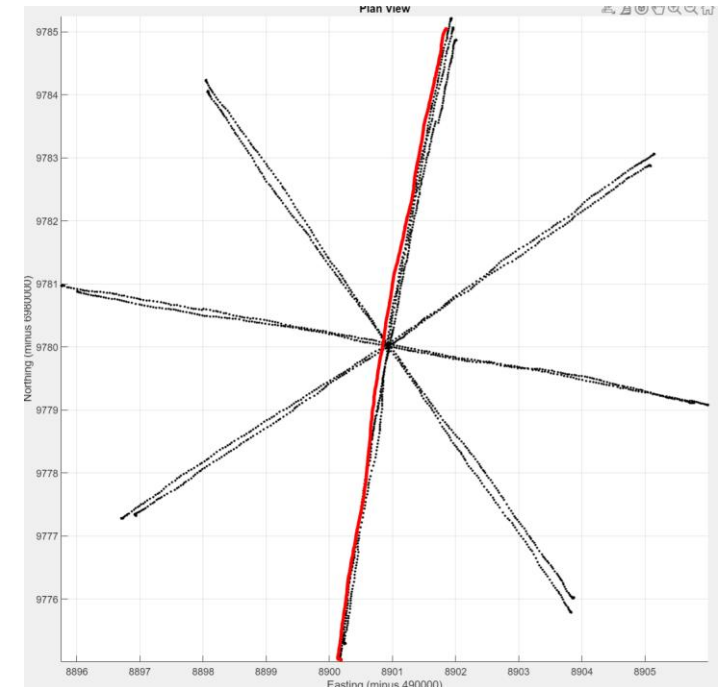
UltraTEM-V AHRS Testing

- Lord Microstrain 3DM-GX4-25 vs SBG Ellipse E
- Tests along IVS:
 - Star Pattern – 8 lines along cardinal and ordinal directions

Position from
GPS Azimuth

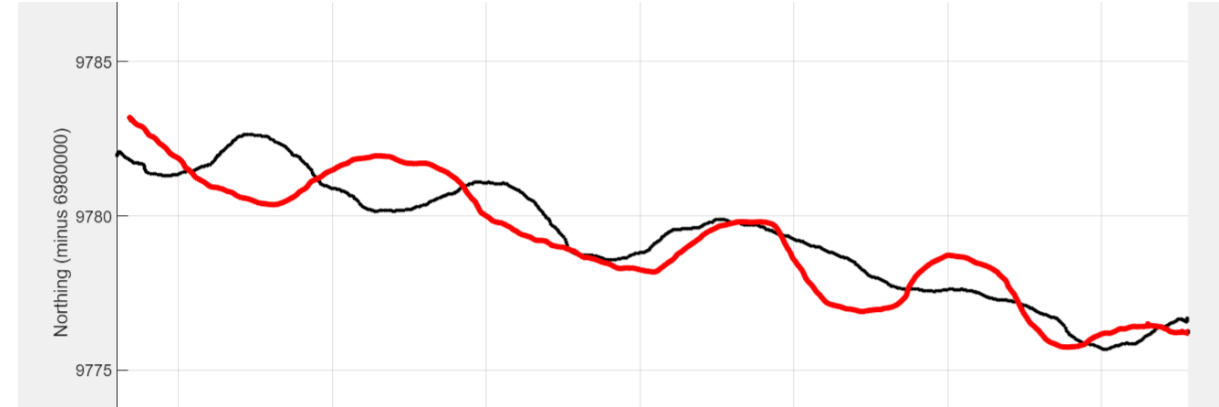


Position from
Ellipse Azimuth

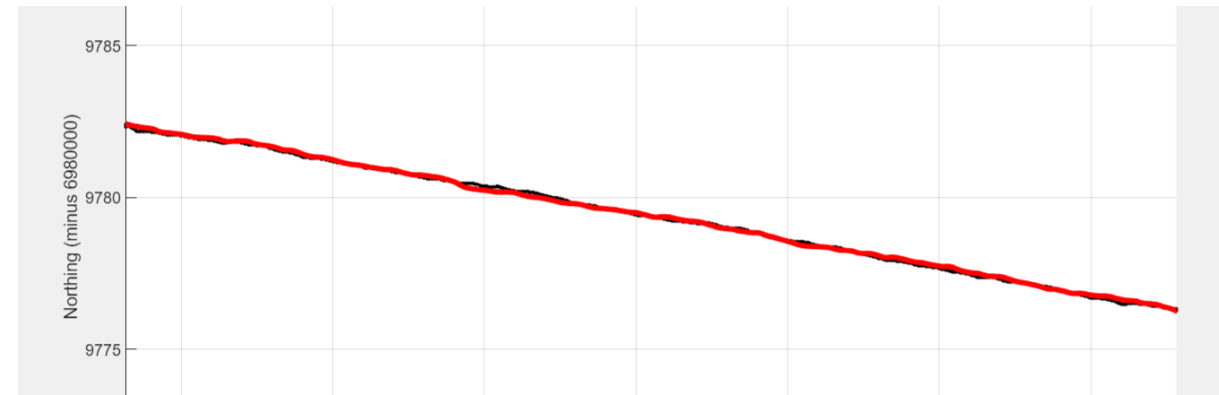


UltraTEM-V AHRS Testing

- Lord Microstrain 3DM-GX4-25 vs SBG Ellipse E
- Tests along IVS:
 - Star Pattern – 8 lines along cardinal and ordinal directions
 - Fishtail – sensor head centered over IVS line, tail wagging
- Ultimately proceeded with 3DM-GX4-25 for APG



Position derived from GPS Azimuth



Position derived from Ellipse Azimuth

UltraTEM-V Testing

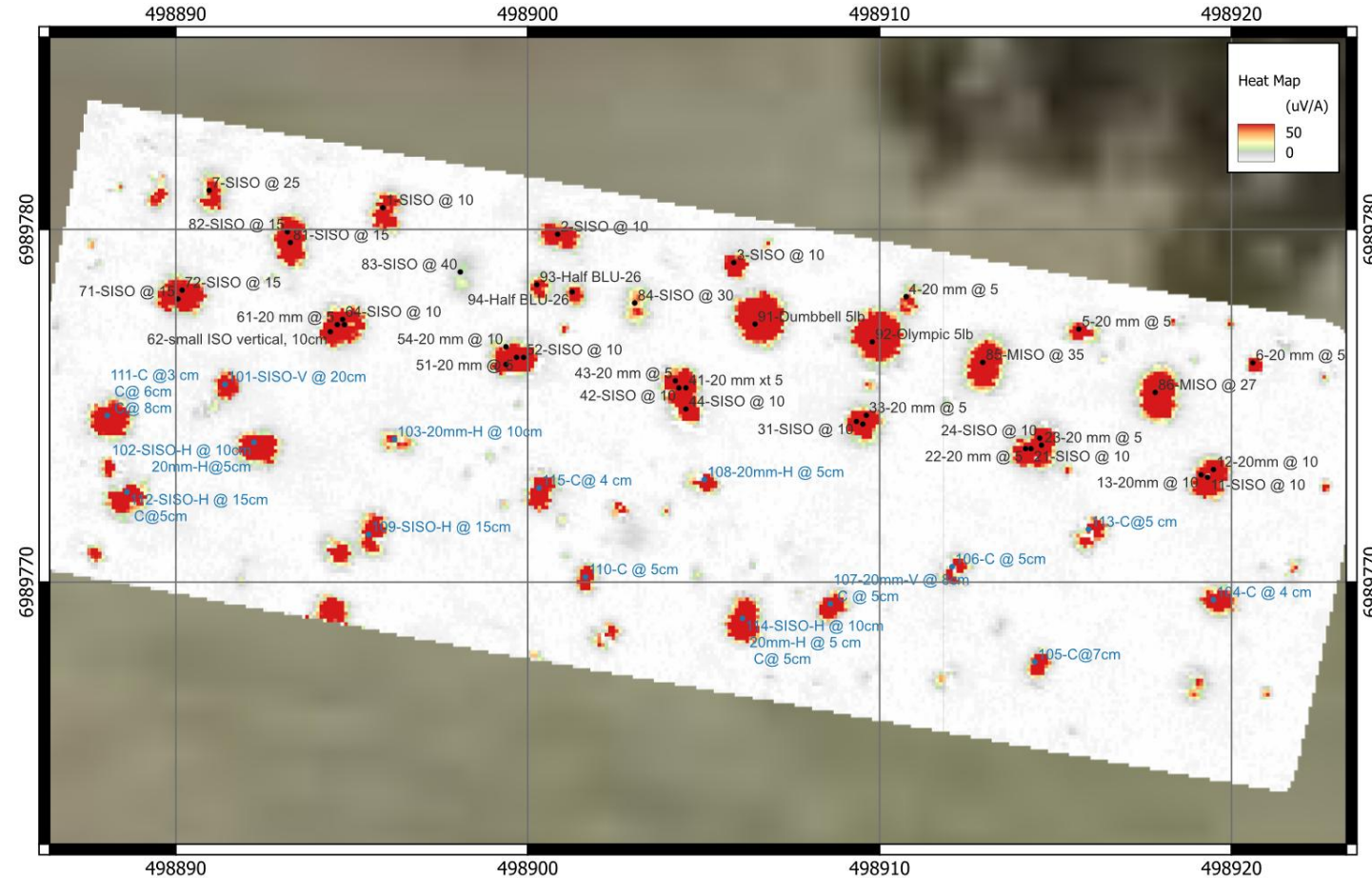
- Head-to-Head Testing
 - Portable Classifier: UT4 vs UT5
 - Portable Classifier: 15 cm vs 8 cm Cubes
 - XC Classifier: UT4 vs UT5



UltraTEM-V on Portable Classifier

UltraTEM-V Testing

- Head-to-Head Testing
 - Portable Classifier: UT4 vs UT5
 - Portable Classifier: 15 cm vs 8 cm Cubes
 - XC Classifier: UT4 vs UT5

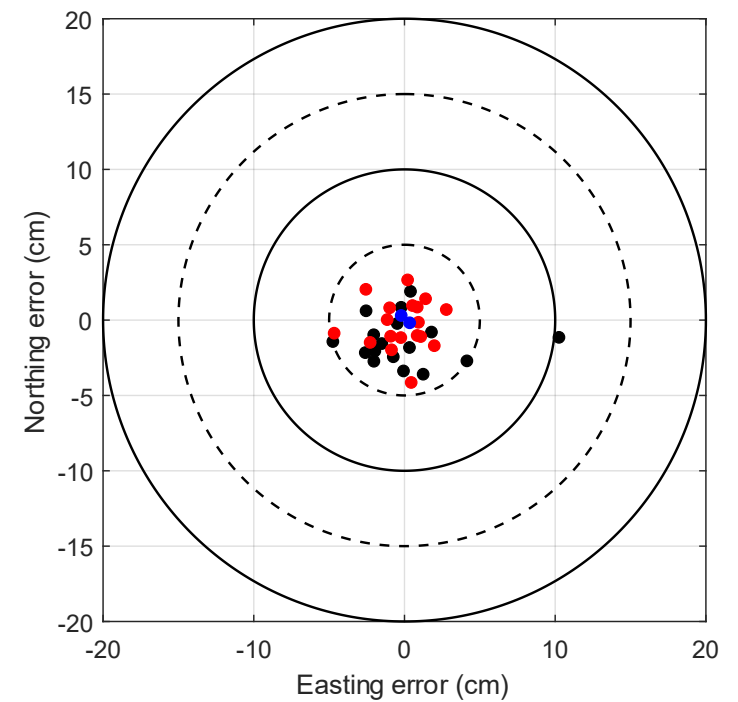


NPPF IVS Results

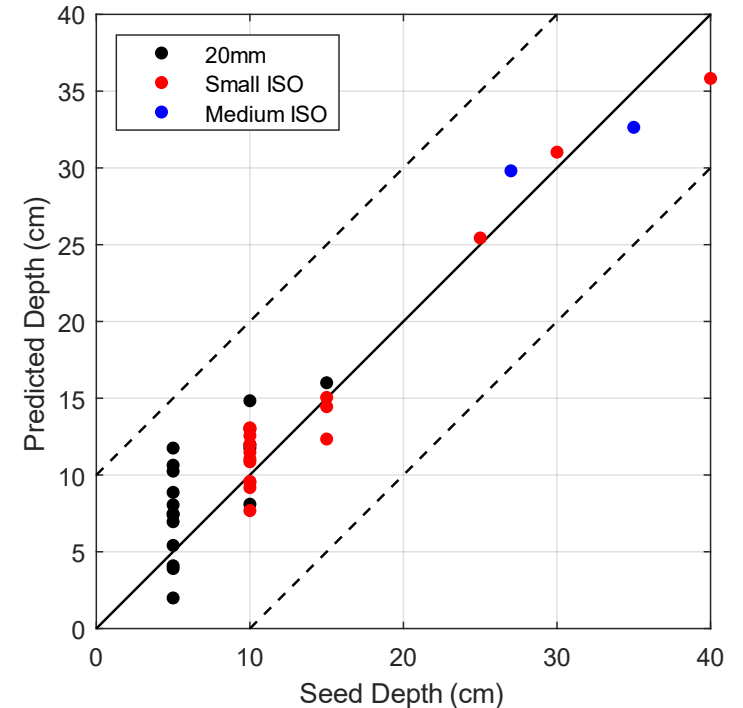
UltraTEM-V Testing

- NPPF Head-to-Head Testing
 - Portable Classifier: UT4 vs UT5
 - Portable Classifier: 15 cm vs 8 cm Cubes
 - XC Classifier: UT4 vs UT5
- Results

Position



Depth



Validation

APG & Actions

04

Validation

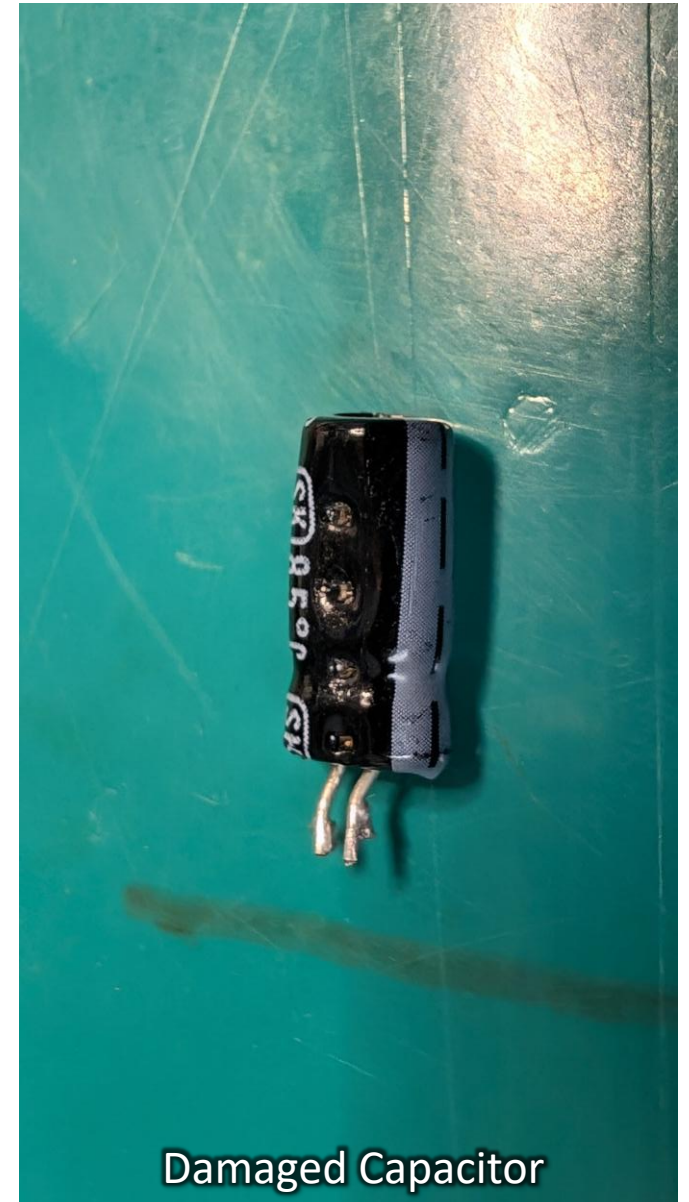
Aberdeen Proving Grounds

- September 2024
- Surveys + Dig Lists for Validation:
 - Dynamic one-pass: $\frac{1}{2}$ acre
 - Dynamic cued: $\frac{1}{4}$ acre
 - Static cued: $\frac{1}{4}$ acre



Validation Challenges

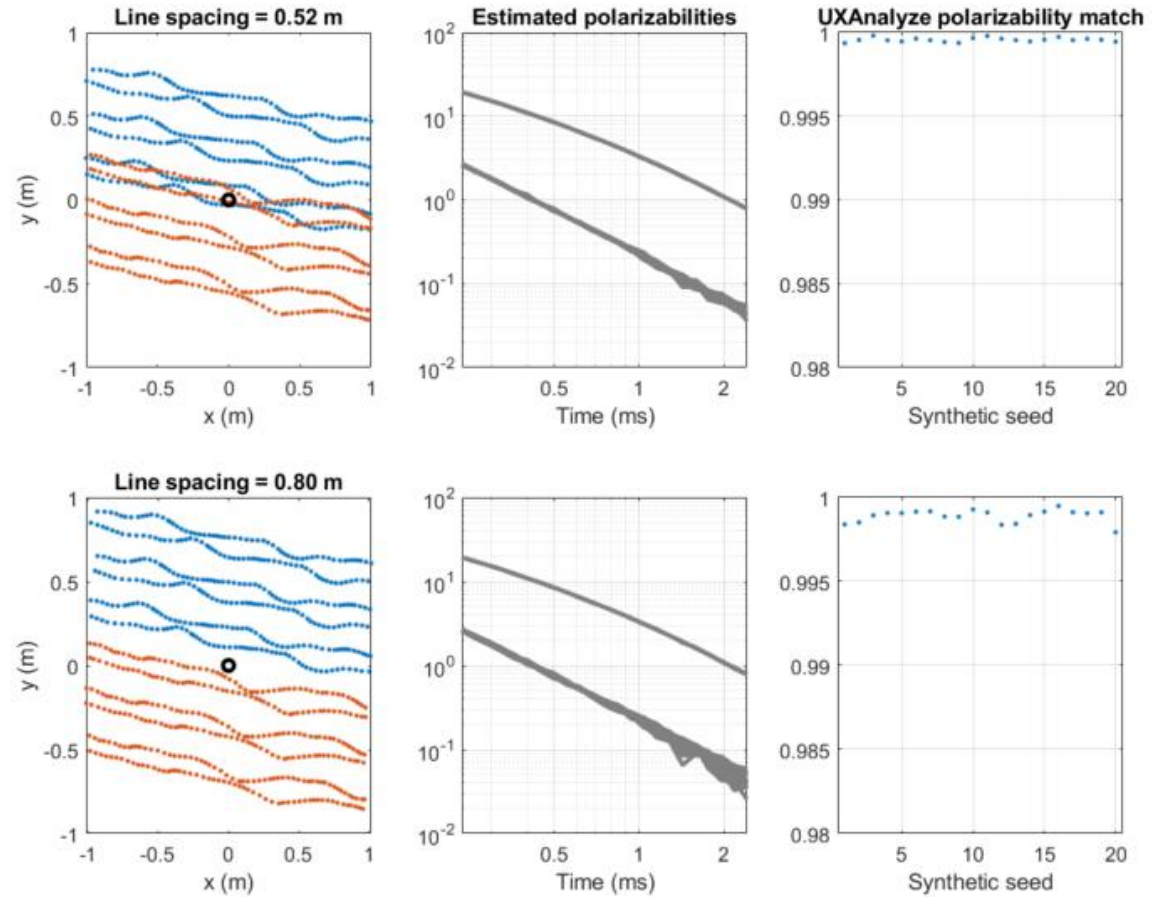
- Late arrival of Batteries
- Firmware bug
- Hardware Damaged in transit



Damaged Capacitor

Validation DAGCAP

- RCA - Hardware Issues
- White Paper comparing system operation between 50 hz and 60 hz environments
- Firmware Release Procedure
- Supporting Documentation
 - Update WS22 + MQO's
 - UXOLab Software Validation
 - User Manual updates



Line Spacing MQO

Conclusions

Validation

05

Conclusions

UltraTEM-V

- UltraTEM-V and Classifier XC Platform Validated for AGC:
 - Dynamic one-pass
 - Dynamic cued
 - Static cued
- UltraTEM-V production version up and running
- UltraTEM-XC production version of carried & pushed variants undergoing testing.
- Upcoming: UltraTEM-V Marine



Questions
&
Thanks for your attention



Gap EOD
Gap Explosive Ordnance Detection

