METALMAPPER 2X2 – INITIAL TESTING AND EFFECTIVENESS ON A MUNITIONS RESPONSE SITE

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Agenda

- Field Lessons Learned

- SFT/IVS Results

- AGC Results

- QA/QC Seeding

- USACE Beach Lessons Learned

- Additional Issues

Field Work Overview

Category	Project 1	Project 2
Setting	Beach, residential	National park, beach
Geophysical Contractor	NAEVA (dynamic) Arcadis (cued)	Arcadis
DGM (acres)	30	6
Dynamic MM2x2 (acres)	0.25	2
Cued MM2x2 Anomalies	6,000	384
MM2x2 Duration (months)	3	0.5
Status	Intrusive inv. in 2018	Intrusive inv. complete

MM2x2 Durability – 3.5 Months in Field

Wear on clamshell from handle

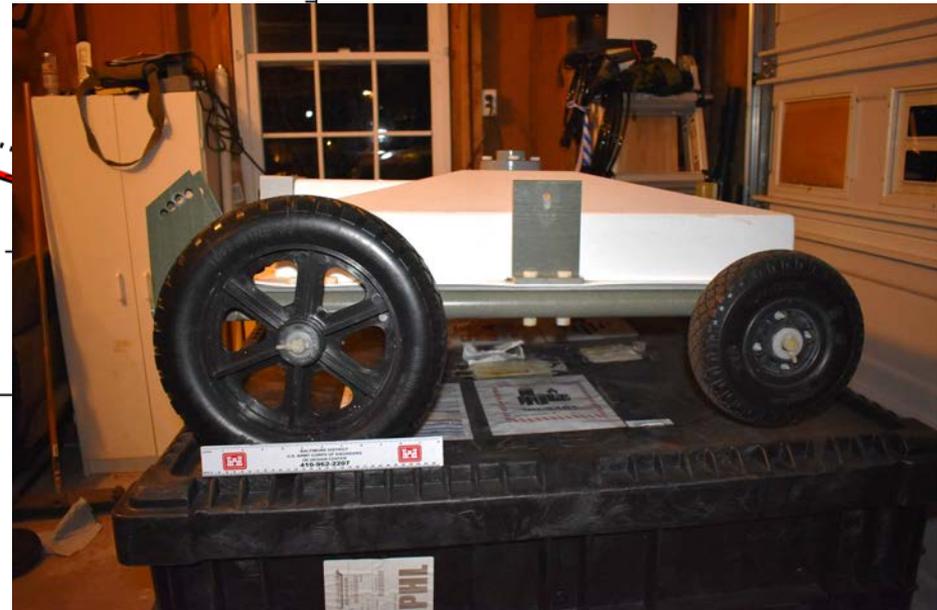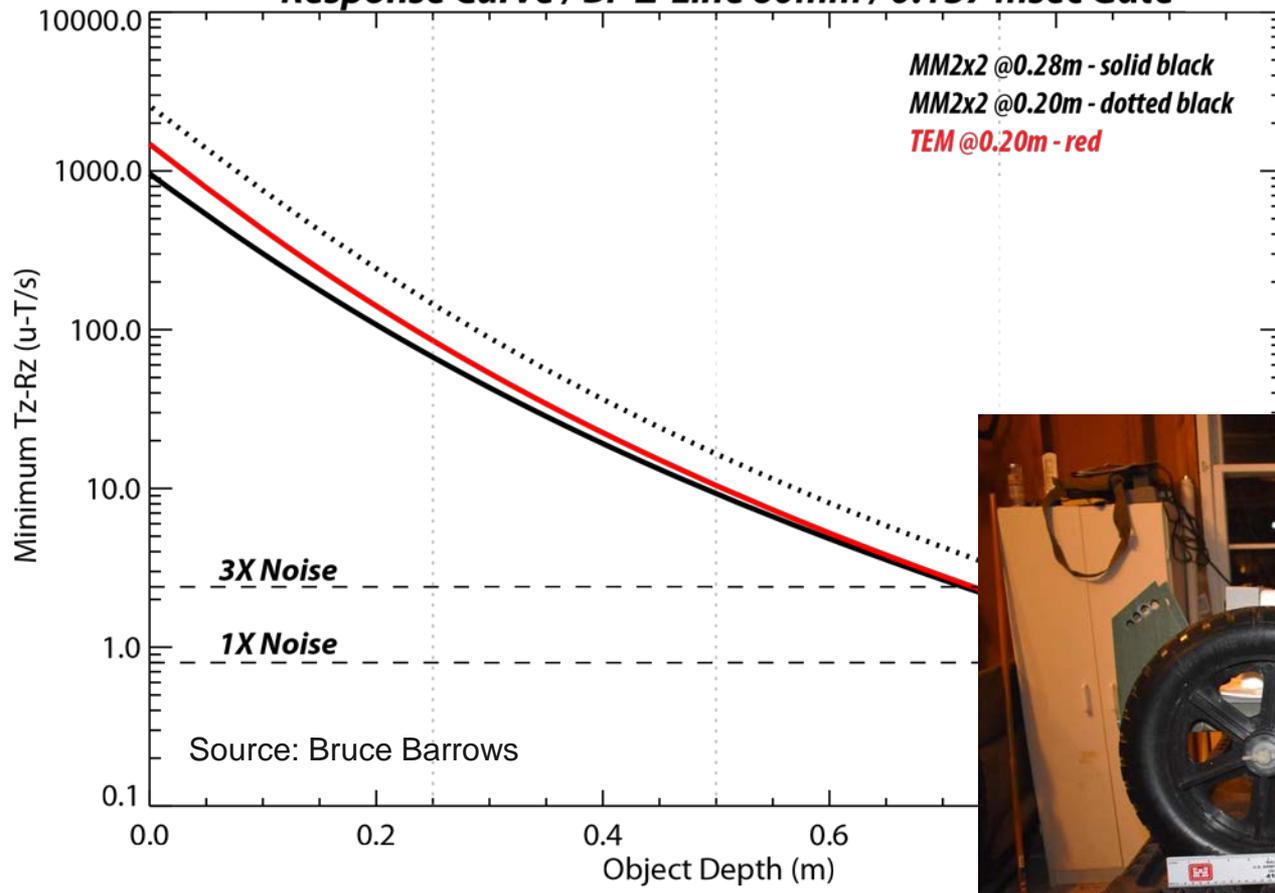Crack on clamshell caused handle pressure

(repaired in-field with JB Weld)

Axle and u-bracket wear

Dynamic Detection

Response Curve / BP Z-Line 60mm / 0.137 msec Gate

MM2x2 @0.28m - solid black
MM2x2 @0.20m - dotted black
TEM @0.20m - red

3X Noise

1X Noise

Source: Bruce Barrows

Minimum Tz-Rz (u-T/s)
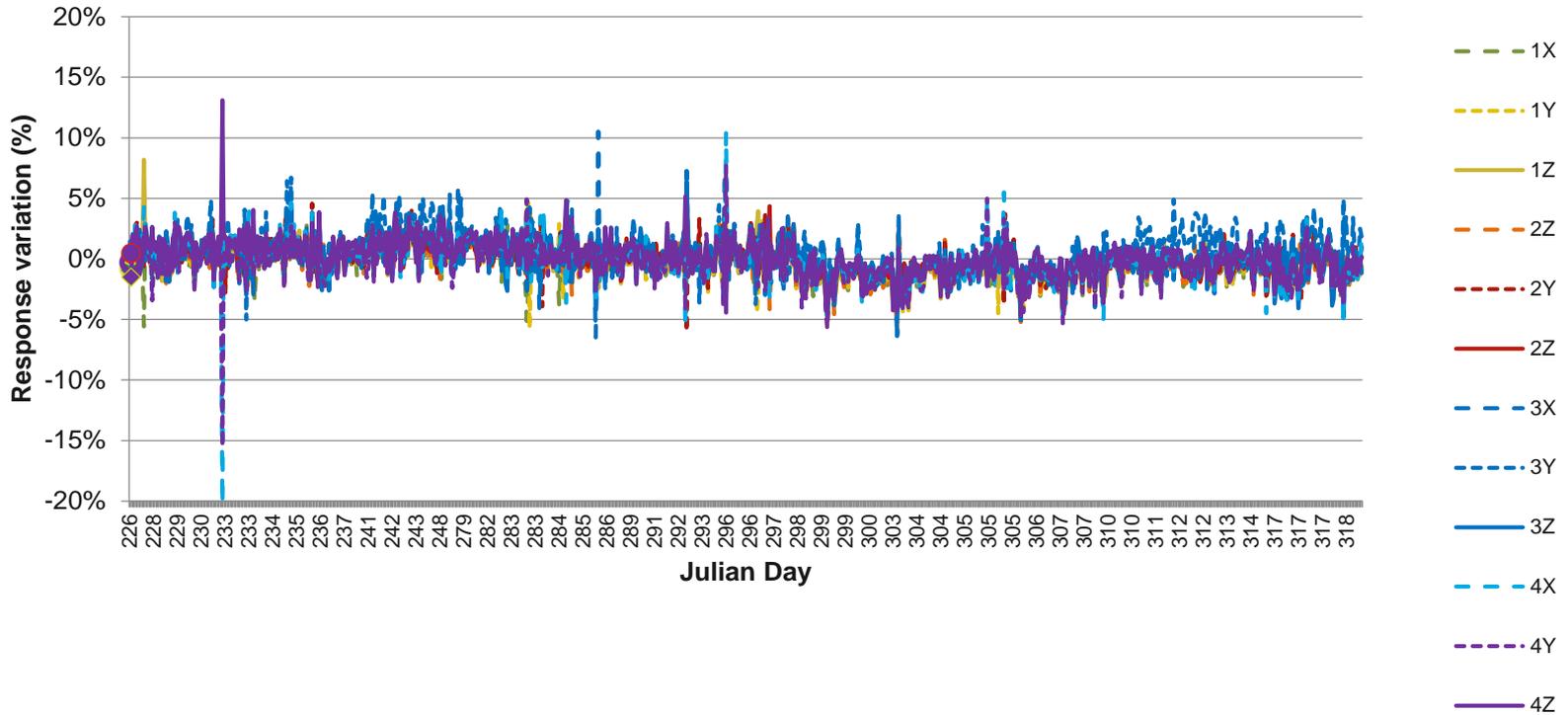
Object Depth (m)

SFTs

- Problem

  - SFT doesn't work in field, but passes in UXA.

  - New reference file doesn't solve problem – degrades over time (1/2 day)

  - Black marks on serialized ISO don't work

  - Incorrect Rx variation calculation?

- Field Solution:

  - Collect multiple SFTs

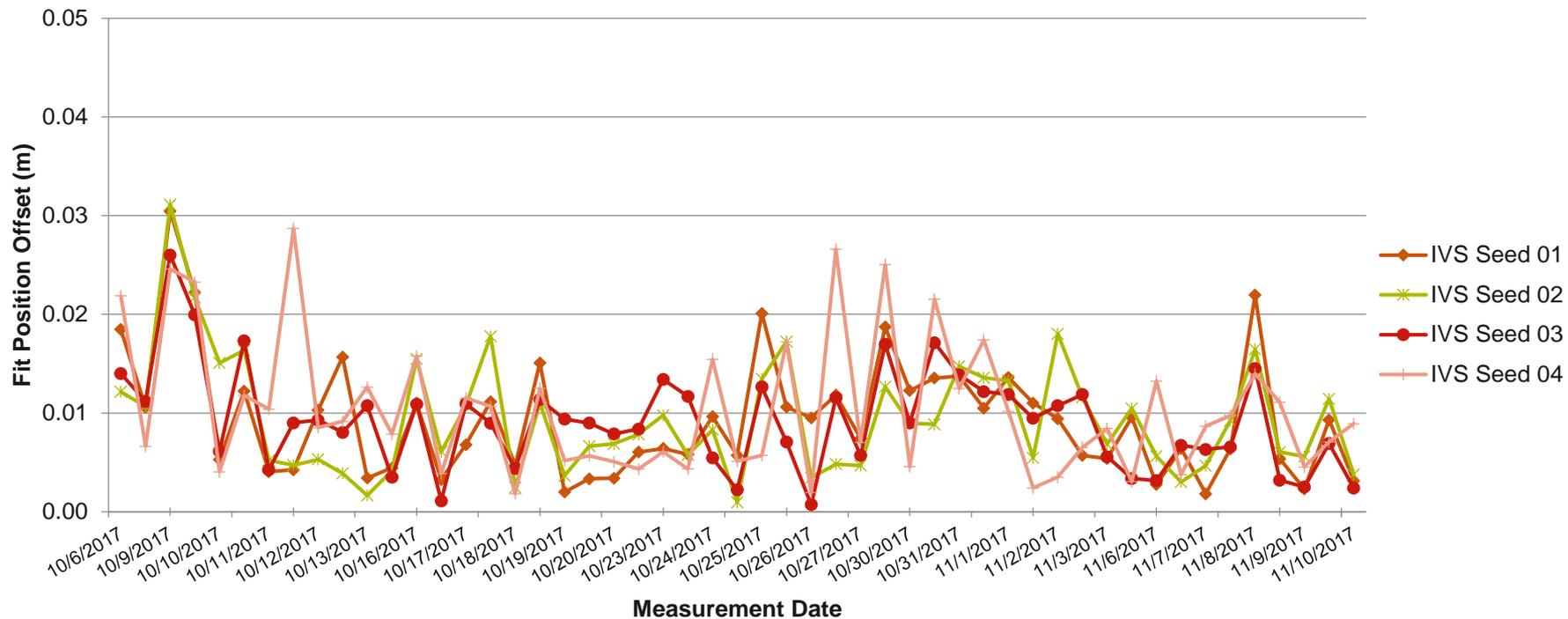 - New reference files

  - Process ASAP

  - Hope and pray
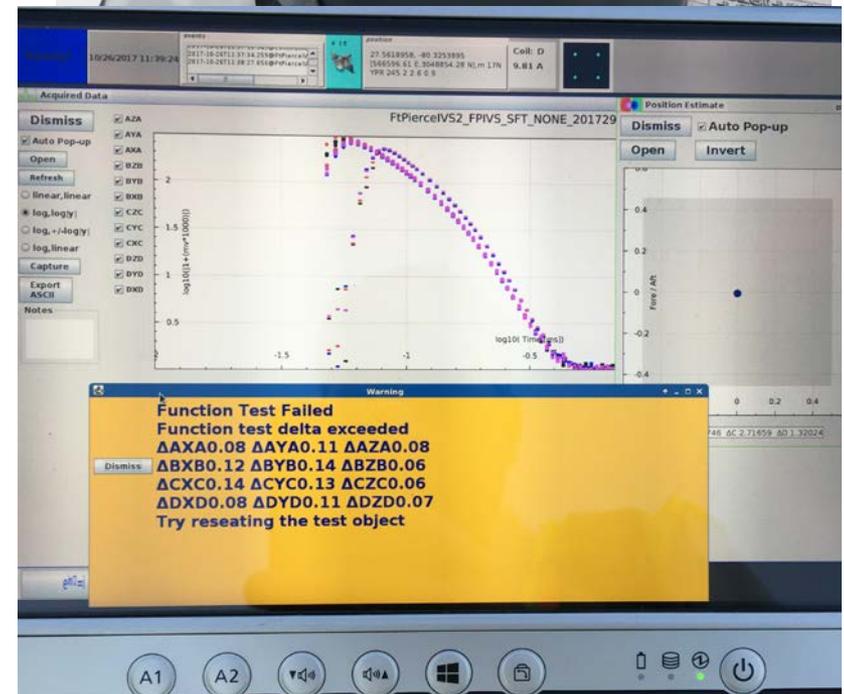
SFT Results

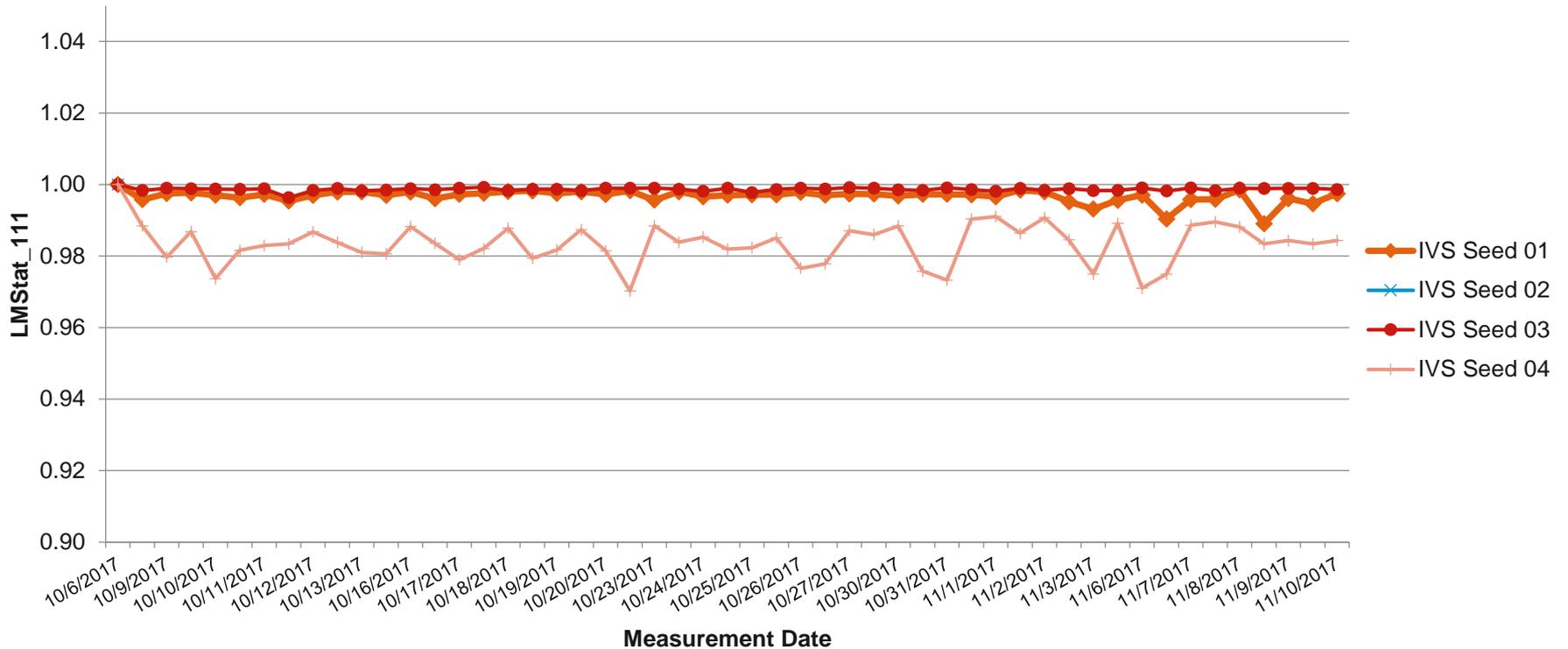**Function Test Results (Rx Response Variation)**

IVS – Cued Positioning Results
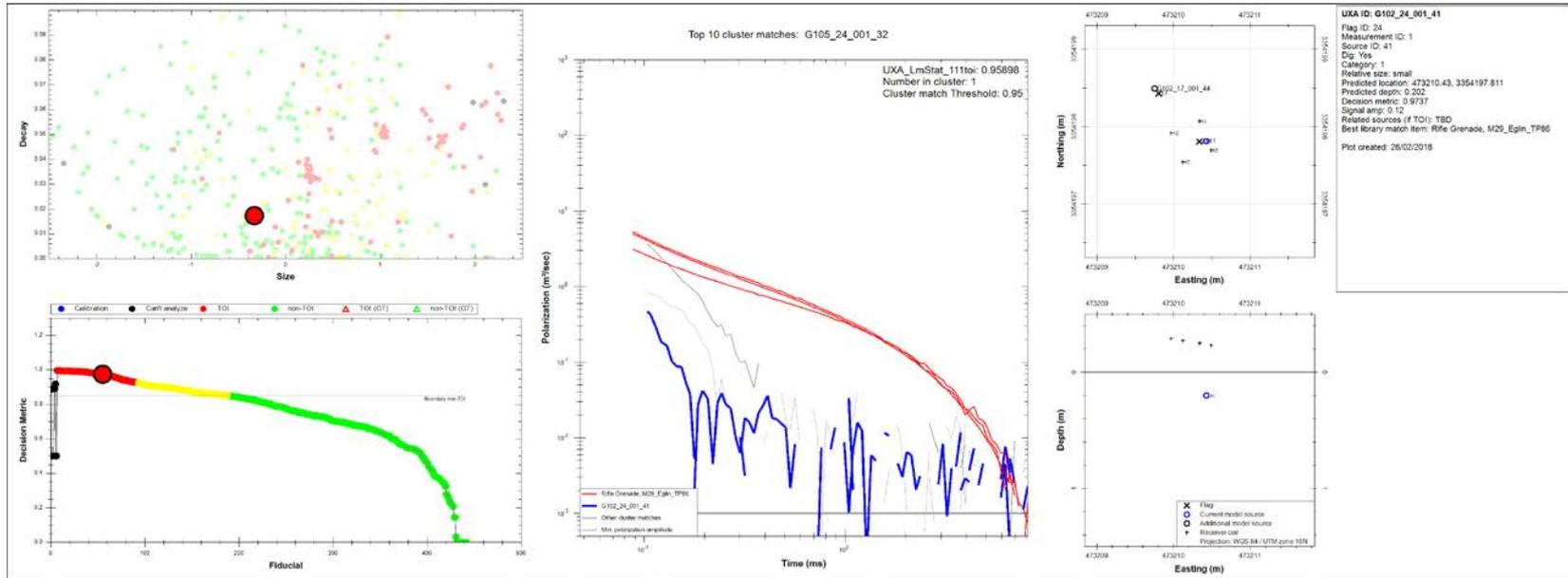

IVS Results (Offset Distance)

IVS – Polarizability Results

IVS Results (LMStat_111ivs)

UX-Analyze V9.3 Data Example
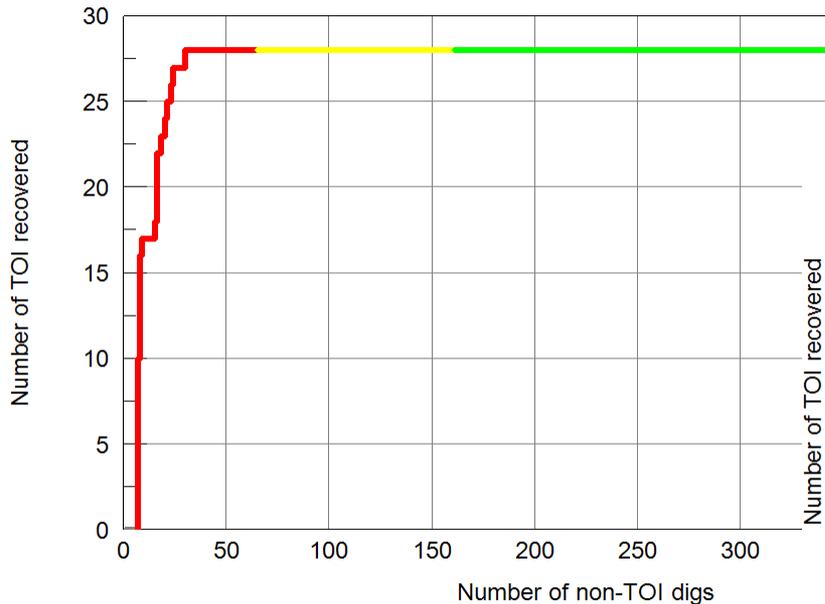

Cat 1 TOI Example:

- **Rifle Grenade**
  - **LmStat_111toi = 0.95895**
  - **Decision Metric = 0.9737**
  - Cluster Matches = 1
  - **Signal Amp = 0.12**
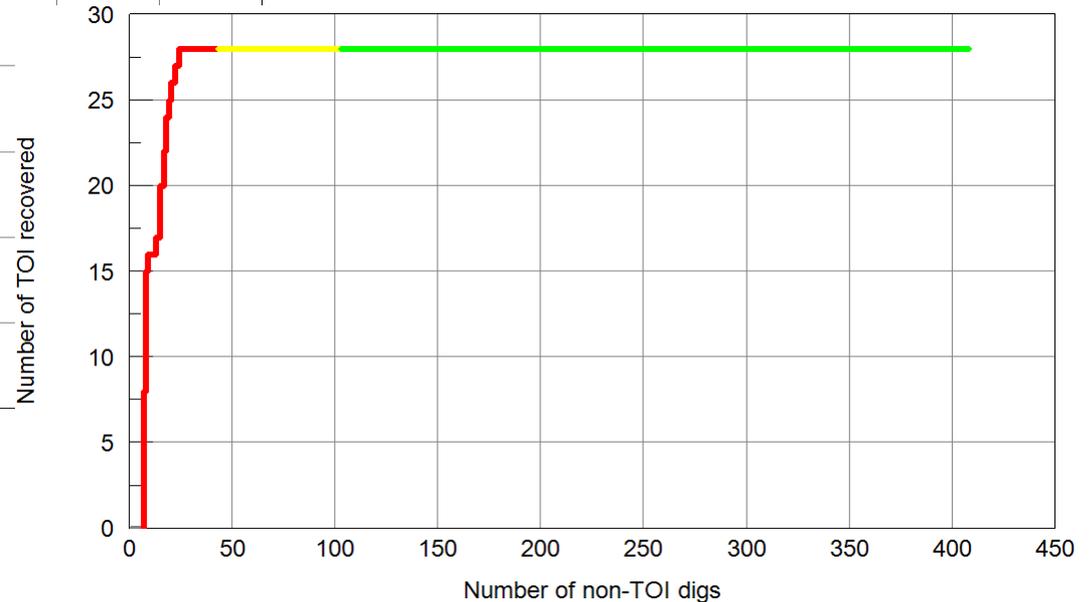 - UXA Rank = 49

Potential Issues

- Noise classified as UXO
- UXA ignoring "Set Thresholds and Prioritize" inputs?
  - Signal amp inputs set to Min: 2 Maximum/Good: 20 (default)

Example Treatability Study Results

UX-Analyze v 9.3


UX-Analyze v 9.2

V9.3 ~50% more non-TOI digs than V9.2

QA Seed Positioning Failure

- EM61-MK2 DGM Offset was 0.95-m, MQO was 0.73-m.
- Target was initially selected, but processor removed it.
- Contributing factors to this failure included the target selection procedures, line spacing, nearby anomalies.
- Corrective actions included selecting discrete targets where offset > 0.73-m, documenting 100% QC review of targets and documenting manual adjustments to target selections

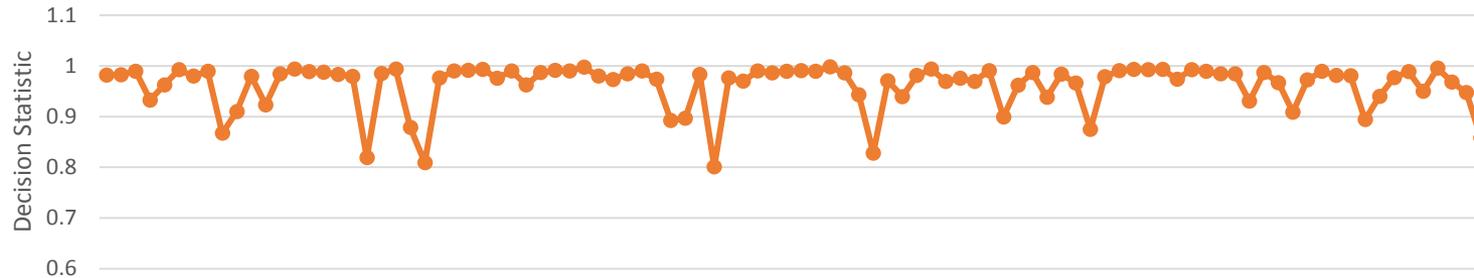Target Reselection
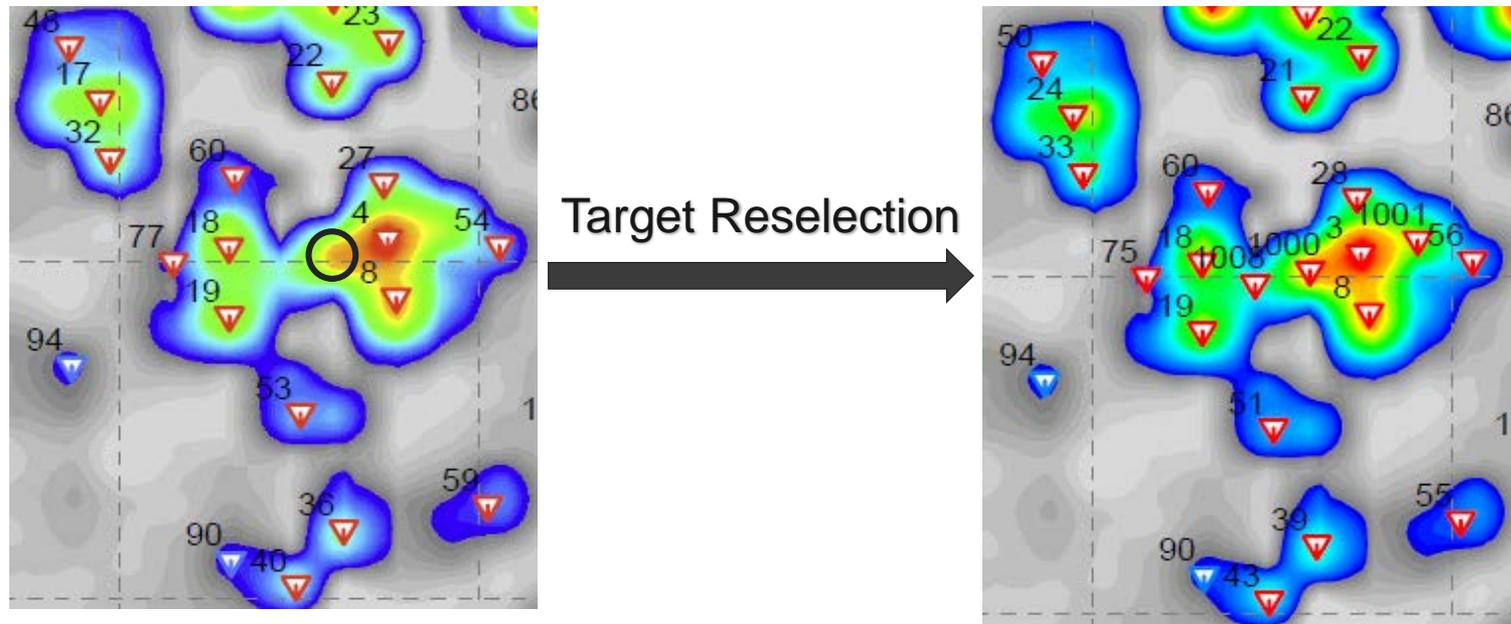
EM61-MK2 vs. Dynamic MM2x2
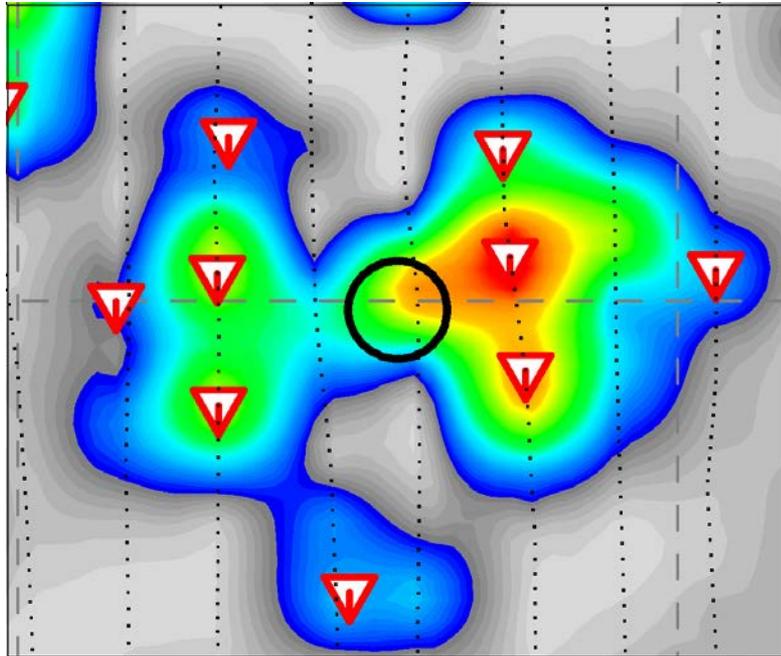
○ QA Seed Location

▽ EM61 Target Location

Offset = 0.95-m
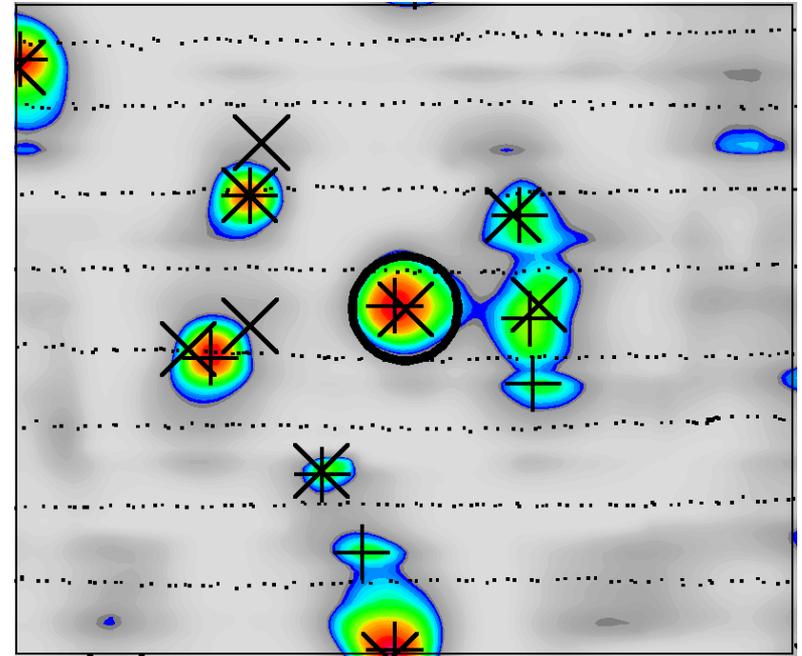
+ Model Coherence Target location

X ISS source location
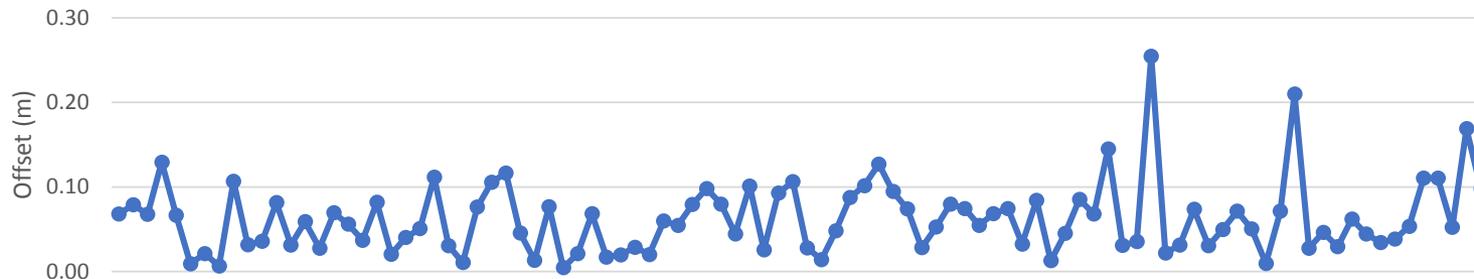
Modcoh offset = 0.09-m

ISS Offset = 0.02-m

Example Cued QC Seed Results

Decision Statistic (Preliminary)

Site noise a key factor to decision statistic values
(i.e. noisy grids = lower decision statistic)

Fit to Seed Offset (m)

Lessons learned – AGC on a beach

Storm events, tidal fluctuations, normal day-to-day variability

Recent USACE Tales from the Beach

It's all about the timing

- 75% of QA seeds washed away prior to intrusive investigation

- Seeds possibly disappearing due to treasure hunters or other beach-users

- Sediment deposition, burying seeds deeper than they can be detected

- MQO to confirm inversion model results for all seeds, $Z \leq 0.15$-m in erosional/ depositional environment

Possible solutions:

- Require shortened time gaps between detection – cued – intrusive

- Real-time dig/no-dig decisions

- Seeding within a few days of dynamic survey

- Re-surveying after storms

Additional Implementation Issues

V9.2 Geosoft HDF5 import – does not import data chronologically

- o   Initial and re-shot measurements can get swapped

V9.2 cued data database error message @ ~198 measurements

- o   Select database->maintenance->grow: which targets imported?
- o   Manually create DB and size appropriately prior to data import

USACE QA/QC Reporting Redundancy

- UX-Analyze removes/masks invalid data, and produces QC products demonstrating data validity

- Do we need to duplicate the UX-Analyze reporting in an MS Access Database?

Conclusions

- Still have MM/Geosoft Issues still to fix

- Seeding procedures critical – dynamic MM2x2 more cost effective?

- Despite all this:
  - Processed SFTs were good (except 1)
  - Cued IVS and BSI indicate proper functioning
  - Data passes MQOs after implementing corrective actions
  - During Treatability Study, successfully found all TOI

Questions?