

Mapping Unmarked Graves at the Reeves Point Cemetery, Kangaroo Island



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Who am I?

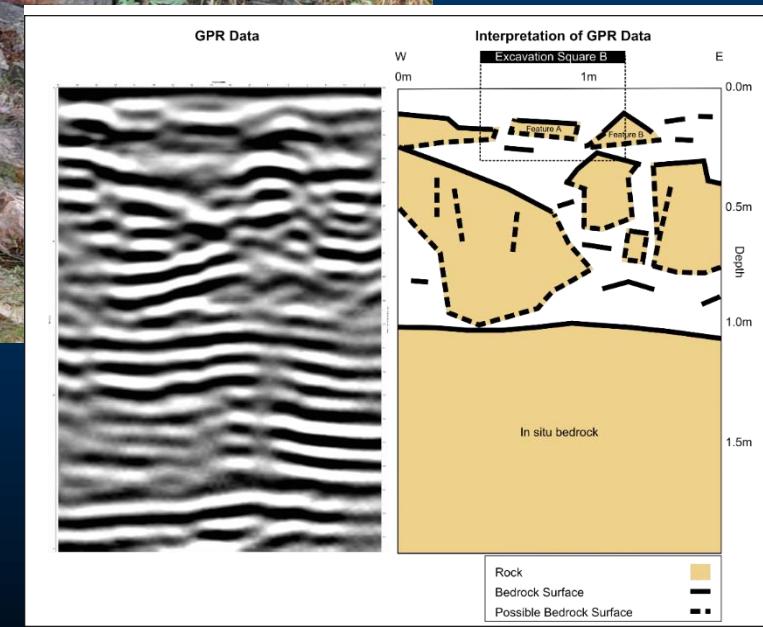
- ARC DECRA Senior Research Fellow in Archaeological Science at Flinders University
- Former Commonwealth Rutherford Fellow at the University of Cambridge
- Former Postdoctoral Researcher at IMS-FORTH in Crete
- PhD from ANU in archaeological geochemistry
- BA (History and English) and BSc (Hons) (Earth Science) from UQ



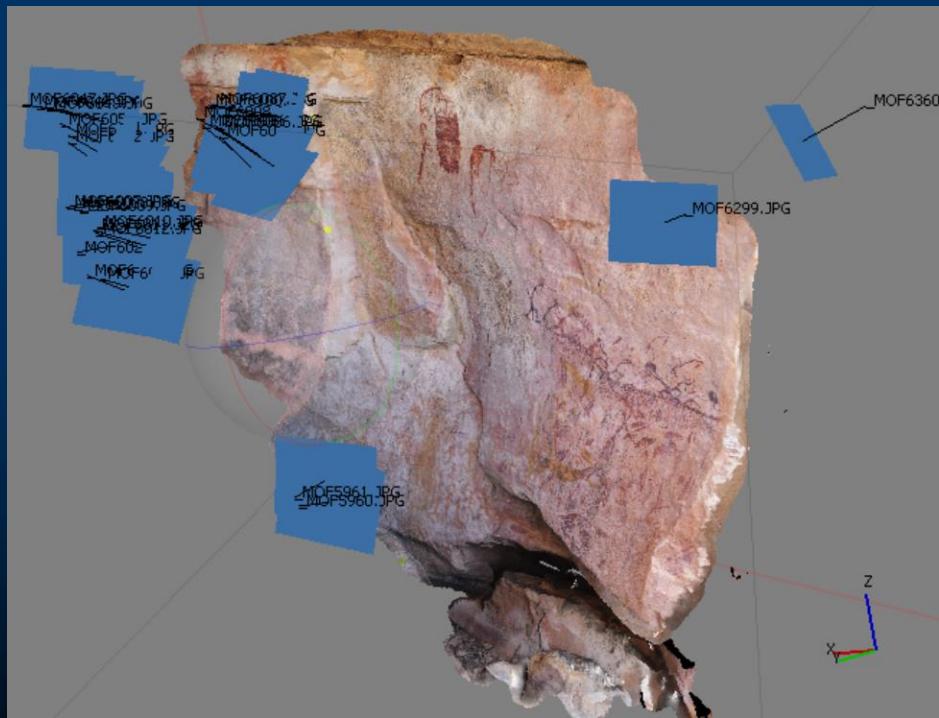
Mapping Ancient Greek and Cambodian Cities



Understanding Archaeological Caves



3D Modeling of Archaeological Sites



Presentation Summary

- Why locate unmarked graves?
- How do we do it non-invasively?
- Reeves Point Cemetery results



A Critical Research Challenge

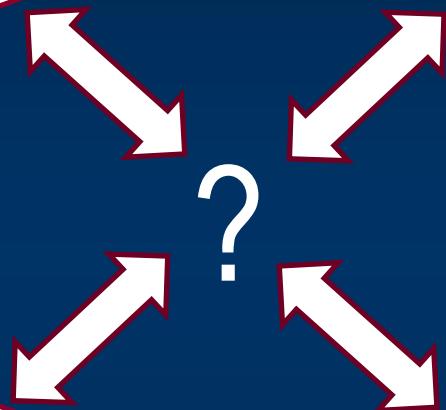
Mapping unmarked graves in cemeteries

Locating areas for repatriation

Forensic investigations

Development surveys

There are ~50,000 unmarked graves in West Terrace Cemetery alone....



Why Geophysics?

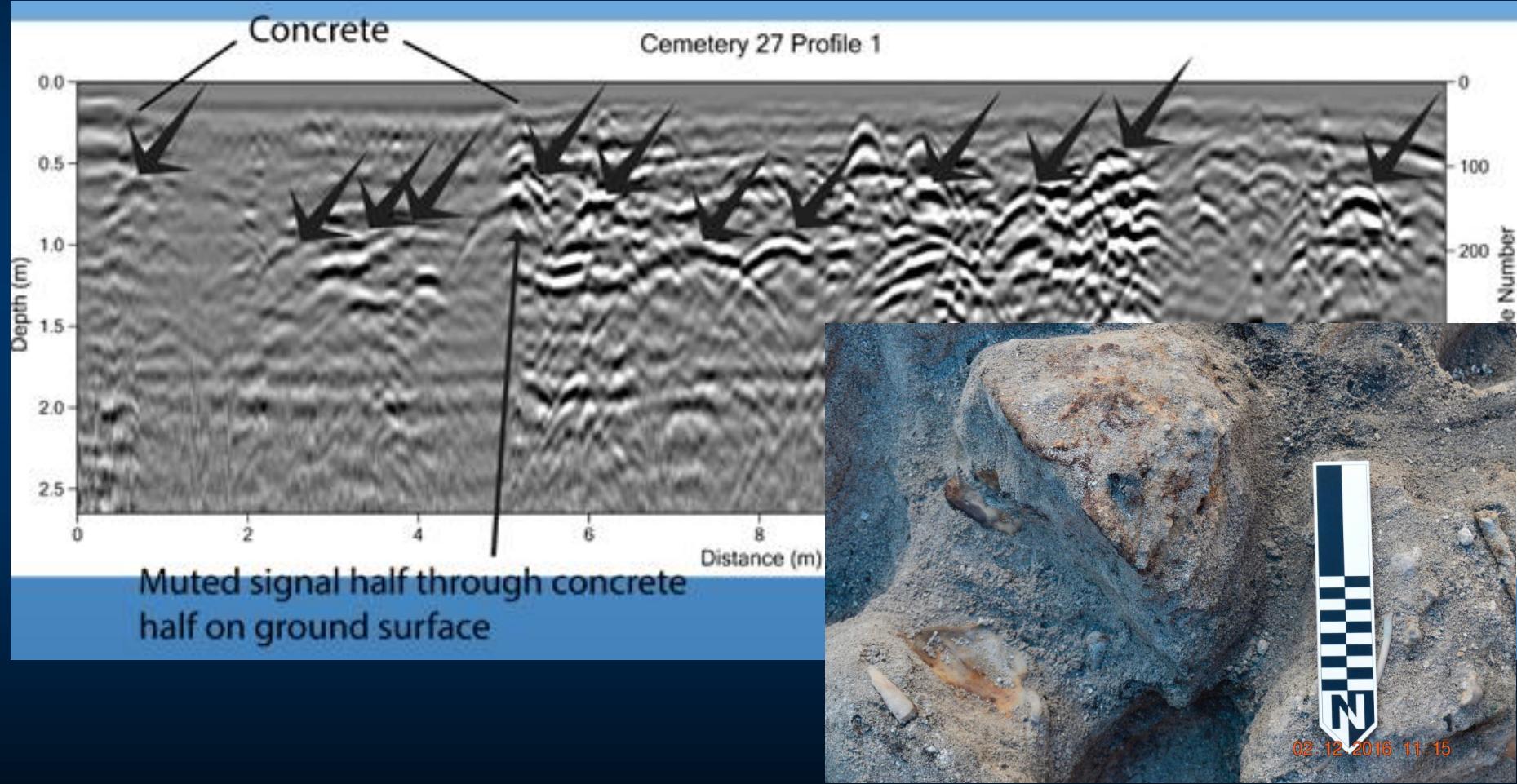


This?



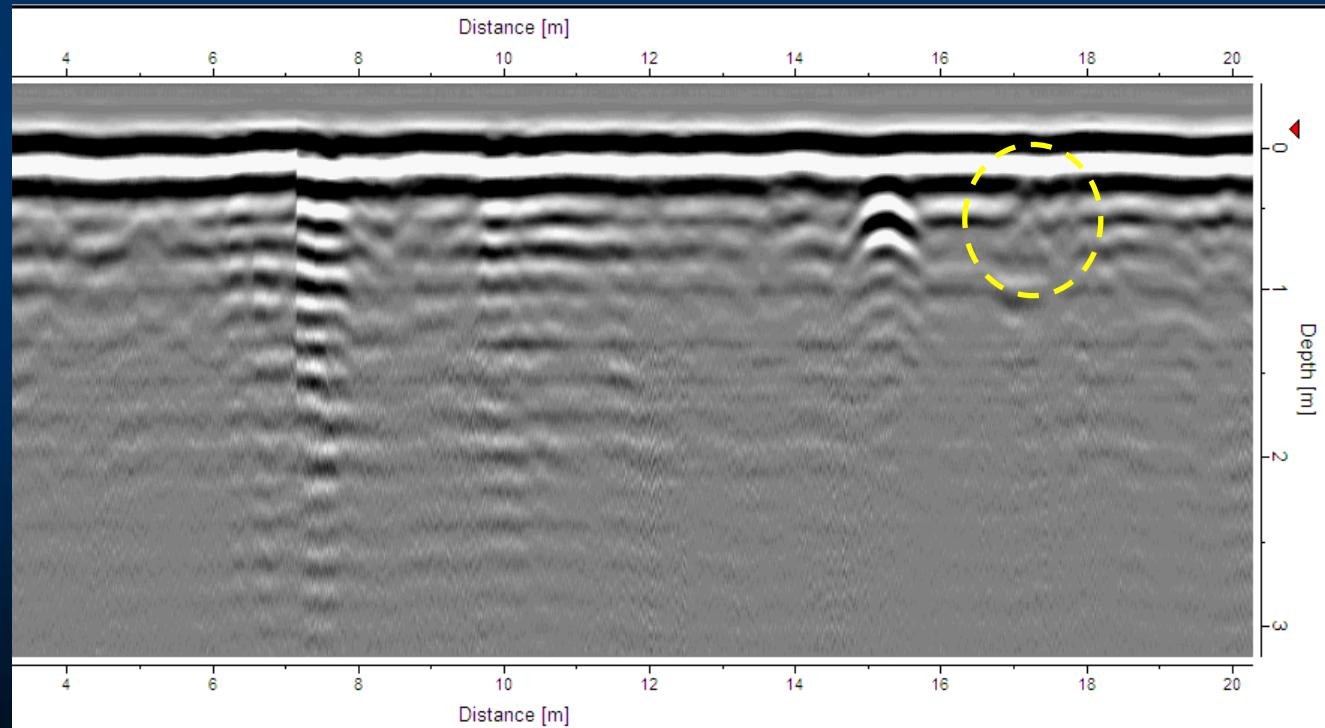
Or This?

Can you find me a bone detector?



Geophysics for Burial Detection

- Most geophysical methods detect soil disturbance or material culture items associated with burials



This Means...

- Lots of high density geophysical data
- Detailed site recording
- High quality positioning



Technique Review

Geospatial

- UAV

Geophysical

- GPR
- Other Methods

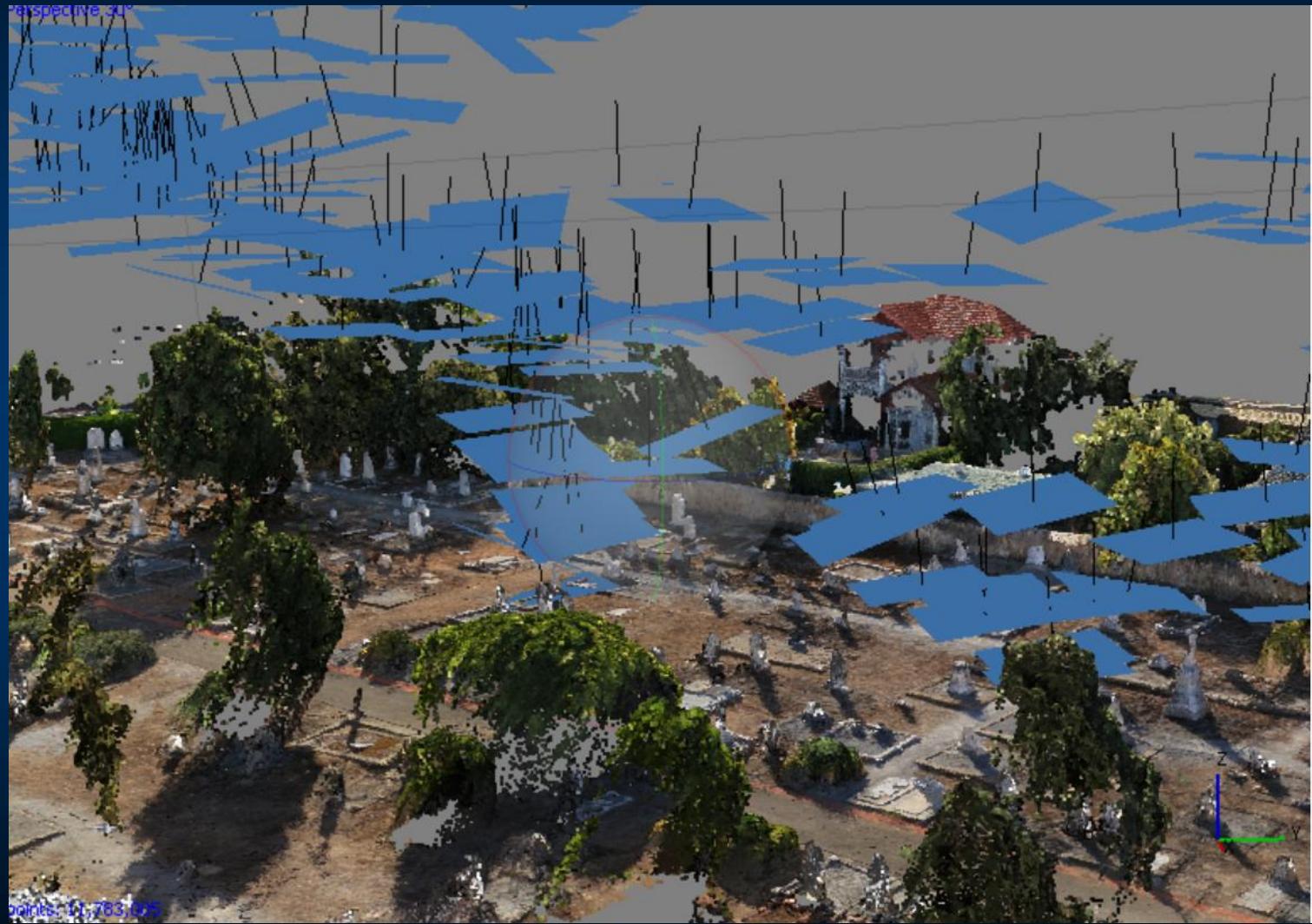


UAV

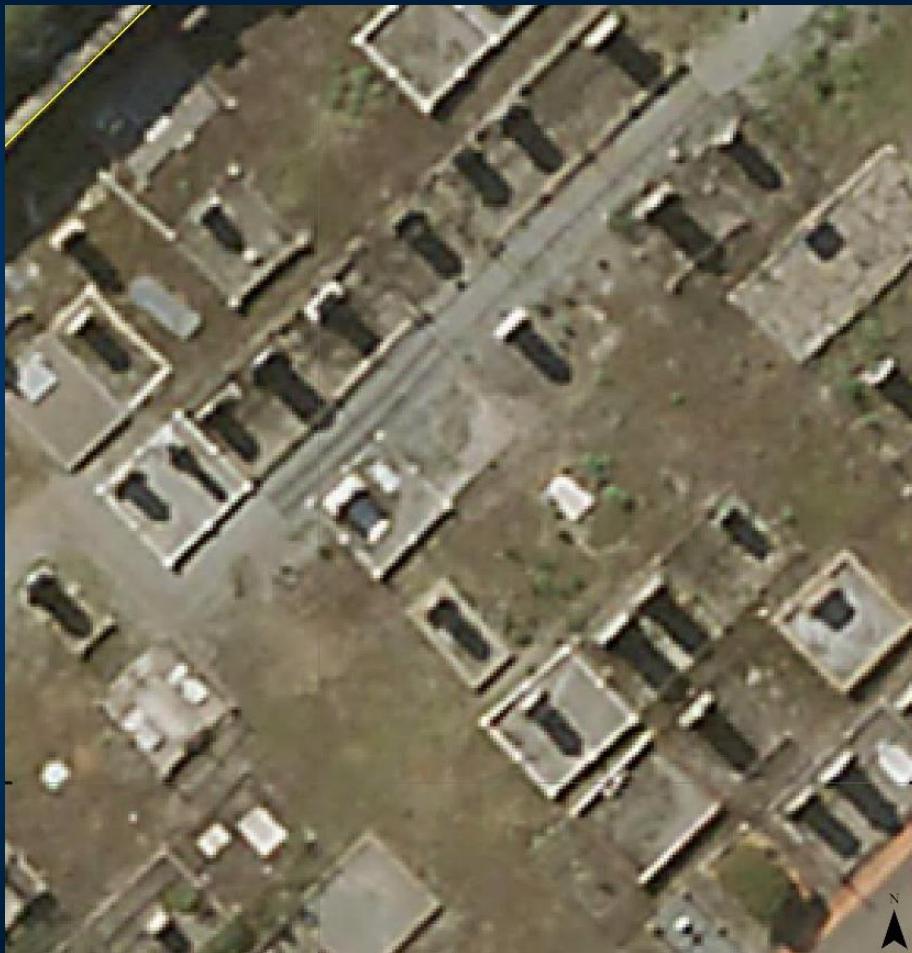
- Provides high resolution aerial photos and digital elevation models through photogrammetry
- Inexpensive and can be deployed in many places
- Provides spatially accurate products when combined with survey grade GPS
- Essential first step to any projects



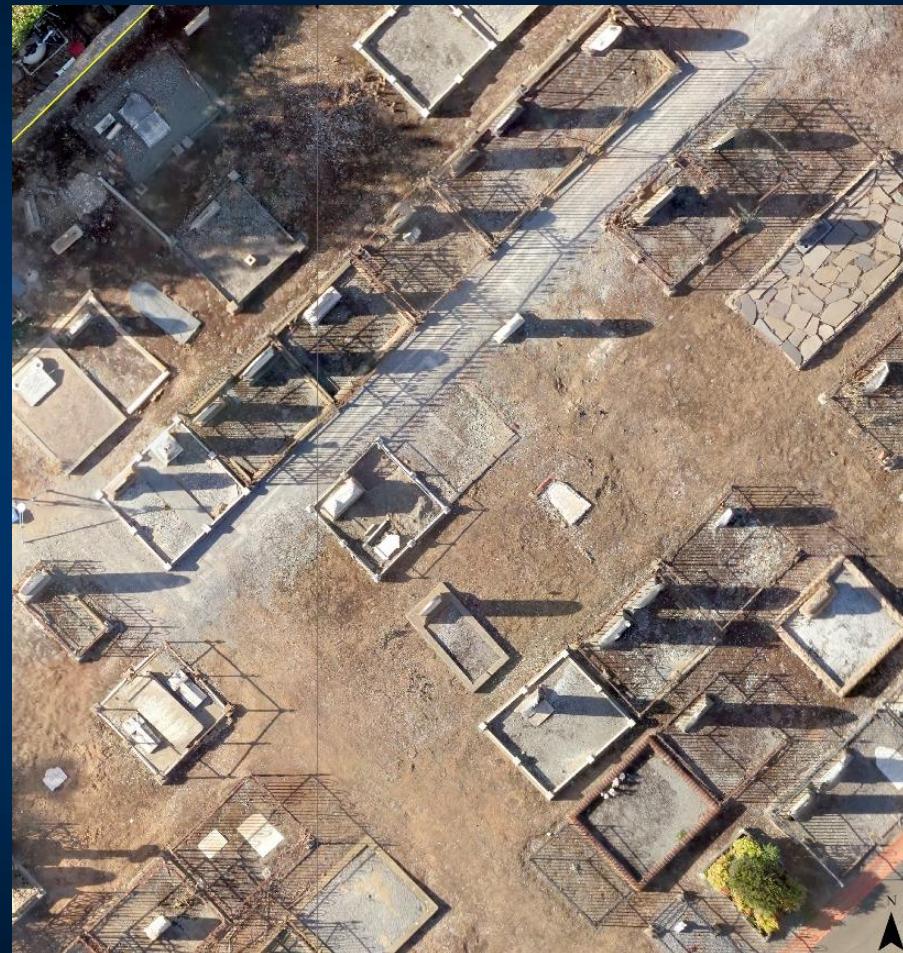
SFM Photogrammetry



How Good is the Data?

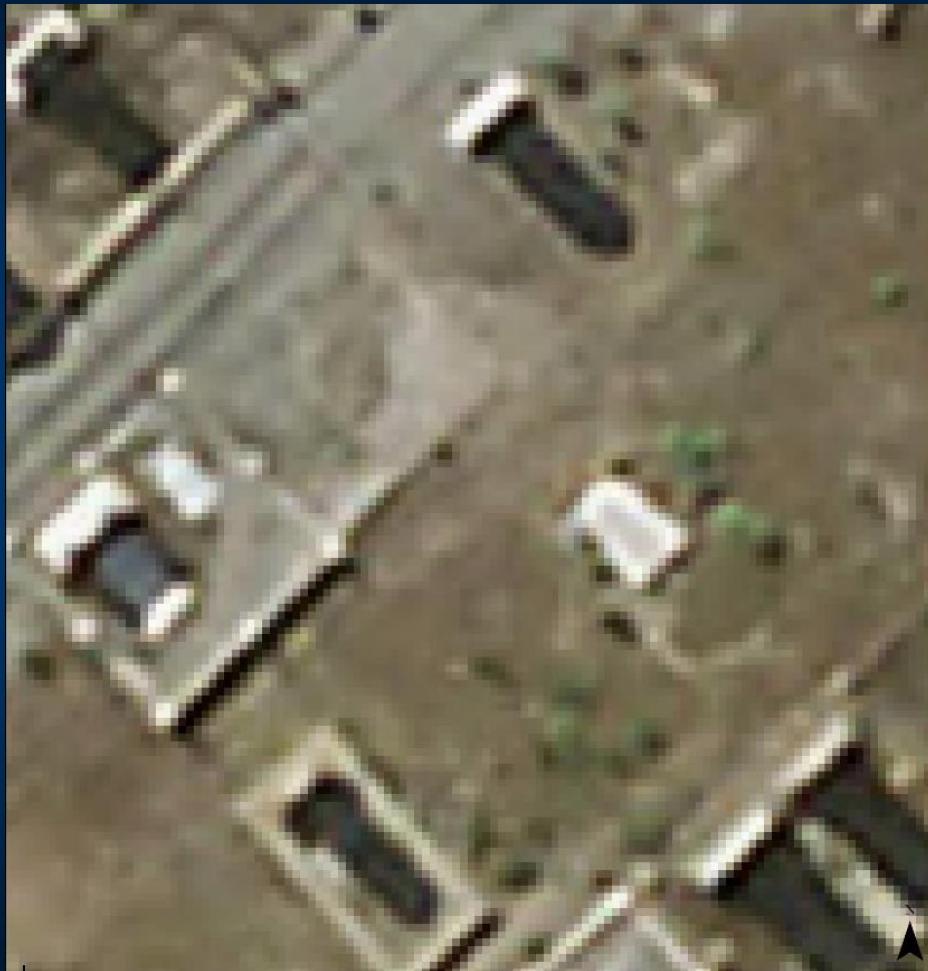


Satellite

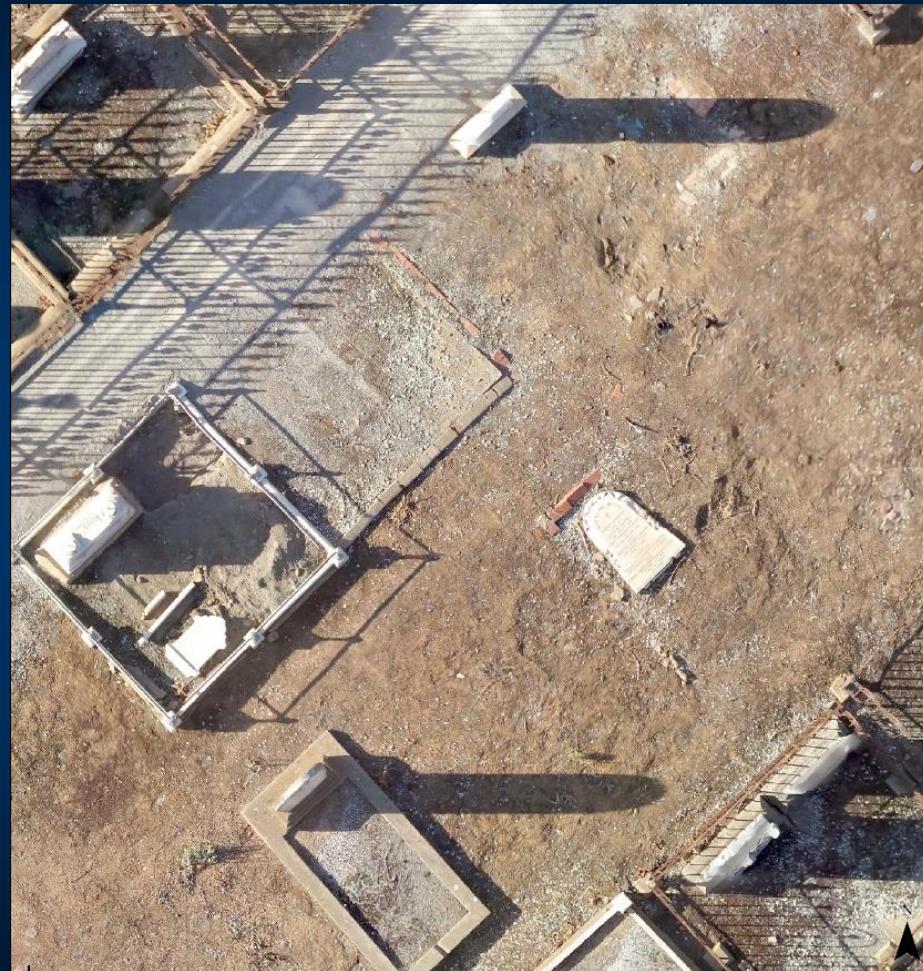


Kite

How Good is the Data?



Satellite



Kite

Just for fun.....



Satellite



Kite

Geophysics

- Locates and maps geological and forensic features in the sub-surface
- Different techniques detect different physical properties
- Rapid Acquisition
- Non-destructive
- Quantitative

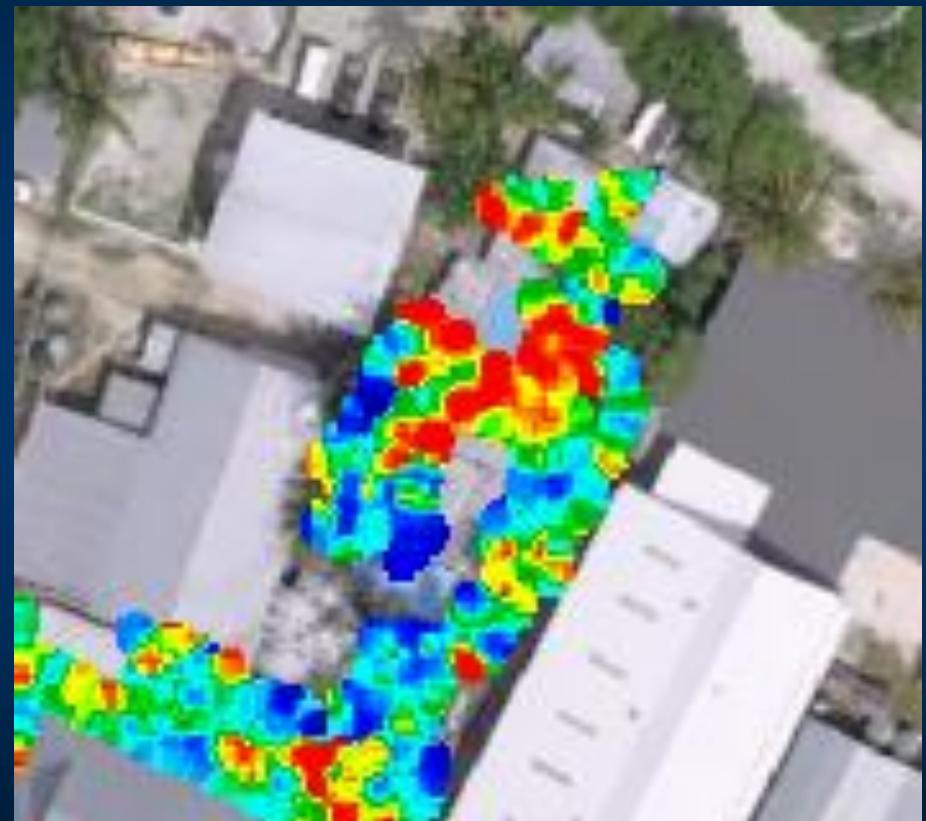
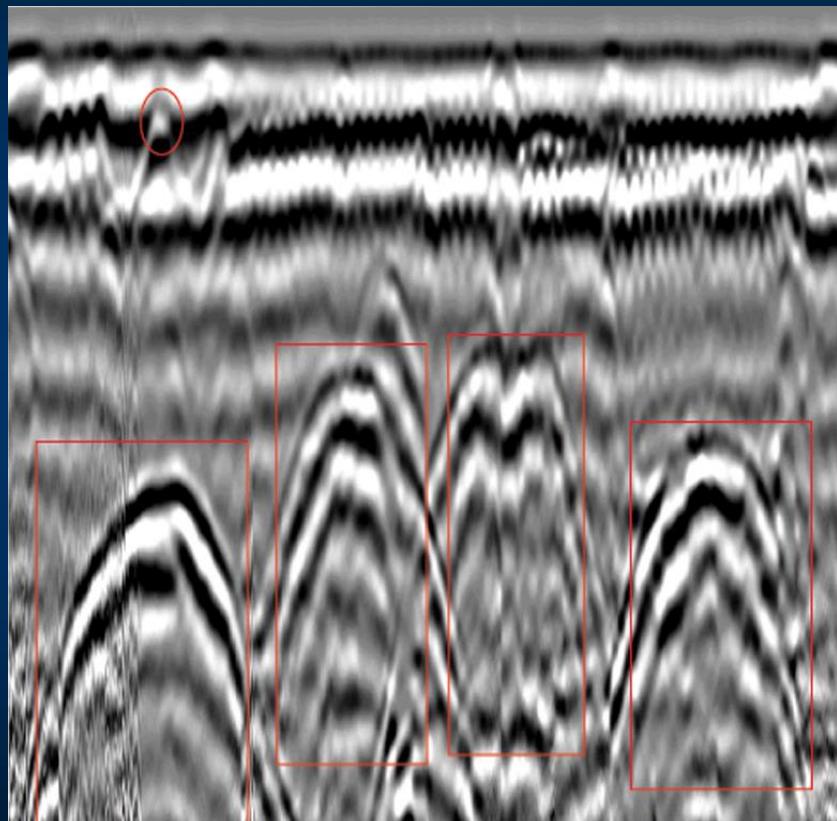


Ground Penetrating Radar (GPR)

- Measures dielectric permittivity (effectively conductivity) of the subsurface
- Detects most forensic and geological features
- Produces 2D or 3D data
- Processing intensive but produces high value data



2D and 3D GPR

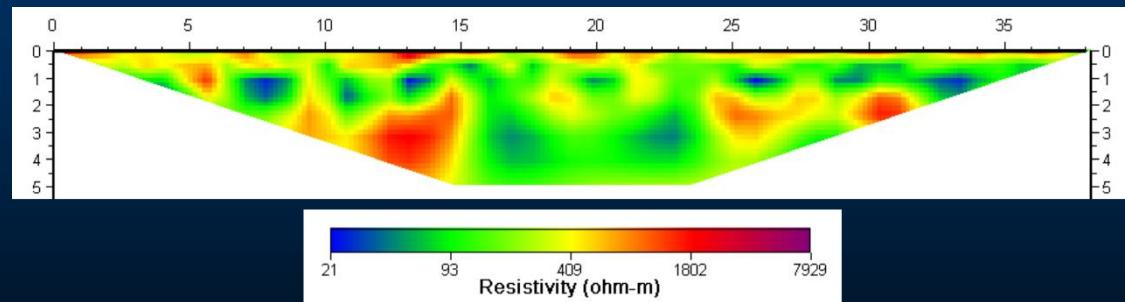


GPR Grave Mapping

- It is essential to see soil disturbance across multiple lines
- This defines the size and shape of the feature
- This information lets you interpret a feature as a grave
- Can provide a confidence level also



Other Geophysical Techniques



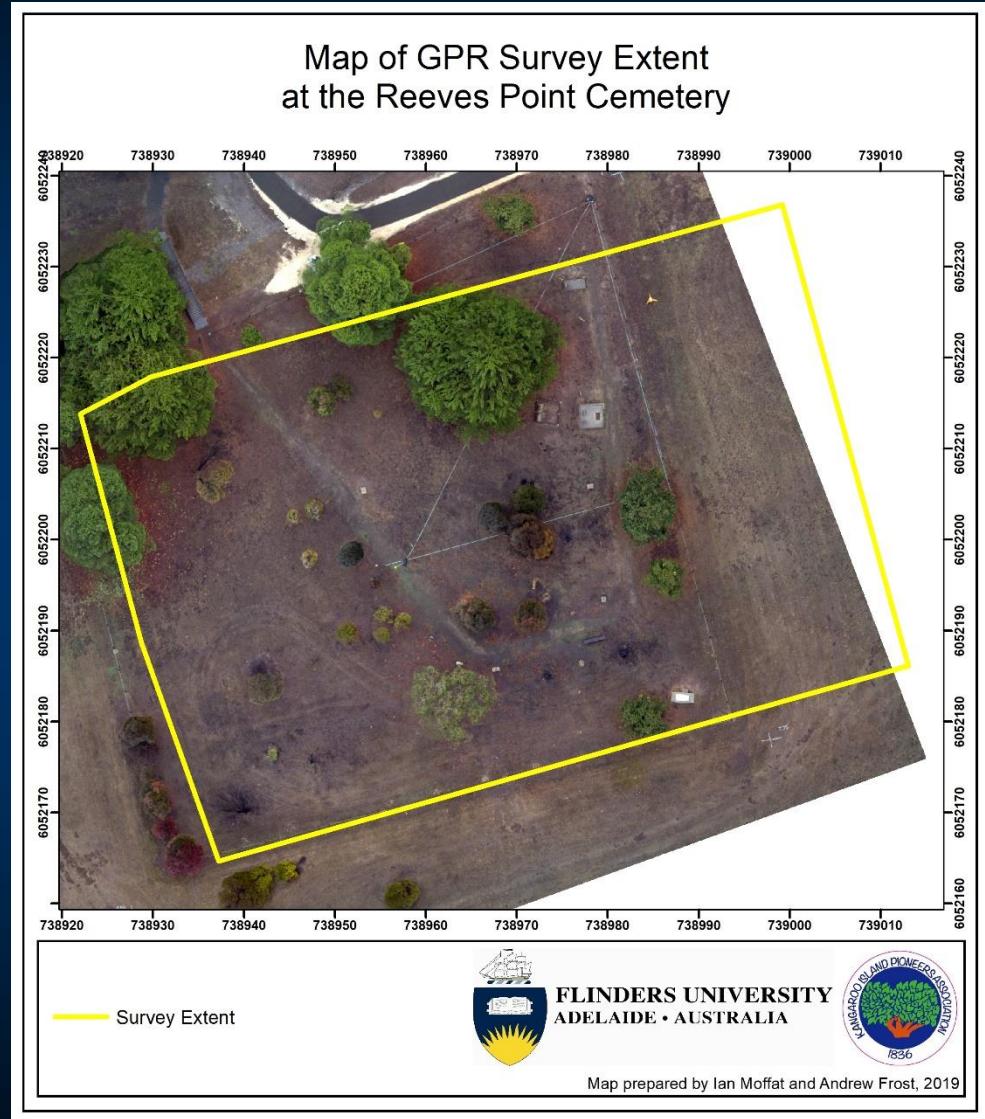
Reeves Point Cemetery, Kangaroo Island

- Established in 1836, SA's oldest cemetery
- 27 marked graves



Reeves Point Cemetery: Data Collection

- 316 GPR Lines collected
- Lines surveyed in with cm accuracy with Total Station
- Absolute co-ordinates collected using a static GPS
- UAV data for site recording



Reeves Point Cemetery: 3D Modelling



Reeves Point Cemetery: Results

- 46 Unmarked Graves
- Most unmarked graves on the eastern portion of the site inside the fence
- No unmarked graves in the south-west quadrant or outside of the fence on the east side

