Excavation Not Allowed:
Informing Feature-scale Analysis with Non-invasive Technologies and Data Integration at the Collins Mound Site, Arkansas, USA

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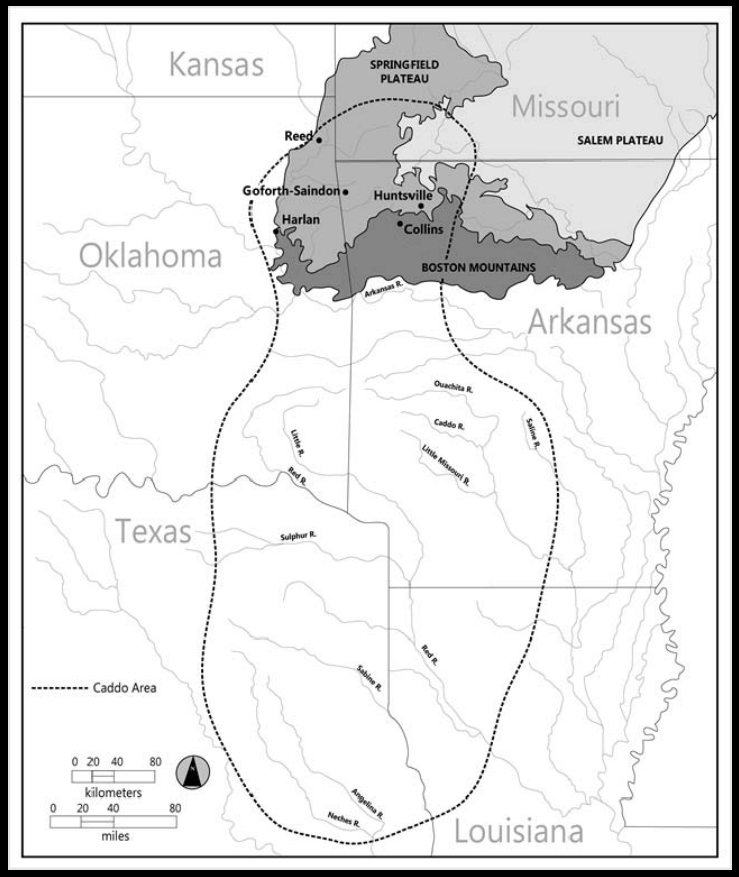
Site Background



Map of the region showing multi-mound sites in the western Ozark Highlands (after Sullivan and McKinnon 2015:71)

Ozark Highlands

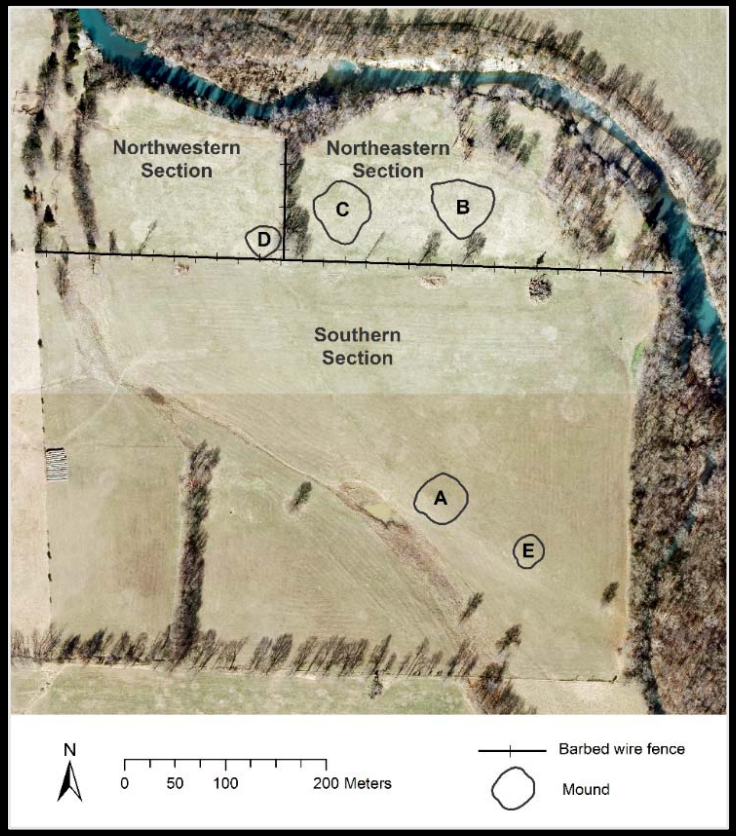
- physiographic boundary

Caddo Area

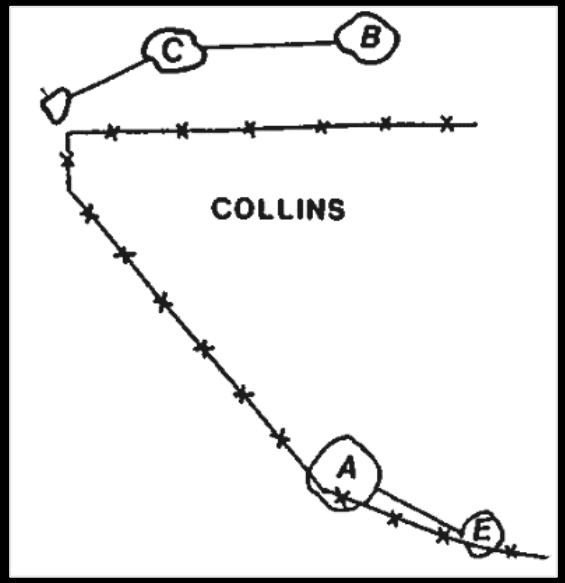
- cultural boundary

Looking over the northeastern corner of the site with the White River and farmland beyond.

Site Background



Current map of Collins Mounds (orthoimagery from USGS The National Map)



Map of Collins Mounds (Kay et al. 1989:136).

Statement of the Problem

- Private ownership puts the Collins site in a state of risk.
- Lack of prior research at the site.
- Sense of urgency to collect data at the site.
- Excavation not allowed.
- Alternative methods needed for data collection.

East Fork of the White River delineating the northern boundary of the Collins site.

Research Questions

- What is the land use history of the site?
- How can the site inform on the nature of social organization, ceremonialism and the ideology of the people that occupied it?
- How is the Collins site situated within the archaeological framework of the region?
- What survey methods will yield useful information for understanding the questions posed above?

Preparing for survey over northeastern section of the site.

Theoretical Approaches

- "Inquiry-based archaeogeophysics"
  - (Thompson and Pluckhahn 2010:38; Thompson et al. 2011)
- Landscape approach
  - (Kvamme 2003)
- Inductive approach
  - (Kvamme 2008; Salmon 1976; Wilson 2000)
- Deductive approach
  - (Salmon 1976)
- Use of analogy
  - (Salmon 1976)

Survey preparation

Methods: Magnetic Gradiometry

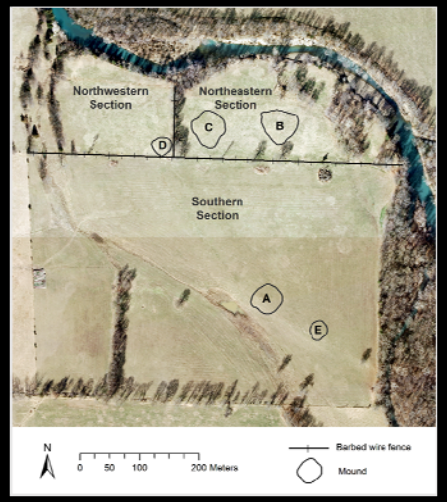
Bartington Grad-601 dual sensor fluxgate gradiometer

- 73 20x20m grids
  - 40 transects per grid
  - 160 samples per transect
  - 467,200 samples

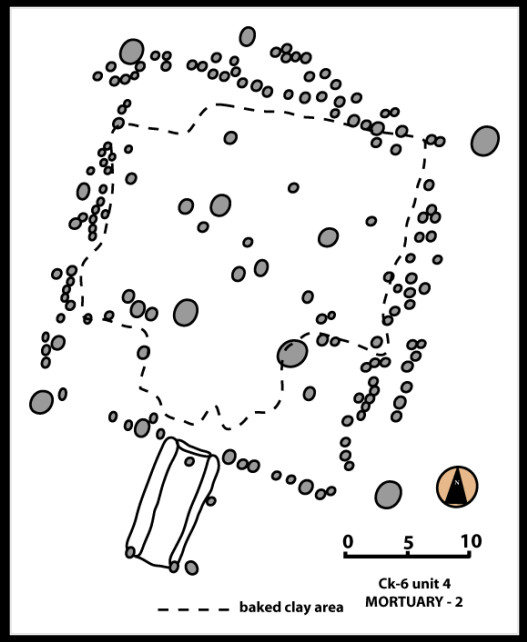
Results: Magnetic Gradiometry

Magnetic gradiometry data over northern section (after Sullivan and McKinnon 2013)

Site map for reference



Interpretations: Magnetic Gradiometry



Charnel house from the Harlan site (after Bell 1984)

Harlan-style charnel houses: mortuary structures used in accordance with a deliberate mortuary ritual cycle

Found at sites of Harlan, Huntsville, Goforth-Saindon

As part of the ritual cycle, a charnel house was set on fire, destroyed, and subsequently buried with mound fill – only to repeat this cycle again over the now buried mortuary structure.

Methods: Ground-penetrating Radar

GSSI SIR-3000 with
400 MHz antenna

- Mound D: 40x40m
- Mound C: 60x60m
- Mound B: 60x60m

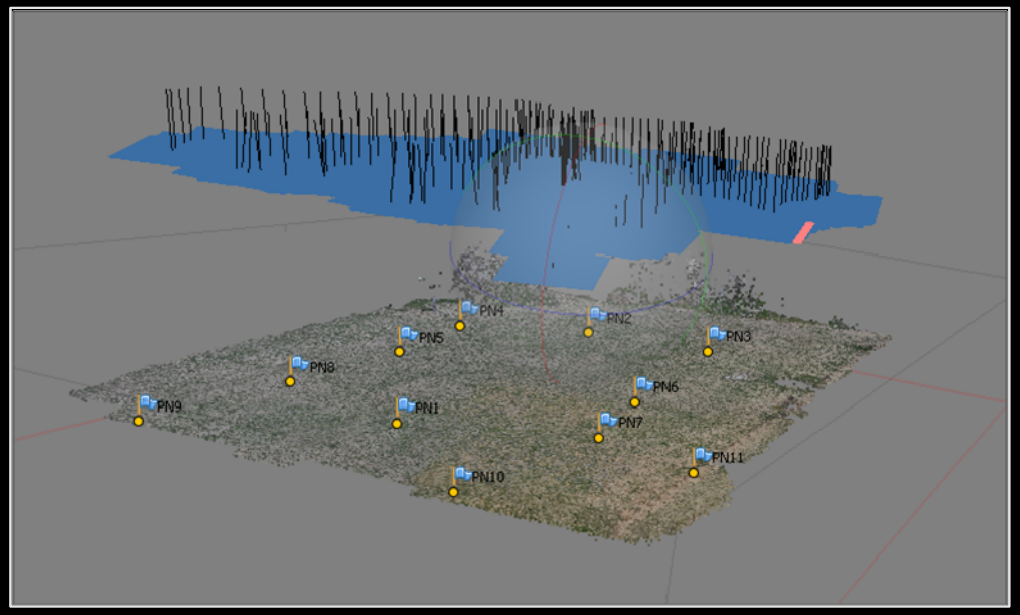
Methods: Low Altitude Aerial Photography

DJI Phantom 2 quadcopter with Cannon EOS M camera with 22 mm lens

Cinestar 8 octocopter with Nikon D600 DSLR camera with a 35.9x24.0 mm sensor

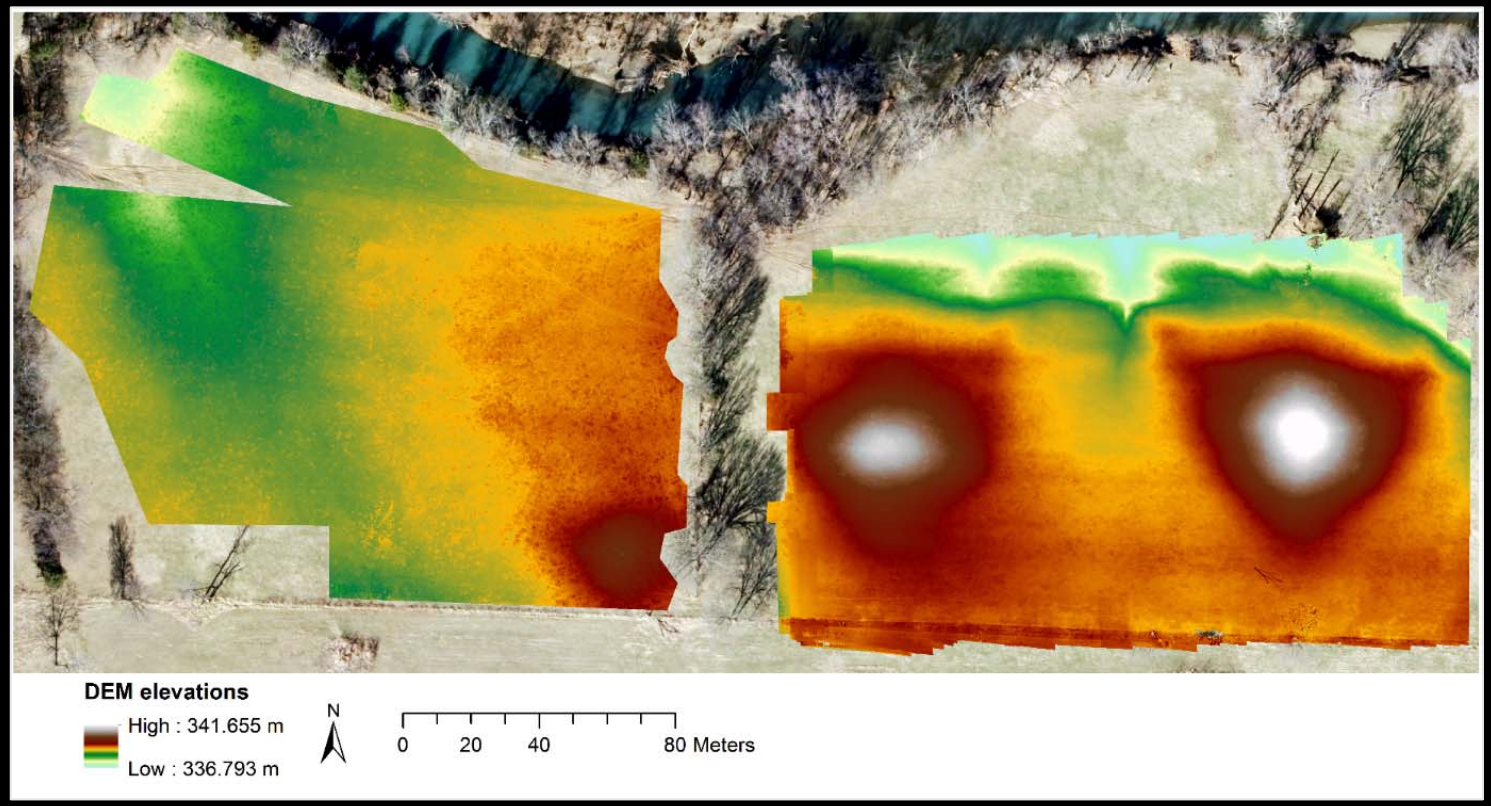
Methods: Low Altitude Aerial Photography

Looking up at the drone after take off



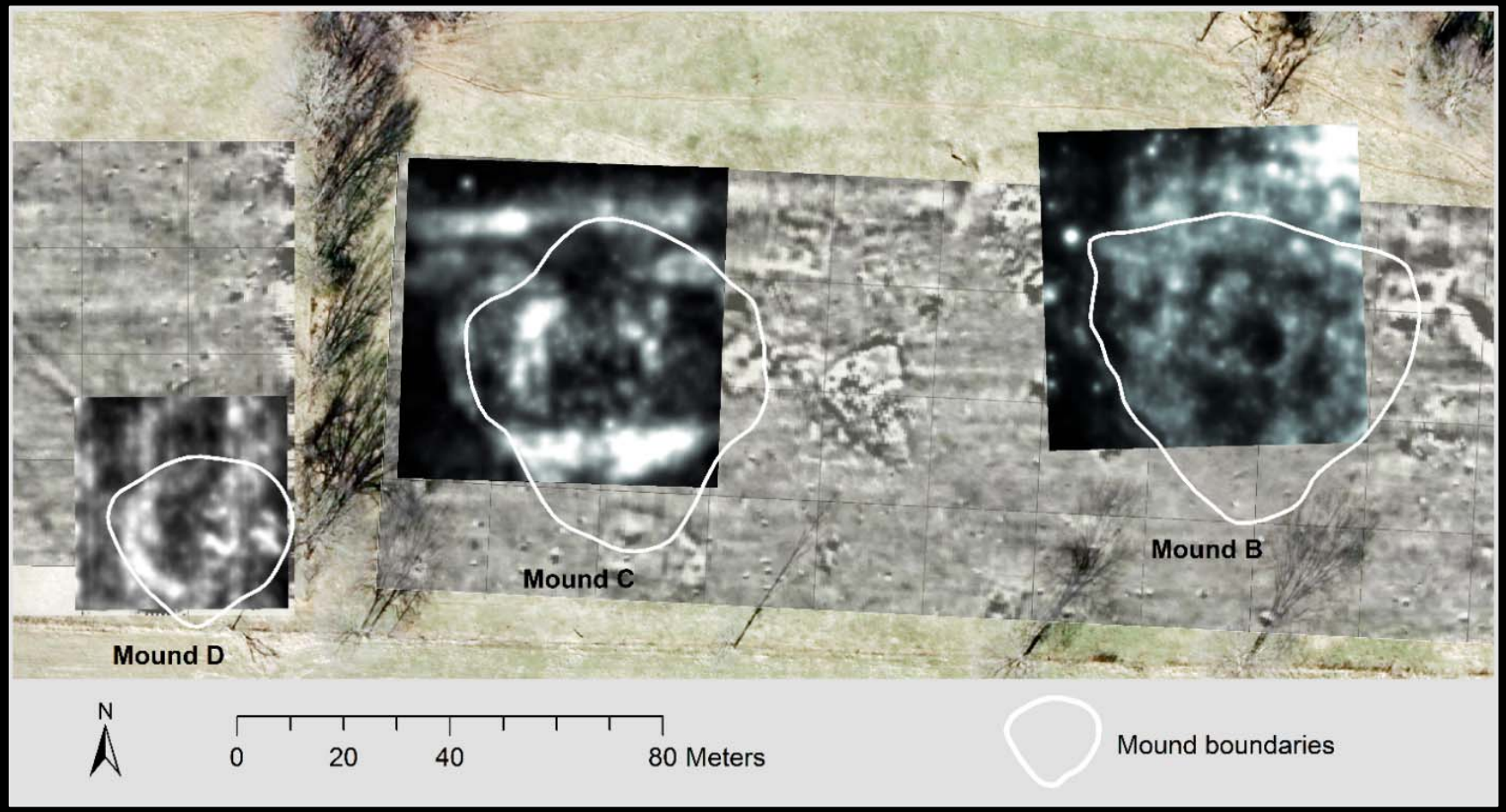
Processing aerial images in PhotoScan software

Results: Low Altitude Aerial Photography



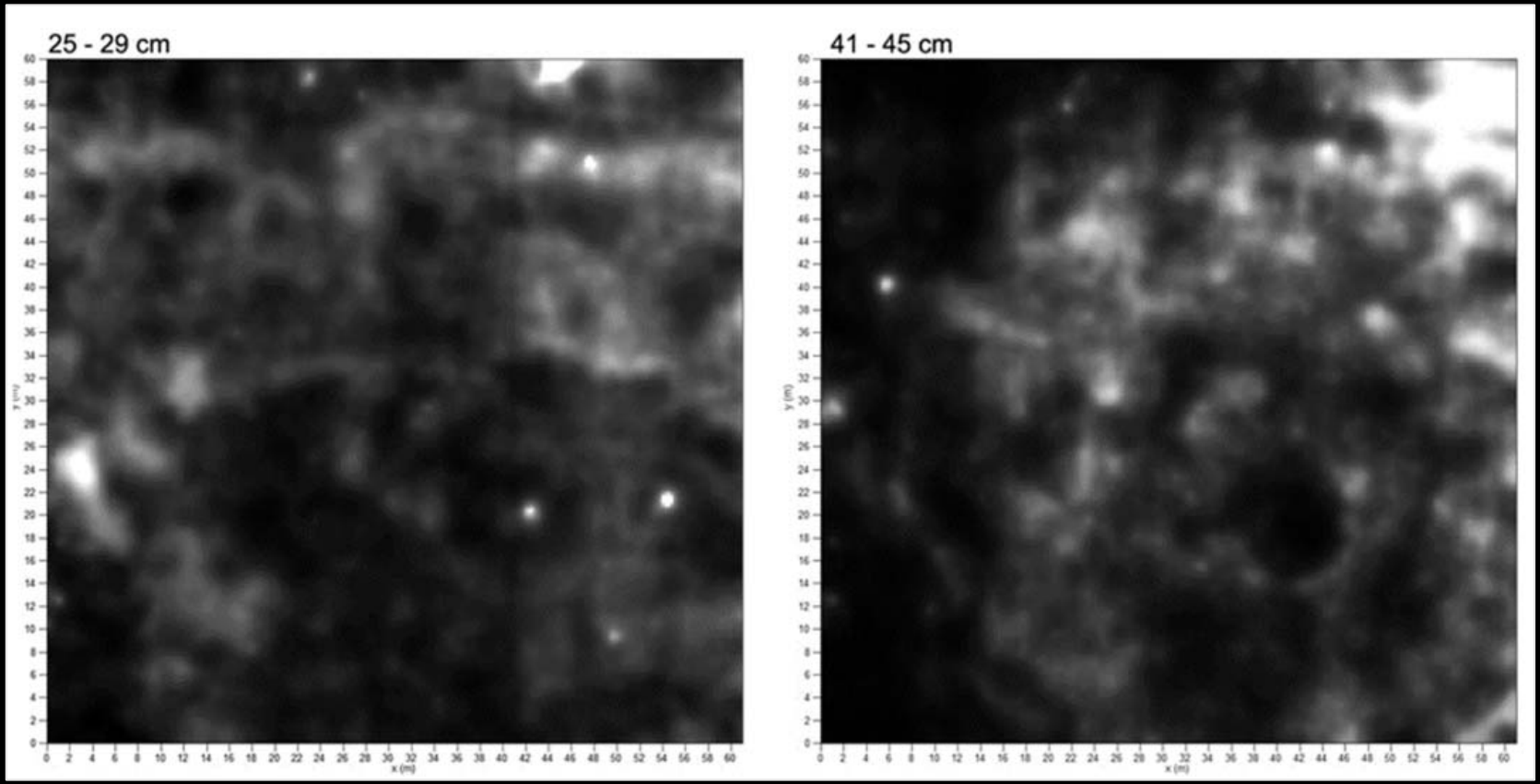
DEM of northern section of Collins site. Model is of subdecimeter accuracy.

Results: Ground-penetrating Radar



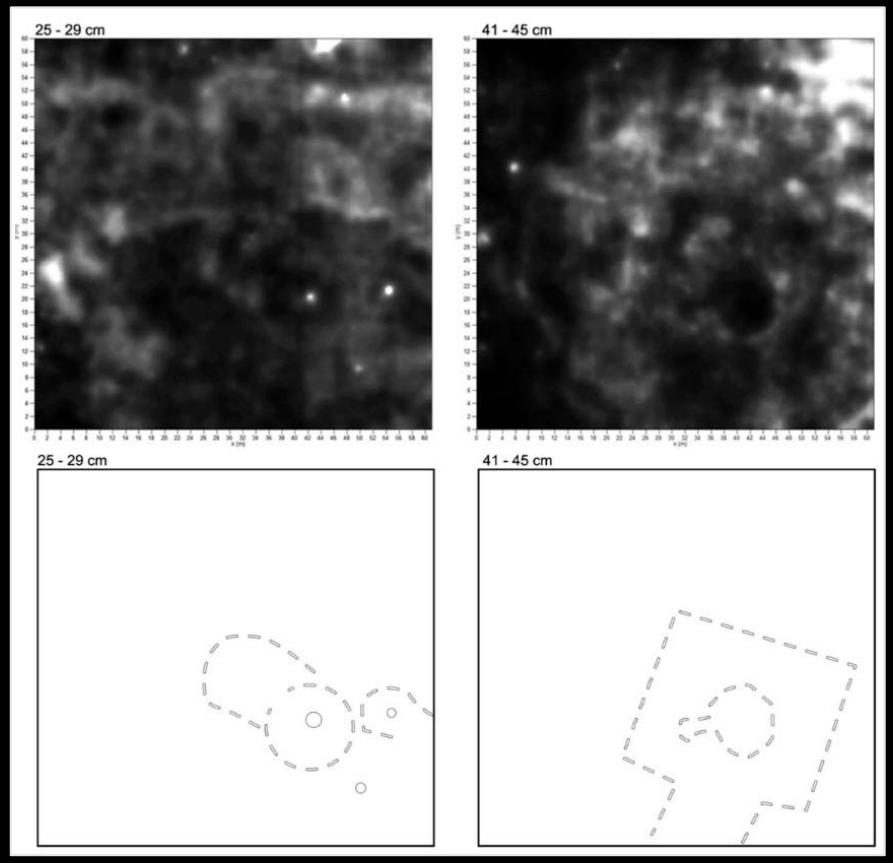
Location of the GPR survey grids in relation to the magnetic gradiometry data and orientation of the mounds.

Results: GPR Mound B

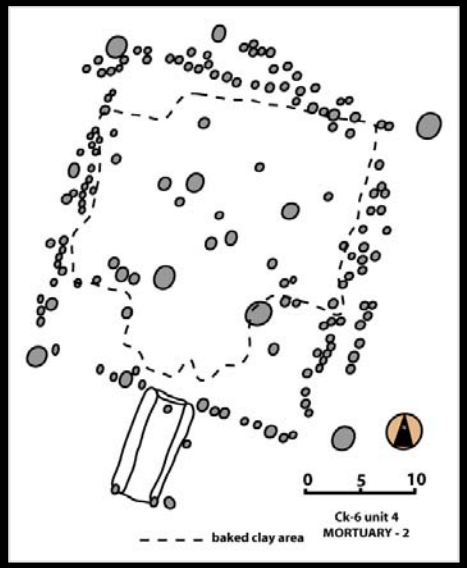


Two amplitude slices at different depths display separate layers in the data, each likely representing different contexts.

Interpretations: GPR Mound B

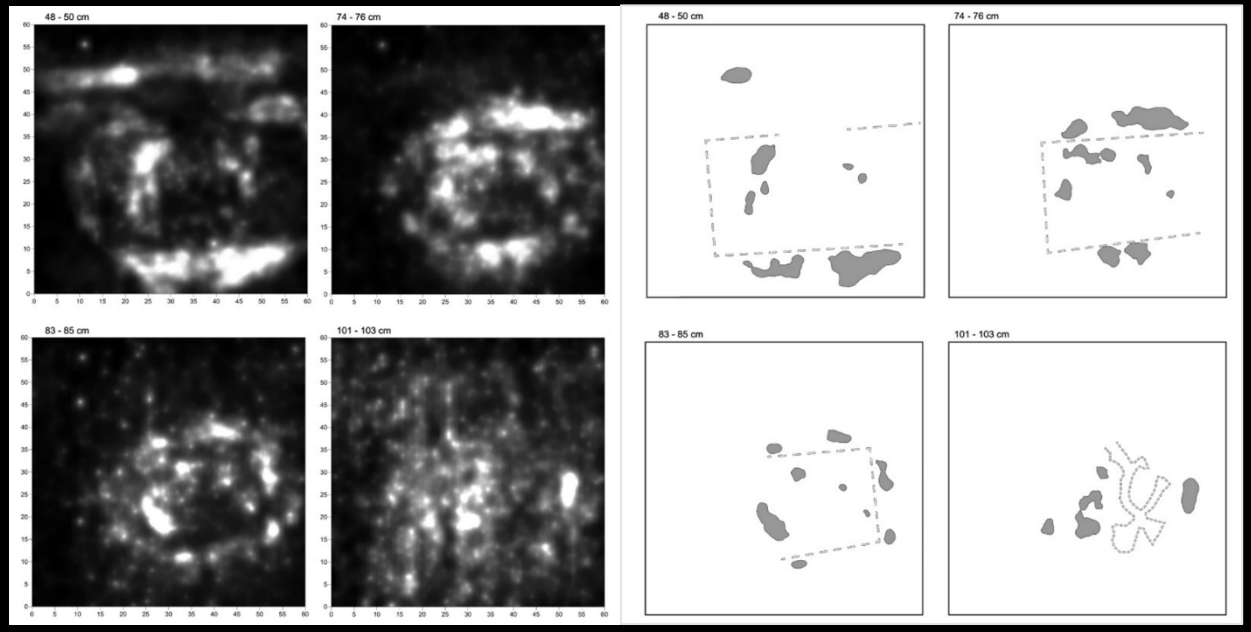


Amplitude slices at different depths over Mound B (top). Features drawn at the given depths on Mound B (bottom).

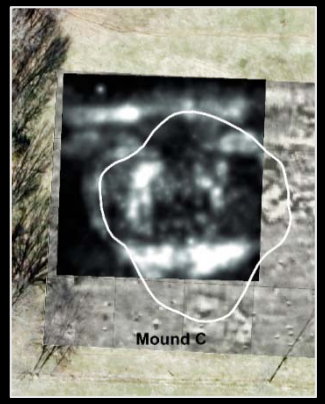


Harlan-style charnel house (after Bell 1984)

Results: GPR Mound C

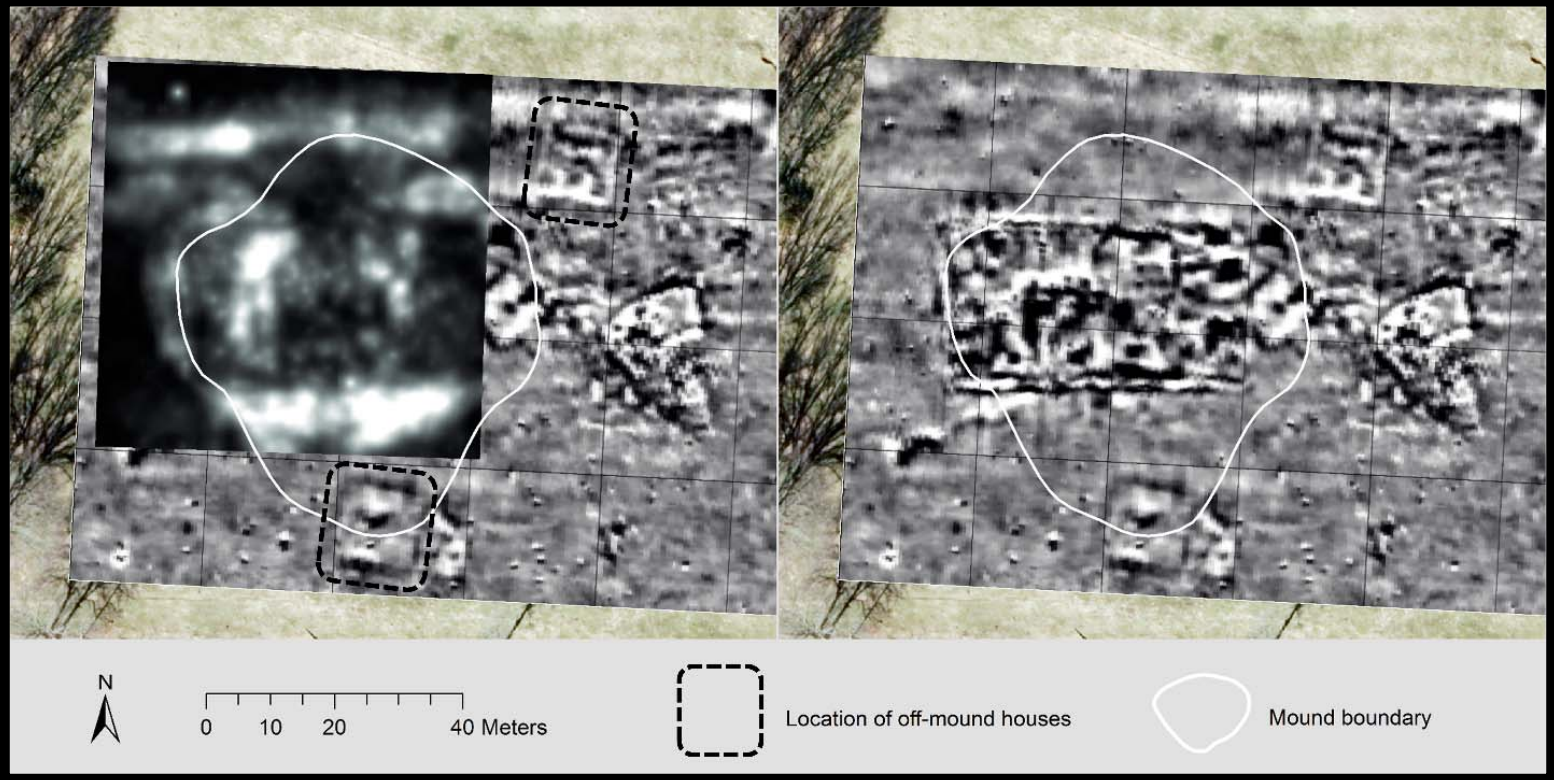


Position of GPR grid for reference.



Four amplitude slices at different depths display separate layers in the data, each likely representing different contexts (left). Features drawn over the slices at the given depths (right).

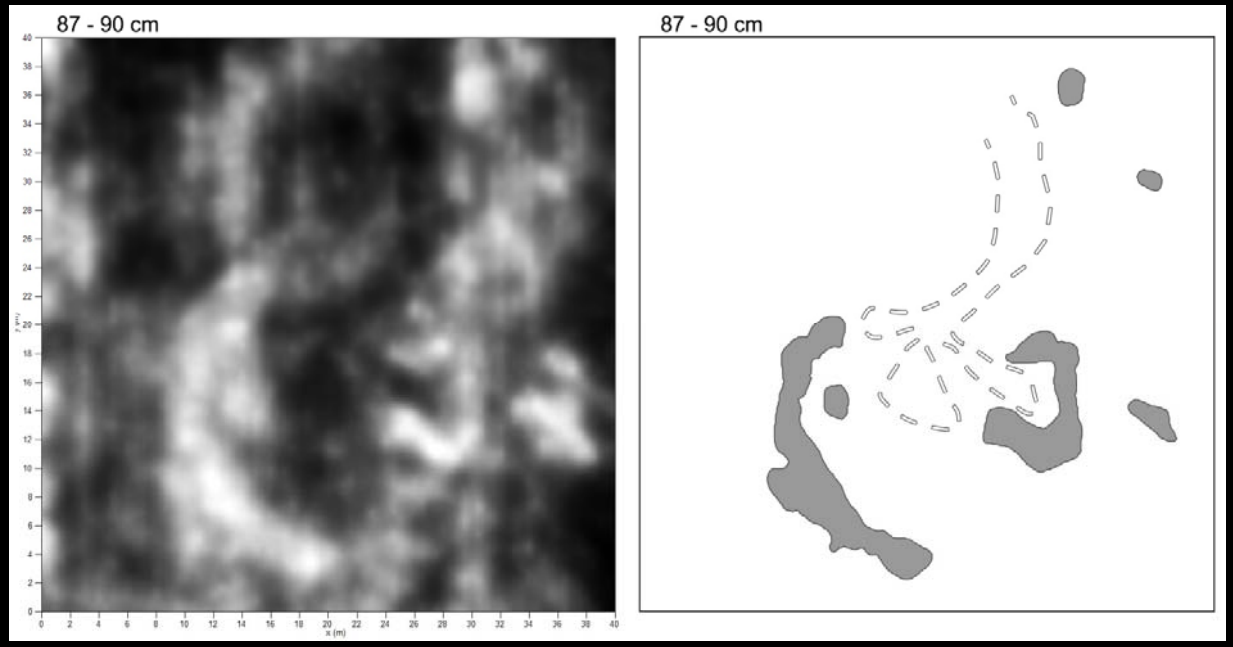
Interpretations: GPR Mound C



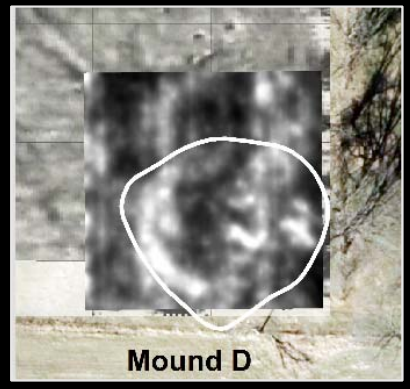
Side by side comparison of GPR and magnetic gradiometry data.

GPR data draped over magnetic gradiometry data with locations of off-mound houses mentioned in the text is displayed in the imagery (left). Magnetic gradiometry data only (right).

Results: GPR Mound D

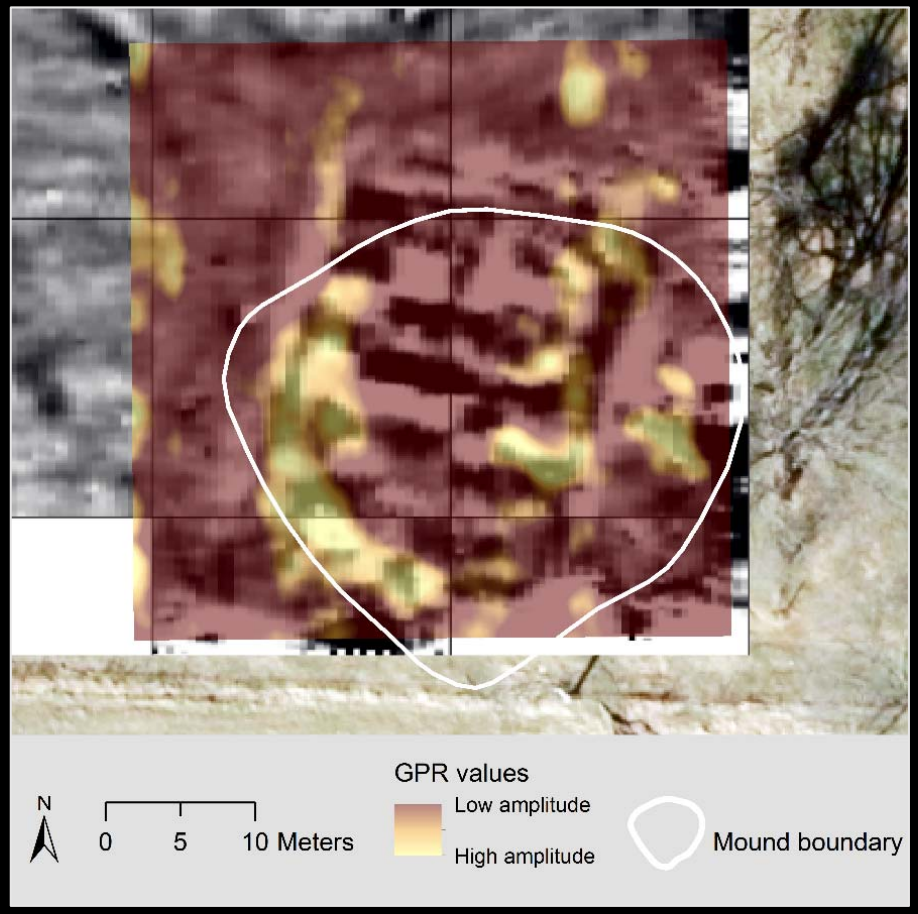


Position of GPR grid for reference.



Amplitude slice from Mound D (left). Features drawn over the slice at the given depth (right).

Interpretations: GPR Mound D



GPR data displayed with a different color ramp at 50% translucency and draped over the magnetic gradiometry data.

Discussion

Inquiry-based archaeogeophysical survey has yielded information that would otherwise be unattainable.

Acknowledgements

Support:

- Arkansas Archeological Survey
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