

Putting Mound House on the Map: Comparing Magnetometry and Excavation

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The Question

Magnetometry is a noninvasive mapping technique that records magnetic qualities of the soil. Mound House is a Middle Woodland mound site in the Lower Illinois Valley.¹ Interpretations of the northern end of the site have focused on its use as a habitation area in conjunction with the mounds (Fig. 1), though our understanding of its use remains limited. Remote sensing of Mound House revealed a high density of magnetic anomalies, making interpretations challenging.

- How does the magnetometry data compare to areas that were excavated?
- How can we extrapolate the remote sensing data to predict organization of the habitation area?

Methods

- Digitized excavated habitation features from 2009-2013 field paperwork
- Selected 424 magnetometry anomalies from a 2D continuous image generated by TerraSurveyor (collected from Bartington Grad 601-2 Magnetometer)
- Created a layered map via QGIS, an open-source mapping platform
- Generated data using zonal statistics on QGIS
- Compared excavated features to magnetometry anomalies selected for analysis
- Analyzed patterns in magnetic anomalies spatially

Results

- Most excavated features correspond with magnetometry anomalies (Fig 2)
- Refuse pits typically correspond with small positive readings from the magnetometer. (Fig. 3)
- There appears to be circular structures of refuse pits (Fig. 4)
- There are anomalies that do not look like excavated features (Fig. 5)

Moving Forward

- This analysis focused on the northern habitation areas. Further analysis could explore to the west, where there are similar stains of activity.
 - All anomalies chosen for analysis had positive magnetometry readings, but there are negative readings equally interesting that demand future study.
 - Excavation is the only way to ascertain subterranean features.
- Magnetometry remains a useful tool to target unit locations and make predictions about the site, but excavations are needed for future study.

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FIGURE 1: SITE OVERVIEW
A modern aerial photo of the site shows three large stains of activity around Mound 2 – which are reflected in areas of increased anomalies in the magnetometry data. The mound (here, the dark circle) has been theorized to be used as a stage for ceremonial practices that would have been visible to the three habitation stains.²

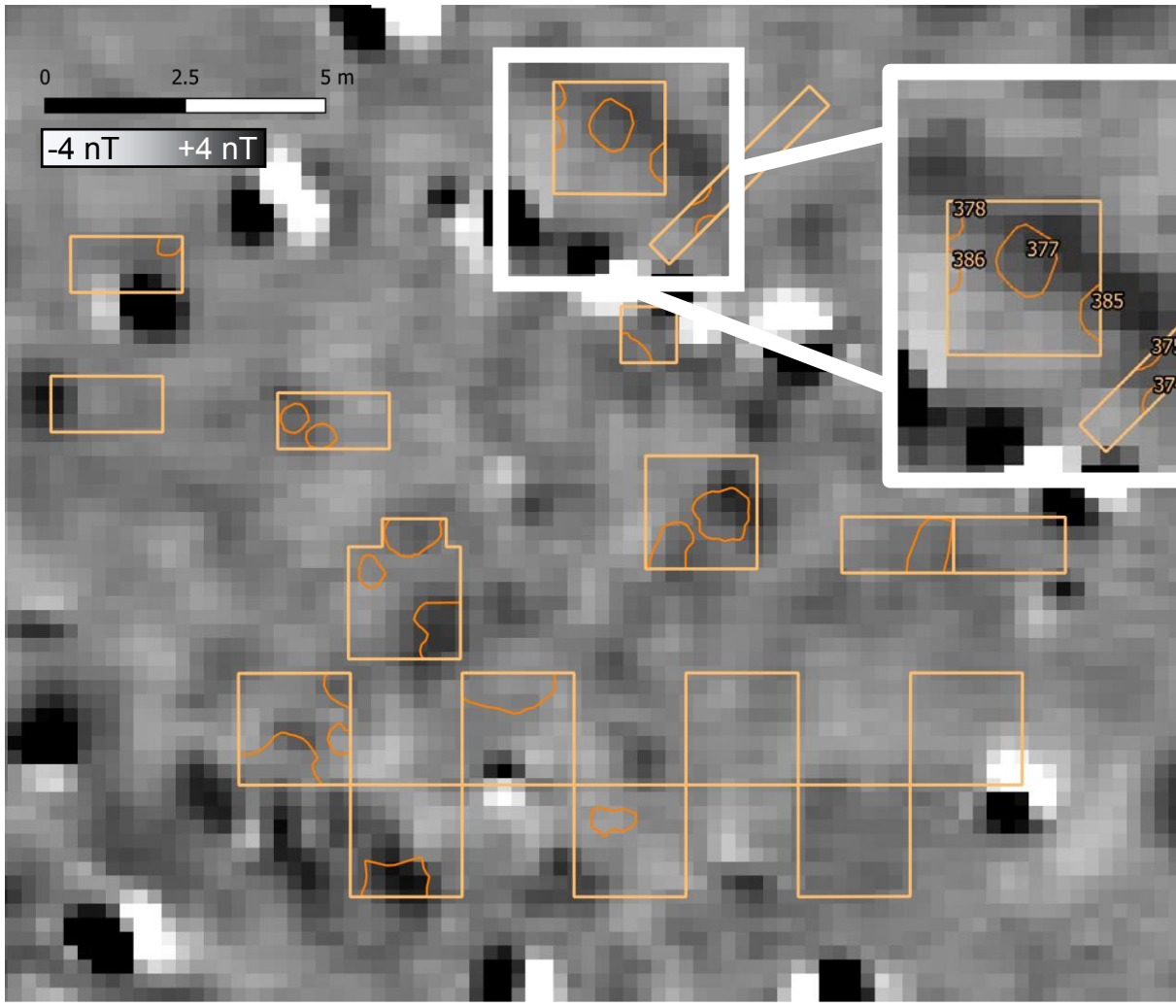


FIGURE 2: MAG SHOWS SOIL CHANGES
A closer look at the features in SQ 617 and SQ 611-612 show that the confirmed, excavated features, digitized as orange outlines here, correspond with darker, positive magnetometry readings. In addition, excavations already reveal organization in refuse pits. Here, F 378, F 386, F 377, F 385, F 375, and F 374 appear to be organized linearly.

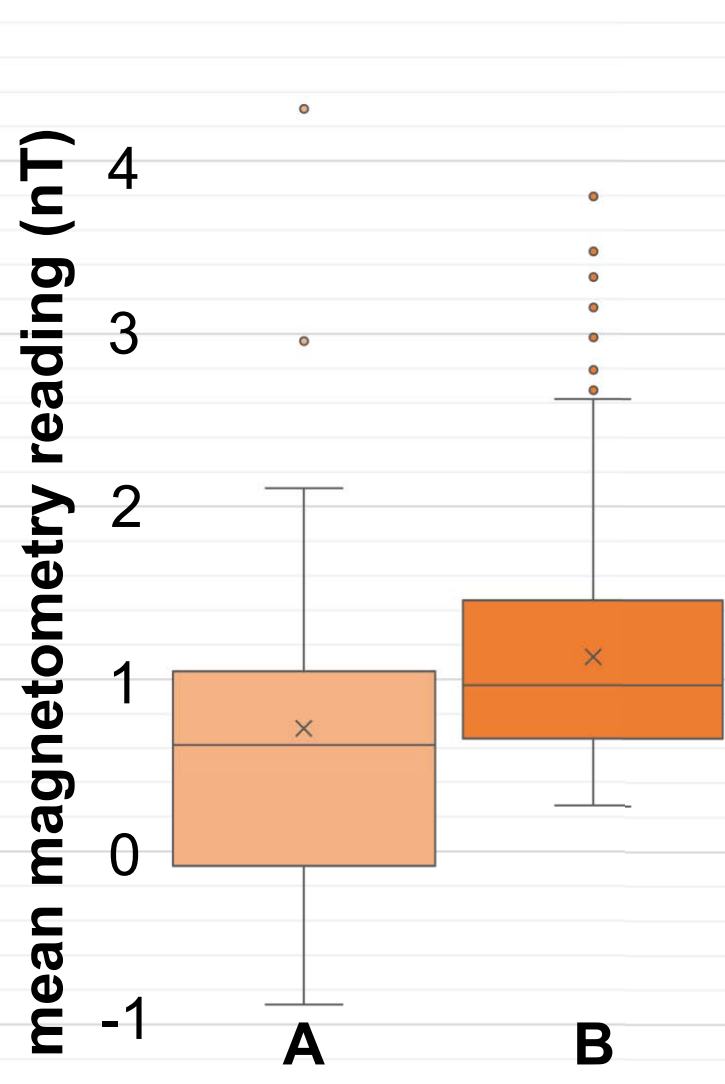


FIGURE 3: FEATURES HAVE POSITIVE nT READINGS
The mean nT readings of excavated features created a framework, and a bias, for selecting anomalies for analysis.
(A) The mean magnetometry readings from every excavated feature from the field paperwork was .715 nT. Most values of excavated features hover between 0 and 1 nT.
(B) Anomalies selected for analysis were chosen if they did not have strong dipoles and were visible with the magnetometry data clipped from 0-4 nT. This criteria was developed from the appearance of confirmed, excavated features, but is slightly biased towards positive anomalies.
The positive readings are probably a signal of less ferrous materials in the soil. This may have been caused by the organic fill of refuse pits.³

References

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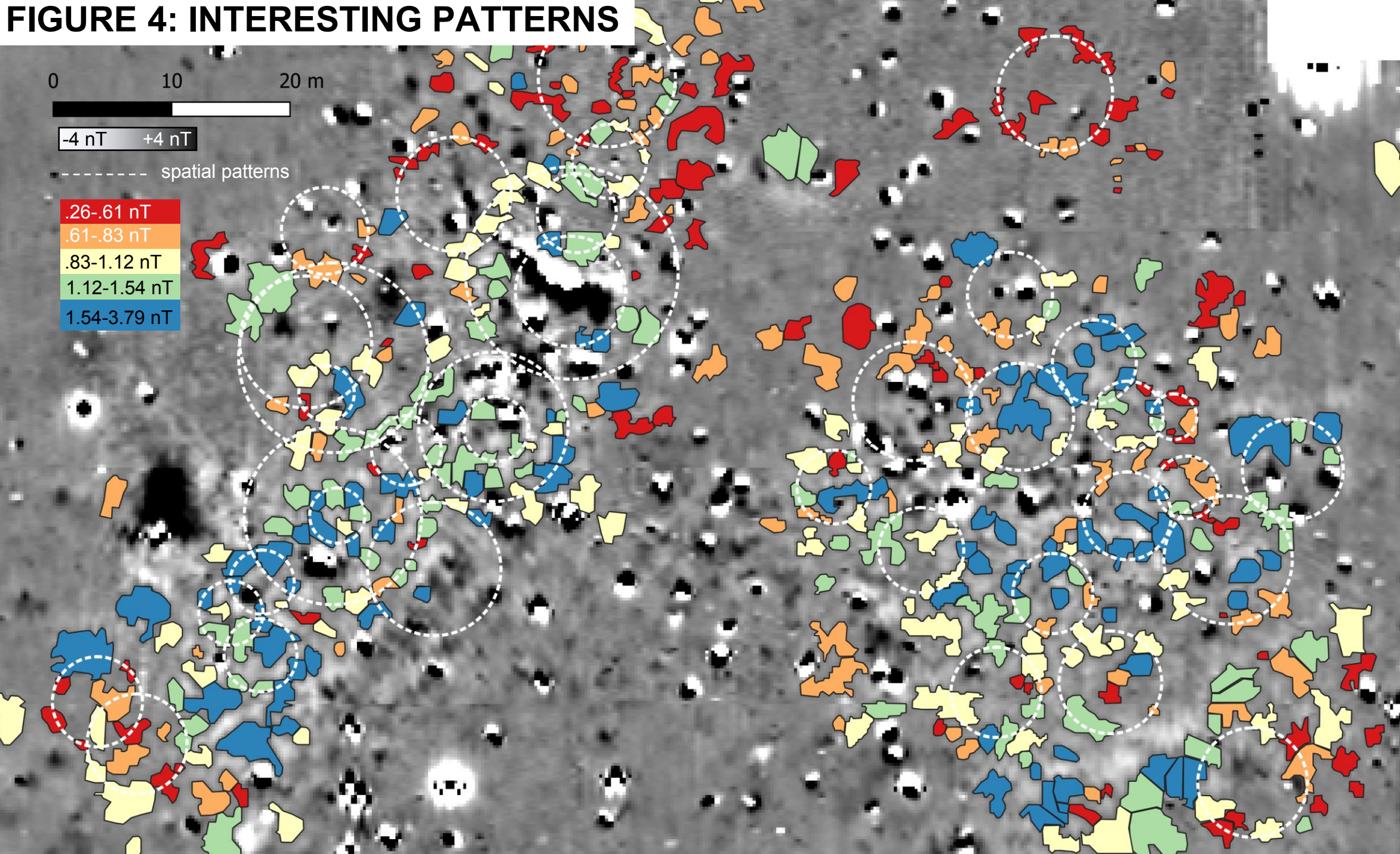
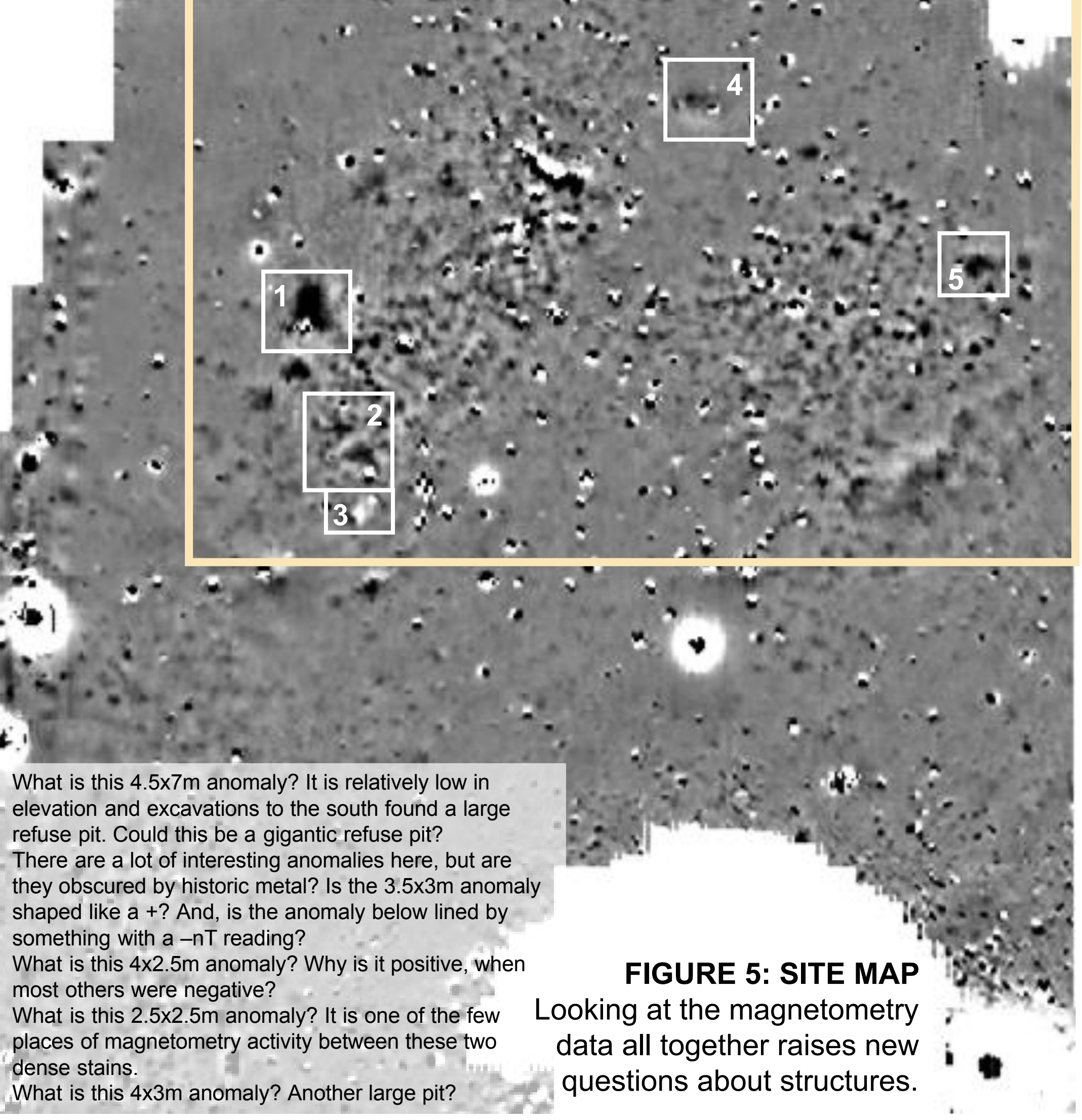


FIGURE 4: INTERESTING PATTERNS
Analyzed magnetometry anomalies with their mean nT reading. Dashed circles were added to highlight spatial patterns. Middle Woodland houses often only appear as post molds archeologically, which are too small and too deep to be read by magnetometers. Instead, they are identified by organized shapes of features.⁴ Here, circles with similar mean nT readings may signify organized features of similar depth, size, and fill. However, until excavation, this remains hypothetical.



1. What is this 4.5x7m anomaly? It is relatively low in elevation and excavations to the south found a large refuse pit. Could this be a gigantic refuse pit?
2. There are a lot of interesting anomalies here, but are they obscured by historic metal? Is the 3.5x3m anomaly shaped like a +? And, is the anomaly below lined by something with a -nT reading?
3. What is this 4x2.5m anomaly? Why is it positive, when most others were negative?
4. What is this 2.5x2.5m anomaly? It is one of the few places of magnetometry activity between these two dense stains.
5. What is this 4x3m anomaly? Another large pit?

FIGURE 5: SITE MAP
Looking at the magnetometry data all together raises new questions about structures.