Subsurface Imaging of a Late Woodland Effigy Mound Site: Lake Koshkonong Effigy Mounds, Wisconsin

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ABSTRACT

The preservation for Effigy Mound sites continues to be a concern. These landscape monuments and sacred sites remain poorly understood and require innovative, noninvasive and nondestructive techniques for archaeological investigations. A collaborative study of a Late Woodland (ca. A.D. 700 - 1100) effigy mound site on the east shore of Lake Koshkonong was undertaken. The site, protected from excavation by Wisconsin State law, is within Jefferson County, southeastern Wisconsin. Previous geophysical tools (magnetometry, EM) were employed to assess the site. Ground penetrating radar (GPR) transects were collected using a pulseEKKO 1000 unit with two antennae frequencies: 225 MHz (0.5 m antennae separation) and 450 MHz (0.25 m antennae separation/step size of 0.05 m). The surveys were conducted along the length and width of several mounds with topographic data being collected with a Topcon laser level to geometrically correct the data. After data processing and using radar stratigraphic principles on the reflection patterns, internal stratigraphy within the mounds were observed. Together with the previous geophysical surveys, the results reveal a complex natural and cultural stratigraphy both within the mound features and between the mounds.

METHODS

Ground penetrating radar (GPR) works by sending electromagnetic pulses into the subsurface and the pulses then reflect off of changes of different material properties that occur in the subsurface. The resulting research, including invasive and noninvasive methodologies, have provided models of the internal stratigraphy of effigy mounds. The data studied in the project was collected over multiple effigy mounds in Jefferson County Indian Mounds and Trail Park on the east side of Lake Koshkonong. (fig. 3) Data was collected using a Sensors and Software pulseEKKO 1000-GPR system with two frequencies. The 225 MHz data was collected at 0.5 m antennae separation and a step size of 0.1 m and the 450 MHz data was collected at 0.25 m antennae separation and a step size of 0.05 m. A total of 10 lines were collected. Nine over various effigy mounds at the site and 1 over a flat trail to provide a baseline for the GPR profile. Using a Topcon laser level, topographic data was collected to later geometrically correct the GPR profiles, in the data processing software, EKKO_Project. GFP_Edit was also used to collate the lines and EKKO_Project to process them for analysis.

RESULTS & DISCUSSION

The layers within mounds can be quite complex, being comprised of deliberate colored layers and soil types that were common for ceremonial purposes (Whittaker and Storey, 2008). In a study on a Late Woodland period sand mound, up to 7 layers of various soil types were identified. In addition, a historic fill, presumed to be looter backfill, was found, using the soil pit method on the effigy mound (Sherwood et al., 2013). Seven layers is on the extreme and according to different models of effigy mound layers presented by Otto in 2009 and Whittaker and Storey in 2008. Conical effigy mounds typically display more complex internal stratigraphy despite their simpler design, while linear and figure-shaped mounds are typically less complex internally (Whittaker and Storey, 2008; Otto, 2009).

CONCLUSION

Using the processed data, radar stratigraphic principles and previously established models, patterns emerged. The pattern are interpreted as disturbances in the soil horizons under the mound and sloping mound strata. Furthermore, these patterns, among others, provide indications of the subsurface that can be used to determine the natural or cultural origin of effigy mounds.

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