DELINEATION OF A JAMAICAN SLAVE VILLAGE USING FIELD GEOPHYSICS

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INTRODUCTION

Geophysical prospection at archaeological sites is one area of archaeometry, the application of methods of the natural sciences to archaeology. Many of these methods are included in the broader definition of geoarchaeology, i.e., the application of methods of the geosciences to archaeology (Rapp, 1998). Geophysics can be used to understand the geologic setting of archaeological sites, to delineate habitation and other use areas at a site, to detect archaeological features such as walls and hearths, and even to find individual artifacts, especially metal objects. The methods are those of near-surface geophysics (Burger, 1992); thorough discussions in an archaeological context and applications are given by Weymouth (1986), Clark (1990), Wynn (1990), and Bevan (1998).

While the greater part of the Jamaican population in the early 19th-century was composed of enslaved Africans and their descendants, traditional historical analysis reveals little about slave society was organized (Armstrong, 1990). Previous archaeological surface reconnaissance at suggested that the village contained at least three components: a domestic area, a burial ground, and a zone of outlying farms. The goal of the Marshall's Pen archaeological program of James Delle is to understand how the village was spatially organized, more specifically: to establish the location and number of the graves located in the cemetery; to determine the number, location, and layout of house areas and associated gardens within the village; and to delineate the boundaries of the so-called provision grounds, where slaves would have been involved in slash-and-burn agriculture to produce food for themselves and their families.

In our project, integrated geophysical studies were conducted at the 19th-century coffee plantation slave village at Marshall's Pen, Mandeville, Jamaica. Cesium vapor magnetometry, magnetic susceptibility, electrical resistivity, and electromagnetic conductivity were used at the village site, the adjacent cemetery, and off-site to delineate use areas and locate individual archaeological features and artifacts. Total station mapping was integrated with GPS data and incorporated with the geophysical results as different layers in a GIS database.

PROJECT PARTICIPANTS

Faculty participants in this project were: Robert S. Sternberg, Franklin & Marshall College, James A. Delle, Franklin & Marshall College; Mary E. Savina, Carleton College; Brian G. McAdoo, Vassar College.

Student participants were: Daniel Alvarado, Trinity University; Nina Carranco, Pomona College; Robert Crick, Franklin & Marshall College; Susan DeYoung, Smith College; Epifanio Figueroa, Rio Hondo College; Sonya Hernandez, Colorado College; Eliza Hollaway, University of Texas at El Paso; Angela Hutchison, Beloit College; Aaron Shear, College of Wooster; Christopher Sherrod, University of Minnesota, Morris.

We were also visited on the project by Betsy Julian, University of Texas at El Paso, a faculty sponsor. We were ably assisted by Matt Mittenthal, a Geosciences major at Franklin & Marshall College, who served as our teaching assistant. Ms. RoseMarie Whitaker, the Jamaica National Heritage Trust, also worked with us in the field. Roderick Banks, Director of Archaeology, and Dorick Gray, Deputy Director of Archaeology, Jamaica National Heritage Trust, visited the site for an overview of the archaeological and geophysical projects. Anthony R.D. Porter, Chief Geologist, Alcan Jamaica Company, kindly gave us a tour of the Kirkvine Works bauxite alumina plant, and visited us at our site.

Figure 1 shows our group at Whitfield Hall in the Blue Mountains.

Figure 1. Field trip to Whitfield Hall, in the Blue Mountains. Front row, left to right: Chris Sherrod, Dan Alvarado, Matt Mittenthal, Angie Hutchison, Sonya Hernandez, Mary Savina, Middle row: Rob Sternberg, Bobby Crick, Jim Delle, Sooz DeYoung, Nina Carranco. Back row: Aaron Shear, Eliza Hollaway, Tiger and another staff member of Whitfield Hall, Epifanio Figueroa. Not shown: Brian McAdoo.

GEOLOGY

Marshall's Pen and the entire Mandeville region are underlain by thick limestone units of Tertiary age. Extensive weathering of the limestones, intercalated siliciclastic units, and windblown and alluvial surficial deposits has produced a sizable bauxite resource, currently mined throughout the region. Although not as dramatic as the cockpit karst topography to the north, the land surface has developed the characteristic closed depressions, sinkholes and isolated hills of karst topography. The village site explored during this project is on the summit and flanks of one such hill, overlooking a sinkhole to the south. The graveyard is in the closed depression near the sinkhole. We also mapped more extensively in this closed depression and on the flanks below some of the surrounding hills.

Some of the karst topography and resulting groundwater flow patterns seem related to the faulting and joints in the limestone, probably related to ongoing tectonic deformation of the region. Surface water is a scarce resource in this region.

An aerial photograph of the site, indicating the work areas, is shown in Figure 2.

HISTORY OF MARSHALL'S PEN

During the period of its operation as a coffee plantation, Marshall's Pen was the property of the Lindsay family of Scotland, first belonging to the Earl of Balcarres, and following Balcarres' death, the estate passed to his son, the Earl of Crawford. In the early 19th century, Balcarres owned approximately 5000 acres in what would become the modern parish of Manchester. The southernmost 1000-acre parcel, now containing the present extent of Marshall's Pen, was developed for coffee production beginning circa 1802. Sometime between that date and 1807, between 200-300 enslaved people of African descent settled on a small limestone hill, now known as Negro House Hill. This location was inhabited until the end of slavery in 1838, when the Earl of Crawford removed the people from Negro House Hill and established a tenant community in nearby Balcarres Township. Descendants of the original slaves still inhabit this village. The Great House, formerly the residence of the plantation owner and foreman, now the residence of Robert and Ann Sutton, served as our headquarters (Figure 3.)

STUDENT PROJECTS

After reconnaissance of the site, experimentation with the different geophysics methods off-site along baselines, and discussion of the archaeology, the students were divided into three research groups. The "Village People"—Susan DeYoung, Aaron Shear and Angela Hutchison—examined the village of Negro House Hill. Figure 4 shows Jim Delle looking over the edge of the village, showing probable stone house platforms in the foreground. The "Duppies," named after the Jamaican word for ghosts—Nina Carranco, Eliza Hollaway, Sonya Hernandez and Chris Sherrod—investigated the cemetery and immediately surrounding area, searching for outlying graves. Figure 5 shows the cemetery area, including stone graves in the foreground, modern stone walls in the background, and the Duppies team running an electrical resistivity profile. The "Explorers"—Dan Alvarado, Bobby Crick and Epifanio Figueroa—

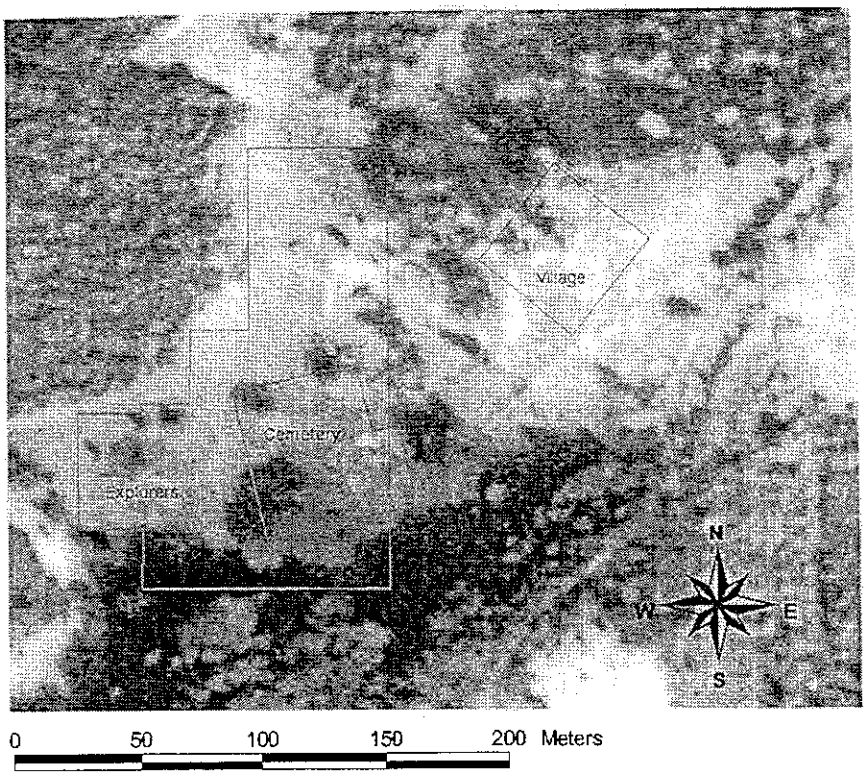

Figure 2. Aerial photograph of Marshall's Pen, showing major survey areas.

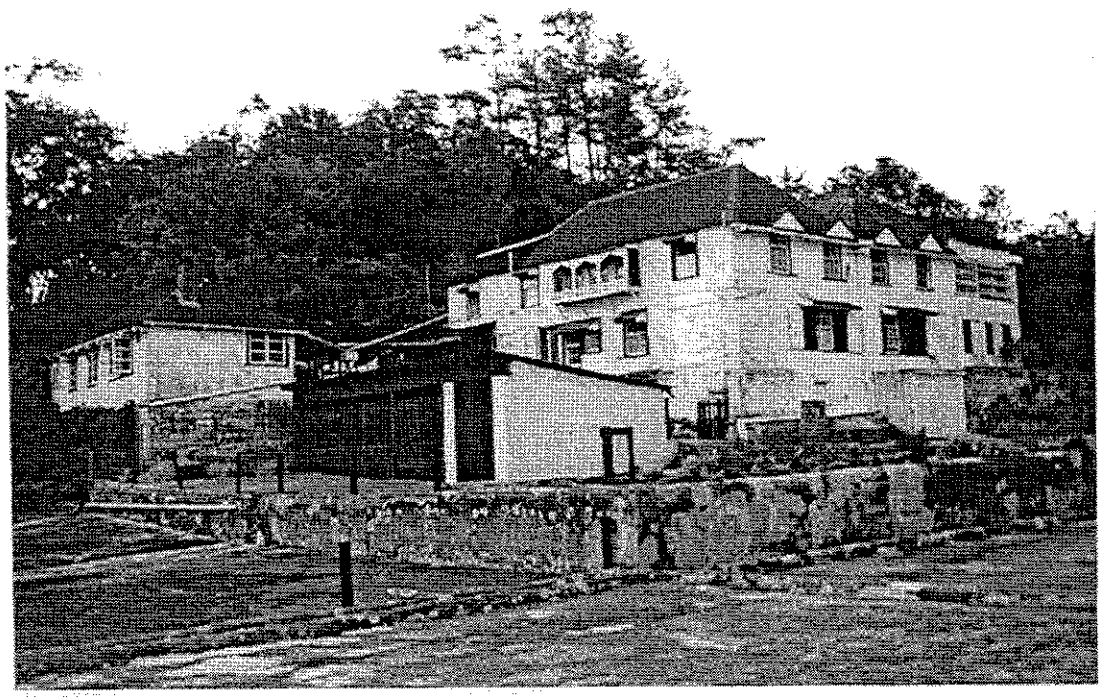

Figure 3. The Great House at Marshall's Pen.

roamed over much of the fields around the site, as shown in Figure 6 with electromagnetic conductivity, running lower resolution surveys to better understand the geologic setting and to look for outlying habitation or use areas. During our two weeks in Jamaica, days in the field were followed by evenings uploading, reducing and graphing data. More thorough analysis of the data and preliminary writeups were completed during our two-week stay at Franklin & Marshall College. Methods used in the field were total station surveying, GPS mapping (Figure 7), cesium vapor magnetometry, magnetic susceptibility, electromagnetic conductivity, and electrical resistivity sounding and profiling.

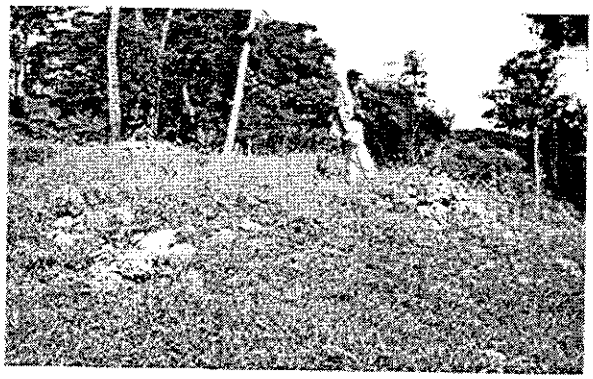

Figure 4. Jim Delle looking over the village.

Figure 5. Duppies resistivity profiling in the cemetery.

Figure 6. Explorers running conductivity west of the cemetery.

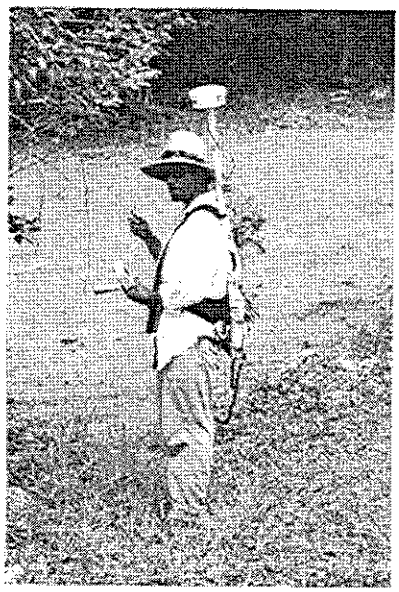

Figure 7. Brian McAdoo running GPS.

PRELIMINARY ARCHAEOLOGICAL RESULTS

Archaeological investigations at Marshall's Pen took place after our departure, carried out by students from Franklin & Marshall College under the direction of James Delle. These focused on the initial area of settlement on Negro House Hill. Initial reconnaissance and mapping looked at ten discrete house compounds, each containing visible surface features associated with between one and five houses. These investigations were based primarily on the observation of magnetic and susceptibility anomalies by the Village People. Of the seven major discrete anomalies detected, five were tested. Two proved to be iron tools, a machete and a woodworking tool, associated with the early nineteenth-century occupation. Three other anomalies all proved to be associated with a large, black, burned feature. Archaeological testing, including soil flotation, was conducted on this feature. Preliminary analysis has been based on examinig two alternate hypotheses: 1) that this feature was a "coal-kiln" in which people burned hardwoods

to make charcoal; or 2) that this feature may have been a communal cooking area. Local oral traditions suggest the possibility of the first interpretation, while archaeological recovery of ceramics, seeds, a metal spoon and wooden knife handle, support the second hypothesis.

Future excavations will continue to test this feature, and may expand to test the series of anomalies detected to the southwest of the known extent of the graveyard associated with the early 19th-century village.

CONCLUSIONS

The bauxite soils of the area were not problematic. Within the village, areas of concentrated magnetic anomalies correlated with magnetic susceptibility anomalies, suggesting a shallow source. This also suggests that these anomalies are due to metal or mineralogical alteration affecting susceptibility due to firing or bacterially activated redox reactions. Depth interpretations from magnetic anomalies locate the sources near the surface, well within the soil layer thickness determined from off-site resistivity soundings. The magnetic anomalies within the village were ground-truthed by followup archaeological investigations

Limestone walls marking rooms and graves did not give marked anomalies with resistivity or conductivity, but were in some cases detectable with magnetometry. Reconnaissance magnetic and electromagnetic surveys over a wider area suggested some promising areas for future investigations.

We had a variety of difficulties in the field with batteries, cables and electronics, most of which were solved on site. The foresight to bring basic tools along was critical. Heavy rains in the afternoon limited several of our field days. The major nonscientific problem was the difficulty of telecommunications back to the U.S. In the lab, the greatest problems were incompatibilities between PC and Macintosh graphics files.

The project was a wonderful learning experience about science, culture and history. We had great excursions to the beach at Montego Bay, a weekend trip to the Blue Mountains where we all hiked to the top of the highest point in Jamaica, and an afternoon outing to picturesque YS Falls. In Lancaster, we enjoyed an outing to local geologic sites, a trip to Philadelphia, an adventure in a maize maze and dinner at an Amish farm.

ACKNOWLEDGMENTS

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