Initial Results from Magnetometer Survey at Dakajalan, Mali

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Abstract

In May 2017, archaeologists from Yale University and the Mission Culturelle de Kangaba conducted a series of magnetometer surveys around the newly identified site of Dakajalan, Sous-Prefecture, Sanankoroba, Mali. Several notable features were located, including areas suitable for future excavations.

Introduction

The location of the capital of the ancient Malian Empire (c. thirteenth – fifteenth century AD) has been the subject of scholarly debate for nearly 200 years. In the mid-nineteenth century, W. D. Cooley (1841) based his assertion that the city was somewhere near Nyamina, west of Segou, in the Republic of Mali, on his interpretations of the travelogue of Ibn Battuta. Beginning in the 1920s, however, numerous colonial agents (Vidal 1923; Gaillard 1923), historians (Delafosse 1924; Niane 1961), and archaeologists (Filipowiak 1979) began to argue for the site of Niani, along the Sankarani river in the Republic of Guinea. Although Niani is often still cited as the Empire’s de facto capital, this claim has not held up well in the face of revised data from both archaeological (Fauvelle-Aymar 2012), and ethnographic (Conrad 1994) sources.

Despite several other sites having been proposed, a convincing location for the Empire’s capital has yet to be securely identified. More recent research by MacDonald et al. (2011) has uncovered a massive urban settlement, known as Sorotomo, dating to the period of Ancient Mali’s expansion. While radiocarbon dates indicate Sorotomo was originally settled in the thirteenth century, and its size and complexity are exceptional, most traditional accounts suggest the initial center of Ancient Mali’s power lay 200km southeast of this settlement on the left bank of the Niger River (MacDonald et al. 2011; Hunwick 1973). While some scholars have convincingly argued for a more nuanced understanding of the concept of medieval African ‘capitals’, incorporating the notion of the “peripatetic capital” into their analysis, it should still be possible to identify archaeological traces for the center of such a politically and economically powerful state (Conrad 1994: 360).

While sites like Sorotomo may represent a central hub of the Malian Empire during its peak, the current project has focused on locations central to the origins of the Empire, and the home of its founding patriarch, Sunjata Keita. Therefore, in March 2017, a joint Malian-American team focused on the recently identified town called Dakajalan, which is associated in local oral tradition with events surrounding the founding of the empire. Investigations included geophysical prospection and informal survey of the region.

Dakajalan

In most “major variants” of the Sunjata Epic a locality known as Dakajalan is said to have played an important role during the early stages of the Malian Empire, most notably functioning as the headquarters from which Sunjata waged war against the kingdom of Soso, and thus is the likely location of the first capital (Conrad 1992: 183). A variety of accounts also suggest Dakajalan to be the setting of Sunjata’s childhood as well as his final resting place. Due to the sacred nature of these events, the
location has long been a secret closely guarded by traditionalists; however, it was believed to have been situated somewhere across the river from the modern town of Kirina, at the center of the Mandé heartland.

Between 2011 and 2014, Mamadou Cissé (2016) directed several seasons of reconnaissance along both sides of the Niger River, between the Mande mountain (Siby and Wanda areas) and the confluence of Senegal and Sankarani rivers (Sous-Prefecture, Kourouba). This work has identified 70 new sites, mainly consisting of habitation mounds and associated areas of metallurgical activity, defensive structures, and caves. The density of sites located by Cissé, in addition to the recent identification of Dakajalan by local informants, demonstrates the archaeological and historical importance of the region.

In 2013, after more than two decades of inquiry, David Conrad of the State University of New York at Oswego, learned the location of Dakajalan and was permitted to visit the site (Figure 1). Cameron Gokee returned in June 2014, and directed a brief reconnaissance of the immediate area (Conrad et al. 2014). With the help of local interlocutors, Gokee identified the positions of several significant events in the Epic of Sunjata. Among other features, these included the reputed locations of the final battle of Kirina (hereby known as Tembali), Sunjata’s military encampment, and the Kèlèbali marigot, where the battle concluded. In addition, Gokee also identified a nearby habitation site, known as Sogondiala I, which displayed evidence of cultural accumulation, possibly extending ~3m in depth. While it was clear the area possessed
sacred importance, surface collection around Dakajalan yielded limited archaeological material. Thus, geophysical prospection was chosen as the next step, as this would provide insight into the spatial distribution of sub-surface archaeological features.

Over the course of March 2017, a team from Yale University and the Mission Culturelle de Kangaba returned to Dakajalan for a targeted geophysical survey of the Dakajalan region. Based on the previous work by Conrad, Gokee, and Cissé, as well as initial reconnaissance and informal survey of the regional landscape, three separate locations were selected for geophysical prospection: Sogondiala I, Tembali, and Doumbouya Field (Figure 2).

The main objective of this geophysical survey was to identify anomalies potentially related to archaeological materials, specifically habitation remains, sacred features, and battlefield features, in order to inform future excavations. A second objective was to determine the suitability of magnetometry for the detection of archaeological materials in the laterite-rich landscape of southern Mali. In order to achieve these objectives, 14 30x30m grids were surveyed within the study region, including six at Sogondiala I, and four each at Tembali and Doumbouya Field. A total 12600m² were surveyed over the course of the field season.

Methods

The survey was conducted in 30x30m grids in order to cover the maximum area with a minimal amount of setup time in this relatively open landscape. Grid layout began in each locale with Womack setting up a 30m baseline according to the best orientation on the landscape. Organized around this baseline, an initial 30x30m grid
was laid out, and then three additional grids were added to form a 60x60m square. In the case of Sodondiala I, two additional grids (totaling 6) were later added in order to further explore adjacent areas.

The magnetometer used is a single-sensor Geoscan FM256 fluxgate gradiometer with a recording sensitivity of 1nT. Data were collected with this magnetometer at a sample interval of 0.125m with 1m traverses. Data was collected in a zigzag fashion walking up one line and down the next starting in the southwest corner of the first grid. The same method was repeated starting in the southwest corner of each successive grid. In order to optimize grid layout, false north was used in some survey areas.

Magnetometer data was downloaded and processed using TerraSurveyor. The raw data from each area was treated using several methods including destriping, destaggering (0.125m), and interpolation. Data for the various grids was then viewed at ranges from 50/-50nT to 8/-8nT in order to interpret various types and strengths of anomalies.

While ground truthing of detected anomalies was not within the scope of this fieldwork, interpretations of possible causes for anomalies are based on shape and intensity compared to similar anomalies that have been ground-truthed at other sites as well as on our understanding of relevant surface features. Hopefully future excavation will allow for confirmation of these interpretations.

Results

Tembali

Survey of this area proceeded rapidly since there were few obstacles aside from several small trees on this flat and even terrain. Analysis of the results reveals a nearly anomaly-free set of grids. Aside from small variation that can be attributed to operator error, the only likely anomalies are a small number of potential iron spikes (+/-15nT). While these could potentially be attributable to bits of ancient iron, the observation of small amounts of modern ferrous trash in the vicinity could also explain these spikes. Since no additional anomalies of interest were located this area does not seem particularly promising for future excavations.

Sodondiala I

Survey took place over two sessions, with the northernmost four grids covered first with the two southernmost grids added later. Unfortunately, the majority of the survey area is obscured by what has been interpreted as subsurface laterite. This is particularly severe around the central tree (Figure 3), where the patterning suggests that...
the tree roots may have lifted up laterite that was then
detected. Several large and strong anomalies (+/-200nT) to the
north of the tree may be either concentrations of laterite or ferrous trash. The large and strong (~30m, 5 +/-200nT)
 northwestern anomaly is likely caused by a sub-
surface continuation of the laterite outcrop that is visible
above-ground at the edge of the survey area. The region
to the south of the tree roots is relatively quiet, containing a
few major anomalies of unknown origin, but may be rela-
ted to the sub-surface laterite. While this laterite and lack
of distinct anomalies makes identification of locations for
ground-truthing problematic, the large amount of surface
pottery makes this area a promising region for excavation.

Doumbouya Field

While the results in this area also revealed sub-
surface laterite, as well as possible modern trash, several
anomalies of potential archaeological interest were iden-
tified (Figure 4). The first anomaly was detected in the
first survey grid (NE grid) and prompted the continua-
tion of our exploration in this area. It appears as a zig-zag
line of anomalies that are consistent with readings from
laterite. However, unlike subsurface outcrops identified at
Sogondiala I, the zig-zag layout of the laterite in this area
resembles stone walls observed above ground in other
nearby parts of Mali. These are constructed to gather and
retain soil in areas of runoff in order to increase field fer-
tility and also often demarcate habitation zones. While
the rocks associated with this anomaly are not visible on
the surface, their arrangement suggests some association
with a previous occupation of the site. The northern edge
of the anomaly is generally consistent with the edge of a
shallow dry gully that cuts through the field, which may
be connected to agricultural activity.

A second potential linear laterite wall-like ano-
maly occurs approximately 30m south of the zig-zag line.
It runs roughly parallel to the zig-zag anomaly; however,
this anomaly runs in a straight line that then curves south
and out of the grid. It is unclear if this anomaly may be
associated with agriculture or other constructions. More
vague, but potential linear anomalies seem to connect the
two potential walls, meeting at a right angle in the SW
grid and possibly forming a rectangular structure. In addi-
tion, a number of other individual or clustered anomalies
occur in these grids, however their lack of a clear pattern
makes their origin unclear.

Adding to the significance of these anomalies is
their proximity to a series of known sacred features within
the immediate vicinity. Less than 50 meters to the south of
the Doumbouya Field survey unit were two large filanin
jala trees, whose sacred nature is highlighted by the fact
that it was the location chosen, in 2014, for the sacrifice
required before Gokee was permitted to survey Dakajalan
(Conrad et al. 2014: 5). To the north, approximately 200
meters, there are a group of shrines, consisting of laterite
cobbles, and a collection of “cups” ground into the late-
rite outcrop (Conrad et al. 2014). While the “cups” are of
unknown origin, the shrines are actively managed by lo-
cal residents of Sogondiala. Although the sacred features’
origins and connection to the archaeological material
is unknown, their presence, and the active engagement
they continue to receive, underscores the importance
of Dakajalan within the Mandé cultural landscape (Conrad
et al. 2014). Therefore, test excavations, specifically tar-
geting the two linear anomalies, may further reveal the
nature and age of archaeological materials from the lar-
ger region. The presence of surface pottery also raises the
potential for the discovery of stratified deposits, however
at this point the dating of the pottery found here remains
unclear.

Conclusions

The results of the magnetometer survey at three
locations in the vicinity of Dakajalan provide a number of
insights into the archaeological potential of these areas,
while also demonstrating that some positive results can
come from magnetometry survey over laterite-rich soils
and rocks. Research in the Chad Basin (Magnavita et al.
2006; Magnavita et al. 2009), as well as along the Middle
Senegal Valley (Coutros 2016) and the Senegalese Tumu-
li Zone (Magnavita and Thiaw 2015), have utilized geo-
physical surveys to varying degrees; however, the use of
these techniques has yet to take hold across much of the
continent. As the first magnetometry survey to be carried
out in southern Mali, the results show both the advantages
and disadvantages of using this methodology in this re-

gion.

While the present study constitutes only an initial
stage of research, it has located several areas suitable for
further investigation, as future excavations at both Sogon-
diala I, and Doumbouya Field may yield important infor-
mation regarding the history of this region. These exca-
Observations should target the mound features of Sogondiala I, and the linear anomalies detected at Doumbouya Field. While both sites may contain stratified deposits, the later has the highest possibility of being directly associated with past sacred landscapes in this region. Further survey and ground truthing are required to identify the age and nature of the anomalies detected through the geophysical prospection, and should be carried out at both locations.

Acknowledgements

The Authors would like to thank Drs. David Conrad and Roderick McIntosh, as well as the rest of the field crew, including Kefilwe Rammutloa, John Coutros, and Sekou Berté. This research could not have been completed without the prior work of Dr. Cameron Gokee and, of course, the insight of Djibril Doumbouya. We are likewise grateful for the support, both monetary and logistical, from the Augusta Hazard fund, the Malian Direction Nationale du Patrimoine Culturel, and our gracious hosts in Sogondiala.

References Cited

Cisse, M.

Conrad, D., C. Gokee, K. Koné, S. Berté, D. Koné, S.L. Koné,

Conrad, D.

Conrad, D.C.

Cooley, W.D.
1841. The Negroland of the Arabs Examined and Explained; or, an inquiry into the Early History and Geography of Central Africa. London: J. Arrowsmith.

Coutros, P.R.

Delafosse, M.

Fauvelle-Aymar, F.-X.
Filipowiak, W.

Gaillard, M.

Hunwick, J.O.

MacDonald, K.C., S. Camara, S.C. Donnay, N. Gestrich, & D. Keita

Magnavita, C., O. Adebayo, A. Höhn, D. Ishaya, S. Kahleber, V. Linseele & S. Ogunseyin

Magnavita, C., P. Breunig, J. Ameje & M. Posselt

Magnavita, S. & Thiaw, I.

Niane, D.T.

Vidal, J.