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MAPPING METHODOLOGY AT CHOCOLA, A SOUTHERN CITY IN THE BOCA COSTA REGION OF GUATEMALA

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The objective of the first work season of the Chocola Archaeological Project was to establish in detail and with accuracy, through reconnaissance and mapping, the general nature of the ruins present at the archaeological site. Before the arrival of PACH, we had only a limited idea about the dimensions and proportions of this ancient city, and it was only when the authorities of the Empresa Campesina Agrícola de Chocola *(Chocola's Agricultural and Peasant Enterprise)* led us in a tour during the first days of the season, that we more clearly came to the conclusion that mapping the site could represent several field seasons. However, our idea was to create a general map adequate to locate and spatially characterize as many visible traits as possible during the three months of the 2003 season, and to try to establish the borders of the prehispanic city (Valdés et al. 2004; Herrera et al. 2004).

Figure 1. Large artifact concentrations from different industries in a possible workshop zone, Mound 33, reconnaissance 2003 and 2004 at Chocola.

During the first field season an area of 5 km2 was covered and 65 mounds detected. For the present season, reconnaissance was expanded to 10 km2, and the number of mounds climbed to 80, ranging from 0.50 m to 25 m in height, and organized in groups of open or enclosed plazas. Based on this, we were able to outline hypothesis about the possible uses and functions of the different areas located across the site. For example, in regard to where could the elite residential areas be located (Valdés et al. 2004), the administrative centers, the possible growing fields and the workshop spaces (Figure 1).

METHODOLOGY OF RECONNAISSANCE

In order to locate these traits, during the two field seasons (2003-2004) we used several GPS units. During the previous season, two *Trimble GeoExplorer* units were used, with a 1 to 3 mm accuracy, depending on the weather conditions and the density of the vegetation, together with other less accurate *Magellan* GPS devices. For a better definition of the information, during the present season we worked with a *GeoExplorer XT* GPS, which provided greater accuracy and allowed for the localization of new benchmarks wherever they were needed.

The reconnaissance of the ancient city was approached in three stages that were simultaneously applied following a previous planning.

- The first involved a team of two persons, one in charge of handling the Trimble GPS unit and the other one in charge of data recording; in this way, the areas defined in the map at a 1:50,000 scale were defined.

- The second stage of reconnaissance involved systematic transects, in lines of ten persons, 5 m apart from one another (Figure 2). Each team included one person responsible for taking notes in the field cards including all traits discovered with their respective UTM coordinates, which were constantly entered in the GPS memory.

Figure 2. Transects established during the 2004 reconnaissance at Chocola.

- The third stage consisted in the verification of the data recovered in each transect and the annotation of further details in regard to the form of the structures and other traits of interest.

It is important to mention that reconnaissance was not an easy task to accomplish due to the different natural impediments encountered at Chocola. The major one was no doubt rain, with the most important rainfalls in the months of June and July (Simmons et al. 1959:277). Another obstacle encountered was total abandonment in the majority of the coffee parcels, due to the low prices of the product. We should add to this the different urticant worms, particularly the so called *"pajaritos"* which cause symptoms similar to those of malaria, with fever, intense pain and a partial blindness that lasts 24 hours, approximately.

DATA PROCESSING

For the handling of the information obtained we used *Pathfinder* and *ArcView* GIS or SIG software programs (Figure 3). With them, it was possible to obtain more than minimal data in UTM coordinates, and we were able to map the mound forms and to define different construction complexes and urban spaces such as plazas and accesses between structures. The *Pathfinder* software is compatible with *ArcView*, and the information obtained with the *Trimble Geoexplorers* units may be transferred to the board of the *ArcView* software in the form of areas, lines or dots. The graphic options of the program allowed us to assign different symbols to each one of the traits. In the future, as we continue to gradually refine the database with the information obtained through reconnaissance and mapping, it will be possible for us to define individual or combined layers showing the data and revealing pattern relationships within the site.

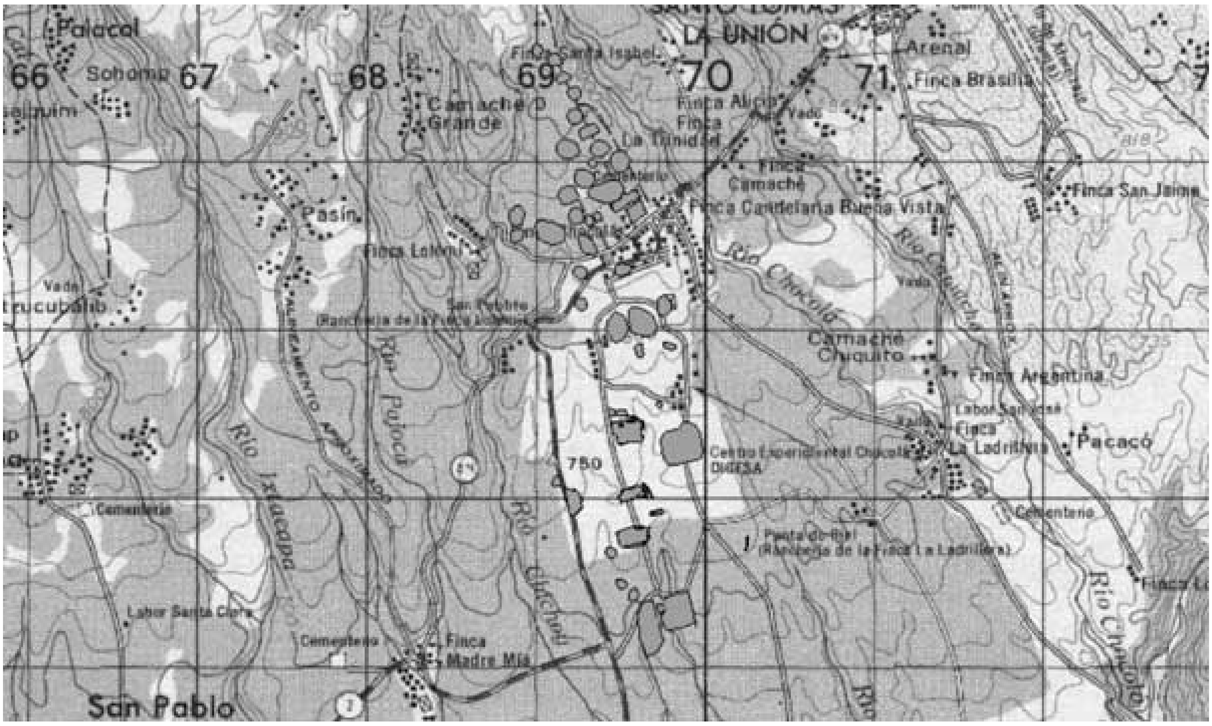

Figure 3. Mounds and platforms recorded during the 2003 and 2004 reconnaissance at Chocola.

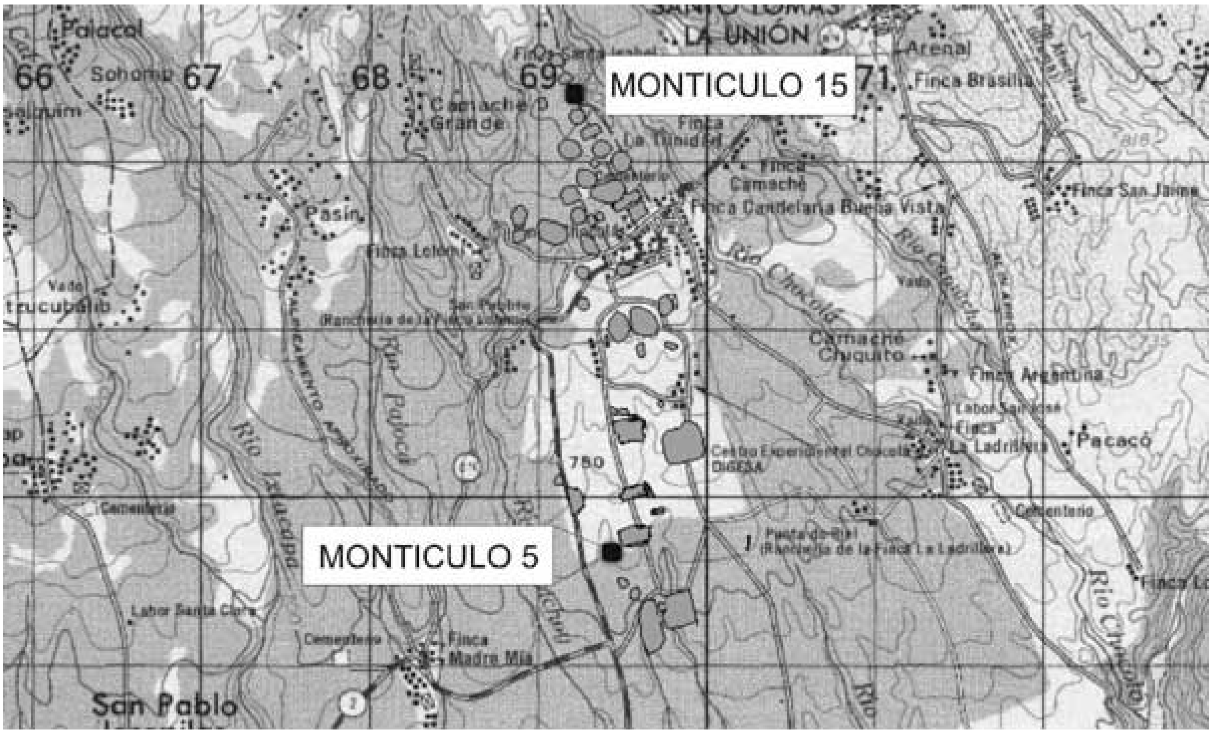

Figure 4. Places selected for excavation in the 2004 season at Chocola.

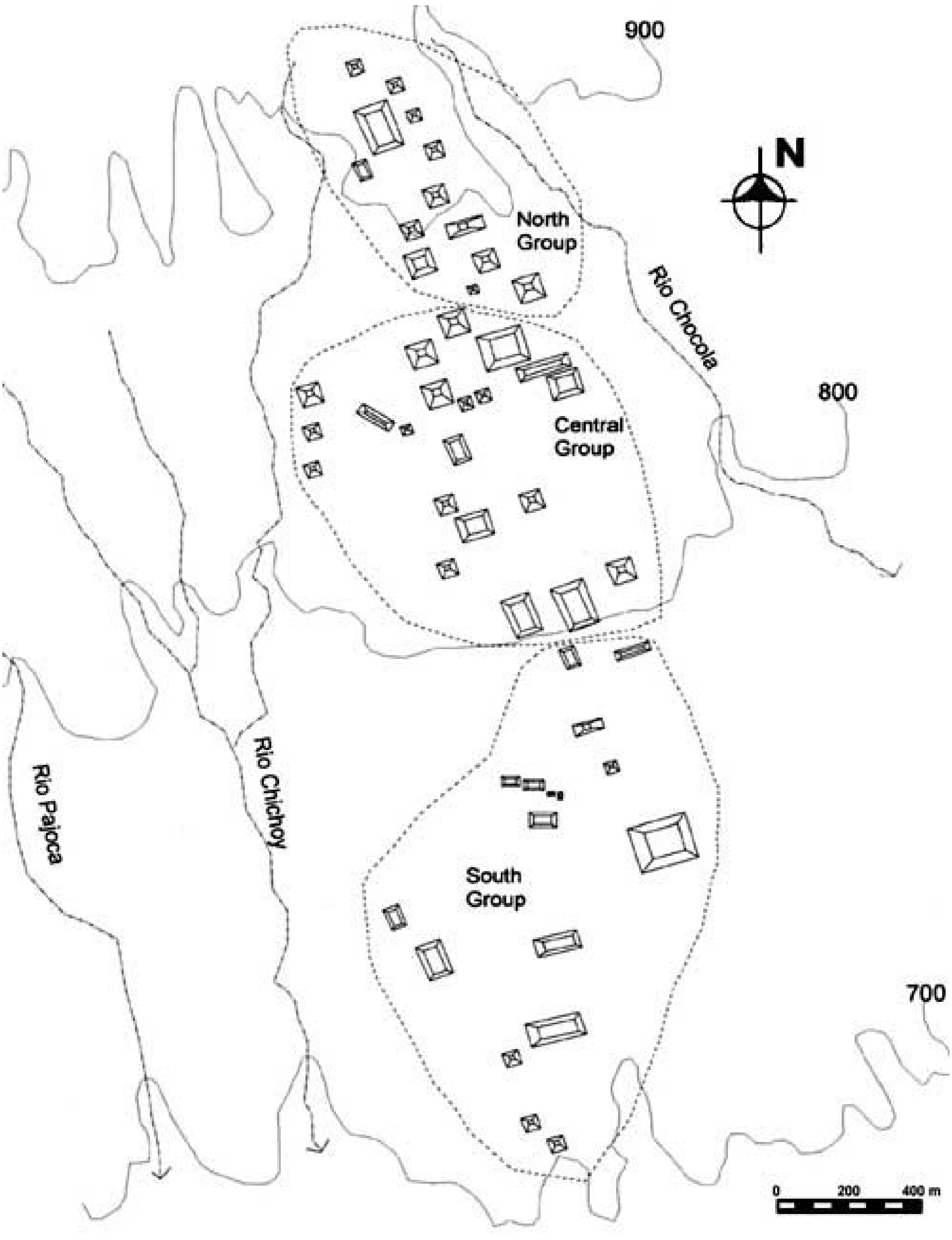

Figure 5. Speculative map showing the possible layout of the final occupation.

For the moment, we are in a position to speculate on what the relationship between the findings discovered represent. This graphic tool makes it possible for us to select places where investigations may be conducted (Figure 4), and to increase our understanding on the settlement pattern of this city, of water resources, possible workshops and agricultural areas, among others (Figure 5). The capability of observing at a scale and with accuracy the different forms mapped through the GIS or SIG program helps us to understand the spatial distribution of buildings and their relationship with one another, proving to be an important tool to assist us in the archaeological survey of Chocola. It should be emphasized that in order to achieve a better understanding of the site, it is necessary to make a reconnaissance in the neighboring communities, as during different visits to these places, it was possible to confirm evidence of human activity in the zone.

During the 2003 season, 50 benchmarks were placed at strategic points throughout the site, and coordinates were taken with a margin of error of millimeters in twelve of them (Figure 6; Poe 2003:3). The strategy of use of these reference points was that they were to form the backbone of the topographic map of the site, which was initiated this season; to this purpose, it was planned and determined in what way such activity was to be initiated. It was decided –inasmuch as one of the objectives this year is to excavate in zones with possible residential evidence- to initiate the mapping of the site in Mounds 5 and 15, using as a guide benchmark number 50 for the first one, and benchmark number 6 for the second, using a base map at a scale of 1:50,000, with all points of reference included.

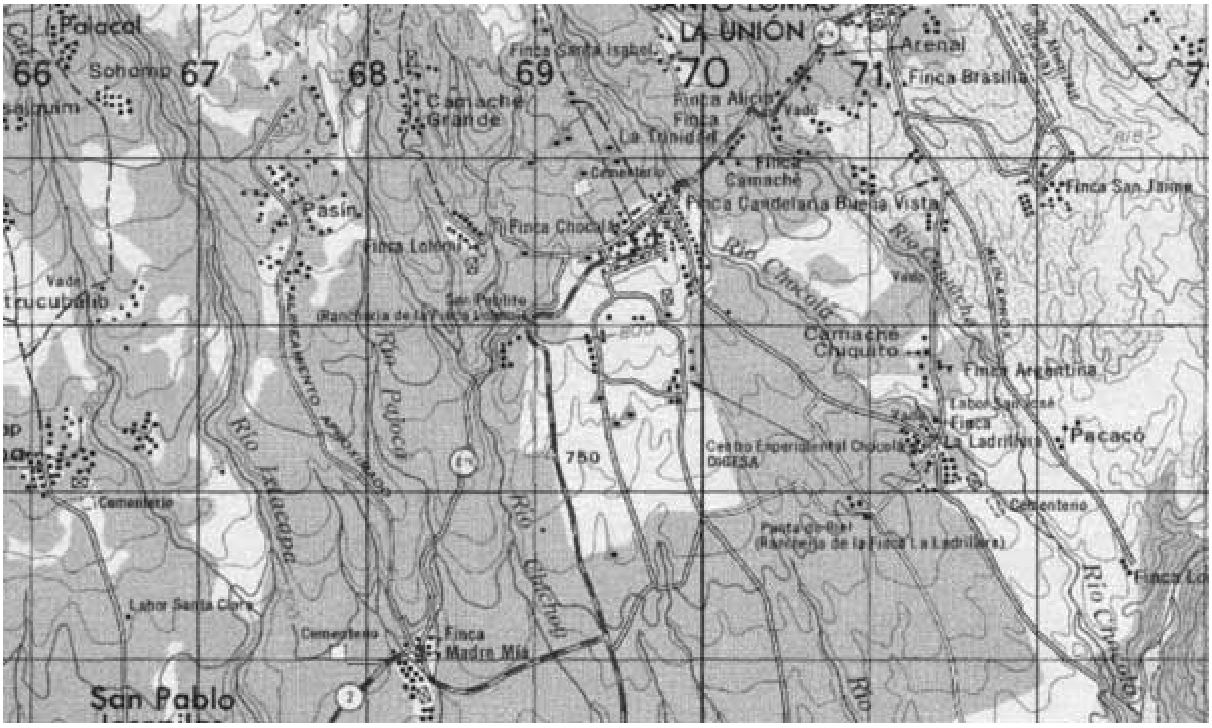

Figure 6. Benchmarks all over the site, forming the backbone of the mapping work at Chocola.

TOPOGRAPHIC WORK

The topographic mapping of Chocola is being carried out with the support of a *Topcon 220* total station, equipped with a *TDS Data Collector*; in addition, for the processing and editing of information we are using the *Surfer 7* software, which allows for creating images adequate to analyze the results from different points of view (Figures 7 and 8). Below, there is a list of some of the advantages of topographic mapping:

- It provides a general map of the city layout with all the artificial or natural alterations they present.

- It makes it possible to have detailed individual maps of the zones where excavations are being conducted, thus increasing knowledge about them.

- It allows for a more accurate record of the areas artificially modified, providing a guideline to approach them.

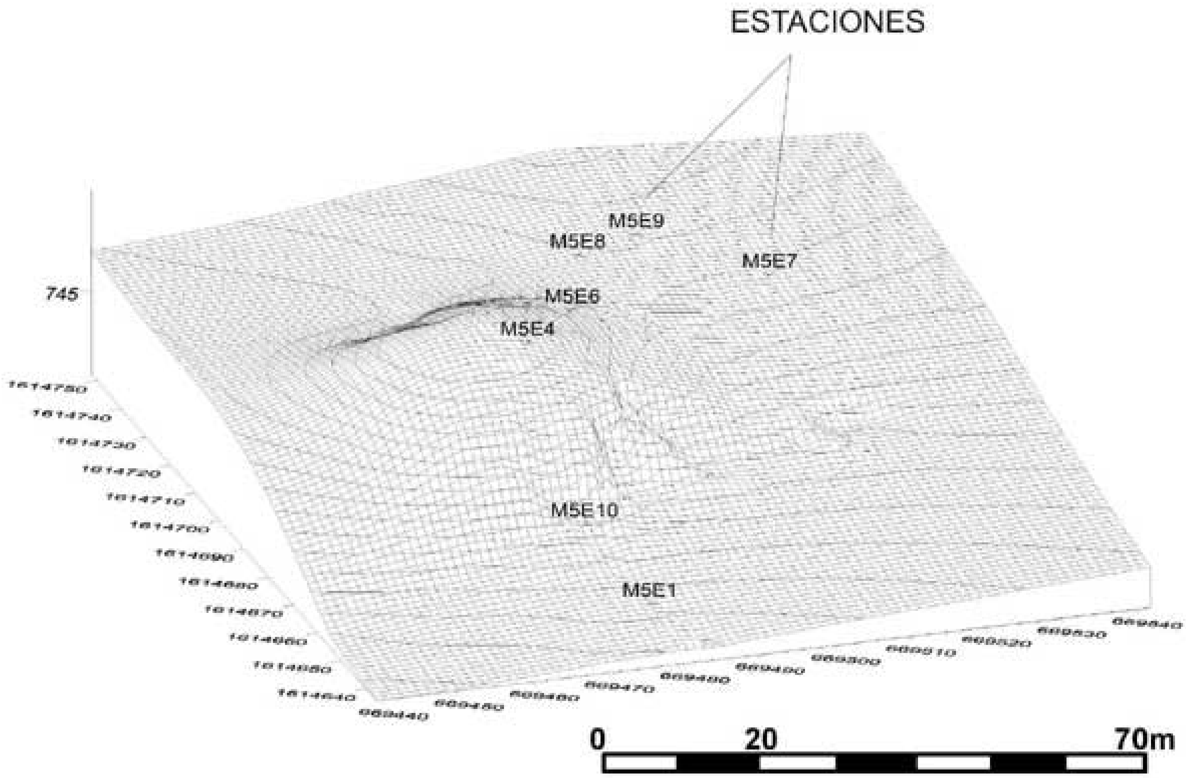

Figure 7. Location of the stations at Mound 5, which allowed for the mapping of the structure.

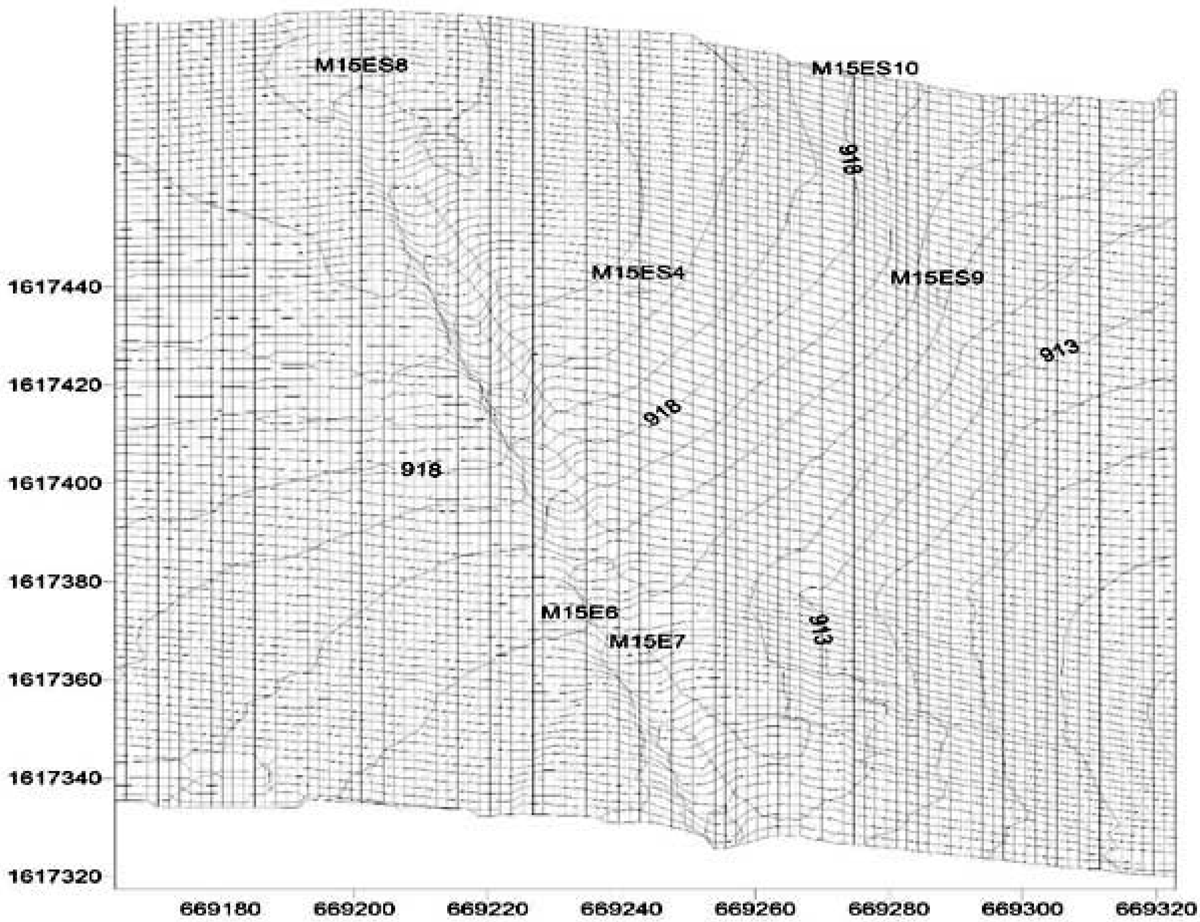

Figure 8. Location of the stations at Mound 15, which allowed for the mapping of the structure.

The achievements of the topographic mapping were:

- The drawing of very precise grids of the excavated areas.
- The formulation of hypotheses with respect to the possible meaning of the different superficial alterations revealed by the mapping.
- The possibility to speculate about construction patterns between the north and south zones.

It should be noted here that achieving the above results was not an easy task, as the gear presented some drawbacks and so did the terrain, making work slow at some moments of the elaboration process. Among other adversities, we may mention sensitivity to water, as the present season was conducted during the wintertime, and mapping had to be interrupted each time it started to rain; another situation was the vegetal cover of the ground, which interposed between the station and the prism, so that strategies had to be implemented to overcome that major obstacle. In a number of cases, it was possible to take readings only by increasing the height of the prism so that it could surpass the vegetation; in others, we were forced to set the machine as close to the surface as possible, and to adapt the prism at the lowest possible position to facilitate the location of points under several coffee plantations. A third strategy involved the execution of transects, inasmuch as there where none of the two first strategies would solve the problem, the most practical thing to do was to cut branches and leafs along a previously established direction. With this action the desired data could be obtained.

ANOTHER WAY OF MAKING A RECONNAISSANCE

In the 2004 season we used a *Geoscan Research FM250 Fluxgate* gradiometer, which helped to support the reconnaissance by providing information on the different concentrations of iron detected in the subsoil. To do this work, David Monsees built 20 m x 20 m grids within which he developed systematic transects and recorded readings each 0.50 m, until the area established was fully covered. As already said, the gradiometer detects iron concentrations, but it is important to note that in the same way it detects the feature of a stone with a greater precision, it detects as well any metal object found on the surface or below it. What is interesting in this situation is that all readings are exported to the *Geoplot 3* software where data are processed to obtain, as a result, concatenated images of the entire grid. These are analyzed by the technician who then observes patterns that certainly are of help to differentiate which readings correspond to metal, organic matter, or in the case of Mound 15, to stone alignments. It is clear that this technology provides a guideline to know where to excavate and increases the possibilities of finding traits, which in turn enrich the archaeological data.

CONCLUSIONS

The manner in which the topographic map is built gives the option of a greater flexibility with respect to the mapping of any particular part of the site that could be of interest, making use of the benchmarks located in most of its extension. The creation of a basic map in UTM coordinates facilitates working in sections that may later be linked together to form a single map of the entire place. The use of GIS or SIG and GPS technology makes it possible to save time and to cover more terrain, and to achieve through these results sufficient information on where to focus our attention, together with all other research tasks. It should be added that the GIS or SIG technology provides a tool with an ample potential for the analysis of the different zones with human activity within the 10 km2 known so far, and of the physical arrangement of the architectural forms on the surface. The combination of advanced reconnaissance and traditional mapping methods with GIS or SIG, such as mappings with GPS and transects, made it possible in a short period of time to acquire an X-ray image of the skeleton of ancient Chocola, in addition to the different research activities carried out, that are gradually providing life and color to the history of this great prehispanic city.

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Figure 1 Large artifact concentrations from different industries in a possible workshop zone, Mound 33, reconnaissance 2003 and 2004 at Chocola.

Figure 2 Transects completed during the 2004 reconnaissance at Chocola.

Figure 3 Mounds and platforms recorded during the 2003 and 2004 reconnaissance at Chocola.

Figure 4 Places selected for excavation in the 2004 season at Chocola.

Figure 5 Speculative map on the possible layout of the final occupation.

Figure 6 Bench marks all over the site, forming the backbone of the mapping at Chocola.

Figure 7 Location of the stations at Mound 5, which allowed for the mapping of the structure.

Figure 8 Location of the stations at Mound 15, which allowed for the mapping of the structure.