Excavations at Amheida 2002

For the 2002 field season of the Columbia University Excavations at Amheida, we continued our efforts to document, interpret and present the archaeological remains of what we believe to be the Roman settlement of Trimithis. As with our preliminary seasons, the interdisciplinary nature of our project has afforded us the opportunity to rethink the notion of excavation. Relying on remote sensing techniques, digital visualization tools, and survey methods, we are beginning to get a feel for the social and geophysical topography of the site while excavating no more than four test pits. We may now look forward to adding additional survey information in the following seasons as well as the results of traditional excavation, historical research and community archaeology.

Before discussing the this seasons work in more detail, we would like to thank Emad Abdulhamid, Supreme Council of Antiquities (SCA) Inspector, and Mehr Bashendi Amin, SCA Director for the Dakhleh and Farafareh Oases, for their friendship and support. We would also like to thank the Geromatics Division Museum of London Archaeological Service, Kamal Rizq, Gabir Muhammad Murat, and entire staff of the project for their hard work. Most of all, we would like to thank the people of the New Valley Province for their hospitality.

Objectives: field work and community outreach

Last season a team of specialists collected general information on the topography of Amheida and its immediate surroundings, conducted a preliminary study of surface finds, and determined potential excavation areas (For all the reports of last season's work, go to www.learn.columbia.edu/amheida/html/2001_field_reports/). Our objectives for the 2002 season were to build on last year's work and develop a detailed geographic reference system to facilitate the excavations planned for the 2003 field season. To this end, we 1) conducted a topographical and magnetic survey of the core of the settlement area; 2) laid two fixed grids for excavation in Structures N3 and N4; 3) executed focused magnetic surveys both in the areas slated for excavation and the construction of onsite laboratories; 4) completed photographic documentation for digital resources on the Columbia University campus and on the World Wide Web; and 5) produced a Geographic Information System (GIS) in ArcView 3.2 for ongoing project use.

In addition to traditional archaeological research and fieldwork, community outreach has also been a focus of the Columbia University Excavations since their inception. This season provided us with the opportunity to discuss our ideas for engaging the Dakhleh community—with a particular focus on secondary school education—with SCA representatives Mehr Bashendi Amin and Emad Abdulhamid. The following sections discuss the methodology of the survey in further detail while also outlining our ideas regarding community outreach.

Topographic Survey

Survey and data processing, Duncan Lees, Jessica Cowley, and David Mackie of the Museum of London Archaeological Service (MoLAS).

The topographic survey was conducted with a Sokkia Total Station and Trimble GPS base station and roving unit. Using both simultaneously, the MoLAS team was able to develop a digital elevation map (DEM) that included the built environment of the settlement core as well as the geophysical topography. Work with the GPS unit began with defining the boundaries of the site based on last year's work. This lasted approximately one day with survey work then focusing on the collection of elevation data beginning in the north end of the site and moving south to the end of the settlement core. Work with the total station followed a similar course, moving from Structure N4 in Area 1 on the north side of the site down south through the settlement core. The three members rotated between stations daily.

The MoLAS team also put in two reference grids oriented with structures N3 and N4. These grids were used this season for detailed magnetic survey as well as for reference points for photographic documentation. The survey used a set of localized fixed points for laying both the reference grids and conducting total station work. At the end of each day, these localized points were converted into points on the global Universal Transverse Mercator (UTM) system. We used AutoCad to edited and save each days work as individual images, and then added them to a master file of the entire site. Elevation data was also evaluated each evening using PenMap software to gauge our progress until the files became too large. At this point, we began adding each day's points and line drawings (i.e. elevation points and building footprints) into the ArcView GIS system as SHAPE files.

Just into the third week of the season, trouble developed with the GPS rover unit. After three to four hours of work in the morning, the rover started to overheat and had trouble getting a fix on satellite broadcasts. Regardless, we were able to log some 600-800 points or more each morning before the unit broke down. On these days we would put three people on the total station or have an extra hand help with the magnetic survey, laying the grid, etc. in the afternoon.

Magnetic Survey

Magnetic survey, James Conlon and Roelof Versteeg, Columbia University, data processing, Roelof Versteeg.

Data acquisition was conducted using two magnetometers. A Scintrex Envimag was used for the base station to measure diurnal variations in the local magnetic field of Amheida. This station was tuned to 41000 nT (ambient magnetic field) and was set to record at 2 seconds intervals. The base station was set up each day at the same location. Data was downloaded in the field directly following completion of each field day.

The performance of the base station (in terms of capturing the magnetic field and the variations therein) was checked by comparing the data recorded by the Envimag over several one-hour periods with similar data collected by the G858, and we feel that the Envimag changes can be reliably used to apply the diurnal correction. It also shows that the expected accuracy in the diurnal correction is on the order of .5 nT.

Data from the rest of the site was collected with a customized cart made from PVC plastic tubing to cause the least amount of interference possible with the magnetometer. We set up a fixed position for the magnetometer sensors as well as the GPS. Data collection was at 5 Hz rate. While this results in data that is somewhat noisier than if one collected at 1 Hz, the noise is in the order of 0.1 nT, and the added resolution (when walking at about 1 m/second) is worth the slight degradation in data quality.

Even our preliminary result show clear anomalies in the data of about 4nT presumably associated with walls because of the linear features and the ground/truth confirmation of the data. In addition to numerous "wall" anomalies, there are many others located in the large, relatively cursory survey. The detailed survey of structure N4 revealed clear wall anomalies as well as strong variations at and around the kilns. All these anomalies will be reviewed and processed further at the campus of Columbia University and reexamined in further detail in subsequent years. In this preliminary stage, there appear to be no significant anomalies at the proposed site of the laboratories, but the data will be reviewed further by Dr. Versteeg.

We had to work out several problems in conducting the magnetic survey. Initially the GPS antenna and central unit were mounted on the cart. However, it was found that this created a change in the magnetic measurements. While (for a fixed orientation) this change would be constant (and could thus be ignored), when changing orientations this change is variable and thus degrades the data quality. This became apparent in some of the data collected during days 1 and 2 (February 25 and 26). Subsequent to this, the GPS and cart were back mounted. The distance was based on walk-away tests as well as functionality. A small effect of the GPS/receiver unit is still present. This effect is angle dependent; our orientation to the earth's magnetic field is likely to remain constant over the area and can be corrected in the final processing stage off site. We also experienced problems in the final week of the season with the power source of the Envimag base station causing us to halt data collection for the last several days of the field season.

Photographic Documentation

Photography, James Conlon, Columbia University

The photographic documentation took just over three days. In addition to general photographic documentation of equipment, methodology, etc. for comparative purposes between seasons, we took multiple sets of panoramic images for use in educational resources. This includes some 14 individual QuickTimeVirtualReality (QTVR) nodes for Web-based resources roughly circumventing the site and well as intensive documentation over the fixed grid on Structure N4. They will be embedded in our maps and put online.

The more intensive photographic documentation coincided with the detailed magnetic survey of N4 as well as the preliminary ceramic study of surface finds in the same area in the 2001 season. The grid is 50m x 50m with the fixed point 100/200 at the southeast corner. We drove in stakes at 10m intervals beginning with110/200 moving on the south edge of the square east to 150/200; 100/210 on the west edge of the square moving north through100/250; 110/250 on the north edge of the square moving east to 150/250; and 150/240 on the east edge of the square moving south to 150/200. We also planted center point 125/225 and a smaller square within with northwest corner 112.5/237.5, northeast corner 137.5/237.5; southeast corner 137.5/212.5, and southwest corner112.5/212.5.

Panoramas were taken starting at 9:00am for the entire outer square at the 10m points moving from the southwest corner of the outer grid clockwise taking most of the day in the field. We then retuned to the grid at the same time several days later to take panoramas for the interior square at every 6.25m points again starting from the southwest corner and moving clockwise around the square. Both days work totaled 844 photographs for structure N4 and 254 for the QTVR nodes.

Community Outreach

James Conlon, Columbia University

Despite several decades of excavation in the Dakhleh Oasis, there have been few attempts to include the local community in the study and display of the Oasis' cultural heritage places. Efforts to conserve and display the historic fabric of al-Qasr and the Temple at Deir al-Hagar stand out as exceptions. With few local models to follow, we initiated a conversation with Emad Abdulhamid, SCA Inspector, and Mehr Bashendi Amin, SCA Director for the Dakhleh and Farafareh Oases. Our discussion produced an informal work plan for community outreach and education programs to coincide with next season's excavations.

We decided to introduce the project to the general public through a series of public lectures at Mutt, Jadida, al-Qasr, and Budkhulu, the urban centers closest to the site. Although it is our intention to work with as broad a cross section of the public as possible, we came to the conclusion that secondary school education should be the focus of outreach activities. As Mr. Amin has ties to the local community, he will act as a liaison to educational institutions in the Oasis. Following the public lectures, we will arrange for a series of work shops for secondary school students based on field and laboratory activities. These workshops will take place both on site and at the Excavation House in Sheikh Wali.

Conclusions

Considering the size of Amheida, we expected to survey Area 1 and continue on south to Area 2 and the rest of the settlement only if time allowed. As for the magnetic survey, any work beyond the detailed mapping of Structures N3, N4, and the proposed site of the laboratories was considered test ground for the mobile magnetometer and global positioning system unit. After three weeks of fieldwork, we had conducted a detailed topographic survey—including building footprints—to the northern edge of the section of burials on the southern half of the site. We have also conducted daily magnetic surveys covering roughly 20% of the site beyond the aforementioned detailed work. Photographic documentation was conducted over three days and we developed the GIS system on a daily basis as we exported each day’s survey work from AutoCAD into ArchView SHAPE files.

In establishing a fixed geographic reference system, we now have the necessary reference framework in place for next season’s excavations. More important, we have a much clearer idea of the spatial logic of the Ahmeida settlement solely through the use of noninvasive methods: photography, remote sensing and survey. In previous seasons, we mapped structures, surface finds, and both natural and cultural features as GPS points with accompanying descriptions and photographs. This gave us an understanding of the of the site, but layering this initial settlement plan and elevation map over the previous season's work is beginning to clarify the *design* of the settlement. Roads, alleyways, and intersections; enclosures, tracts and open spaces; individual structures and larger complexes; focal points of the settlement space; subsurface images, and geophysical topographies: in other words, the material remains of the attempts to purposefully or inventively arrange parts or details; the basic scheme or pattern that seeks to affect and control spatial function and development now constitute a layered, visual record for further study. This work will continue in coming seasons and will be complemented by the social-historical meanings gained from excavation, research and interpretation.

In regard to community outreach, we outlined a working plan for opening the site and our work to the community through the local branch of the SCA and Ministry of Education. In this way the project would develop a long-term relationship with the educators most engaged with history and archaeology and in turn facilitate the development of a community-based organization. This organization would contribute to display and interpretation strategies for the site and enable us to be proactive in our decision making process. Typically, opening the excavation process to the local community is understood primarily as a way of obtaining more information on the location of sites, but this process will contribute a more broad epistemological foundation for site interpretation on a whole.