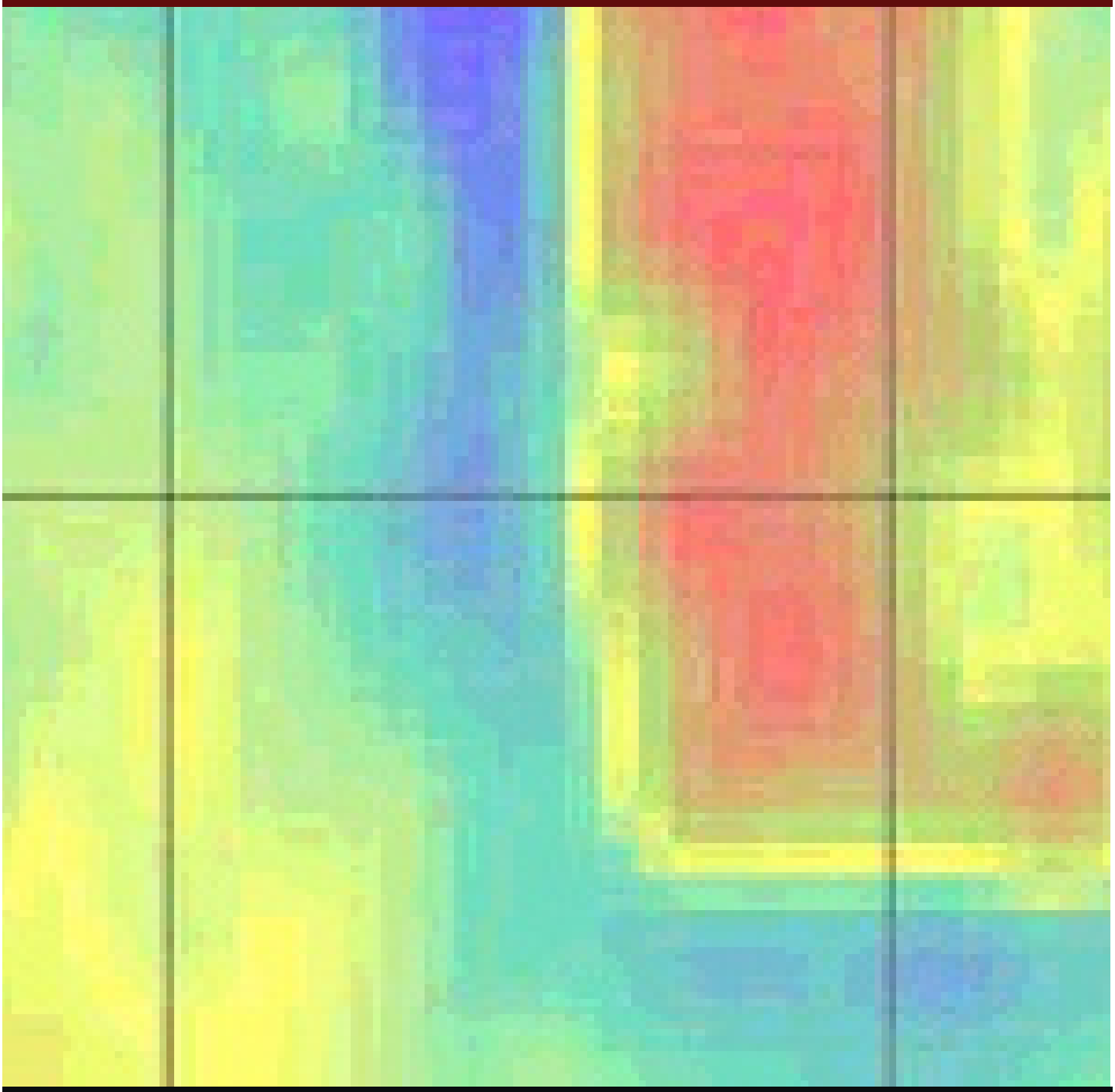
The North American Database and Website of Archaeological Geophysics (NADAG) | 2000-21

University of Arkansas



National Park Service
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US Department of the Interior
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Final Project Report

The North American Database and Website of Archaeological Geophysics (NADAG)

http://www.cast.uark.edu/nadag

Prepared by:

Kenneth L. Kvamme, Principal Investigator
Department of Anthropology and Center for Advanced Spatial Technologies
Old Main 330, University of Arkansas, Fayetteville, AR 72701
(501)575-4130; kkvamme@.uark.edu

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National Center for Preservation Technology and Training
United States Department of the Interior
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P.O. Box 37127
Washington, D.C. 20013-7127

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NCPTT's Preservation Technology and Training Grants program develops partners in non-profit organizations, universities and government agencies throughout the United States to complete critical research, training, and information management work, and lends significant support to developments in the conservation and preservation community.

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2. Table of Contents

3. Executive Summary

The *North American Database of Archaeological Geophysics* (NADAG) is a database and website under continuous development that aims to promote use, education, communication, and a knowledge base of the practice of archaeological geophysics in North America. It is maintained by the Center for Advanced Spatial Technologies at the University of Arkansas at: http://www.cast.uark.edu/nadag. Most North American archaeologists have little knowledge of geophysical methods or of their potential to archaeology, and their level of use in projects remains low. This circumstance exists despite the many benefits of these techniques and large advances in the quality of results in recent years. In European and Japanese archaeology geophysical methods are routinely employed, widely accepted, and are actually mandated in several countries where national databases and websites of results are maintained. The NADAG project will help to elevate North America's awareness of these methods.

NADAG contains a number of components pertaining to archaeological geophysics in North America and around the globe. (1) *The NADAG Home Page* lists project sponsors and gives access to the site's components through menus. (2) *The About NADAG Page* lists the site's components, sponsors, and intent. (3) *The Image Library* focuses on imagery depicting project results. (4) *The Projects Database* contains more detailed information about archeo-geophysical projects and is searchable by multiple fields of information. (5) *Education Materials* includes sections on geophysical theory, field methods, data processing, interpretation, and field verification. (6) *The Bibliography Database* references published and unpublished technical reports describing archeo-geophysical work in North America and elsewhere. (7) *The Instrumentation Database* describes geophysical instrumentation and provides links to manufacturers' websites. (8) *The Practitioners and Consultants directory* provides a listing of researchers active in archeo-geophysics, with links to their websites. (9) *The Upcoming Events* page lists relevant conferences, workshops, meetings, and field projects open to the public. (10) *The Links to Other Websites* provides a ready means for examination of other nationally sponsored websites, as well as corporate and private offerings pertaining to archaeological geophysics from around the world.

NADAG will form an important resource for the general archaeological community, students, land managers, or Native American groups interested in or contemplating the use of geophysical methods. It reveals the nature of results, provides educational materials, describes instrumentation, and offers a directory of practitioners who can do the work. The community of practicing archeo-geophysicists benefit by being able to review results from various projects, including summaries of many hard-to-obtain documents such as government reports. Education of the general public is also promoted, reducing misunderstandings of the technologies caused by inaccurate portrayals in the media and elsewhere.

NADAG operates under a premise of open data and data sharing. Submitted information is attributed to authors and institutions, and abstracted for inclusion in the database. Sensitive site location data are not released. The scope of NADAG includes all projects conducted within the territories of the United States or within the continent of North America.

4. Introduction: Project Background

The *North American Database of Archaeological Geophysics* (NADAG) is a database and website that aims to promote use, education, communication, and a knowledge base of the practice of archaeological geophysics in North America. The scope of NADAG includes all projects conducted within the territories of the United States or within the continent of North America. It is located at http://www.cast.uark.edu/nadag. The impetus behind the development of NADAG rested in a three-fold perspective that recognized significant improvements in the technologies in recent years, the great benefits to archaeology derived from the use of these methods, and a realization of a low level of awareness of geophysical methods among North American archaeologists.

Geophysical prospecting methods are growing in importance to the conduct of archaeology around the globe. One reason lies in major advances in instrumentation that have increased speed and sensitivity; another is computerization. Digitally-gathered field data may be downloaded to computers where digital image processing methods filter out noise and regional trends, enhance linear features, improve contrast, and reveal subtle details previously difficult to visualize. The consequences of these advances are profound: (1) larger areas may be geophysically surveyed in a given amount of time, and surveys of large areas facilitate interpretation of settlement layouts and structure owing to the greater possibility of associations between features and the realization of context; (2) regions may be sampled more intensively allowing greater feature resolution; (3) superior details of subsurface features and depth penetration may be achieved; (4) output may be expressed as imagery that is more readily interpretable to the specialist and non-specialist alike (a buried house foundation can look like one in processed geophysical imagery).

A principal benefit of geophysical survey methods is that they provide cost-effective means for the acquisition of archaeological information relevant to multiple domains of inquiry. For example, management and planning maps of archaeological sites can be created that document their basic subsurface structure and the layout of features. The placement of expensive excavations and testing programs can be guided to features of potentially greater interest, producing large cost savings in site explorations. Primary data for settlement pattern research and analysis can be obtained when details of a site are clearly mapped. In other words, geophysical results can provide detailed maps of complete settlement layouts, showing the distribution and arrangements of houses within a village, lanes between them, fortifications systems, privies, graves, ditches, pits, middens, and the like. Within houses, individual rooms and features within them like hearths may sometimes be discerned. Finally, non-invasive examination of culturally sensitive burial, sacred, or ceremonial sites can be achieved, a fact that is increasingly noteworthy to Native American groups. The Winebago Tribe of Wisconsin, for example, has trained a team in the use of ground penetrating radar as a means to locate graves and other features left by their ancestors.

Despite these advances and benefits the level of use of geophysics in North America remains low in comparison to Europe and Japan. In the United Kingdom, for example, geophysical surveys are mandated as a first step in the site evaluation process, and the mapped results constitute an important management and planning record in a site's official

documentation. Moreover, several national archaeo-geophysical websites and databases are in place in Europe, including English Heritage (www.eng-h.gov.uk/SDB), Austria's "Archive of Geophysical Data" (http://www.univie.ac.at/Projekte/Idea/Prosp/Surveys/), the German "Geophysical Prospection of Archaeological Sites" (http://www.region-lb.de/HomeSites/HvdOsten/), and others. In the UK the use of these methods is so commonplace that they have attracted popular attention through a weekly television show known as "The Time Team," where geophysical surveys are conducted and then followed up immediately with excavation to verify or refute findings. Given the popularity of this show (it has been aired for several seasons), it would not be wrong to speculate that the British lay public is probably more aware of geophysical methods than professional North American archaeologists.

The primary purpose of NADAG is to rectify this situation through education, by making the results of geophysical work available, and providing a gateway to practitioners, manufacturers, and the resources they offer. It is emphasized that significant increases and reliance on geophysical methods are being made in North America. The US National Park Service has sponsored a week-long workshop in remote sensing for 10 years with an average attendance of about 40 participants, resulting in significant exposure of these methods to primarily government archaeologists, but also contractors, academics, and students. The number of practitioners is increasing and there is greatly increased demand for their services.

NADAG is being developed within the "ArcheoImaging Lab," a laboratory within the Department of Anthropology managed by Kenneth L. Kvamme, the project's Principal Investigator and Associate Professor within the department. Two graduate assistants, Ryan Peterson and Richard Allan, aided in the development of the project during the 1999-2000 academic year. The website server, supporting software, and database engine are managed and supported by the Center for Advanced Spatial Technologies (CAST) at the University of Arkansas. CAST supports a large staff of technicians and programmers who have assisted in database creation and interfacing.

NADAG was initially envisioned as a three-year project. As originally conceived year 1 was to establish the initial structure of the database and website, with input into the database of local geophysical surveys in Arkansas, projects conducted nationally by the principal investigator, and particularly the entry of at least 400 bibliographic citations. Year 2 is to focus on increasing educational materials to at least 50 pages, growth of the database to include at least 300 geophysical studies, and to annotate at least 300 geophysical publications. Year 3 is to concentrate on continued growth and participation in the database, with improved educational materials for grades 6-12 and expansion into the related remote sensing domains of aerial photography and geochemistry. This report documents progress achieved during year 1.

The NADAG logo, seen on the opening splash page of the website and in the header of this page, is an electrical resistivity image of a 30 x 25 m bird effigy (mound 81) acquired at a 50 cm depth at Effigy Mounds National Monument in May, 1999, by the Principal Investigator. It reveals a number of discontinuous structures within the mound suggesting individual building episodes.

5. Methods and Materials

The Structure of NADAG

NADAG as originally proposed was to contain several components pertaining to archaeological geophysics in North America and around the globe. This concept was carried out in its implementation. NADAG now contains 11 principal sections, each devoted to a different theme, as follows.

1) *NADAG Home Page* lists project sponsors and gives access to the site's components through menus.

2) *About NADAG* lists the reasons for the website, and reviews the site's components and goals.

3) *Image Library* focuses on thumb-nail (64 x 64 pixel) imagery depicting project results; clicking on a thumb-nail reveals larger imagery, taken from images in the database.

4) *Projects Database*, run by the Oracle database engine with eight linked database tables, contains more detailed information about archeo-geophysical projects and is searchable by type of site, type of survey, state, and other fields of information.

5) *Bibliographic Materials* references published and unpublished technical reports describing archeo-geophysical work in North America and elsewhere.

6) *Education Materials* includes sections on geophysical theory, field methods, data processing, interpretation, tuning of instruments, field verification, and other items.

7) *Instrumentation and Manufacturers* describes geophysical instrumentation and provides links to manufacturers' websites.

8) *Practitioners and Consultants* directory provides a listing of researchers active in archeo-geophysics, with links to their websites.

9) *Upcoming Events* lists relevant conferences, workshops, meetings, and field projects open to the public.

10) *Links to Geophysical and Related Websites* provides a ready means for examination of other nationally sponsored websites, as well as corporate and private offerings pertaining to archaeological geophysics from around the world.

11) *Contacts and Submissions* allows the viewer to directly contact NADAG personnel.

The *Upcoming Events* page was added when it was realized how useful this information could be to practitioners and those interested in geophysical methods. While a distinct "image database" was originally proposed, the image data have been incorporated within the general

projects database. Access to the imagery can be achieved through the *Image Library* of thumbnail graphics or through the *Projects Database*, eliminating the need for a distinct portal.

Hardware

NADAG was developed utilizing a variety of hardware devices. The primary work is conducted on two Windows NT 4 workstations running on Dell Pentium 3 computers with significant RAM and disk space. Peripheral devices include an optical scanner (with up to 1200 dpi resolution), a 36 x 48" coordinate digitizer, a variety of color and black-and-white output devices, and a digital camera. The scanner, digitizer, and digital camera are employed to acquire graphics from submitted reports or from field contexts. The various printers have been used to develop brochures, fliers, and notices for mailings. NADAG is managed by CAST, at the University of Arkansas, on a SUN Ultra Enterprise 5000 with four UltraSparc CPUs, one GB RAM, and 600 GB disk space, running Solaris 2.6. The web server is the Netscape Enterprise System. With DS3 (145 M/sec) connectivity to internet and internet2, these systems can support many hundreds of concurrent users.

Software

NADAG was constructed utilizing a variety of software systems and components within the Windows NT 4.0 environment. Individual HTML files have been composed utilizing diverse programs ranging from simple ASCII editors like Notepad, to MS Word conversions, and Netscape Composer. Midway through the project the decision was made to move to Macromedia's Dreamweaver 3 environment (Macromedia, Inc., 1999a) for all composition and management of the website. A mirror image of the website is located on one of these NT4 platforms; FTP is used to place new and updated materials onto the Unix-powered website.

A number of graphics formats are recognized within NADAG, including continuous tone color, continuous tone gray scale, contour line, dot density plots, pseudo-three-dimensional views, and various combinations between them. Graphics files are generated in a number of ways. Graphical materials obtained through reports are typically scanned at resolutions varying from 75 – 150 dpi, most often in gray scale for black and white copies or in 24-bit color for rare color plates. Some graphics data have been obtained digitally in graphics file formats (TIF, BMP, JPG, GIF), as well as in more specialized software formats commonly employed in geophysical work, such as GSSI's RADAN (Geophysical Survey Systems, Inc., 1998), Geoscan's GEOPLOT (Geoscan Research, 2000), or Golden Software's SURFER formats (Golden Software, Inc., 1997). Regardless of how data are obtained, graphics files are imported to Adobe Photoshop (Adobe Systems, Inc., 1999) or Macromedia Fireworks (Macromedia, Inc., 1999b) where enhancements to quality are made, color tints are added (for gray scale formats), size adjustments are undertaken, and file compression is applied to reduce file size for more rapid downloads over the internet. In all cases continuously-varying imagery are converted to the JPG standard while line-drawn and choropleth-style materials are coded using the GIF standard, for minimum file sizes. All graphics icons depicting imagery (e.g., in the *Image Library*) are produced as 64 x 64 pixel squares, while other graphics typically are generated at sizes smaller than 500 x 500 pixels, with a target file size of less than 35 KB whenever possible. For larger imagery containing more detail an upper maximum of about 65 KB is targeted. The sizes of files are a principal concern owing to download times required using telephone line and modem technology.

The NADAG database engine is Oracle 8, with web applications suite. Oracle 8 has allowed an efficient database structure to be created, described below.

Database Organization

The logical data structure of the NADAG databases is given in Figure 1. A relational database format is employed where individual tables containing a common set of information, are linked or related by unique identifying keys. The main table in the database structure is the *Site Table*, since this is the single locus at which all geophysical survey work occurs. There can be many archaeological cultures, geophysical surveys, and bibliographic citations pertaining to a site, but only one site. The site table includes basic location data and characteristics about the site, like soils and landform (note that UTM location data will only be stored to the nearest 10 km; longitude and latitude to the nearest 7.5 minutes, when available). The *Culture Table* holds a many-to-one relationship with the *Site Table*, because multiple cultures can be represented at a site, and their details like names and dates are held here. The *Archaeological References Table* also is many-to-one, and holds citations relevant to the archaeology of a particular site.

The *Survey Table* is the principal table relevant to geophysical surveys. Each survey visit that produced results (e.g., a report) requires an entry. Thus, two visits to the same site requires two entries, so this table is potentially many-to-one with the *Site Table*. While this table holds basic data about who did a survey, when it was done, for whom, and what survey conditions were like, the *Survey Technique Table* gives specific information about geophysical techniques employed (like instrument type and machine settings), with one entry for each technique (e.g., one each for magnetometry, ground penetrating radar). In other words, the *Survey Technique Table* holds a many-to-one relationship with the *Survey Table* if more than a single geophysical method was utilized during a survey visit. The *Bibliography Table* holds citation data for project reports, whether a CRM technical report or a publication. This table can conceivably be many-to-one with the *Survey Table* if a technical report is prepared for a particular survey, which later results in a publication, for example. It can also hold a one-to-many relationship when a single report describes the results of several surveys at several sites. The *Address Table* holds address information pertaining to the authors of surveys. Finally, with NADAG's focus on the graphical results of geophysical surveys, the *Image Table* contains special information about image results associated with survey techniques, like the display format (color/gray, line, orthographic, or continuous-tone imagery) and software used to generate the imagery, as well as the images themselves. Obviously, this table can hold a many-to-one relationship with each *Survey Technique* entry.

The NADAG database engine is Oracle 8, now running in a Windows NT environment (Curtis and King, 1998). Data entry screens have been established to facilitate the input of information, and data dictionaries for many of the fields are now under development. Unfortunately, the *Web Applications Suite*, an Oracle product that promises an efficient means to interface internet output with database information, is nearly a year behind in its development schedule. This circumstance is affecting many website database applications nationally. In view of this problem, which has affected NADAG's development, two solutions have been pursued. First, as a short-term solution, individual database entries have been placed within HTML files that are then linked with pre-defined search capabilities. Users will be able to search by location

(state / province), by survey technique (e.g., magnetometry, radar), and utilize the image library. The second solution, which may ultimately replace the need for Oracle's Web Applications Suite, is movement to Macromedia's Dreamweaver UltrDev software (Macromedia, Inc., 2000), a system that allows linking of databases to web site displays. This software is being examined at this time.

Largely through mailed requests and informational brochures (see below), we have obtained access to cultural resources management (CRM) geophysical projects from state agencies in Arkansas, Florida, and Connecticut, access to reports performed under Army Corps of Engineers jurisdiction, access to nearly 30 projects conducted by Kenneth L. Kvamme (project principal investigator), and access to a collection of approximately 61 additional CRM reports by various individuals at this time. We also have a large host of published journal articles. These data have been or are being entered into the NADAG databases.

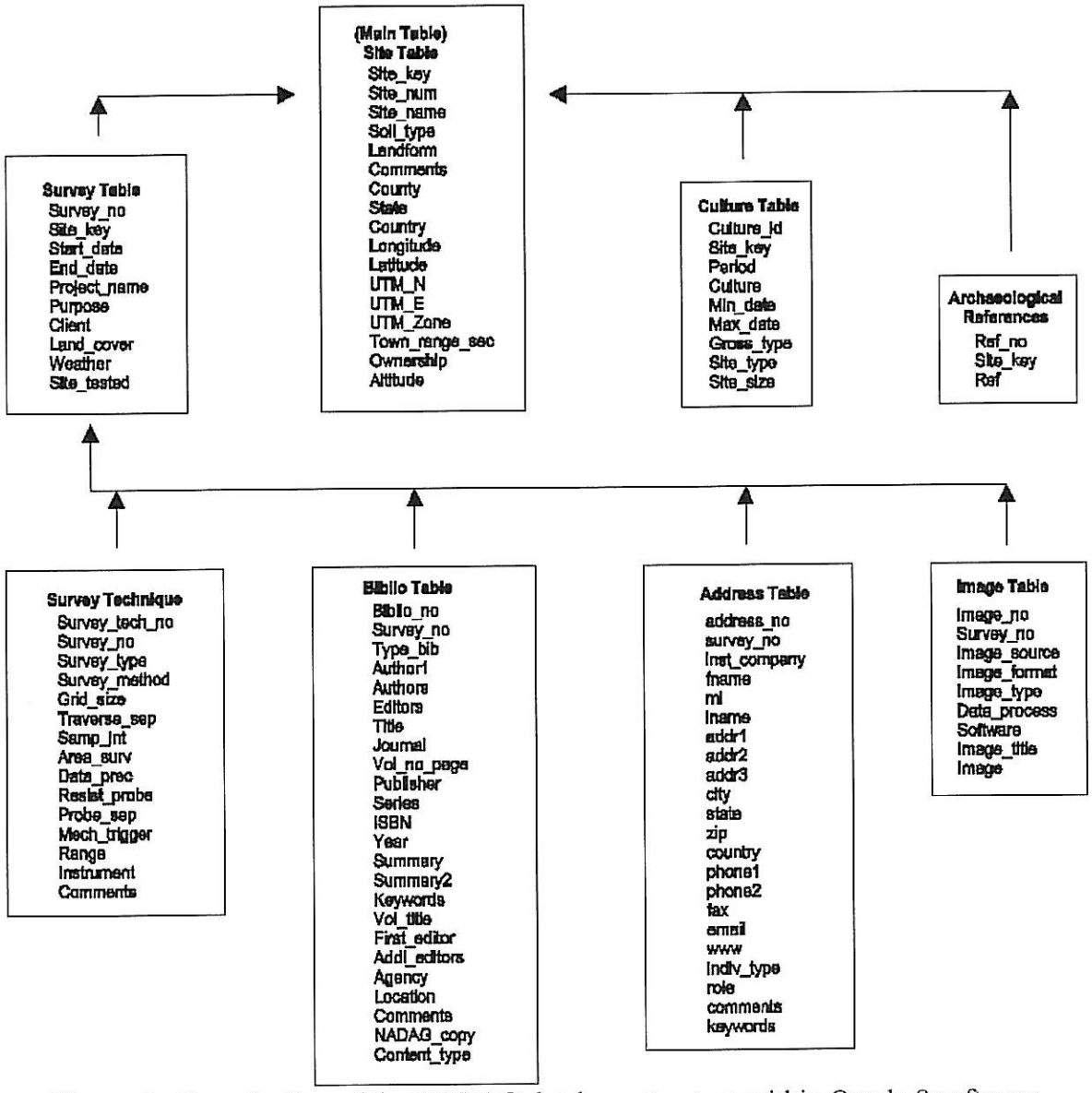
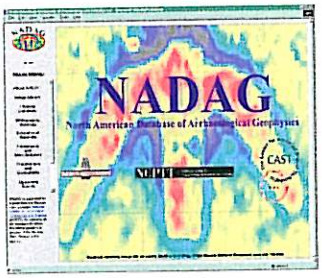


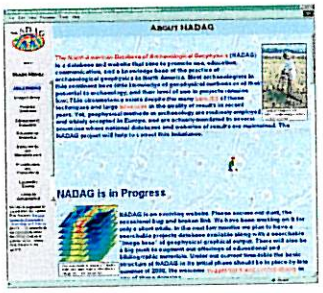
Figure 1. Organization of the NADAG database structure within Oracle 8 software.

6. Results and Discussion

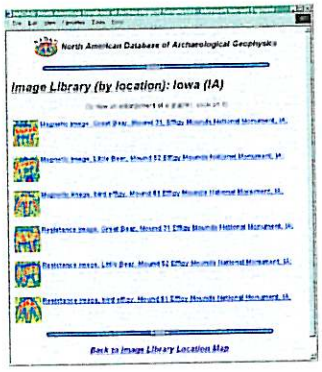


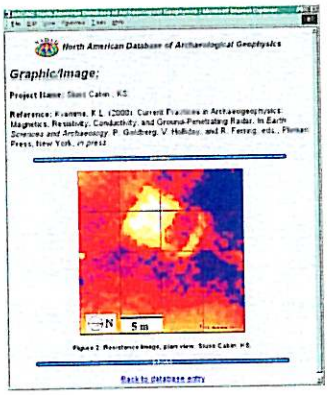
Status of NADAG: Contents

1) *NADAG Home Page* lists the project sponsors and offers a gateway to the site's components through a series of menus.

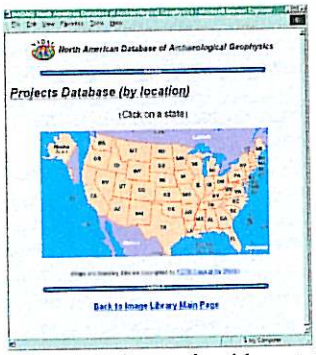


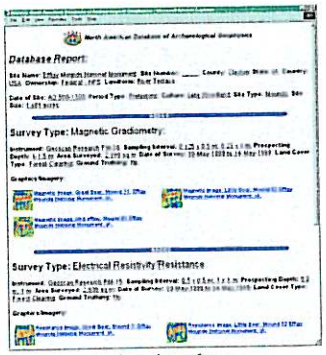
2) *About NADAG* lists the reasons for the website, and the site's components and sponsors. It contains two primary links to separate pages describing the benefits of using geophysical sensing in archaeology and recent advances in geophysical prospecting technology, along with more generalized links to other components of the site, CAST, other CAST databases, and contacts to the NADAG developers.





3) *Image Library* focuses on thumb-nail (64 x 64 pixel) imagery depicting project results; clicking on a thumb-nail reveals larger imagery. At the close of year 1 we are striving to enter as much data as possible, by scanning or converting digital graphics. Approximately 25 sites are included representing geophysical projects in 9 states.

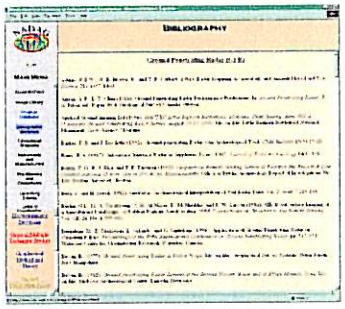




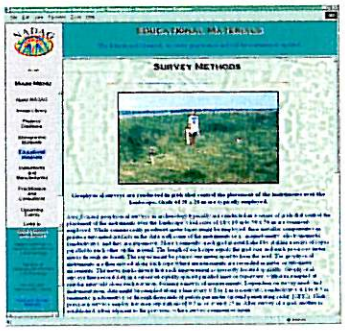
4) *Projects Database*, run by the Oracle database engine with eight linked database tables, contains more detailed information about archeo-geophysical projects and is searchable by type of site, type of survey, state, and other fields of information. The projects database is currently searchable by state and by type of survey (e.g., magnetics, resistivity) with all fields currently coded displayed. Approximately 41 entries now exist in the database.

5) *Bibliographic Materials*. The web presentation is divided into sections with a total of 1325 entries, subdivided as follows:

- "By state" (presently only United States data exist in the database), with a total of 231 total entries and each state is presented as a separate page with 39 states represented: AL (1), AR (4), AZ (2), CA (4), CO (9), DE (1), FL (11), GA (3), IA (11), ID (2), IL (14), IN (5), KS (10), KY (2), MA (1), MD (2), ME (4), MI (15), MN (11), MT (7), MS (2), NC (6), ND (14), NE (8), NJ (1), NY (2), OH (10), OK (4), OR (1), PA (3), SC (3), SD (3), TX (20), UT (2), VA (6), VE (1), WA (2), WI (2), WY (22);
- "Data Interpretation / Image Processing" (8 entries);
- "Electromagnetic Surveying" (46 entries);
- "General/Multiple Technique Studies" (266 entries);
- "Geophysical Method and Theory" (60 entries);
- "Ground Penetrating Radar" (117 entries);
- "Magnetic Surveys" (307 entries);
- "Metal Detection" (64 entries);
- "Other Methods" (57 entries);
- "Electrical Resistivity" (114 entries);
- "Underwater Prospection" (55 entries).



6) *Education Materials* includes sections on geophysical theory, field methods, data processing, interpretation, tuning of instruments, field verification, and other items. It is still a weak offering. It is currently subdivided into 7 pages describing "Recent Advances in Geophysical Methods in Archaeology," "Benefits of Geophysical Surveys in Archaeology," "Geophysical Method and Theory," " Field and Survey Methods," "Data processing," "Educational Tools" (with links to two sites), and "Educational Links" with a total of 28 links to educational sites.



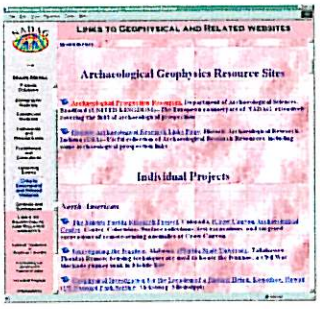
7) *Instrumentation and Manufacturers* describes geophysical instrumentation and provides links to manufacturers' websites. It is offered in four sections:
   - "Alphabetical List of Maufacturers" (29 links);
   - "Categorical List of Maufacturers" (49 total links), as follows
     - "Conductivity" (5 links);
     - "GPR" (9 links);
     - "Magnetic" (13 links or items);
     - "Metal Detectors" (5 links);
     - "Resistivity" (7 links);
     - "Software" (10 links).
   - "List of Geophysical Instruments" (91 total links), as follows
     - "Conductivity" (6 links);
     - "GPR" (10 links);
     - "Magnetic" (22 links);
     - "Metal Detectors" (18 links);
     - "Resistivity" (25 links);
     - "Seismographic" (10 links or items).
   - "Geophysical Instrument Rental" (17 total links), as follows

- "Conductivity" (3 links);
- "Magnetometers" (4 links);
- "Metal Detectors" (2 links);
- "Resistivity" (3 links);
- "Other" (5 links).

8) *Practitioners and Consultants* directory provides a listing of researchers active in archeo- geophysics, with complete addresses and links to their websites. We are also attempting to include keyword data about the methods and techniques that each practitioner specializes in. It is organized in two sections:
   - "Company Names" (12 links or items):
   - "Individual Practitioner and Consultant Names" (12 links or items).

9) *Upcoming Events*. The list of events focuses primarily on the present (2000-2001), but begins in 1994 with a number of past significant events indicated. The nature of these events includes specialized geophysical conferences, regional conferences that include geophysical presentations, remote sensing training workshops, and scheduled events that utilize these methods. The following shows the number of event links or listed items per year: 1994 (1 link); 1995 (1 link) ; 1996 (1 link); 1997 (2 links); 1998 (2 links); 1999 (3 links); 2000 (13 links); 2001 (5 links).

10) *Links to Geophysical and Related Websites.* These pages contain a total of 176 links grouped into several sections:
   - "National Databases or Regional Libraries of Archaeological Geophysical Results" (7 links);
   - "Archaeological Geophysics Resource Sites" (2 links);
   - "Individual Projects" (46 total links), with sub-groups:
     - "North America" (19 links);
     - "Europe" (25 links);
     - "Other" (2 links);
   - "Organizations" (8 links);
   - "Journals" (17 links);
   - "Universities Offering Archaeological Geophysics Training" (5 links);
   - "Universities Offering Degrees in Archaeological Geophysics" (4 links);
   - "Universities Offering Degrees in the General Field of Geophysics (mostly geology)" (87 links).



12) *Contacts and Submissions* allows the viewer to directly contact NADAG personnel through e-mail or other addresses.

Relevant Statistics

- Number of external hits since April 1, 2000: 1100.
- Total "pages" on site: 69.
- At least 442 external links.
- Bibliographic citations: 1325.
- Database entries: 41 (approx.).
- Image library entries: 25 (approx).

Other Activities

- *Press.*
  1. "North American Database and Website of Archeological Geophysics." *NCPTT Notes, Fall Supplement*, No. 34, 1999, p. 3.

  2. "UA archeologist creates remote sensing library." *Northwest Arkansas Times*, November 9, 1999, p. C6 (Hogge, 1999).

  3. "UA leads country with archeology database." *The Arkansas Traveler*, December 1, 1999, p. 1,3 (Denger, 1999).

  4. "North American Database of Archaeological Geophysics (NADAG)." *Society for American Archaeology Bulletin* (*SAA Bulletin*), March, 2000, p. 30.

- *Conference Presentation (Poster).*
  "NADAG – North American Database of Archaeological Geophysics."
  American Quaternary Association meeting, Fayetteville, Arkansas, May 22-24, 2000 (Kenneth L. Kvamme, et al., 2000).

- *Demonstration.*
  "North American Database of Archaeological Geophysics." Presented in the exhibit: "The Future of Public Archeology: On-Line Demos at the National Park Service Exhibit." Society for American Archaeology meeting, Philadelphia, April 7-8, 2000.

- *NADAG Brochures.*
  In order to promote the project and encourage participation a descriptive brochure was developed (Appendix). After it was approved by NCPTT it was mailed with a letter to all State Archaeologists requesting materials relevant to archaeological geophysics in their respective states. A subsequent mailing was also sent to individuals, companies, and agencies currently practicing archaeological geophysics. Requests for archeo-geophysical project data, including image data, have been distributed to appropriate individuals, government agencies, and companies. In total 83 individuals and companies, 50 state government agencies, and recently 120 university departments of anthropology have been contacted. These mailings resulted in the receipt of a variety of reports and

materials for inclusion in the NADAG databases. A short-form of the brochure, one-third of a page in size on card stock, was also developed for distribution at professional meetings. Brochures were distributed at:

1. Alaskan Anthropological Conference, in Anchorage, from March 23-25,
2. Society for American Archaeology meeting, in Philadelphia, from April 5-9,
3. Ground Penetrating Radar Workshop, in Denver, from April 28-30,
4. National Park Service-sponsored Workshop "Recent Advances in Archeological Prospection Techniques," in Tucson from April 24-28,
5. American Quaternary Association meetings (AMQUA), held in Fayetteville, Arkansas, May 22-24, 2000.

7. Conclusions

The North American Database of Archaeological Geophysics (NADAG) attempts to provide a resource to the archaeological community, practicing archeo-geophysicists, and the public by making available, through the internet, databases of results and bibliographic citations, educational materials, and pointers to instrument manufacturers and those capable of doing such work. In its first year the basic structure of NADAG has been established, with working databases, a bibliography far in excess of that planned, some basic educational items, and links to numerous other sites of importance to the topic. Steps have been taken to advertise the site, with brochures and conference promotions, and presentations have been given at conferences. Much yet needs to be done, particularly in the entry of further items to the database, bibliographic annotations, further development of educational materials, and its promotion. The NADAG team looks forward to year 2 of the project.

8. Acknowledgements

I wish to thank Mary Carroll of NCPTT for her cooperation, support, and quick response throughout year 1 of this project. I am especially indebted to Ryan Peterson and Rich Allan, graduate students in the Department of Anthropology, for their contributions in developing the NADAG website. I am grateful to the Center for Advanced Spatial Technologies for their continued support and cooperation, and especially to Robert Harris, for putting together the Oracle databases. Charles Kvamme developed a number of the animations in the pages of NADAG. Finally, I wish to thank all those archeo-geophysicists who have thus far contributed to NADAG. Without them this web site would not be possible.

9. References

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Macromedia, Inc.
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Appendix:

North American Database

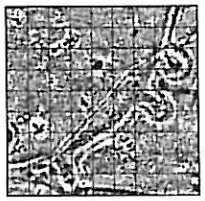
of Archaeological Geophysics (NADAG) Brochures

NADAG

North American Database of Archaeological Geophysics

www.cast.uark.edu/nadag

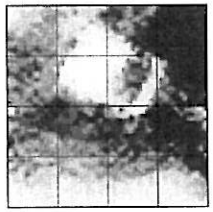
The *North American Database of Archaeological Geophysics* (NADAG) is a database and website that aims to promote use, education, communication, and a knowledge base of the practice of archaeological geophysics in North America. Most archaeologists in this continent have little knowledge of geophysical methods or their potential to archaeology, and their level of use in projects remains low. This circumstance exists despite the many benefits of these techniques and large advances in the quality of results in recent years. Yet, geophysical methods in archaeology are routinely employed and widely accepted in Europe, and are actually mandated in several countries where national databases and websites of results are maintained. The NADAG project will help to correct this imbalance.



Advances in Geophysical Methods in Archaeology

Geophysical prospection methods are growing in importance to the conduct of archaeology around the globe. One reason lies in major advances in instrumentation that have increased speed and sensitivity; another is computerization. Digitally-gathered field data may be downloaded to computers where digital image processing methods filter out noise and regional trends, enhance linear features, improve contrast, and reveal subtle details previously difficult to visualize. The consequences of these advances are:

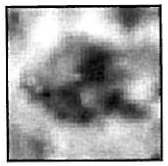
- larger areas may be geophysically surveyed in a given amount of time (surveys of large areas facilitate interpretation of settlement layouts and structure owing to the greater possibility of associations between features and the realization of context);
- regions may be sampled more intensively allowing greater feature resolution;
- superior details of subsurface features and depth penetration may be achieved;
- output may be expressed as imagery that is more readily interpretable to the specialist and non-specialist alike (a buried house foundation can look like one in processed geophysical imagery).



Benefits of Geophysical Methods in Archaeology

Geophysical survey methods provide cost-effective means for the acquisition of archaeological information relevant to a number of domains:

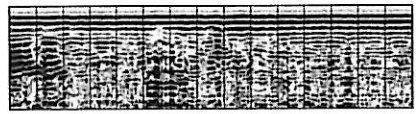
- management and planning maps of archaeological sites can be created that document their basic subsurface structure and the layout of features;
- the placement of expensive excavations and testing programs can be guided to features of potentially greater interest, producing large cost savings in site explorations;
- primary data for settlement pattern research and analysis can be obtained when details of a site are clearly mapped;
- non-invasive examination of culturally sensitive burial, sacred, or ceremonial sites can be achieved.



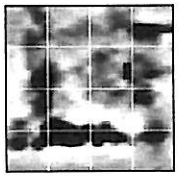
The Components of NADAG

NADAG contains a number of components pertaining to archaeological geophysics in North America and around the globe:

1) *The Home Page* lists the site's components and sponsors;
2) *The Image Library*, the center-piece of the website, focuses on imagery depicting project results;
3) *The Projects Database* contains more detailed information about archaeo-geophysical projects and is searchable by type of site, type of survey, state, and other fields of information;
4) *Education Materials* includes sections on geophysical theory, field methods, data processing, interpretation, and field verification;
5) *The Bibliography Database* references published and unpublished technical reports describing archaeo-geophysical work in North America and elsewhere;
6) *The Instrumentation Database* describes geophysical instrumentation and provides links to manufacturer's websites;
7) *The Practitioners and Consultants* directory provides a listing of researchers active in archaeo-geophysics, with links to their websites;
8) *The Upcoming Events* page lists relevant conferences, workshops, meetings, and field projects open to the public;



9) *The Links to Other Websites* provides a ready means for examination of other nationally sponsored websites, as well as corporate and private offerings pertaining to archaeological geophysics from around the world.

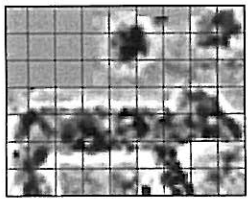


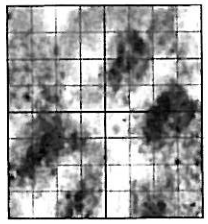
Who Will Use NADAG?

- NADAG will form an important resource for the general archaeological community, students, land managers, or Native American groups interested in or contemplating the use of geophysical methods. It will reveal the nature and quality of results, possibly from a specific region or site-type of interest, provide educational materials, describe instrumentation, and offer a directory of practitioners who can perform the work.

- The community of practicing archaeo-geophysicists will benefit by being able to review results from various types of archaeological sites, areas, under different conditions, and from many instruments. NADAG will make available summaries of many hard-to-obtain documents, such as government reports, providing access to an important and little-used resource. By sharing their results with NADAG, practitioners and consultants will be able to promote their work.

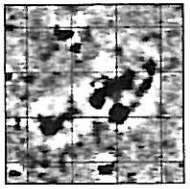
- Education of the lay public in archaeo-geophysics will be promoted, helping avoidance of misunderstandings of the technologies caused by inaccurate portrayals in the media. NADAG will be popularly viewed because it merges archaeology with technology, two great interests of the public.





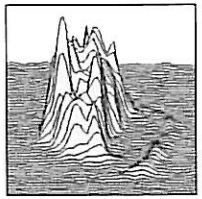
NADAG Philosophy

Several national databases and websites of archaeo-geophysical results exist in Europe where data from hundreds of projects are summarized. A North American counterpart is needed. NADAG operates under the premise of open data and data sharing. All submitted information will be properly attributed to authors and institutions, and abstracted for inclusion in the database. Sensitive site location data will not be released, with all results reported only to the county level. The scope of NADAG includes all projects conducted within the territories of the United States or within the continent of North America.



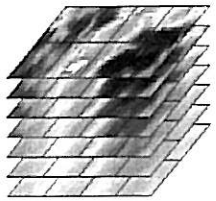
Project Support & Long-Term Management

The NADAG project is being developed under a grant from the National Park Service's National Center for Preservation Technology and Training. It is maintained by the Center for Advanced Spatial Technologies (CAST) at the University of Arkansas. CAST employs a full-time staff with expertise in database maintenance, including other websites with a national focus: *The National Archeological Data Base, The National Ethnographic Data Base, The Human Origins Data Base,* and *A National Database of GIS Data.*



Technical Details

The NADAG databases are managed by CAST at the University of Arkansas on a SUN Ultra Enterprise 5000 with four UltraSparc CPUs, one GB RAM, and 600 GB disk space, running Solaris 2.6. The web server is the Netscape Enterprise System and the database engine is Oracle 8.0 with web applications suite. With DS3 (145 M/sec) connectivity to internet and internet2, these systems can support many hundreds of concurrent users.



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Project Director: *Kenneth L. Kvamme*
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NADAG
Department of Anthropology
Old Main 330,
University of Arkansas
Fayetteville, AR 72701
e-mail: nadag@cast.uark.edu
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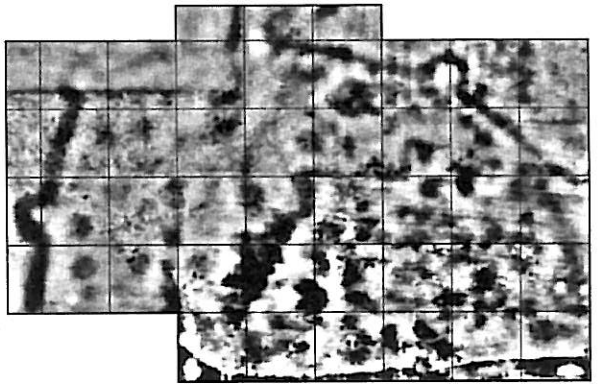

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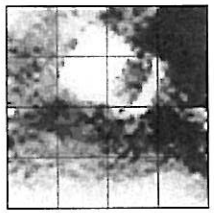

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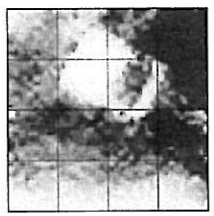

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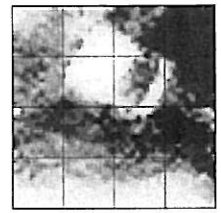

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Components of NADAG

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