

SAA 2001

SOCIETY FOR AMERICAN ARCHAEOLOGY

66th Annual Meeting
New Orleans, Louisiana
April 18-22, 2001

“Compliance or Complacency?: The Current State of Geophysics in North American CRM”

Abstract:

What is the future of geophysical techniques in North American CRM? We will discuss the most recent advances in instruments, software, training, and integration into the archaeological process and compliance issues. As opposed to the well-established incorporation of geophysical methods in European CRM work, the relative absence of geophysics in American CRM reflects the uncertain place these techniques hold in North American archaeology, and among State and National agencies. As a consequence, there is no formal status within compliance regulations for geophysical assessment of site significance. This has led to the under utilization of these powerful and proven techniques.

Organizers & Chairs:

Meg Watters

Geophysical Survey Systems, Inc.

Stephen Ball, Assistant Director

Glenn A. Black Laboratory of Archaeology
Indiana University

Organizers Biographies

Meg Watters

Geophysical Survey Systems, Inc.

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Meg Watters specializes in developing and applying geophysical survey methods to archaeology. She has experience with magnetometry, resistivity, conductivity and ground penetrating radar (GPR) surveys for archaeology. She has worked in Cultural Resource Management and instructed for the National Park Service Remote Sensing Workshop. Meg is currently the Training Manager at Geophysical Survey Systems, Inc. (GSSI), an industry-leading manufacturer of GPR and GEM 300 equipment. In addition to training, she develops 3D imaging software for GPR, adapts GPR for specific archaeological applications, and conducts fieldwork. In the past she has performed geophysical surveys on archaeological sites in Mexico, Morocco, Sudan, Spain, Italy, Greece, Turkey, China and throughout the United States.

Stephen Ball

Assistant Director

Glenn A. Black Laboratory for Archaeology

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Stephen Ball is currently the Assistant Director of the Glenn A. Black Laboratory of Archaeology at Indiana University. He has been incorporating geophysical surveys in his archaeological research since 1989. The focus of his research has been on Middle Mississippian cultures (specifically, the Angel phase) and adjacent late prehistoric cultures in the southern Midwest. He received his dissertation from Indiana University in 1999.

Section 1

The State of Things: Geophysical Equipment, Software and Applications

Meg Watters, Geophysical Survey Systems, Inc.

Email: Meg@geophysical.com



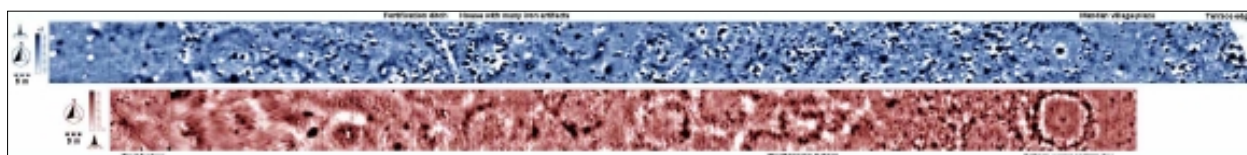
The use of geophysical techniques in archaeological applications is nothing new. Equipment and software developments over the past years have enabled archaeologists and evolving archeophysics specialists to contribute valuable information to archaeological problems. This form of non-invasive survey is quickly becoming an important step in strategic site planning. This paper will present an overview of geophysical equipment and software: a brief history, present-day developments, and a look to the future.

Geophysical Surveys as Discovery, Planning, and Research Tools in North Dakota

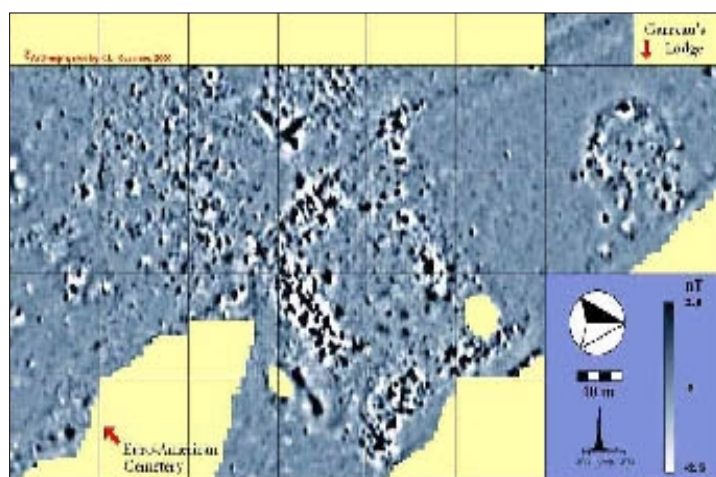
Kenneth Kvamme, University of Arkansas

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Since 1997, in association with several institutions and the State Historical Society of North Dakota, large-area geophysical surveys have been conducted within multiple prehistoric and historic state parks, including native villages, trading posts, and an historic cemetery. New imaging techniques have yielded highly interpretable graphics and planning maps for these sites that document their basic structure and the



Section 1 (Continued)

arrangement of features. These documents have been utilized for park interpretive displays and with success in guiding the placement of excavation and testing programs, allowing more efficient data recovery. Importantly, the results have provided new primary data for settlement research and analysis.

Kenneth L. Kvamme (Ph.D. 1983, UC- Santa Barbara) is Associate Professor teaching GIS science, remote sensing, and archaeology at the University of Arkansas-Fayetteville, where he is Director of the Archeolmaging Lab and serves on the faculties of the Center for Advanced Spatial Technologies (CAST), Anthropology, and Environmental Dynamics. Kvamme has experience in geomagnetic, electrical resistivity, electromagnetic conductivity, and ground penetrating radar surveys, with successful large-scale projects throughout the United States and in Europe. He currently directs the U.S. National Park Service sponsored web site: “North American Database of Archaeological Geophysics” (NADAG, <http://www.cast.uark.edu/nadag>). Kvamme is the Editor for North America of the *Archaeological Computing Newsletter*, Associate Editor for *Archaeological Prospection*, and is on the Advisory Boards of *Journal of Archaeological Method and Theory* and *Journal of Quantitative Anthropology*. He regularly offers training workshops in GIS and remote sensing.

Bringing Archaeogeophysics into Mainstream CRM

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The Arkansas Archeological Survey is using geophysical equipment as a routine part of archaeological research at protected sites, such as Toltec and Menard-Hodges, and at threatened sites. Federal and state statutes do not require the use of this equipment. Geophysical equipment is not mentioned in the SOIs Standards for the Treatment of Historic Properties, nor in ACHPs Treatment of Archaeological Properties, nor in the archaeological standards adopted by the Arkansas SHPO. Because remote sensing is a cost-effective and non-destructive technique it should be a routine part of CRM, and should be mentioned in the federal and state archeological guidance.

Section 1 Discussion

Moderator:

Tom Green
Arkansas Archeological Survey
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Thomas J. Green is the Director of the Arkansas Archeological Survey. The Survey is a statewide research, public service and education institution with ten research stations in Arkansas. Prior to assuming this position in 1992, Green was the Idaho State Archaeologist and Deputy State Historic Preservation Office in Idaho. Green received his Ph.D. in anthropology from Indiana University in 1977.

Section 2

Site Selection and Survey Management Considerations

Lewis E. Somers
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Not all archaeological sites are suitable for geophysical survey. Site selection / rejection is best addressed from both a technical and business management point of view. Technical issues revolve about the contrast between the archaeological deposit and the surrounding soil matrix. Business management issues are concerned with survey specification and cost control. This paper discusses the technical requirements for a successful geophysical survey in terms the electromagnetic properties of deposits. It also presents example survey specifications and survey management procedures that have been found useful for cost control.

The Geophysical Consultant and the Archaeologist: How to Ensure Successful Integration of Geophysical Techniques into Archaeological Investigations

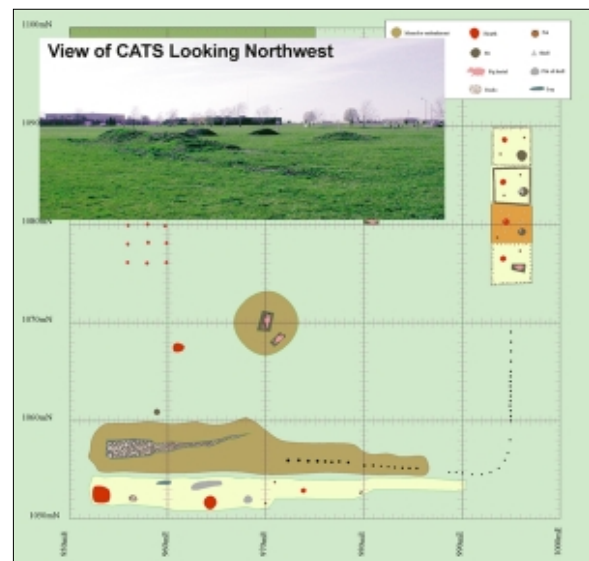
David Maki and Geoffrey Jones
Archaeophysics LLC
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Communication and cooperation between the archaeologist and the consulting geophysicist is necessary for successful integration of geophysical methods into archaeological investigations. This paper discusses some of the lessons learned during numerous projects from the interaction between consulting archaeological geophysicists and archaeologists. An emphasis will be placed on client education, realistic goal setting, the integration of geophysical methods in all phases of traditional archaeological investigation, pre-survey and post-survey testing, and reporting of final results.

The Role of Controlled Test Sites in Training, Research, and Certification

Dr. Michael L. Hargrave
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The successful integration of geophysics into CRM will require: 1) a larger pool of technicians who can competently collect, process, and interpret geophysical data; and 2) a better understanding by the professional community of the reliability of geophysics. Controlled test facilities provide simulated archaeological features or other buried



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“targets” whose physical characteristics are well documented. Test sites permit controlled comparisons of alternative instruments, software, and data collection methods, and could play a role in the certification of geophysical technicians. This paper describes existing test sites and offers guidance for those who desire to construct or use such facilities.

Michael L. Hargrave (PhD, Southern Illinois University at Carbondale, 1991) is a principal investigator at CERL, one of the four research facilities that comprise the U.S. Army Corps Engineer Research and Development Center. At CERL, he works with diverse researchers to identify and apply technologies that can help Department of Defense installations manage their cultural resources in a more effective manner. One of his primary interests is the use of geophysical techniques to improve the reliability and cost-effectiveness, and to reduce the invasive nature of archaeological investigations. Dr. Hargrave has worked with professional geophysicists such as Lewis Somers (Geoscan Research USA), David Maki (Archaeo-Physics), and Don Johnson (IMAC) to conduct geophysical surveys at Fort Riley (Kansas), Fort Bragg (North Carolina), Fort Campbell (Kentucky, Tennessee), and Fort Leonard Wood (Missouri). In his own research, Dr. Hargrave conducts gradiometer and resistivity surveys at late prehistoric sites in Illinois. Dr. Hargrave is a point of contact for information about CATS, the controlled archaeological test site located at CERL, Champaign, Illinois.

Section 2 Discussion

Moderator:

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Section 3

Getting the Ball Rolling: Putting Geophysical Techniques to Work in a CRM Firm

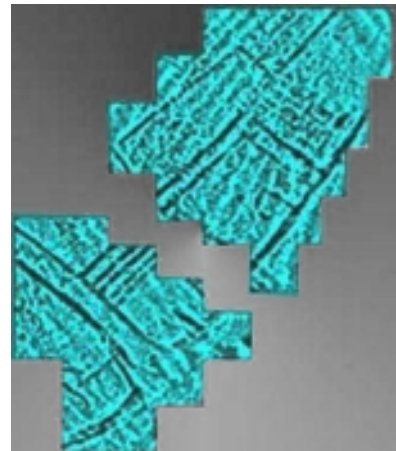
Berle Clay
Cultural Resource Analysts, Inc.
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The process by which a medium-size CRM firm develops geophysical competence involves a course of operator education, co-worker education and client/agency education. Critical is focusing simply on how we do archaeology in the field and how we develop research designs to do that work. Archaeologists tend to be conservative, but changes will come, under pressure from the rising costs of doing fieldwork, from the increasing complexity of the tasks we are asked to perform, and from non-archaeologists. Geophysical survey techniques are poised to go places, but archaeological traditions perhaps need a kick in the tail to get the ball rolling.

Why are Geophysical Methods used so Frequently in European Archaeology?

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The author will chart the seemingly irresistible rise of geophysical prospection CRM type work in Europe. Some of the reasons for the high level use are inherent within the legislative system, others are more fundamental. It will be argued that confidence in methodologies and strategies is the key to the successful integration of geophysical prospecting techniques and this can only be achieved via education. Experience from Britain suggests that education must reach not only those who have aspirations to become archaeological geophysicists but also those who may specify or commission a survey.



Chris Gaffney has been working in archaeological geophysics for nearly 20 years and carried out doctoral research in earth resistance at the University of Bradford. During the late 1980s he set up GSB Prospection with John Gater and the company has completed 1600 projects in many countries across Europe and beyond. The company is probably the largest specialising in archaeological geophysics and has an active research agenda. Dr Gaffney is an Honorary Visiting Lecturer in the Department of Archaeology, University of Bradford. He has helped set up, and actively promotes, the journal *Archaeological Prospection*, for which he is also an Associate Editor.

Section 3 (Continued)

Are We There Yet?: Geophysics in the National Park Service

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As the lead cultural resource agency in the Federal Government, the National Park Service has been instrumental in the development and application of geophysical techniques to archaeological investigations. NPS archaeologists and their partners have applied these techniques to monumental architectural sites, prehistoric villages and smaller prehistoric sites as well as numerous historic sites across the Nation. The agency has also provided the cultural resource community with a hands-on workshop over the past ten years. However, the lack of a national program dedicated to the incorporation of these techniques continues to hamper their acceptance into current archaeological methodology and university training.

SECTION 3 Discussion

Moderator:

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Comments by:

Francis P. McManamon PhD
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Francis P. McManamon is the Chief Archeologist of the National Park Service and serves as Departmental Consulting Archeologist, carrying out responsibilities to the Secretary of the Interior. He oversees the Archeology and Ethnography Program of the Service's National Center for Cultural Resource Stewardship and Partnerships in Washington, DC. The programs and projects for which he is responsible include: the development of policy, regulations, and guidance for National Park system archeology and ethnography; general archeological information exchange, development and maintenance of the National Archeological Database; a variety of interagency cooperative activities; and, national policy, regulation, and guideline development. A prominent component of this program is the suite of activities undertaken to improve the protection of archeological resources, including archeological collections and records. Dr. McManamon and his staff also work closely with other federal agencies on archeological issues and topics. He served as a member of the United States delegation for the final meeting of governmental experts and for the diplomatic conference at which the UNIDROIT convention was considered and endorsed.