Archaeological Remote Sensing in North America

INNOVATIVE TECHNIQUES FOR ANTHROPOLOGICAL APPLICATIONS

Edited by Duncan P. McKinnon and Bryan S. Haley
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The latest on the rapidly growing use of innovative archaeological remote sensing for anthropological applications in North America

Upgrading the highly praised 2006 publication Remote Sensing in Archaeology, edited by Jay K. Johnson, Archaeological Remote Sensing in North America: Innovative Techniques for Anthropological Applications is a must-have volume for today's archaeologist. Targeted to practitioners of archaeological remote sensing as well as students, this suite of current and exemplary applications adheres to high standards for methodology, processing, presentation, and interpretation.

The use of remote sensing technologies to address academic and applied archaeological and anthropological research problems is growing at a tremendous rate in North America. Fueling this growth are new research paradigms using innovative instrumentation technologies and broader-area data collection methods. Increasingly, investigators pursuing these new approaches are integrating remote sensing data collection with theory-based interpretations to address anthropological questions within larger research programs.

"An important collection that illustrates the diversity of techniques used to collect geophysical data and their use in archaeological interpretation. The inclusion of chapters that cover several regions and historic as well as prehistoric sites adds further value."

—Gene Clay, principal investigator and geophysical specialist at Cultural Resource Analysis, Inc.

"Includes current, well-written, and interesting material that provides a significant contribution to the field. The use of remote sensing technology with traditional methods is current with the state of research. The chapters are well grounded in archaeological and anthropological theory. The methods outlined in the book also start to set a standard or baseline that can be implemented by others."

—Roy Since, associate professor, Department of Geography, University of North Carolina at Greensboro

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Archaeological Remote Sensing in North America: Innovative Techniques for Anthropological Applications


Reviewed by Robert G. McCullough, Illinois State Archaeological Survey, Prairie Research Institute, University of Champaign at Urbana–Champaign

In a first look at this volume, my impression was: “how can this collection of studies profess to be a comprehensive geophysical text for North America without the usual cast of characters?” I was referring to various authors in the publication Remote Sensing in Archaeology: An Explicitly North American Perspective, edited by Johnson in 2006. That volume pulled together a diverse set of geophysical work from often hard-to-find manuscripts and became a handbook for the methodology of conducting geophysical surveys and data processing, as well as a reference that explained how these instruments work.

In contrast, Archaeological Remote Sensing in North America: Innovative Techniques for Anthropological Applications is focused on how remote sensing can address important anthropological questions. This volume is intended to be essentially a sequel to the methods volume. Although Johnson writes an interesting reflexive “Forward,” and Kvamme presents a commentary for the last chapter, a newer generation of geophysical specialists dominates this volume.

The goal of Archaeological Remote Sensing in North America is to move beyond creating maps of subsurface anomalies to guide future excavations. The focus of this volume is to integrate geophysical results with theory-driven anthropology. The increasing availability of geophysical equipment has encouraged a wider range of research questions that, as many of the studies here demonstrate, can only be addressed through geophysical survey. These chapters integrate cultural contexts and other types of archaeological data with feature distribution maps, allowing for broader interpretations than are possible with geophysics alone.

Archaeological Remote Sensing in North America is organized by four anthropological themes, unlike the 2006 volume that was organized by geophysical methods. This organization makes sense, not only because of the theory-driven theme of this volume, but also because multiple instruments were often necessary to address specific questions related to subsurface contexts. As in any edited collection, not all the chapters are equally successful in forwarding the volume’s goals, but I agree with Kvamme’s commentary chapter (Chapter 14, pp. 217–218) that studies that utilize magnetic susceptibility data (Chapter 1, but especially Chapters 9 and 10) represent “another of this volume’s highlights and represent a major sea change in contemporary practice.”

In the first section, focused on “Site Structure and Community Organization,” three of the four chapters presented the results of wide-area magnetometer (mag) surveys of mound...
and village/town complexes. These produced spectacular results and indeed revealed
details on dynamic community organization that could only be obtained through
geophysics. The mag data, however, were supplemented by other geophysical tech-
niques and/or archival information, surface collections, and previous excavation data.
Hammerstedt et al. (Chapter 1) made good use of the complementary techniques of
magnetic susceptibility and soil resistivity for anomaly confirmation at Spiro. They
were able to show differential usage of landforms, as well as over sixty, large circular
structures in an area previously thought to have been unoccupied. Patch et al. (Chapter
2) examined two Mississippian towns in the Tennessee River Valley, revealing the set-
tlement complexity at both sites and convincingly demonstrating a contraction of the
town at Cox and sequential settlements at the Bell site. McKinnon and Haley (Chapter
3) looked at a Caddo mound and a Mississippian town (Hollywood Mounds), using
surface collections and previous studies to good effect, although this reader found their
use of the ethnohistorical literature a bit *ex post facto*.

Three chapters were placed under the “Technological Transformation and Eco-
nomic Change” theme. Strum (Chapter 5) presented a well-planned, straightforward
survey of Cherto Ketl Field in Chaco Canyon that combined the use of time-series
aerial photographs with subcentimeter GPS, GIS, and ground-penetrating radar
(GPR), along with clear explanations of the techniques. The GPR survey was suc-
cessful in identifying earlier construction intervals, a shift in orientation of lines, and
different types of features in association. Wiewel’s work (Chapter 6) at tightly nucleated
Huff Village in North Dakota also produced excellent results by combining site-wide
mag, a high resolution digital elevation model (DEM) with trend surface correction,
previous excavation data, and coring. By integrating these methods, Wiewel was able
to confidently estimate the size and distribution of the structures, as well as the size
and placement of many of the pit features and hearths, which in turn allowed him to
estimate population size, longevity, and agricultural production as a baseline for com-
paring sites and examining temporal trends.

The “Archaeological Landscapes” theme included a LiDAR study by Thomson
(Chapter 8) for the huge shell islands in southwest Florida covered in dense mangrove
trees with fluctuating tides that limit terrestrial geophysical surveys. The other two
studies focused on historic sites to test the validity of magnetic susceptibility in combi-
nation with other methods. Lynch and Becker (Chapter 9) make a major contribution
by employing magnetic susceptibility, an underutilized technique, as well as soil resis-
tivity and mag to a fort in Wyoming, a lighthouse in Michigan, and a tar kiln in North
Carolina, clearly demonstrating the applicability of these techniques for research and
contextual evaluation in a variety of historic settings. Henry et al.’s (Chapter 10) exam-
ination of Civil War battlements in Kentucky takes a different interpretive approach.
Using a public archaeology perspective, they examine how contemporary resident
populations identify with historic places (place-making) and how geophysics can excite
and inform this endeavor.

The final theme, “Earthen Mound Construction and Composition,” contains three
chapters that examine the internal structures of mounds, illustrating noninvasive
approaches to investigating these often endangered and culturally sensitive resources. Bigman and Seinfeld (Chapter 12) examined GPR radargrams from five low, sandy mounds at the Middle to Late Woodland Letchworth Mounds in Tallahassee, Florida, determining that four out of the five were constructed in a single episode. Zimmer-Dauphinee (Chapter 13) used electrical resistivity tomography (ERT) to investigate the interior of the two largest mounds (one flat-top and one conical) at the Toltec site in Arkansas. ERT is not widely understood by most American archaeologists, and credit goes to the author for his short explanation of how this technique works and the methodology employed. This study found that both mounds were originally constructed in their current shapes, but had been enlarged while maintaining the same morphology. An evaluation of structural variation in Middle Woodland mounds in the Lower Illinois River Valley by King et al. (Chapter 11) employed ERT, GPR, and mag to test for attributes of the standard model, which includes the preparation of surfaces, a varied ramp complex, a central tomb, and a final capping layer. Two of the mound groups observed by the investigators gave especially good results in detecting internal mound structure that supported the standard model. As with many of the other studies, these techniques also were useful in evaluating the degree of preservation after decades of plowing and erosion.

Archaeologists have known for some time now that remote sensing has become a game changer for the preservation and interpretation of archaeological resources. The application of these techniques has provided information that would be impractical to collect with traditional methods. All the authors set up nice backgrounds to their investigations, and the results are applicable for resource evaluation and future preservation. Overall, this volume is an innovative work that demonstrates entirely new avenues for anthropological questions and presents case studies on how these techniques can be integrated with traditional archaeological data for more dynamic interpretations. I’m certainly more knowledgeable for reading it.

With that said, many of the chapters in this volume assume a certain level of knowledge in geophysics and may be difficult for someone expecting a how-to manual. For instance, the articles are uneven in terms of giving basic collection methodology and processing information. Some assume that standard collection intervals and processing are being used. Even though the explicit intent of this volume is the presentation of results within an anthropological framework, some basic survey and processing information would be helpful for evaluating a particular investigation or for applying it in the future. In addition, some of the anomalies discussed in text are difficult to see in the figures. In my view, with the development of new techniques, we need to see an evolution in publishing studies employing geophysical data. A larger format book and/or electronic companion files would have enhanced this volume.