# ISAP NEWS

The newsletter of the International Society for Archaeological Prospection

*Issue 17, October 2008*

## Contents



## Editor's Note

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Welcome to the 17th issue of ISAP News, the final edition for 2008! Don't worry, it will be back again early in the new year. If you would like to contribute to ISAP News 18, please send items for inclusion to me by 21st January 2009.

At the end of this year two consecutive meetings are being held at the Geological Society in London: on 16th December an EIGG meeting on 'Recent Work in Archaeological Geophysics' and on 17th December an FGG meeting on 'Geoscientific Equipment and Techniques at Crime Scenes'. The archaeological day – the provisional programme for which can be seen on page 8 – has been well attended by ISAP members in the past. As a result the ISAP committee has taken the opportunity to hold this year's society AGM at 6pm on the 16th, after the EIGG meeting has been drawn to a close. It would be great to see as many of you as possible, both during the day and at the meeting.

# New Project On The Study Of City Planning With Geophysical Maps

Christophe Benech, Archéorient, CNRS, France christophe.benech@mom.fr

More and more geophysical surveys have been carried out on archaeological sites for the study of ancient city planning. The geophysical maps provide homogeneous and continuous information about all or at least a part of urban space. This information considerably changes our vision of city planning which was mainly based on excavations that means rather punctual information. Some recent studies (Benech 2007, Benech 2008) have recently shown that the geophysical maps open new and wide perspectives of research of urbanism if it is possible to determine an appropriate approach of the interpretation of the maps.

A new three year project began this year under the direction of C. Benech: this project titled "Geophysical survey and study of urban centers from ancient Syria" (PROGECESA) is an interdisciplinary project financed by the French National Agency of Research (ANR). The team is composed by geophysicists and archaeologists who are going to share their experience for a better integration of geophysical results into the archaeology of urbanism. The team is composed of:

- J. Abdul Massih (archaeologist, University of Lebanon)
- M. Al-Maqdissi (archaeologist, General Direction of Antiquities and Museums from Syria)
- C. Camerlynck (geophysicist, UMR 7619 Sisyphe, Université Paris 6)
- C. Castel (archaeologist, UMR 5133, Université Lyon 2)
- M. Gelin (archaeologist, UMR 7041, Université Paris 1)
- S. Gondet (geophysicist, UMR 5133, Université Lyon 2)
- V. Matoïan (archaeologist, UMR 5133, Université Lyon 2)
- P. Quenet (archaeologist, UMR 5133, Université Lyon 2)
- F. Réjiba (geophysicist, UMR 7619 Sisyphe, Université Paris 6)

This project concerns the study of five archaeological sites, from early Bonze Age until Byzantine period (figure 1): Al-Rawda (Early Bronze Age), Tell Sheirat (Early Bronze Age), Ugarit (Late Bronze Age), Amrit/Marathus (Iron Age) and Cyrrhus (Hellenistic, Roman and Byzantine period).

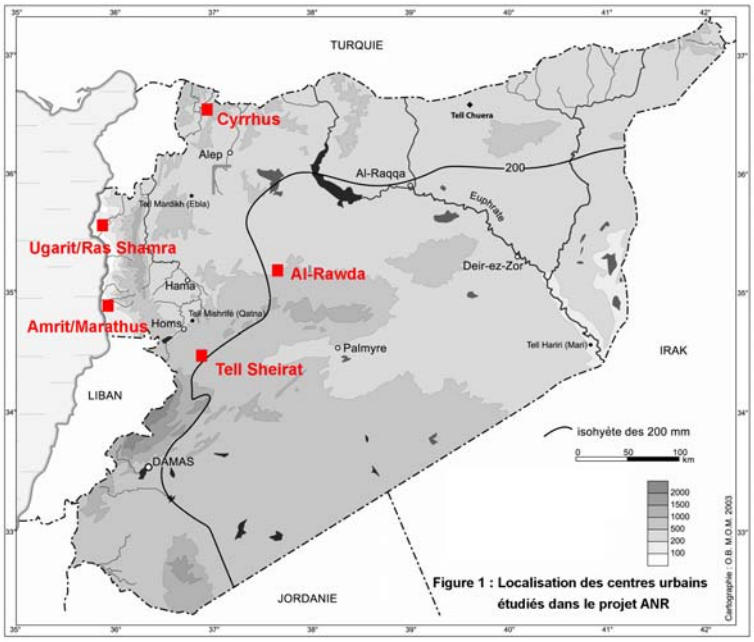


*Figure 1: Location of the archaeological sites included in the project PROGECESA*

It is therefore a diachronic study of city planning and the use of space following urban configurations: from the radio-concentric plan of the Bronze Age (figure 2) through to the orthogonal plan of the classical period. The project aims to study the logic of circulation inside the town and, when it is possible, inside the dwelling units. Beyond the theoretical models which are usually presented, the geophysical map allows work on the conception of these models and their evolution through the time. Two of these sites have been already surveyed and the others began this year. The surveys are carried out using the magnetic method and will be completed in the following years with GPR for the study of specific points in the evolution of the shape of the city and the streets network.

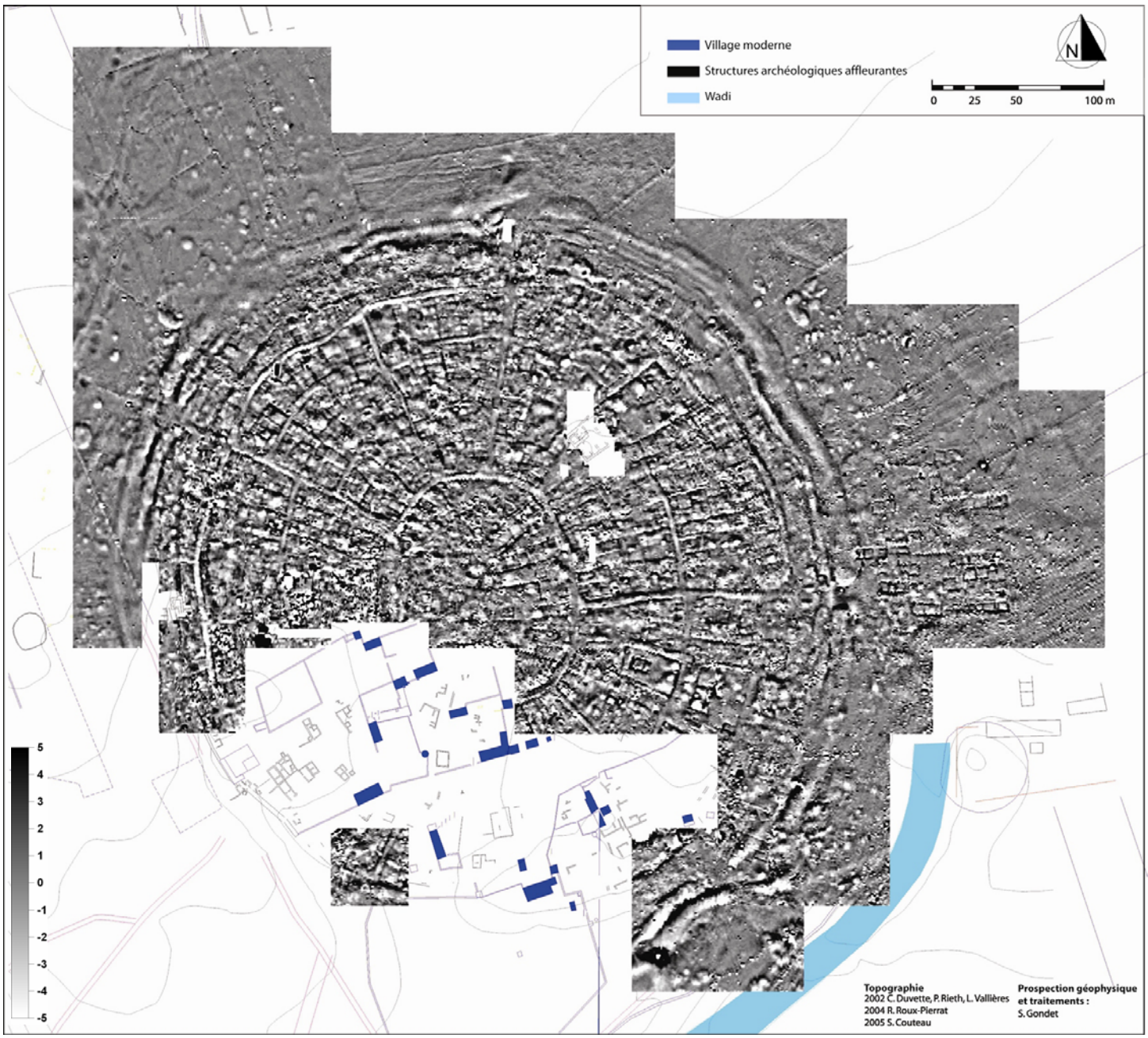


*Figure 2: Magnetic survey with a caesium gradiometer of the archaeological site of Al-Rawda (by S. Gondet, UMR 5133 Archeorient). The radio-concentric plan of Rawda is characteristic of the city planning from the Bronze Age*

## Bibliography


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Benech, C., 2008. The use of 'space syntax' for the study of city planning and household from geophysical maps: the case of Doura-Europos (Syria). *Proceedings of the Colloquium "Urban Living in the Eastern Mediterranean"*, Vienna, October 24-27, forthcoming.

# A Magnetic Survey Of The Biesterfeldt Site, North Dakota, USA

Steven L. De Vore, National Park Service, USA steve_de_vore@nps.gov

The Biesterfeldt Site (32RM1) represents the only sizable earth lodge village site located on the Sheyenne River in southeastern North Dakota (fig. 1). Trade goods recovered from the site date it to the mid- to late 18th century. Ethnographic and historic documentation indicate that the site was occupied by the Cheyenne during their migration from the Great Lakes region to the western Plains and their transformation from horticultural villagers to nomadic equestrians. The site has been identified as a Post-Contact Coalescent variant site of the Coalescent tradition in the marginal region of the Northern Plains cultural sub-area (Wood 1971:70).

*Fig. 1. General view of Site 32RM1.*

Several archaeological investigations have been conducted at the site since its initial documentation in the mid-19th century. In 1868, W. H. Gardner, an Army surgeon, described 74 depressions at the site, including 65 lodges and several cache pits inside the defensive ditch, measuring three to five meters in diameter and approximately 0.6 meters deep (Gardner 1868). He also indicated the presence of 150 to 200 houses outside the ditch. He dug into the depressions to a depth of 0.6 to 0.9 meters and found charred faunal remains, shell, and ash along with lithic debitage and pottery. The pottery had criss-crossed diagonal impressions and zigzags (Gardner 1868). In 1890, T. H. Lewis mapped and described the site (Lewis 1890). 1908, O. G. Libby and A. B. Stout mapped the site (Grinnell 1918). Their map shows 36 house depressions and several smaller cache pit depressions on the north side of the fence, which runs through the site. The ditch is also illustrated; however, the house depressions on the south side of the fence were not easily detected since the southern portion of the site had been under cultivation for eight years. Although other maps of the site were made in the early 1900s (Will 1914; NDSHS 1923), the Libby and Stout map is the only one that indicates the location of surface features associated with house and pit depressions. In 1938, W. D. Strong conducted excavations at the Biesterfeldt Site (Strong 1940; Wood 1971). Strong identified the site as consisting of approximately 70 house depressions enclosed by a ditch except along the steep bank. He excavated seven houses, a number of cache pits, and a portion of the ditch (Strong 1940:371; Wood 1971:7-24). Native American artifacts and domestic materials were uncovered along with historic European trade goods (Strong 1940:372-375; Wood 1971:24-44). Burning was evident in the excavated houses. A geophysical survey of the site by Minnesota State University-Moorhead archaeological field school in 2007 consisted of magnetometry, resistance, electromagnetic conductivity, and down-hole magnetic susceptibility (Dalan et al. 2007:7-14). The results of the archaeological prospection investigations during the field school yielded excellent results characterizing the eastern half of the site. The correlation of mapped cultural features in the unplowed northern half of the site with geophysical anomalies was significant.

*Fig. 2. Magnetic survey with dual fluxgate gradiometer.*

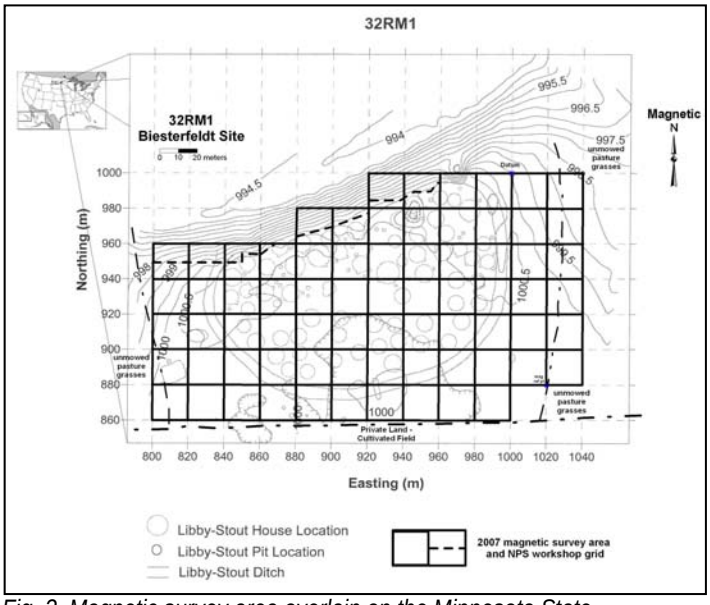


*Fig. 3. Magnetic survey area overlain on the Minnesota State University-Moorhead site topographic map.*

The present magnetic survey was conducted at Site 32RM1 with a Bartington Grad 601-2 dual fluxgate gradiometer (fig. 2). The magnetic survey was part of the geophysical investigations of the site during the National Park Service's 2008 archaeological prospection workshop (De Vore 2008). The survey area was divided into 20 m by 20 m grid units (fig. 3), which was oriented on magnetic north (total survey area of 27,200 $m^2$ or 2.72 hectares).

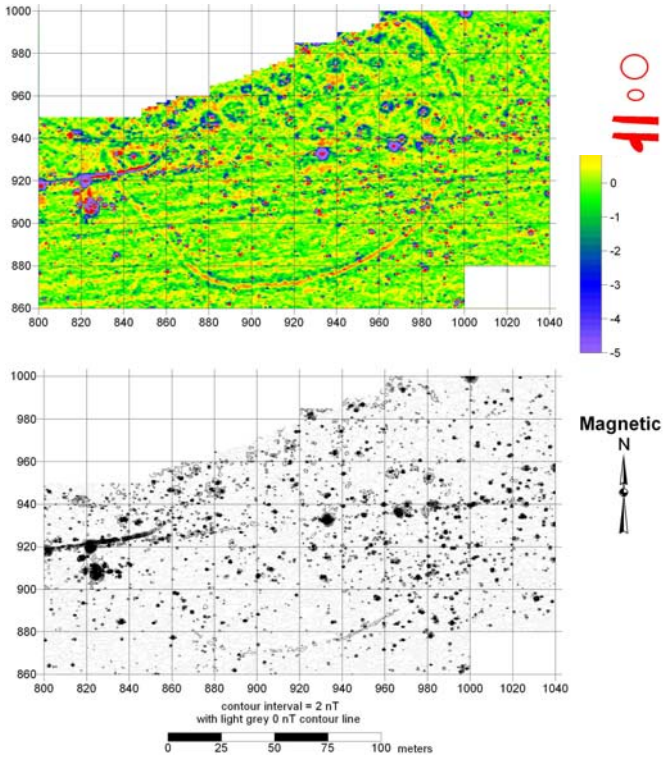


*Fig. 4. Magnetic survey data collected at the site.*

The geophysical data was collected at eight samples per meter along one-meter traverses across the grid units in a bi-directional collection mode. The Archeo-Surveyor processing software was used to process the magnetic data from the site. Steps included the creation of a composite file from the grid files, the correction of an operator error in the collection of the data with a rotation and replacement of the corrected traverse data, a despiking operation to remove traverse discontinuities, interpolation of the data from the original 8 x 1 data matrix to a 4 x 4 data matrix, and the use of a low pass filter to remove any high frequency, small scale spatial detail and to improve the visibility of larger, weak archaeological features (fig. 4).

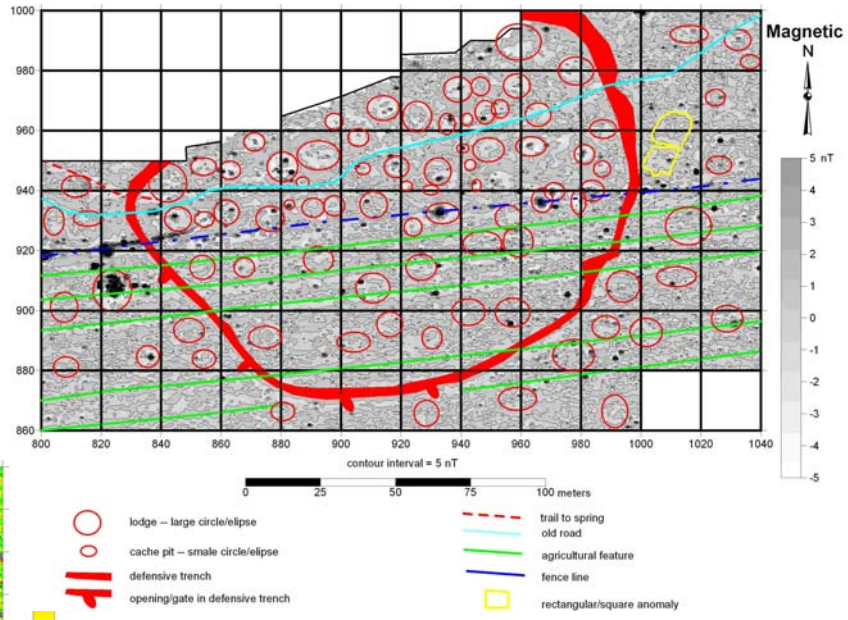


*Fig. 5. Interpretation of the magnetic data from Site 32RM1.*

The magnetic survey resulted in the identification of numerous subsurface anomalies associated with the village site including house/lodge locations, cache/refuse pits, a defensive ditch/trench, and more recent agricultural disturbances to the site (fig. 5). Based on the dual fluxgate gradiometer survey, the site contained a high degree of integrity and will contribute significant information on the prehistoric/protohistoric occupation of the site. The survey with the dual fluxgate gradiometer at the Native American site indicated its usefulness in collecting basic background archaeological data concerning the nature and extent of the archaeological resources.

References

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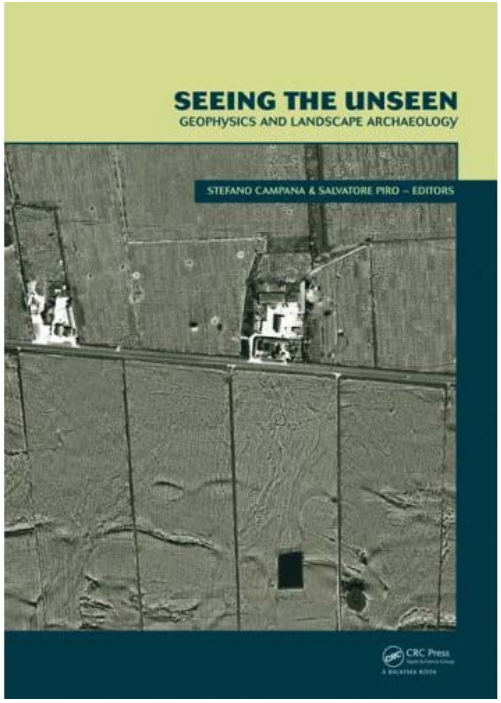
## Book Notification

### Ed.s Campana S. and Piro S. 2009 *Seeing the Unseen. Geophysics and Landscape Archaeology.* CRC Press – Taylor & Francis group, Oxon, UK. ISBN 978-0-415-44721-8

Geophysical techniques, based on well known physical principles, involve indirect measurements of earth related physical attributes. In the case of archaeological structures, contrasts result from subsurface disturbances associated with past cultural activities. Where contrasts between the sought after archaeological features and surrounding soils are small or non-existent then the limitations of geophysical methods and instrumentation becomes apparent. The actual enhancement and success achieved in a geophysical investigation is subject to numerous site specified related conditions.




As a result of the increasing interest in the topic and the related need for knowledge, we decided firstly to organize an International Summer School on “Geophysics for Landscape Archaeology” (Grosseto - Italy, July 2006) and secondly to publish, in a specific volume for use by both students and researchers, the lessons learnt and the results achieved during the school.

The present volume is divided into two sections: theory of geophysical prospection and practice and results in the field. The theoretical section groups into chapters papers on: introduction to landscape archaeology, mapping and geophysical prospection, electrical methods, magnetic methods, electromagnetic methods and ground penetrating radar. There is, however, significant crossover of issues of data integration and research applications between chapters and sections.

Section 1

*Archaeological site detection and mapping: some thought on differing scales of detail and archaeological "non-visibility".* Stefano Campana (University of Siena-Italy)

*Introduction to Geophysical Prospection applied to Archaeology.* Salvatore Piro (National Research Council-Italy)

*Electrical methods*

*Electrical and Magnetic Methods in Archaeological Prospection.* Armin Schmidt (University of Bradford-UK)

*Electrical Resistivity Tomography: A Flexible Technique in Solving Problems of Archaeological Research.* Gregory Tsokas (Aristotle University of Thessaloniki-Greece)

*Theory and practice of the new fast electrical imaging system ARP©.* Michel Dabas (University of Paris-France)

*Magnetic method*

*Caesium-magnetometry for large scale archaeological prospection.* Helmut Becker (Bavarian State Conservation Office-Munich-Germany)

*Why bother? Large scale geomagnetic survey and the quest for 'Real Archaeology'.* Dominc Powlesland (Landscape Research Centre-UK)

*The complementary nature of Geophysical survey methods.* Meg Watters (University of Birmingham-UK)

*The Use of Geophysical Techniques in Landscape Studies: Experience from the Commercial Sector.* Chris Gaffney (Remote Vision Research-UK)

*Electromagnetic methods*

*Short history, strategies and practical aspects of electromagnetic detection based on the description of field experiments.* Albert Hesse (University Pierre et Marie Curie-France)

*Electromagnetic methods.* Alain Tabbagh (University Pierre et Marie Curie-France)

*Ground Penetrating Radar*

*GPR Methods for Archaeology.* Dean Goodman (Geophysical Archaeometry Laboratory-USA)

*Ground-penetrating Radar for Landscape Archaeology: Method and Applications.* Lawrence Conyers (University of Denver-USA)

*Comparative Geophysical Survey Results in Japan: Focusing on Kiln and Building Remains.* Yasushi Nishimura (National Research Institute for Cultural Properties-JAPAN)

Section 2

This includes reports on the work achieved at the Aiali test-site near Grosseto, Italy. In the first and second chapters of section 2 Stefano Campana introduces the site background and the results obtained through remote sensing tools: from Quickbird-2 satellite imagery to vertical air photographs and aerial survey. In chapter 3 Emanuele Vaccaro and Mariaelena Ghisleni provide the results of field walking survey, grid collection and the detailed study of pottery. Chapter 4 is addressed by Stefano Campana and Salvatore Piro to introduce the geophysical surveys of the site. In the next chapter Helmut Becker, Stefano Campana, Thomas Himmler and Iacopo Nicolosi discuss the results of different magnetic sensors (Fluxgate, Overhouser And Caesium-Magnetometry)in the sample areas. Chapter 6 handles Ground Penetrating Radar (GPR) surveys by Dean Goodman and Salvatore Piro. Chapter 7 discusses the results obtained through the application of electromagnetic survey by Alain Tabbagh whilst Chapter 8 deals with the most recent methods applied during field work – electrical survey – and is summarized by Michel Dabas and Gianfranco Morelli.

In conclusion Stefano Campana and Salvatore Piro, an archaeologist and a geophysicist, try to combine all the information together. Through a GIS-based analysis the editors integrate different sources of geophysical measurement as well satellite imagery, aerial photography, archaeological information collected during field walking survey and archaeological knowledge. The critical impact of the work is addressed to show the improvement of available archaeological information as a consequence of the improvement of the survey methods.

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## Journal Notification

### Archaeological Prospection 15:4

*Archaeological Prospection – the first fifteen years.*
Arnold Aspinall and Chris Gaffney

*A Geophysical Investigation of Subsurface Structures and Quaternary Geology at San Marco Pueblo, NM, LA98.* Emily Anne Hinz, John F. Ferguson, Louise Pellerin and Ann Felice Ramenofsky

*Determination of Grave Locations in Dedemezari Necropolis (Western Turkey) Using Magnetic Field Derivatives.* Aydýn Buyuksarac, Muzaffer Ozgu Arisoy, Ozcan Bektas, Ozdemir Kocak and Tayfun Cay

*Airborne Remote Sensing of Valley Floor Geoarchaeology DAEDALUS ATM and CASI.* Keith Challis, Mark Kincey and Andrew J Howard

*GPR survey for sub-floor mapping and analysis of structural damage in the Sagrado Corazón de Jesús Church, Spain.* Manuel Ramírez-Blanco, Francisco García-García, Isabel Rodríguez-Abad, Rosa Martínez-Sala and Javier Benlloch

## Conference, Seminar and Course Announcements

### "Recent Work in Archaeological Geophysics" and "Geoscientific Equipment and Techniques at Crime Scenes"

### Burlington House, Piccadilly, London, UK, 16 - 17 December 2008

EIGG
Environmental & Industrial Geophysics Group

Lecture programme for 16th December: Recent Work in Archaeological Geophysics

| | |
|---|---|
| 0915-1000 | Registration and Coffee |
| 1000-1005 | Introduction |
| 1005-1025 | *"There Is a Tunnel in My Garden…"* A Schmidt |

| | |
|---|---|
| 1030-1050 | *A Survey in the Park: Methodological and Practical Problems Associated with Leisure Activity in the Late Victorian Period.* A Parkyn |
| 1055-1115 | *Investigation of Historic Concrete Chimneys at Battersea Power Station Using Methods Including High Resolution GPR and Ultrasonics.* S Brightwell |
| 1120-1150 | Coffee |
| 1150-1210 | *Simultaneous Detection of Soil Electrical and Magnetic Anomalies with Multi-Coil Electromagnetic Induction Sensors.* D Simpson, M Van Meirvenne, T Saey, H Vermeersch, J Bourgeois, A Lehouck, L Cockx, U Vitharana |
| 1215-1235 | *From Gridded to Gridless - a View From the North.* J Lyall |
| 1240-1300 | *Whole-Site Assessment: advantages for archaeologists, planners and developers.* I Hill, K Challis, N Linford, D Knight |
| 1305-1420 | Lunch (available locally) |
| 1420-1440 | *London Gateway: a Developer Funded Archaeological Investigation of the Thames Estuary.* S Arnott, P Baggaley |
| 1445-1505 | *Archaeological Geophysical Prospection in Peatland Environments: Locating the Sweet Track at Canada Farm, Shapwick Heath (Somerset).* K Armstrong, P Cheetham |
| 1510-1530 | *Strategic Use of Geophysics in Deeply Buried Palaeo-Landscape Reconstruction.* C R Bates, M R Bates |
| 1535-1605 | Tea |
| 1605-1625 | *Magnetometry and Soil Magnetism on Archaeological Structures on Easter Island (Chile).* J Fassbinder, K Bondar, B Vogt |
| 1630-1650 | *Geophysics in the Mautern Hinterland Survey - a Multistage Fieldproject at the Danubian Limes in Lower Austria.* V Lindinger, J Coolen, S Groh |
| 1655-1715 | *Some Recent Work on the Gorgan Wall in Iran.* R Ainslie, E Sauer and H Omrani Rekavindi |
| 1720-1740 | *Mapping the City: Remote Sensing at the Roman Town of Cyrene, Libya.* C Gaffney, R Cuttler, V Gaffney, H Goodchild, A Howard and G Sears |
| 1745 | Conclusion |
| 1800 | Depart |
| 1800-1900 | Separate event: ISAP AGM |

Posters (09:30-17:40 in the Lower Library):

*Ground-Penetrating Radar Survey Across the Transept of the Kirk of St Nicholas (Aberdeen).* C Cuenca-Garcia

*Recent Geophysical Research at Venta Icenorum, Caistor St Edmonds, Norfolk.* D Bescoby, W Bowden and P N Chroston

*The Impact of Meteorites on Archaeology.* D Elks and S Stowe

*"Free with Centurian Wheatoflakes" - Lenticular Visualisation of 3-D Ground Penetrating Radar data.* J Adcock, J Gater and E Wood

*Archaeological Geophysical Investigations at Hulton Abbey, Stoke-on-Trent, Staffs, UK*. J Pringle, J P Cassella, J Jervis, N J Cassidy and T Grossey

*Ground-Penetrating Radar Survey at the Roman Town of Ammaia (Portugal).* L Verdonck, D Taelman and F Vermeulen

*Geophysical Survey in the Discovery, Characterisation and Questioning of Broch Sites in Orkney.* M Saunders and S Ovenden

*A Local Society Archaeological Geophysical Survey: Experiences and Outcomes.* R Potter and J Shepherd

*A Geophysical Survey at Earls Colne Priory, Colchester, Essex.* T Dennis, R Potter, R W S Shackle and P S S Spencer

*Linear Pipeline Surveys: Some Case Studies.* A Bartlett

*Prospecting Deeply Alluviated Environments.* M Roseveare, A Roseveare and T Desalle

*Magnetic Prospecting Near the Geomagnetic Equator - Methods and Selected Results of Geophysical Surveying on the Peruvian Geoglyphs.* T Gorka and J Fassbinder

*Roman Frontiers: Geophysical Prospecting of the Limes in Bavaria.* J Fassbinder, K Berghausen. T Gorka

*Over the Parapet: Geoprospection in No-Man's Land.* P Masters

*Running Before You Can Walk. Recorded Scanning, a Large Area Rapid Prospection Tool.* B Urmston and P Baggaley

*Mapping buried prehistoric land surfaces using GPR and GIS and the implications for heritage management.* J Adcock, H Chapman, E Wood, J Gater and M Parker-Pearson

Commercial displays:

Allied Associates Ltd  Bartington Instruments Ltd  Geomatrix Ltd

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The programme for 17th December: Geoscientific Equipment and Techniques at Crime Scenes will be announced shortly.

Further information and a registration form can be found at
http://www.geolsoc.org.uk/gsl/groups/specialist/eigg/page3649.html

## National Park Service's 2009 Archaeological Prospection Workshop

## Natchitoches, Louisiana, USA, 18-22 May 2009

The National Park Service's 2009 workshop on archaeological prospection techniques entitled *Current Archaeological Prospection Advances for Non-Destructive Investigations in the 21st Century* will be held May 18-22, 2009, at the National Park Service's National Center for Preservation Technology and Training, Natchitoches, Louisiana. Lodging will be at the Ramada Inn. The field exercises will take place at the Los Adaes State Historic Site (a Spanish presidio and capital of the Spanish province of Texas between 1719 and 1772). Co-sponsors for the workshop include the National Park Service, the U.S. Army Corps of Engineers, Los Adaes State Historic Site, Northwestern State University of Louisiana, and the Louisiana Division of Historic Preservation. This will be the nineteenth year of the workshop dedicated to the use of geophysical, aerial photography, and other remote sensing methods as they apply to the identification, evaluation, conservation, and protection of archaeological resources across this Nation. The workshop will present lectures on the theory of operation, methodology, processing, and interpretation with on-hands use of the equipment in the field. There is a registration charge of $475.00.

Application forms are available on the Midwest Archeological Center's web page at http://www.nps.gov/history/mwac/. For further information, please contact Steven L. DeVore, Archeologist, National Park Service, Midwest Archeological Center, Federal Building, Room 474, 100 Centennial Mall North, Lincoln, Nebraska 68508-3873: tel: (402) 437-5392, ext. 141; fax: (402) 437-5098; email: steve_de_vore@nps.gov.

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