ISAP NEWS

The newsletter of the International Society for Archaeological Prospection

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Editor's Note

Robert Fry R.J.Fry@student.bradford.ac.uk

Welcome to the 31st issue of ISAP News! A huge thank you to all who have found the time to contribute to the newsletter, I hope you will find it an enjoyable read.

Included in this issue of ISAPNews, a GPR survey over an Australian Aboriginal cemetery, a combined ERT and auger survey from Egypt, and a commercial update from ArchaeoPhysica in England. Please note also the announcement of the NSGG meeting this year, details can be found on page 9.

*Please send any contributions or queries for the next newsletter (ISAP News 32) to the address above by the **31st July 2012**. All entries are gratefully received; I will always try to respond to emails in the same day if possible.*

Important Notices

Membership renewal
£7 or €10 for the whole year. Please visit:
http://www.bradford.ac.uk/acad/archsci/archprospection/renew.php

Archaeological Prospection Journal
Take advantage of the great deal offered to ISAP members by Wiley-Blackwell for this journal
http://www.bradford.ac.uk/archsci/archprospection/menu.php?2

The Malå MIRA at the Wallaga Lake Aboriginal Cemetery

David Hunter
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Hunter Geophysics undertook a ground-penetrating radar survey of an indigenous cemetery south of Sydney, Australia, using the Malå MIRA (Malå Imaging Radar Array) system. The MIRA exhibited some advantages over cart-based GPR systems and may be ideal for surveying large sites where high-resolution data is required.

The Wallaga Lake area, located on Australia's eastern coast approximately 300 kilometres south of Sydney, has been inhabited for at least five thousand years. The Aboriginal Reserve was gazetted in 1891 and was officially provided to the Merrimans Local Aboriginal Land Council in 1984.

The Merrimans Local Aboriginal Land Council recently received federal government funding to improve maintenance of their privately-owned cemetery. This was complemented by a state-funded project to conduct an anthropological investigation to determine the names and locations of people buried in the cemetery as no records had been kept concerning the burials in the cemetery. Detailed oral history and archival research was able to identify the names of more than 200 people who had been buried in the cemetery since 1900. As part of this project, Hunter Geophysics was contracted to perform a ground-penetrating radar survey in order to locate the unmarked graves and to create a map of the cemetery for management purposes. Work continues toward matching the unmarked graves detected by the geophysical survey with names of those believed to be buried in the cemetery.

The cemetery is on the side of a sandstone embankment immediately adjacent to Wallaga Lake, and is approximately 90x50 metres in dimensions. The topography is very steep, with a nine-metre variation in height above sea level from the cemetery's eastern and western boundaries. Approximately thirty trees and fifty extant headstones were present at the time of the geophysical survey.

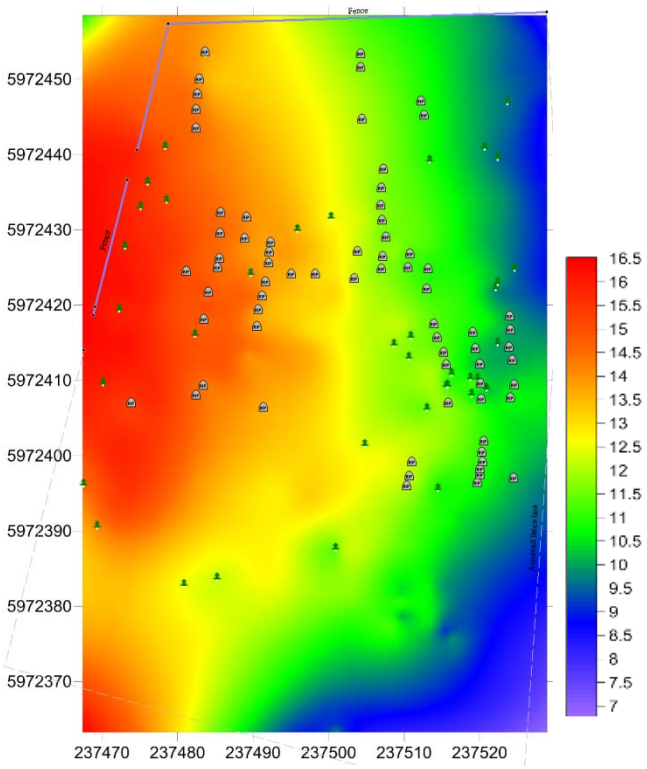

Figure 1. Site map of the Wallaga Lake Aboriginal Cemetery created by Hunter Geophysics. A topographic image plot is overlain onto the map.

A site map – showing the location of marked graves, trees, bushes and the cemetery boundary fence – was created using a Sokkia SET5W total station. Figure 1 shows the site map with a topographic plot. Areas of dense tree canopy were surveyed using the Malå X3M cart-based ground-penetrating radar system with staked-out survey grids, which were entered into the site map using the total station; all other areas were surveyed using the Malå MIRA, which used a Trimble R8 RTK GNSS base and rover system for survey navigation and data geo-referencing. The cart-based 500MHz X3M surveys employed a traverse interval of 25cm and a trace interval of 2.5cm, while the MIRA used sixteen 400MHz antennas arranged side-by-side for an effective traverse interval of 8cm. Data processing was out-sourced in order to hasten the process while Hunter

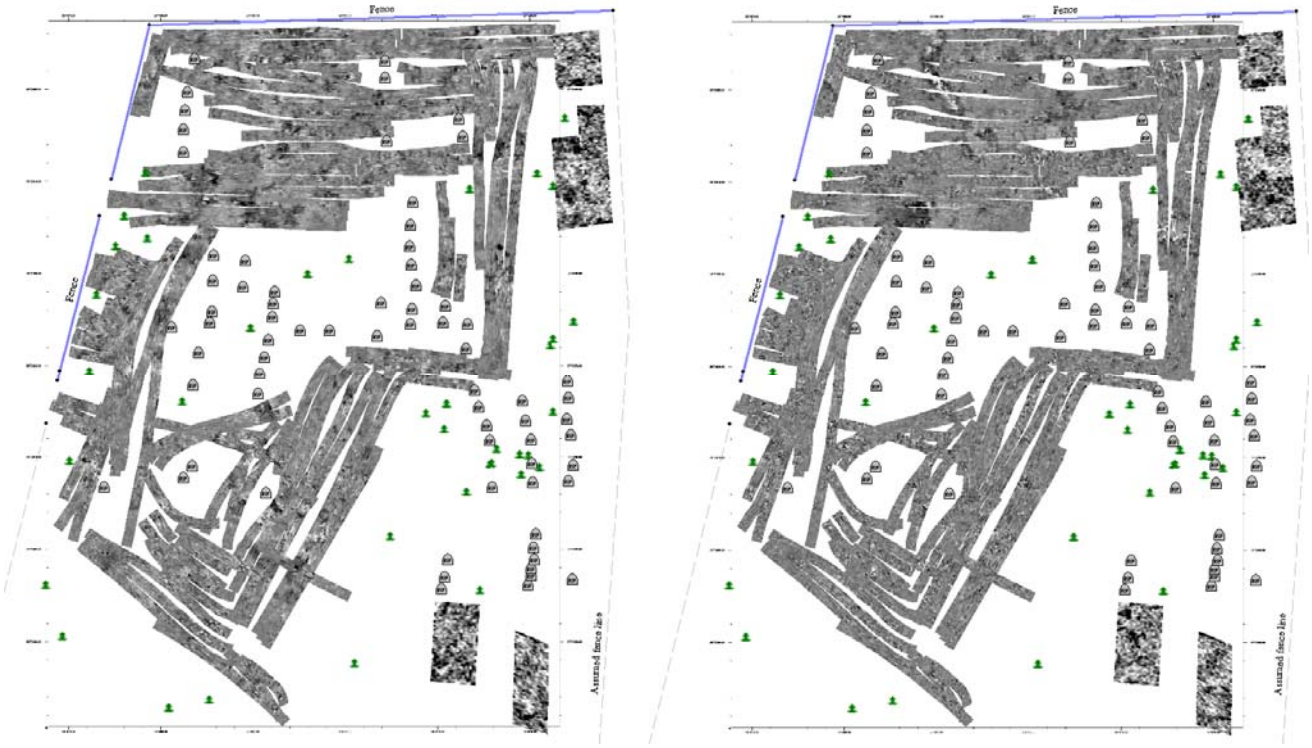

Figure 2. Ground-penetrating radar geo-referenced depth-slices at (2a) 30cm and (2b) 56cm below the ground surface. These plots can be viewed in high-resolution online at http://www.huntergeophysics.com/archive/wallaga/fig2.jpg Image copyright Hunter Geophysics 2012

Geophysics demobilized from the site. MalåGPR, the Måla distributor for Australia, processed the MIRA data and Armin Schmidt of GeoDataWIZ (www.GeodataWIZ.com) processed the cart-based data. Geo-referenced depth-slices can be seen in figure 2.

The areas surveyed using the X3M produced several rectangular anomalies of approximate dimensions six feet by three feet, typical of historic graves, while the MIRA data showed evidence of numerous *burial pits* (as opposed to grave-shaft burials). Figure 3 is a map showing the interpretations of the collected ground-penetrating radar data.

The author has found that the Malå MIRA system provides a reduction in the time required to perform a geophysical investigation in a cemetery environment. The MIRA system does not require staking-out survey grids, as it can use either an RTK GNSS receiver or a robotic total station for data positioning. An RTK GNSS system may also provide survey guidance via a laptop or windscreen-mounted PDA.

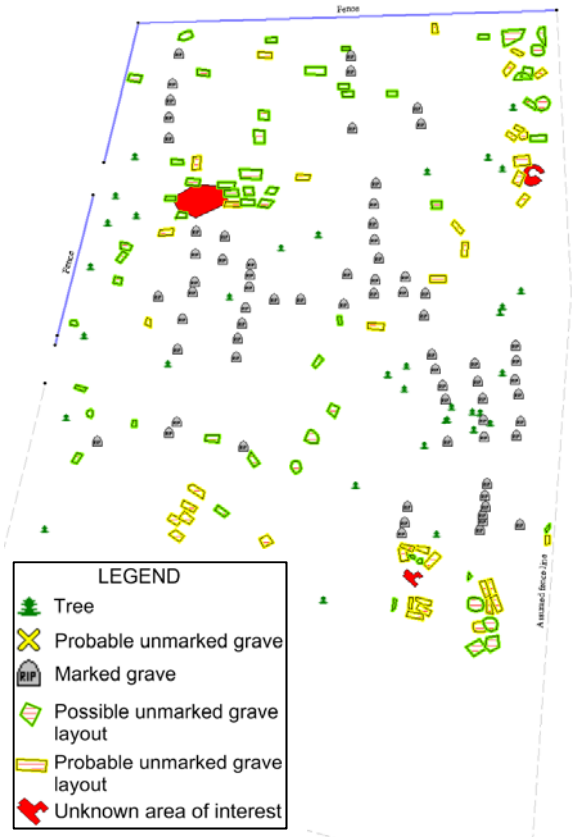

Figure 3. map of geophysical interpretations presented with surface obstacles also shown on the map

An apparent benefit of the MIRA's ability to perform a 'grid-less' survey is that, as is often the case in cemeteries, surface obstacles such as headstones can be surveyed *around*, rather than having to establish survey grids arranged around obstacles. Without the ability to perform a grid-less survey, the geophysical investigation of the Wallaga Lake Aboriginal Cemetery would have required additional time in the field. Four staff managed to perform the geophysical survey in a day.

The Malå MIRA system did have one significant disadvantage in that manoeuvrability was limited. As seen in figure 4, the system used for this project was mounted on a small trailer and was towed by a car, rather than being mounted on the front of a tractor, as shown in Trinks *et al.* (2008:5). It was often necessary to stop surveying in order to physically lift the trailer into tight areas. Mounting the system at the front of a smaller vehicle may have resulted in improved manoeuvrability.

Fig. 4. The Malå MIRA being towed behind a wagon at the Wallaga Lake Aboriginal Cemetery

The ground-penetrating radar survey conducted by Hunter Geophysics successfully identified a series of what are most likely grave-shaft- and pit-burials at the Wallaga Lake Aboriginal Cemetery. An anthropological study of the cemetery and the local Aboriginal tribe continues with the identification of those buried in the graves detected by the geophysical survey. This is being achieved through studying local histories and the memories of the surviving indigenous population rather than through excavation.

References

Trinks, I, Nissen, J, Johansson, B, Emilsson, J, Gustafsson, C, Friborg, J and J. Gustafsson, 2008. 'Pilot study of the new multichannel GPR system MIRA for large scale, high-resolution archaeological prospection at the site of the Viking town Birka in Sweden' in ISAP News, issue 16, July 2008. The International Society for Archaeological Prospection.

The Theban Harbours and Waterscapes Survey. Recent Fieldwork to Investigate the Canals and Harbours on the West and East Banks at ancient Thebes (Luxor), Egypt

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A programme of fieldwork has recently been conducted as part of the Theban Harbours and Waterscapes Survey (THaWS) in the Nile Valley, Upper Egypt. The project, run by the Egypt Exploration Society (http://www.ees.ac.uk; http://eestheban.tumblr.com) is an ongoing programme of research designed to advance our understanding of the past locations and migrations of the River Nile in the Theban Region over the last five millennia, and locate any basins and canals that may have been excavated to connect palaces and temples on the West and East Banks to the River Nile, including the enormous basins known today as Birket Habu and Birket Luxor. Work is also continuing on the East Bank to clarify interpretations of the geomorphological origins and development of the complex of temples at Karnak.

The 2012 field season, conducted in February to April, followed a reconnaissance of the study area in January 2011, which was cut short by the rapidly changing political and social upheaval. The aim of the 2012 fieldwork was to begin investigation at a number of specific locations on the West and East Banks of the Nile at Thebes. During past surveys in the Egyptian Nile valley we found Electrical Resistivity Tomography (ERT) (followed up by hand augering along the geophysical profiles in order to ground-truth the results) to be a very effective tool for detecting sub-surface features and former channels at Karnak and in the Edfu floodplain. For the ERT surveys in 2008 and 2009 a Geoscan Research RM15 resistance meter was used with a PA3 probe array to take readings using an expanding Wenner array. In the 2012 season an Allied Associates Tigre 64 multi-probe system was used (Figure 1). All the data has been processed using the Res 2D Inv software program. All the ERT profiles (and all other work e.g. hand augering and magnetometry) have been geo-referenced using a Total Station and the topographic data has been incorporated in the processing of the profiles.

Figure 1 ERT survey being conducted to the east of the Colossi of Memnon, West Bank, Thebes (photo: Angus Graham)

To complement this work we also made limited use of magnetometry (Figure 2) to map potential near-surface archaeological features in broader area survey. As magnetometry is limited to collecting data to only 1.5 to 2m below the surface we plan to further complement this with the use of Ground Penetrating Radar (GPR) in coming seasons.

Figure 2 Magnetometry being conducted to the east of the Ramesseum, West Bank, Thebes (photo: Angus Graham).

Our geophysical work was followed by geoarchaeological investigation. Locations were selected based upon the results of our geophysical survey data for hand augering in order to assess what the resistance readings corresponded to below the ground. An Eijkelkamp hand-auger was used to retrieve sediment from the floodplain to a depth of 8m. The sediments are recorded on-site immediately after retrieval and all sediment is sieved using 2mm and 4mm mesh to recover any artefacts (e.g. ceramic and stone fragments) and non-artefacts (e.g. other stones, rhizocretions etc). The data from the hand auger survey was then compared with the results of the ERT and magnetometer surveys.

Results of the geophysical survey in the 2012 season indicated some positive findings. On the West Bank of Thebes the ERT in the floodplain to the east of the Ramesseum (Figure 3) indicated the presence of high resistivity material suggesting a probable ancient site. The location of the feature along the ERT profile (Figure 4) corresponds to a rectangular area of variable vegetation measuring 120m by 65m recorded by Gardner Wilkinson on a map dated to 1830. Results of a small magnetometer survey in this area produced a linear positive anomaly, corresponding to the edge of the feature in the ERT as well as Wilkinson's feature. Preliminary results from the augering in this locality also produced sandstone and limestone fragments and brief observations of ceramic fragments in the surrounding fields support the hypothesis that we have identified the possible presence of an ancient site some 350m to the east of the Ramesseum.

Two ERT profiles of data were collected from the temple area at Karnak. Results of the survey indicate an exciting distribution of high resistivity readings from the area below the main temple structures. These results have substantially added to our data set and with further parallel ERT profiles planned for 2013 together with hand-augering we are gaining a clearer understanding of the geomorphological history of the temple complex.

Figure 3. Oblique photo showing the location of the Nile floodplain in relation to the Ramesseum. The magnetometry was conducted in the field of burnt stubble (photo: Kristian Strutt).

The ERT profiles conducted at Birket Habu provided some evidence to suggest possible channels or canals running into the harbour basin at the northern and southern sides of the entrance. Hand augering of the features confirmed channel deposits, but further study of the data is necessary to fully interpret their formation processes. Once all of the data has been fully analysed we hope to clarify preliminary interpretations. Plans are underway for the 2013 field season, where geophysical survey and augering will be expanded to cover further locations on the East and West Bank at Thebes.

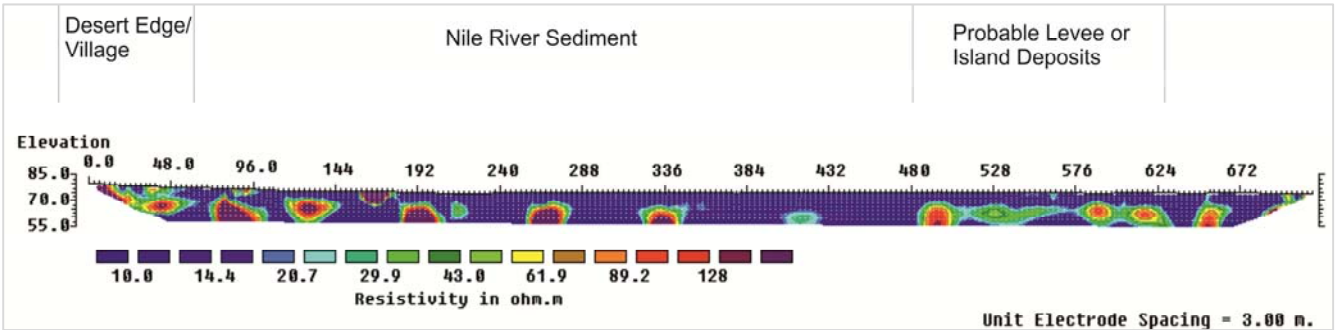

Figure 4. Profile of ERT data showing the presence of a possible levee or island in a former channel suggested by the sedimentary record upon which Gardner Wilkinson noted the rectangular feature.

Commercial Profile: ArchaeoPhysica

Martin Roseveare
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Website

ArchaeoPhysica has a new website! It now features an occasional blog on mostly technical matters, sometimes controversial but hopefully always relevant. Let us know if there is anything you would like to see. It can be found at the following:

Website: www.archaeophysica.co.uk

Jobs

Any geophysicists looking for work? We may be hiring later this year so send us your CVs and a short note about why you would like to work with us. Either email (see above) or send CVs to:

ArchaeoPhysica
Kitchener's
Home Farm
Harewood End
Hereford HR2 8JS

Current Projects

Two major research projects start this summer in Cornwall, one being an unparalleled geophysical study of a number of coastal promontory forts, supported by topographic and other work. These will hopefully reveal information about their construction and allow comparisons to be made between these enigmatic monuments.

The other project is a geophysical survey of over 100 hectares to examine the relationships between soils, land use, magnetic response and results from the National Mapping Programme aerial survey. Another 200 hectares of geophysical data from other sites in the county is being examined as part of the project.

Technical News and Research

Technical news includes our discovery that since its introduction 18 months ago our sledge-mounted multi-instrument intelligent acquisition system has supported the collection of almost 1000 hectares of caesium vapour magnetic data. This has been supplemented on some sites by the simultaneous collection of low frequency electromagnetic data.

Research into the viability of surface electric charge for prospecting archaeological sites is ongoing and progressing to a large-scale data collection phase this autumn.

Connect

Follow us on Twitter @archaeophysica for more news!

NSGG day meeting:
Recent Work in Archaeological Geophysics

Geological Society of London, Burlington House, Piccadilly, London
4th December 2012

Near surface geophysical techniques are now a well established tool for the evaluation of archaeological sites from their initial discovery to subsequent interpretation and management. However, this success has brought new challenges with ever larger areas needing to be surveyed rapidly and greater demands to characterise buried remains without excavation meaning ongoing improvement of techniques and methodologies is necessary. Meanwhile exciting new archaeological discoveries continue to be made with geophysics and it is valuable to share these with colleagues.

This will be the tenth in a succession of biennial meetings in which contributors present and debate the results of recent research and case studies. Suppliers of equipment and software also attend and the meeting therefore represents an invaluable opportunity for archaeological and geophysical practitioners, students, academic and amateur researchers to catch up with recent research and developments.

The meeting typically attracts 100 or more participants and, as well as oral presentations, there will be space for commercial and poster displays. Those interested in contributing are warmly encouraged to contact the convenor, and to submit abstracts of up to 1000 words in length, accompanied by suitable greyscale illustrative material, no later than the 31st August 2012. These will be collated and made available to all those attending.

The standard registration fee is £25 but registered students and fellows of the Geological Society can attend for £15 *(we regret that owing to rising costs this year we have to ask fellows to contribute towards catering costs)*. The fee includes entrance to the talks, a printed book of abstracts and tea/coffee and biscuits at breaks. A further charge will be made for commercial exhibitors. Pre-registration and payment (to The Geological Society) is preferred and will be possible between 1st July and 23rd November 2012. Please contact: Paul Linford at the address below.

Please note that unlike recent previous meetings in this series there will regrettably ***not*** *be a forensic geosciences meeting the following day as the Forensic Geosciences Group have a prior conference commitment earlier in the year.*

Convenor: Paul Linford, English Heritage, Fort Cumberland, Eastney, Portsmouth,
PO4 9LD, UK; Tel: +44 (0)23 9285 6749; Fax: +44 (0)23 9285 6701
email: Paul.Linford@english-heritage.org.uk

1st MAC International Workshop of Archaeological Geophysics

Ullastret, Girona, Catalonia 21st – 25th May 2012

Organized by:

Generalitat de Catalunya Departament de Cultura

Museu d'Arqueologia de Catalunya

SOT

Endorsed by:

ISAP

Presentation

The 1st MAC-IWAG is another activity offered by Museu d'Arqueologia de Catalunya in order to support research in the field of non-destructive technologies for archaeological prospection, after two years of testing some of the technologies in Catalonian archaeological sites. With the participation of some of the best experts in archaeological geophysics worldwide, MAC-IWAG offers archaeologists and geophysicists an intensive 5-day course, within the framework of Museu d'Arqueologia de Catalunya-Ullastret (Girona, Catalonia).

Scope

The scope of the 1st MAC-IWAG is training archaeologists and geophysicists in the most advanced geophysical techniques for archaeological prospection. The workshop will be held at the Museu d'Arqueologia de Catalunya-Ullastret: Puig de St. Andreu and Illa d'en Reixac Iron Age archaeological sites (VI-II BC); Girona, Spain (http://www.mac.cat/eng/Branches/Ullastret).

Lecturers

Dr. Albert Casas (Universitat de Barcelona, Spain)
Dr. Michel Dabas (Geocarta, France)
Mr. Phillipe de Smedt (Ghent University, Belgium)
Mr. Gabriel de Prado (MAC, Catalunya, Spain)
Mrs. Ekhine Garcia (SOT Prospection, Barcelona)
Dr. Dean Goodman (GAL, USA)
Mrs. Aurora Martín (MAC, Catalunya, Spain)
Mr. Cornelius Meyer (Eastern Atlas, Germany)
Mr. Gianfranco Morelli (SOING, Italy)
Dr. Alexandre Novo (Geostudi Astier, Italy)
Dr. Jordi Principal (MAC, Catalunya, Spain)
Mr. Roger Sala (SOT Prospection, Barcelona)
Dr. Armin Schmidt (GeoDataWIZ, UK)
Mr. Robert Tamba (SOT Prospection, Barcelona)

Illa d'en Reixac (Ullastret), Iron Age Iberian site. MAC-Ullastret

Teaching and programme

Lectures will focus on four techniques: Ground penetrating radar, magnetics, electromagnetic induction and electric resistivity. The workshop includes theoretical topics, fieldwork activities and data processing.
Basic theory through presentation of case histories will be introduced for every technique.
Fieldwork will focus in fast and large-scale data acquisition for high-resolution mapping. Data acquisition will be carried out in the Ullastret archaeological site. Fieldwork will include archaeological excavation.
The participants will go through data processing flows, visualization and final archaeological data interpretation.

Participants

The workshop is open to geophysicists, archaeologists, engineers, physicists and geologists who are interested in geophysical technologies for archaeological prospection.

Cost

The registration fee is 300 Euros, which does not cover accommodation and meals. Assistance will be offered with arranging accommodation close to the venue. There will be four competitive ISAP bursaries of 100 Euros each, for attendants of the workshop who are ISAP members and who are either students or young professionals on a junior salary scale.

Further information and inscriptions

Jordi Principal (jprincipal@gencat.cat)

Gabriel de Prado (gdeprado@gencat.cat)

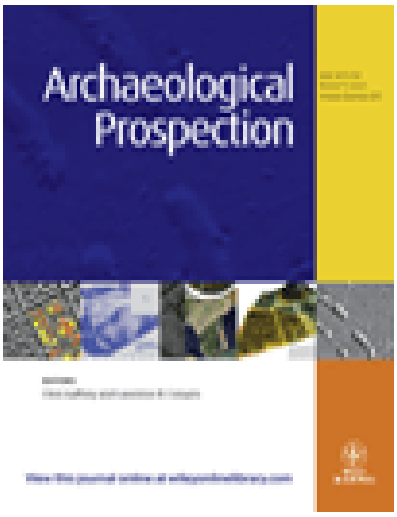
Journal Notification

Archaeological Prospection

Archaeological Prospection Volume 19 (2) is at the printers. This issue contains the following articles:

Stampolidis and Tsokas. The use of edge delineating methods in interpreting magnetic archaeological prospection data.

Milea *et al*. Assessment of the effect of instrumental and discretization errors on derivative based potential field geophysical methods.



Cocchi *et al*. Marine archeogeophysical prospecting of Roman Salapia settlement (Puglia, Italy): detecting ancient harbour remains.

Trier and Pilø. Automatic detection of pit structures in airborne laser scanning data.

De Clercq *et al.* Towards an integrated methodology for assessing rural settlement landscapes in the Belgian Lowlands.

Gaffney *et al.* The Stonehenge Hidden Landscapes Project

MSc Archaeological Prospection - Shallow Geophysics

MSc. Archaeological Prospection – Shallow Geophysics, The University of Bradford, UK.

The course is a highly focused postgraduate degree programme which develops specialist skills in the theory and practice of archaeological prospection, in particular in near-surface geophysics.

It provides students with knowledge and experience of the principal geophysical and geochemical techniques currently available for the detection of buried archaeological features and other near-surface targets. The course provides appropriate background to materials and soil science, together with the relevant mathematical principles.

Other methods of detection such as remote sensing, topographical survey and field-walking are introduced as essential components of an integrated approach to landscape assessment. Sampling procedures and the computer treatment and display of field data from all methods are critically examined with the aid of case studies based on field experience. Skills and knowledge are developed through lectures, seminars, laboratory and fieldwork classes and a substantial individual research dissertation.

Special Features:

- In-depth specialist training, including hands-on experience in the Division's geophysics and computer laboratories and in the field
- First destination figures indicate that about 85% of postgraduates in Archaeological Sciences achieve work or further studies in the discipline or cognate areas

Course Syllabus

- Electrical Methods of Survey
- Magnetic and Electromagnetic Methods of Survey
- Site Evaluation Strategies
- GIS for Practitioners
- The Nature of Matter
- Treatment, Display and Interpretation of Field Data
- Soils and Chemical Prospection
- Dissertation (MSc)

For more information, visit: http://www.bradford.ac.uk/postgraduate/archaeological-prospection-shallow-geophysics/ or contact Dr Chris Gaffney (c.gaffney@bradford.ac.uk).

UNIVERSITY OF BRADFORD
MAKING KNOWLEDGE WORK

MA/MSc Archaeological Survey and Landscape

The survey of sites and landscapes is one of the most fast developing and dynamic areas of archaeology. New technological and methodological advances mean that we can now reveal entire buried sites without excavation, and map entire landscapes.

This new Masters course will give you direct and practical experience of the latest geophysical and topographical survey techniques and approaches. The course is designed to develop your skills of analysis, interpretation and visualisation of survey results. It also allows you to understand the results in a wider context through the application of theoretical frameworks across a broad range of regions and periods. A unique attribute of the course is that it allows you to undertake research-led survey work at Portus, the port of Imperial Rome, and other Classical sites in Italy, conducted in close collaboration with the British School at Rome, one of Britain's leading research institutes abroad, as well as on sites in the UK.

Southampton has an excellent international reputation as a leader in the development and application of advanced survey techniques. Our staff have many years' experience undertaking surveys in the UK, France, Italy, Spain, North Africa and the Middle East. They will teach you cutting-edge scientific techniques for the study of sites and landscapes, including geophysical and GIS-based skills; they are supported by state-of-the art computing facilities and equipment. You will learn about a full range of different scientific methods in the classroom as well as being fully involved in fieldwork and data-processing on research-led projects. This course will fully prepare you for future research or for professional employment in the archaeological sector. If you so choose you can further enrich your learning experience by taking stimulating options in such fields as Maritime Archaeology, Roman Archaeology and Archaeological Computing, amongst many others.

For more information, **www.southampton.ac.uk/humanities/v400_survey**

Typical Core Modules:

- Desk-based Archaeological Evaluation
- Archaeological Survey and Recording
- Archaeological Geophysics
- Dissertation

Typical Optional Modules:

- Core Computing
- CAD/GIS for Archaeologists
- Geoarchaeology
- Maritime Archaeology

Cover image: Magnetometer survey on the West Bank of Thebes, Egypt (photo: Angus Graham)