Issue 33: November 2012

ISAP NEWS

The newsletter of the International Society for Archaeological Prospection

Contents

Editor's Note

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

Welcome to the 33rd 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.

*Please send any contributions or queries for the next newsletter (ISAP News 34) to the address above by the **31st January 2013**. All entries are gratefully received; I will always try to respond to emails in the same day if possible.*

I hope everyone has a great festive season - don't forget to renew your ISAP Membership in the New Year!

Important Notices

NSGG Day Meeting Bursaries
NSGG Day Meeting ISAP Bursaries available for early-career ISAP members! – Details on Page 13

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

New research at Segni, Lazio (Italy)

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The British School at Rome, Rome, Italy

A new 3-year joint research project (2012-2014) has been established by The British School at Rome and the Archaeological Museum of Segni (Comune di Segni, Italy) to investigate a number of key areas of historical importance within the town of Segni, which lies approximately 50km to the southeast of Rome in the Lepini Mountains.

As part of the initial study, three areas were targeted with geophysical survey. GPR survey was used in the first area, located alongside the podium of the famous temple of Juno Moneta, now preserved as part of the church of St. Peter. The second site is an open field, in a prominent position on the acropolis, so both GPR and gradiometer surveys were used. The third area is located in Piazza Santa Maria, which is the main square of the town and hence could only be surveyed using GPR survey. This area is where the Roman forum has been hypothesised to have been located. The documentation of medieval activity in this area is more substantial and suggests the existence of an earlier cathedral complex. However, these historical documents fail to provide the exact location of the medieval cathedral and the modern square layout is suggested to have been greatly transformed since the medieval period (Cifarelli and Colaiacomo, 2011: 96).

A GSSI SIR-3000 was used for the GPR survey at this site, using a 400 MHz antenna mounted on a cart system with an odometer (Figure 1). A total of 165 traverses of varying length were collected zig-zag in a north-south direction, with a traverse separation of 0.25m.

The exceptionally clear results of the GPR survey display a sequence of high amplitude linear anomalies, which are likely to denote the walls of buildings (Figure 2). These features appear to share a similar alignment, providing an insight into the historical plan of this area. Furthermore, later phases of buildings have been built on earlier structures, suggesting some level of reconstruction as well as the possible reuse of building materials. There are two concentrations of structural remains: the first is along the north-

Figure 1: GPR survey data collection in Piazza Santa Maria.

-western edge of the survey area, and the second is located towards the south-west of the survey area.

The area to the south-east of the survey area was therefore subsequently chosen to be examined through excavation. The GPR survey results suggested these structures occur at different depths, but have the same positioning and alignment, running parallel with the modern buildings that form the edge of the square. The shallowest structure occurs between depths of 7 to 13ns (depth estimation of 0.51m to 0.76m, correlated through depths acquired during the excavation). This structure appears to be formed of two rooms separated by a corridor. On the same orientation and directly beneath this structure, the remains of an earlier building are present. This earlier structure appears to be more substantial; being composed of three rooms with a central corridor, and occurs between depths of 13 to 31ns (approximately 0.76m to 1.77m).

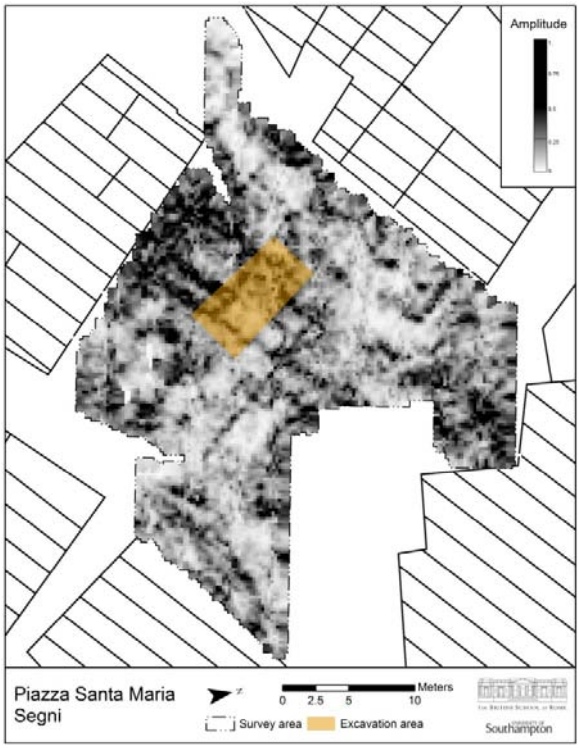

Figure 2: GPR survey results (depth approximation 20-22ns: 1.15m to 1.27m)

The excavation examined an area of approximately 9m by 5m, allowing insight into the relationship between the anomalies within the geophysical datasets and the features exposed through excavation. The excavation confirmed the presence of several features identified in the GPR data set, and in turn provided a chronology for the recorded features. In particular, several floor surfaces were discovered, the most impressive of which is a late Republican mosaic (Figures 3&4).

The first year of the Segni Project has produced some interesting and exciting results. This project has been particularly beneficial as it has allowed for a scientific study in feature recognition of anomalies, as well as expanding the archaeological record of an important historical centre in Italy.

Figure 3: Aerial photo of the excavation in Piazza Santa Maria, Segni

The Segni Project is directed by Dr Francesco Maria Cifarelli (Archaeological Museum of Segni) and Professor Christopher Smith (British School at Rome), and field directed by Stephen Kay (Molly Cotton Fellow, British School at Rome) and Dott.ssa Federica Colaiacomo (Conservator, Archaeological Museum of Segni). The geophysical survey was undertaken by the APSS (Archaeological Prospection Services of Southampton) and the British School at Rome (Sophie Hay, Alice James, Stephen Kay and Elizabeth Richley) and was made possible through the generous donations of the Banca di Credito Cooperativo Di Roma and the Banca Anagni Credito Cooperativo. The excavations are funded by the Comune di Segni (with particular thanks to the Mayor Arch. Stefano Corsi and the Cultural officer Dott. Valente Spigone) and the Society for the Promotion of Roman Studies.

Figure 4: The late Republican mosaic

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Further information can be found at www.bsr.ac.uk and www.museosegni.it or follow on Twitter: @segniproject

GPR and Protohistory: the site of Colle Rotondo (Rome, Italy)

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Geophysical investigations on the plateau of Colle Rotondo (Rome, Italy) were carried out using a bistatic GPR PulseEkko Pro by Sensors and Software, Inc. (Canada), equipped with 500 MHz antennas, mounted on a cart with odometer and GPS locator. The measurements were acquired in step mode in order to obtain a sampling interval of 2 cm, with a GPS location every 50 traces collected. In all acquisitions has been used a time window of 50 ns and a stacking of 4 (Figure 1).

Figure 1: The GPR system involved in the Colle Rotondo survey

Two acquisitions multi-profile were acquired, the first one (YGrid 1) for a total of 300 parallel profiles with a line spacing of 0.5 m; the second one (YGrid 2) for a total of 21 parallel profiles with a line spacing of 0.25 m.

The depth-slice analysis of Grid 1 has highlighted the strong presence of anomalies along the southern side of the plateau. This presence is at a depth ranging between 1 and 1.5 m, in agreement with the velocity analysis performed with the calibration of the hyperbolas (v = 0115 m/ns). This value is also in agreement with both the geology of the soil (sand, clays and tuffs), and the migration performed on the GPR data.

The nature of the soil, slightly attenuating, did not permit the GPR to reach greater depths. The shape and the strong intensity of the above mentioned anomalies can be related not only to the geological stratigraphy of the first one and a half meters (consisting of two different sandy sediments), but also to manmade anomalies with a quite regular geometry (A), one of which caused by a large circular black layer (perhaps a Protohistoric furnace) of considerable size, as demonstrated by subsequent archaeological excavations. The presence of an anomaly in the SW edge of the plateau (B), perhaps due to an anthropic layer, was confirmed by a subsequent archaeological trench, revealing a stratus rich in flint, due to the late Palaeolithic (Figure 2).

Figure 2:GPR maps between 1 and 1.5 m depth. Quite strong anomalies are visible only in the areas (A) and (B)

Surprisingly, the rest of the plateau presents no specific geophysical anomalies, which could suggest the complete absence of anthropic elements in this area due to the slope of the plateau itself to the South; the intense agricultural work of the past; or the presence of man-made objects of small dimensions such as not to be "illuminated" with sufficient resolution by the instrument. It is also possible that there is

presence of archaeological material below the depth of 1.5 m reached by the instrument itself.

Subsequently, the results of Grid 2 were analysed; these were acquired in an area close to the excavation, in which archaeological structures were brought to the light at a depth of about 0.30 m, such as a wall (E) and a (F). The results of the GPR map revealed two strong elongated anomalies, due to the above mentioned archaeological structures. Figure 3 shows clearly this correspondence, confirming the ability of this geophysical instrument to detect such structural manmade elements. In particular, it is possible to understand that the wall (E) does not present any angle but it seems to be a continuous structure; while the drainage channel (F) seems to continue along a diagonal line.

In conclusion, we can certainly argue that the GPR prospection acquired on the plateau of Colle Rotondo gave encouraging and partially verified results by subsequent invasive archaeological procedures, within 1-1.5 m below the surface.

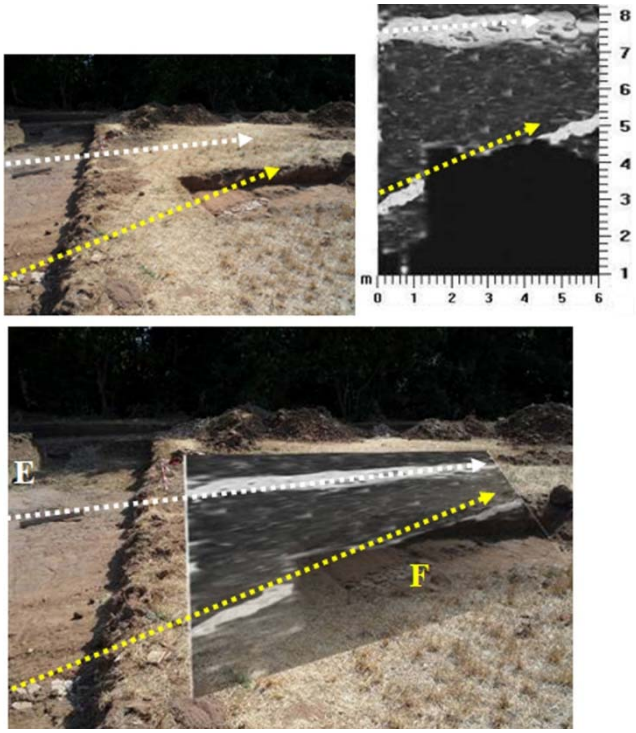

Figure 3:The figure shows the partially excavated area in which GPR data are collected (upper left). The GPR map and the overlap image show how the (E) and (F) archaeological features continue at a depth of 0.30 m without changing their orientation.

Magnetometry at Yuthu, Peru – results of a vertical gradiometer survey close to the geomagnetic equator

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Earlier this year we had the opportunity to conduct a geophysical survey at Yuthu, an early pre-Inka village site, (400–100 BC), in Cusco, Peru. In contrast with the later Inka period with its royal estates, terraces and impressive stone architecture, pre-Inka sites – and the people who occupied them – are poorly understood. Excavations have revealed that Yuthu is divided into two parts: a ceremonial sector occupying a small artificial platform; and a separate domestic sector with pit houses located on the natural slope (Davis 2011; Davis and Delgado 2009; 2010). In an attempt to better understand the layout of the site and determine features for future excavation, we decided to undertake a geophysical survey. Due to various limitations beyond our control, (including equipment importation restrictions, budget, and the presence of crops on site), we hoped that a fluxgate gradiometer, (*Bartington Grad601-2*), might provide useful archaeological information (Figure 1).

Figure 1. The magnetometer survey in progress over the ceremonial platform area.

While there were some worries about working at an altitude of 3,600m above sea level, the greater concern was the effect of the low geomagnetic latitude on the magnetic anomalies. In January 2012, the magnetic inclination in Cusco was -2.7°, resulting in a very different situation to Europe or North America. In preparation for this, we modelled magnetic anomalies for a few simple archaeological features based on previous excavation results (see Figure 2). While certainly different from the responses we're more familiar with from a vertical gradiometer, we determined that it would still be possible to detect and identify such features based on these bipolar anomalies.

Another initial concern had been the geology, but despite the prevalence of igneous bedrock in the Andes, the parent material underlying Yuthu is composed of gypsum, limestone and shales (Carlotto *et al*, 1996a; 1996b). Excavations have, however, shown that igneous rocks were used in wall construction in the ceremonial sector, and we hoped that this might help us to identify such features.

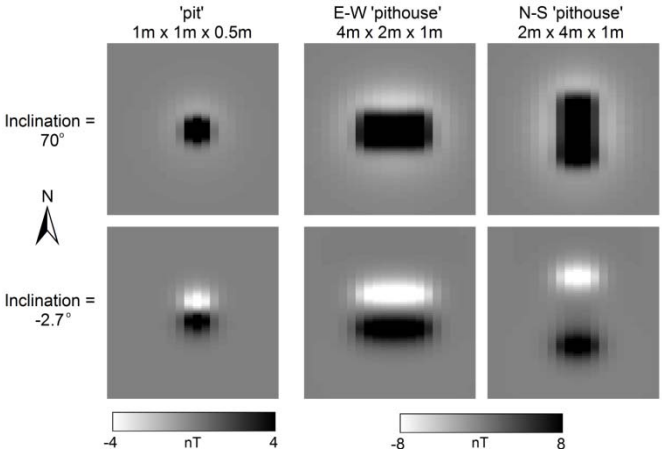

Figure 2. Comparison between modelled magnetic anomalies for simple archaeological features in North America (top row) and Cusco, Peru (bottom row). Features are based on excavated remains at Yuthu and are modelled for a 1m vertical gradiometer, a magnetic susceptibility contrast of 10 x 10^{-8} SI units, and data collection at 0.125m intervals along traverses spaced 0.5m apart.

Figure 3 presents two extracts from the 6 hectare survey area. Each demonstrates that the results are not as easy to interpret as we had hoped! Many surface features, such as agricultural furrows [A], field boundaries [B], and terraces [C], have produced recognisable responses, but the rest is more complicated. Numerous bipolar anomalies are visible across the survey area, but almost none of them have the characteristic north-south orientation that the modelling had predicted.

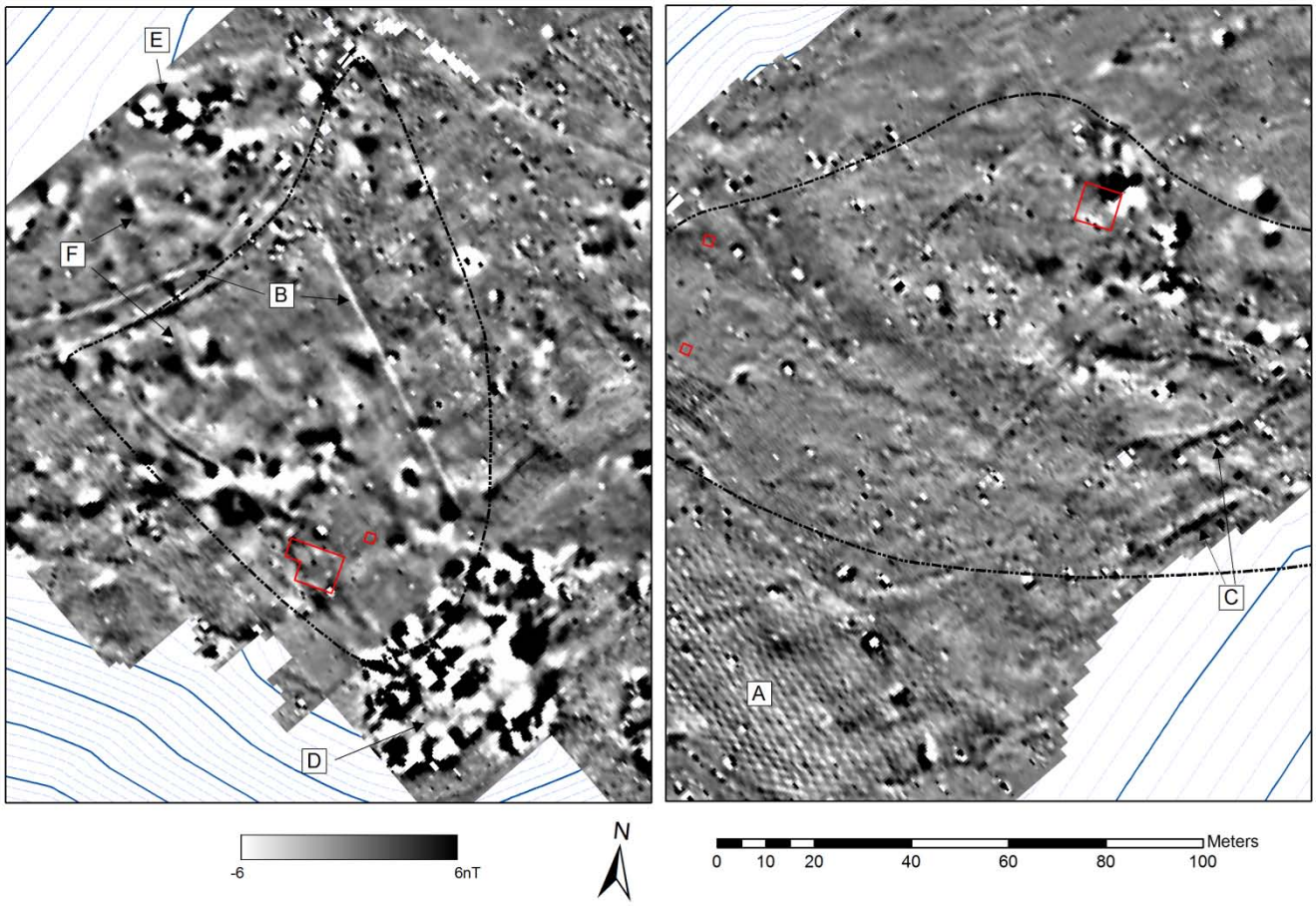

Figure 3. Extracts of the magnetometer results. Left: the ceremonial sector (dashed line), including the platform. Right: part of the domestic area (dashed). Previous excavation units are outlined in red.

This indicates that they are due to remanent rather than induced magnetisations. Some of these may be recent and due to broken iron farm tools, but it is not clear whether clusters of strongly magnetic bipolar responses (e.g. at [D] and [E]) are anthropogenic or natural in origin. These could be due to igneous material, perhaps from former structural remains, and will require ground-truthing for verification. The group at [D] actually lies on the steep slope just below the ceremonial platform. This could be explained by demolished wall material that was cleared off the platform at some point, although this remains speculation at present.

A number of interesting linear and curvilinear negative anomalies can be seen over the ceremonial sector, at (F), and elsewhere. These possibly indicate buried stone walls constructed from a weakly magnetic material such as the local limestone. Again, ground-truthing will be necessary to test this idea.

Without excavation we are still uncertain as to why so few induced bipolar magnetic anomalies can be identified. One possibility for enhancing these data would be to attempt a reduction to the pole to recalculate anomalies as though the inducing magnetic field had a 90^{o} inclination; however, we don't expect a much clearer result given that so many bipolar anomalies are not orientated parallel to the direction of the geomagnetic field.

We had hoped to experiment with collecting data while holding the instrument horizontally to measure the horizontal gradient, but unfortunately, an intermittent problem with the sensors, (likely resulting from the automated setup at this low magnetic inclination), prevented us from doing so.

While geophysical results frequently allow us to ask many new questions about a site, in this instance they far outnumber the answers they provide. We may have an opportunity to conduct a GPR survey at Yuthu next summer that will hopefully help us better understand these results and the site. Until then, we very much encourage any comments or suggestions that readers of this newsletter may have.

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1st MAC International Workshop on Archaeological Geophysics

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The Archaeological Museum of Catalonia (MAC) and SOT Archaeological Prospection, Barcelona, organised their first international workshop on archaeological geophysics from 21-25 May 2012. Held at the archaeological site of Ullastret, 20 km east of Girona in northern Catalonia (Spain), the 5-day workshop was mainly aimed at archaeologists to introduce them to the concepts of archaeological geophysics and to demonstrate the processes by which an archaeological interpretation is created. ISAP supported the workshop as part of its regional outreach activities and awarded a bursary to an ISAP member to cover part of the registration fee.

The organisers assembled an impressive line-up of presenters (including many ISAP members, see the list below) to cover all relevant topics. These ranged from archaeological overviews of the region and the test site in Ullastret, to the explanations of basic geophysical principles, integration of techniques and data interpretation, and logistical considerations that must be taken into account when planning a geophysical survey.

As always, participants enjoyed the day-long practical fieldwork and experienced first-hand the challenges that must be addressed when setting out a survey area, measuring control points and avoiding interference between different instruments. The intricate problems encountered with different RTK-GPS system were an eye-opener for many who had only read the advertising literature of GPS manufacturers.

On top of all this, the organisers secured additional in-kind fieldwork support from several companies and researchers, who surveyed the test site with their multisensor and/or motorised systems, including Eastern Atlas (magnetometer array), Geocarta (ARP wheeled earth resistance), Geostudi Astier (multi-channel ERI), Ghent University (DUALEM) and IDS (Stream-X multichannel GPR).

Gianfranco Morelli explains the multichannel ERI system

This was an excellent opportunity for participants to see modern instruments in action and also allowed the collection of multiple data-sets for the whole test site. The data were then combined in a project-GIS and interpreted jointly as part of the workshop. The lively interpretation discussion between archaeologists and archaeological geophysicists showed how geophysical data are not the final results, but require sophisticated archaeological interpretation. Archaeologists were amazed to see the many different answers that could be deduced from the data, even to questions that had not been asked.

The test site, Illa d'en Reixac, was an Iberian town on a former lake's central island, approximately 4 ha in size and dating to the 6th-2nd *c.* BC. The data showed clearly the layout of streets and buildings, and a full discussion will be published in a monograph about the workshop and its findings.

While the workshop had a clear regional focus, its organisation as an international event was highly beneficial, as it allowed presentations from international experts and attendance of non-Spanish participants. It also attracted considerable media interest with good coverage on Catalonia's State Television and the regional newspapers. There was enough time to talk, eat and form new friendships, and the social programme, including a visit to the Graeco-Roman site of Empúries, was another proof of the famous Spanish hospitality.

The presenters at the workshop were Cornelius Meyer (Eastern Atlas), Dean Goodman (GAL), Michel Dabas (Geocarta), Armin Schmidt (GeodataWIZ), Gianfranco Morelli (Geostudi Astier), Phillipe DeSmedt (Ghent University), Alexandre Novo (IDS), Aurora Martin, Gabriel de Prado, Jordi Principal (MAC), Ekhine García, Roger Sala, Robert Tamba (SOT Archaeological Prospection) and Albert Casas (Universitat de Barcelona).

Interview for TV3 with Roger Sala. In the background the GPR survey using the IDS Stream-X system.

NSGG Day Meeting on Recent Work in Archaeological Geophysics

December 4th, London, UK

Fourth Announcement: NSGG day meeting on Recent Work in Archaeological Geophysics

Geological Society of London, Burlington House, Piccadilly, London W1J 0BG
4th December 2012

Since the last announcement there has been an enthusiastic response to the call for papers and a provisional programme for the meeting is now available on the Near Surface Geophysics Group's website:

http://www.nsgg.org.uk/meetings/

Instructions for registering are also available on this page and, if you are thinking of coming, we'd be most grateful if you could register so that we have the best possible indication of the number of people likely to attend.

The rates are:

- Member of the Geological Society or BGA - £15
- Student - £15
- Non-Member - £25

The fee includes entrance to the talks, a printed book of abstracts and tea/coffee and biscuits at breaks. Pre-registration will be available until the 23rd November 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 will also be attending 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 commercial exhibits and poster displays.

*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 had a prior conference commitment this year in August.*

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

Bursaries for 2012 NSGG Day-Meeting

For the NSGG day meeting *Recent Work in Archaeological Geophysics* (4 December 2012, London) ISAP will provide the following grants:

Registration Fee Contribution for early-career members
ISAP will pay £20 to any ISAP early-career member (student or young professional) who makes a presentation (poster or oral) on that day, to contribute to the registration fee and some production costs. The payment will be made at the door.

"The bursaries are open to students (Undergraduate, Masters or PhD/Doctorate) and early-career young professionals who are ISAP members with a current paid subscription. Early-career young professional will normally have graduated within the last three years and be currently on a junior salary scale. ISAP may contact their line manager to confirm the latter."

Poster Prize
A prize for the best poster presented at this day conference, to the amount of £50. The posters will be judged by a panel selected by the ISAP Management Committee. The competition is open to all posters presented on the day.

The National Park Service's 2013 workshop on archaeological prospection techniques entitled *Current Archaeological Prospection Advances for Non-Destructive Investigations in the 21st Century*

May 13-17, 2013 Nebraska, USA

The National Park Service's 2013 workshop on archaeological prospection techniques entitled *Current Archaeological Prospection Advances for Non-Destructive Investigations in the 21st Century* will be held May 13-17, 2013, at the Cedar Point Biological Station near Ogallala, Nebraska.

Lodging will be at the Cedar Point Biological Station near Ogallala, Nebraska.

The field exercises will take place at the site of Alkali Station near Paxton, Nebraska.

Alkali Station was a major trail facility used by travellers on the Oregon and California trails, the Pony Express, the transcontinental telegraph, and the frontier army. Co-sponsors for the workshop include the National Park Service's Midwest Archeological Center, the Lute Family, and the University of Nebraska's Cedar Point Biological Station.

This will be the twenty-second 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.cr.nps.gov/mwac/>.

For further information, please contact:
Steven L. DeVore, Archaeologist, National Park Service, Midwest Archaeological 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

10TH INTERNATIONAL CONFERENCE ON ARCHAEOLOGICAL PROSPECTION

Austrian Academy of Sciences, Vienna

The organizing committee and partner organizations are honoured to announce the 10th International Conference on Archaeological Prospection (AP2013) on behalf of the International Society for Archaeological Prospection (ISAP) and the Aerial Archaeology Research Group (AARG) to be held in Vienna/Austria from Wednesday May 29th until Sunday 2nd of June 2013.

The AP 2013 Conference will be hosted by the Austrian Academy of Sciences, the Ludwig Boltzmann Institute for Archaeological Prospection and Virtual Archaeology and the Vienna Institute for Archaeological Science – University of Vienna.

The conference aims to provide a forum for the presentation and discussion of latest developments and cutting edge research in the field of archaeological prospection. It shall cover the entire spectrum of methodology and technology applied to the detection, localization and investigation of buried cultural heritage (aerial photography, airborne laser scanning, hyperspectral imaging, near-surface geophysics, data processing, visualization and archaeological interpretation).

The focus shall be on integrative approaches exploiting the diversity of all data and information necessary for the visualization and interpretation of archaeological and historical monuments, structures and entire archaeological landscapes.

Conference topics are: Archaeological feedback, GIS and prospection, Integrated prospection approaches, Interpretation and presentation, Processing and visualization and Technical aspects.

This scientific and social venue will provide a meeting place for young researchers and experienced professionals in the field of archaeological prospection. We welcome high level contributions from all over the globe and beyond.

Young researchers are invited to join the conference on a reduced conference fee.

Registration information will be announced in due course.

Further information can be found at: http://ap2013.univie.ac.at/home/

ÖAW Austrian Academy of Sciences

Ludwig Boltzmann Institute Archaeological Prospection and Virtual Archaeology

universität wien

2nd National Polish Conference on Archaeological Prospection, Poznan University, 22-23 November 2012

This regional conference address important aspects of archaeological prospection relevant in a Polish context. It will be started by three key-note presentations from ISAP members (Neil Linford, Jörg Fassbinder and Cornelius Meyer) that will lead into the main topic of the first day, namely standards of work. This is currently a very important topic in Poland where a market for private contractors starts to emerge. The second day will be dedicated to archaeological geophysical work undertaken in Poland in recent years.

The ISAP management committee has endorsed this conference, and welcomes further requests for ISAP support for other regional events. Past endorsements and studentship support have included the *1st National Polish Conference on Archaeological Prospection* (2010), the German day-meeting *Archäologische Prospektion – Potential und Perspektiven* (2011) and the *1st MAC International Workshop on Archaeological Geophysics* (2012 in Spain, see the article in this issue). Please send requests for ISAP endorsements and support for such regional events as a short statement to the ISAP Chairman, Dr Chris Gaffney (C.Gaffney@Bradford.ac.uk).

Journal Notification

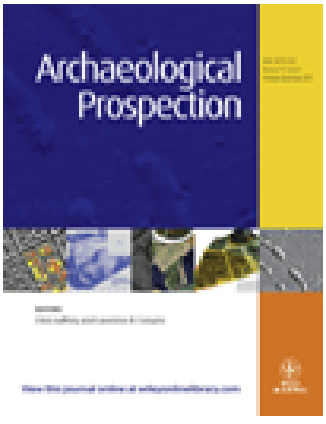
Archaeological Prospection

Archaeological Prospection – 19(4)

The fourth Issue of the year is now heading towards the printers.
Papers and Short Reports include:

Wegmann *et al.*
Assessing Coastal Landscape Change for Archaeological Purposes: Integrating Shallow Geophysics, Historical Archives, and Geomorphology at Port Angeles, Washington, USA

Patella *et al.*
Resistivity tomography in the park of Pratolino at Vaglia (Florence, Italy)



Bossuet *et al.*
The city map of ancient Epomanduodurum (Mandeure -Mathay, Franche- Comté, eastern France). contribution of geophysical prospecting techniques (2001-2011)

Nowaczinski *et al.*
A multi-methodological approach for the investigation of archaeological ditches – exemplified by the Early Bronze Age settlement of Fidvár near Vráble

Rogers *et al.*
Comparing Similar Ground-Penetrating Radar Surveys Under Different Moisture Conditions at Kalavasos-Ayios Dhimitrios, Cyprus.

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)