ISAP News

the newsletter of the International Society for Archaeological Prospection

Issue No. 2, August 2004

Welcome to the second issue of **ISAP News**, I hope you enjoy it. Again we have a mixture of topics – everything from complex surveys to public participation at open days. I'm considering putting together a watery issue at some point, to cover marine, shoreline and inland prospection, so drop me a line if you have any leads. Meanwhile, keep sending me your news!

Anne Roseveare, Editor ISAP

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High resolution GPR surveys for the study of "Domus del Centenario" – Pompei, Italy

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Abstract

In the present short note the results of a Ground Penetrating Radar (GPR) survey, carried out with the aim of detecting the archaeological structures below the actual excavated portion of "Domus del Centenario", in the archaeological site of Pompei (Italy), are presented and discussed. With GPR a high-resolution data acquisition technique has been adopted with the aim of reconstruction of an overall view of the investigated area. For the measurements a Sir System 10 A+, equipped with a 500 MHz bistatic antenna with constant offset, was employed. Some signal processing and representation techniques have been used for data elaboration and interpretation.

The results obtained on shallow buried structures indicate that the plan of part of the previous building can be identified and characterised from the GPR time-slices representation.

The location, depth, size and general structure of the buried buildings were effectively estimated from non-destructive remote sensing with a ground-penetrating radar system.

1. Working Programme

To enhance the knowledge of the "Domus del Centenario", focussing on the location and conservation of the unknown buried structures below the levels already studied, a scientific collaboration has been developed between the University of Bologna (Department of Archaeology), the University of Parma (Department of Cultural Heritage) and the Institute of Technologies Applied to Cultural Heritage (ITABC-CNR). In the present short note the results of the Ground Penetrating Radar (GPR) survey, carried out with the aim of detecting the archaeological structures hypothesized below the actual excavated area of "Domus del Centenario", are presented and discussed.

2. The site

The "Domus del Centenario", located in the "insula IX 8 - Pompei" (Fig. 1), is characterised by a long and rich building-history, started during the III century B.C. At the beginning of the Vesuvio' s eruption (79 A.D.), this domus was a big complex with two atria and one peristyle. From the North to South, the domus can be subdivided in three main nuclei: a) a private apartment, with a big triclinium (43) and three cubicula (42, 44, 45); b) a thermal complex (46-49) and c) service-lodging. The heart of the domus was the peristyle (23). After 62 A.D. a nymphaeum (64) was built (Fig. 2).

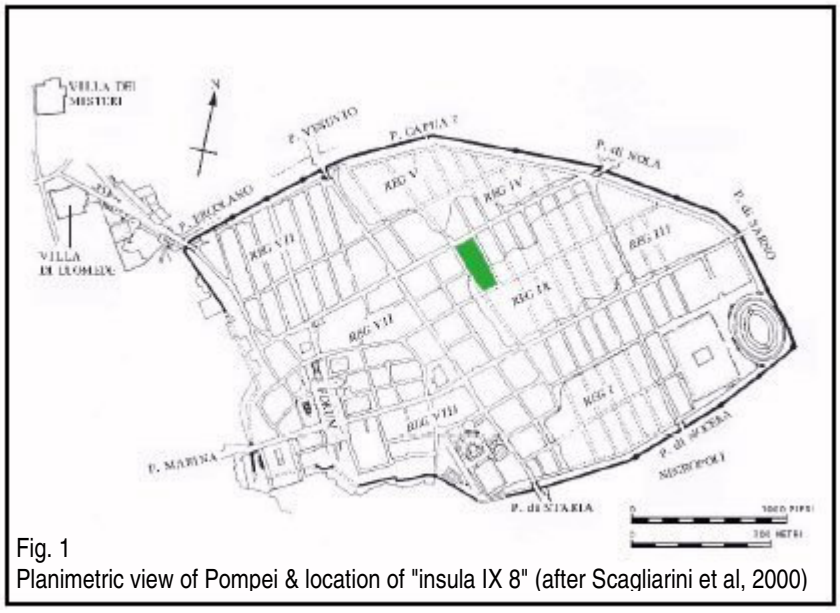


Fig. 1
Planimetric view of Pompei & location of "insula IX 8" (after Scagliarini et al, 2000)

Fig. 2 Planimetric view of excavated "insula IX 8" (after Scagliarini et al 2000)

3. GPR survey - data acquisition

GPR survey was performed during June 2001, for a total of 2 days' fieldwork, in the area indicated in Fig. 3. For the measurements a GPR SIR 10A+ (GSSI), equipped with a 500 MHz bistatic antenna with constant offset, has been employed. Single-fold exploratory profiles were first carried out at the site with the following objectives: 1) preliminary identification of the targets; 2) calibration of the instrument; 3) analysis of the subsurface response as a function of the orientation of the profiles.

A total of 123 adjacent profiles at the site were collected alternately in forward and reverse directions across the survey grids. The horizontal spacing between parallel profiles at the site was 0.5 m. Radar reflections along the transects were recorded continuously, with different lengths, across the ground at 80 scan s^{-1}; horizontal stacking was set to 4 scans. Along each profile markers were spaced every 1 m to provide spatial reference. All radar reflections within the 75 ns (two-way-travel) time window were recorded digitally in the field as 8 bit data and 512 samples per radar scan. The survey was carried out within five different blocks. The first block (A) measured 17 m (east-west) by 14 m (north-south); the second block (B) measured 7 m (east-west) by 14 m (north-south) and the third block (C) measured 9 m (east-west) by 17 m (north-south). The fourth blocks (D1, D2 and D3) measured respectively 4 m (north-south) by 20 m (east-west), 3 m (east-west) by 23 m (north-south) and 4 m (north-south) by 18 m (east-west) and the fifth block (E) measured 7 m (north-south) by 8 m (east-west).

4. GPR data elaboration and representation

With the aim of obtaining a planimetric vision of all possible anomalous bodies the time-slice representation technique was applied using all field profiles (Goodman et al, 1995; Malagodi et al, 1996; Piro et al, 2003; Goodman et al, 2004). Time-slices are calculated by creating 2-D horizontal contour maps of the averaged absolute value of the wave amplitude from a specified time value across parallel profiles. Time-slice data sets were generated by spatially averaging the squared wave amplitudes of radar reflections in the horizontal as well as the vertical direction. Averaging every 0.25 m along the radargram profile and averaging in 4 ns of the waveform in the vertical were used to create a time slice parameter. The rather thick vertical averaging window of 4 nanoseconds for this particular site proved to provide the best images of the subsurface archaeology. The data were gridded using a Kriging algorithm that included a search of all data within a 1.0 m radius of the desired point to be interpolated on the grid. A filter was used to remove the background reflections and was applied to the field profiles. The low-pass (3x3) filter was applied to the time-slice data set, computing a moving windows average with a filter length set by the users.

5. Analysis of the results

In Fig. 4 the time-slices (11-15 ns, two-way-travel) are shown for all the investigated blocks. On these maps (estimated depth 0.5 m) many anomalous structures are visible. In these areas the location of various reflectors, having different shapes, sizes and orientation could be clearly imaged. In particular, in the block (A), a linear anomaly oriented north-south (possible wall) and a circular anomaly (the pond of a fountain) are clearly visible. In the block (B) some portions of wall are present. In the block (C) a big anomaly oriented north-south is clearly visible. In the block (D1-2-3) many reflectors are visible without a clear geometry. In the block (E) two anomalies, perpendicular to each other, are present.

In Fig. 5 the time-slices (26-30 ns twt) are shown for all the investigated blocks. On these maps (estimated depth 1.2 m) the individuated anomalies are better visible. The block A is characterised by the presence of a high reflector, which corresponds with the bottom of the identified structure (the pond of a fountain), at this depth the previous wall is not visible. In the block B, below the previously investigated levels, many isolated reflectors are present. In the block C, the elongated anomaly (underground shaft) is better defined and connected with an anomaly very close to the room (n. 18 - Fig. 2). This anomaly has confirmed the presence of a suspected cavity below the mosaic pavement of the room n.18, which is characterised by a subsidence. In the block (D1-2-3) many reflectors are visible without a clear geometric correlation. The block E, at this depth, is characterised by the presence of two large anomalies: the first is due to the previously identified structure, the second is oriented with an angle of 45°.

Recent archaeological excavations made (by Prof. Sara Santoro - University of Parma) in the blocks A, B and C have confirmed the structures identified with the GPR survey. In Fig. 6a the location of the excavated pond in the block A and in Fig. 6b details of the excavated structure are shown.

Fig. 3 Planimetric view of "insula IX 8": location of the blocks investigated with GPR method

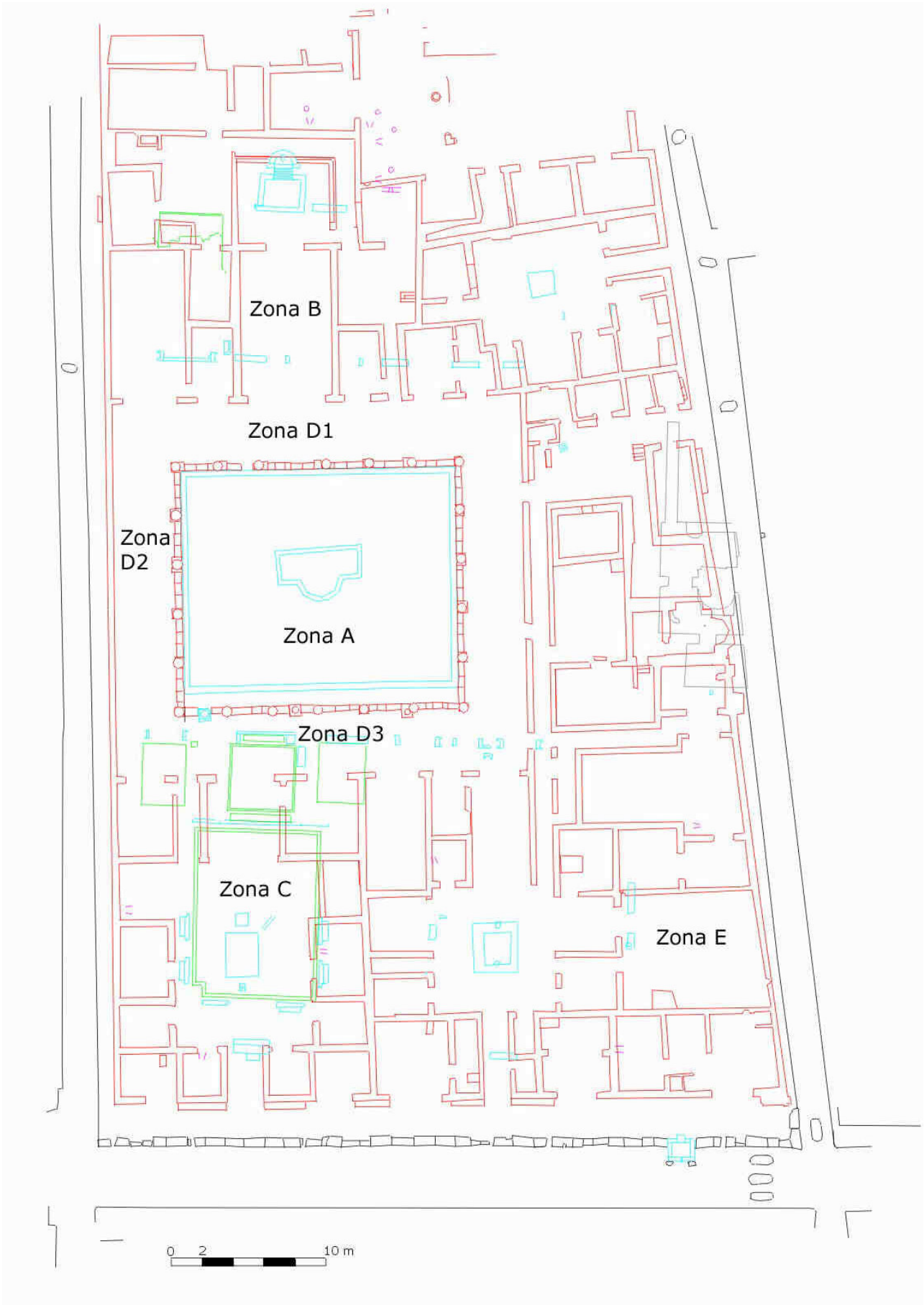


Fig. 4 Domus del Centenario. GPR time-slices at 11-15 ns twt; estimated depth: 0.50 m

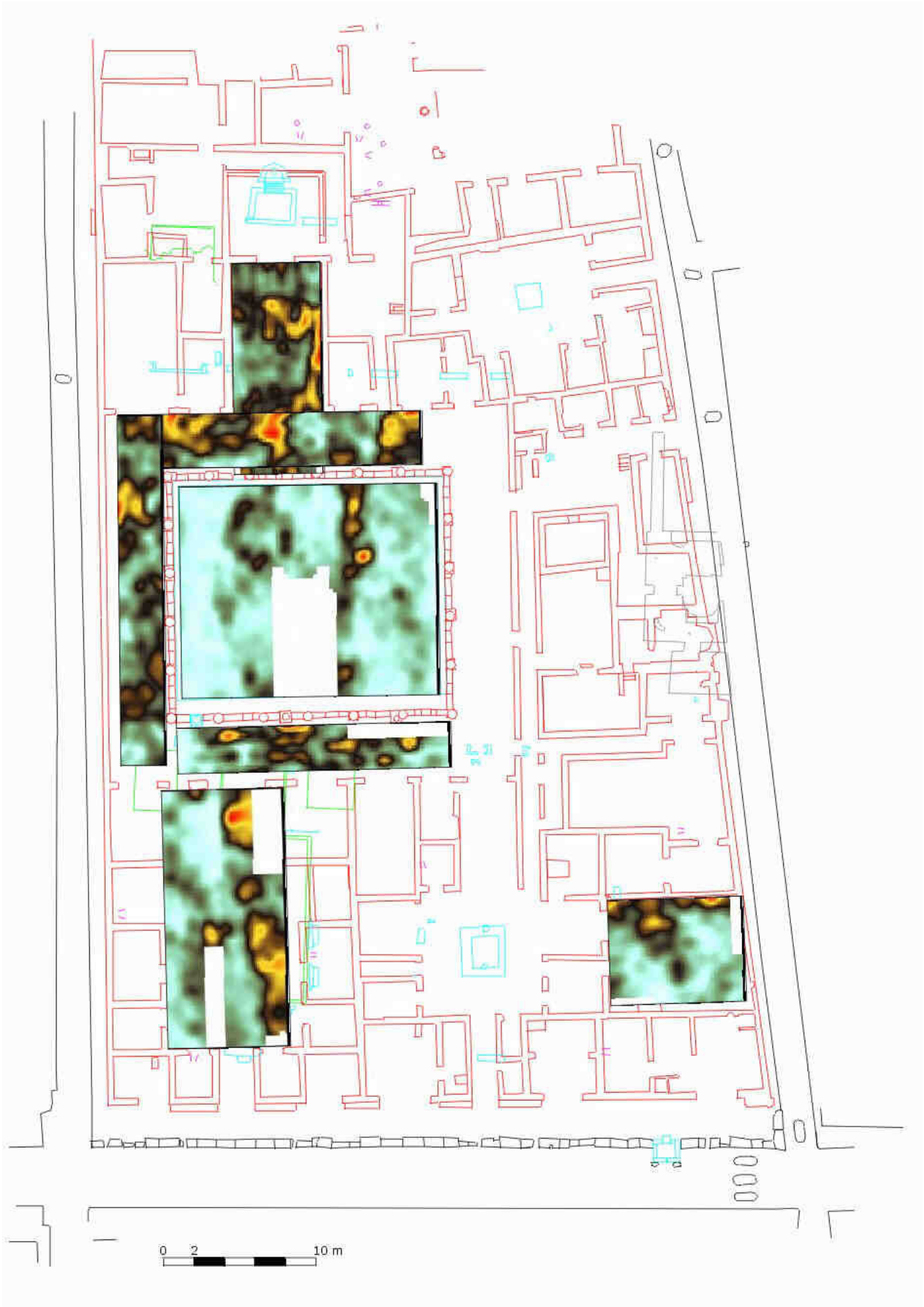
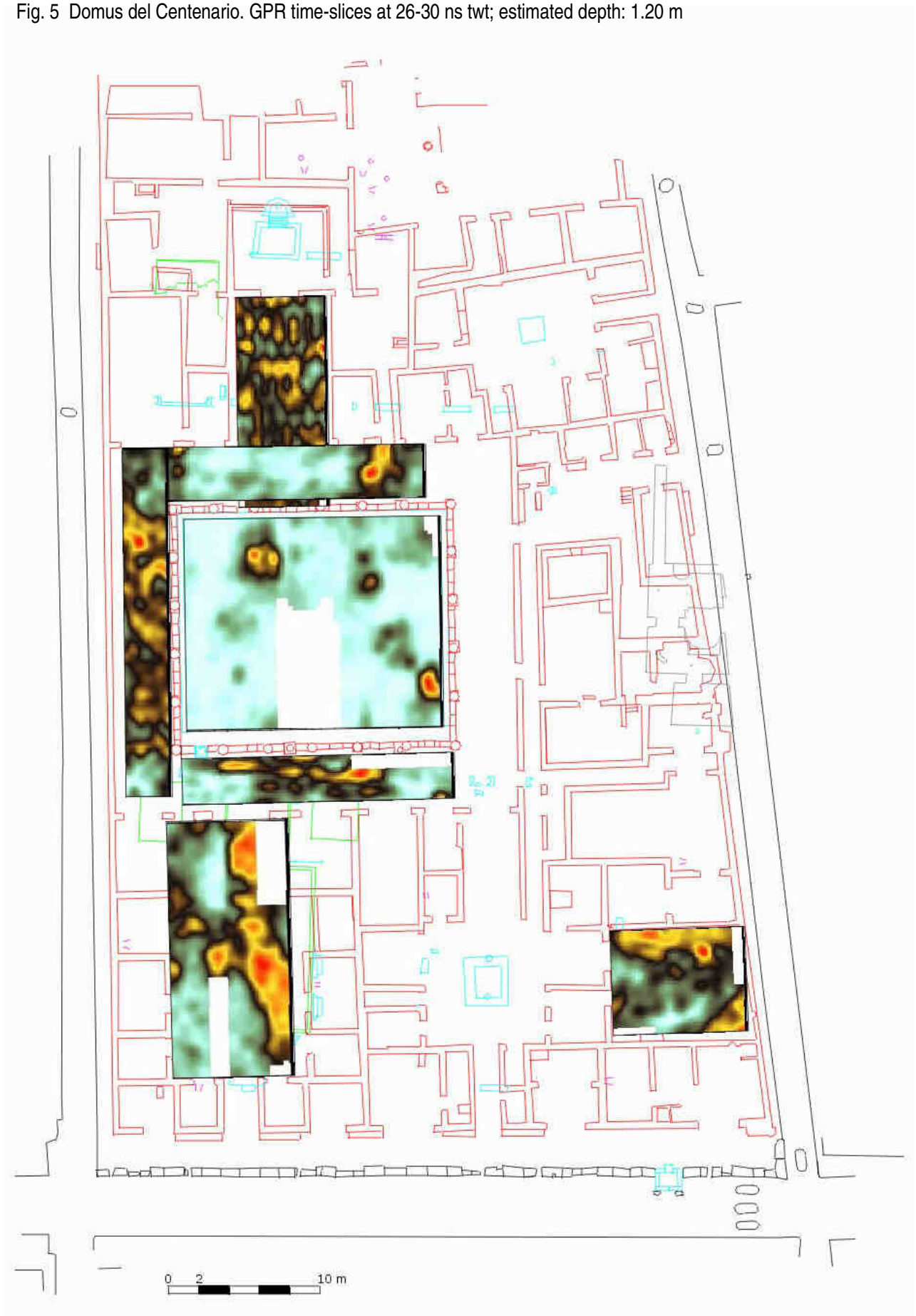


Fig. 5 Domus del Centenario. GPR time-slices at 26-30 ns twt; estimated depth: 1.20 m



This project is still in progress and new surveys, employing GPR, microgravimetric and geoelectric methods in collaboration with the Earth Sciences Department of University La Sapienza of Rome, are planned for the next months, before the archaeological excavations.

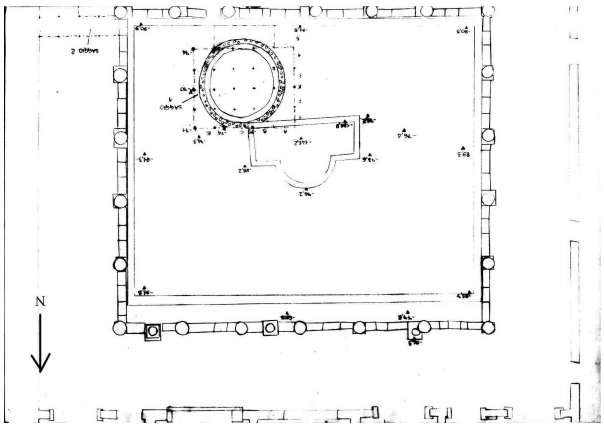
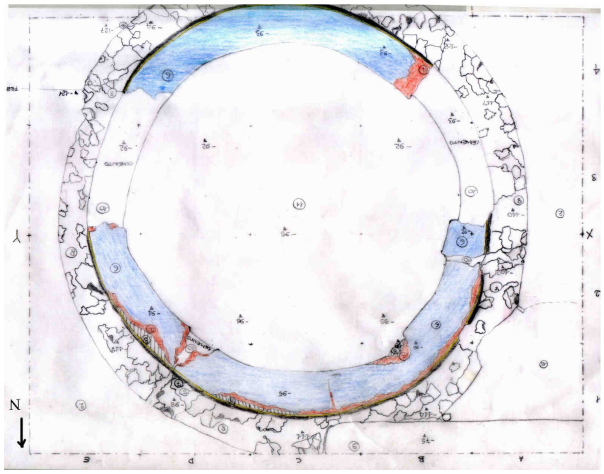


Fig 6 Block A, location (a) and detail (b) of the excavated pond



Acknowledgements

The Author is very grateful to Prof. D. Scagliarini (University of Bologna) and Prof. S. Santoro (University of Parma) for the participation to this project and to D. Verrecchia (ITABC-CNR) for the technical support during the survey.

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GAI Archaeo-Geophysics Seminar, Dublin

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Review of the 1st Archaeo-Geophysics Seminar hosted by the Geophysical Association of Ireland, Dublin, Republic of Ireland, 26 May 2004

The first Archaeo-Geophysics Seminar hosted by the Geophysical Association of Ireland (GAI) and supported by the Heritage Council aimed to illustrate geophysical applications and methodologies within archaeological investigations carried out in Ireland. The frequent use of commercial archaeo-geophysical surveys in Ireland reflects the 'Celtic Tiger'; the country' s economic boom that has seen investment rise and a consequent increase in developer-funded infrastructure projects. Papers were presented by speakers involved in work both on the island of Ireland and in the UK in four sessions.

Kevin Barton (Landscape & Geophysical Services) gave an excellent overview in his opening paper of the development and use of non-invasive prospection techniques in Ireland. Including both terrestrial and waterborne methods, the paper set the appropriate tone for the seminar and highlighted the importance of integrating geophysical data with aerial photography, geological and topographical data. Kevin Barton also made references to the oft-discussed lament concerning the absence of published guidelines and standards in Ireland for archaeo-geophysical survey. This debate continued throughout the day and may yet prove to have sown the first seeds of an Irish Guideline counsel, bringing the discussion to a wider audience.

Joe Fenwick (NUI Galway) gave an overview of recent geophysical surveys and their implications on - and in the vicinity of - the Hill of Tara, the ancient seat of the Kings of Ireland, one of the country's most famous palimpsests and a symbol of cultural identity. The Discovery Programme (an archaeological research institution) has examined a 13 hectare area on the Hill using fluxgate gradiometer, magnetic susceptibility and earth resistance instruments. The survey has improved knowledge of the ritual landscape on the Hill having identified a 210 x 175 m oval palisade Late Neolithic enclosure - which also contained several smaller concentric rings - and the 318 x 264 m hengiform enclosure of Ráith na Rig. Their research methodology contrasted with a reconnaissance/scanning method carried out on a proposed motorway adjacent to the site by contractor GSB Prospection and commissioned by the National Roads Authority (the NRA is a government body responsible for road infrastructure). The reconnaissance surveys subsequently revealed a high concentration of archaeological monuments and settlement activity in the hinterland of Tara. The subsequent Q&A session ignited a heated debate between the speaker and representatives of the NRA concerning the planning strategy that informs motorway route selection, the number and locations of alternative routes and mitigation procedures that can be adopted when dealing with a site of international importance such as Tara.

Martina McCarthy (GeoArc Limited) presented a case history concerning the 'lost' Cistercian Abbey of Kilbeggan (County Westmeath). A 13 hectare fluxgate gradiometer survey identified amongst other things a widespread area of anomalous data. The anomalous area was subsequently investigated with a targeted earth resistance survey and identified the presence of the Cistercian Abbey and associated structures. The clarity and geophysical response of the abbey within the earth resistance data allowed McCarthy to postulate degrees of preservation beneath the soil. The paper was a useful demonstration of applying different instruments to a medieval landscape within a commercial development site.

Session Two was concerned with the application of geophysical techniques to infrastructure developments. **Chris Gaffney (GSB Prospection)** reviewed the development of the commercial archaeo-geophysical contractor within the UK planning system over the last 25 years. The notion of 'prospecting' for archaeological sites and how it can be used within a commercial framework was discussed, highlighting the problems and benefits brought by detailed specifications, frequently short time-scales and the need for sampling strategies over large sites. The paper provided an excellent introduction to the National Roads Authority's double presentation concerning recent work within their remit.

James Eogan (NRA Waterford County Council) gave an overview of NRA statistics, targets and planning processes as well as the mitigation procedures used to protect archaeological sites. The NRA's policy of avoiding the destruction of known archaeological monuments where possible is precisely

what is needed in a major infrastructural scheme, although as Fenwick's paper and subsequent discussion on Tara showed, route selection frequently boils down to the lesser of several evils. Geophysics forms only part of an integrated site assessment that includes desktop assessments, walkover surveys, cataloguing and aerial reconnaissance. Once a preferred route has been announced, archaeological geophysics may or may not be used depending upon the mitigation strategy selected.

Rónán Swan (NRA Westmeath County Council) presented two case studies. The 37 km Kinnegad-Enfield-Kilcock M4 Motorway was surveyed in part by geophysical contractors GeoArc and Archaeological Consultancy Services and revealed, via magnetometer surveys, a pair of contemporary medieval enclosures, 7 km apart at Killickaweeny and Johnstown. The N4 McNeads Bridge-Kinnegad Pilot Study commissioned Earthsound Archaeological Geophysics to carry out a 5 x 5 m magnetic susceptibility survey across a 5 km route of blanket peats, integrating geophysics with existing pedological, geological, topographical and cartographic data, supplementary magnetometer and earth resistance surveys (including control surveys over non-anomalous areas), trial trenching over every anomalous area and a programme of centreline/offset trenching along the entire route. Despite the multi-discipline approach, the pilot study suffered a basic lack of significant archaeological features. Ground truthing confirmed the presence of ploughing regimes/field systems (present in the magnetometer data) and fulachta fiadh (burnt mounds, absent in the magnetic susceptibility data).

Session 3 examined specialist techniques. **Rory Quinn (Centre for Maritime Archaeology)** presented data relating to marine geoarchaeology, shipwreck site formation processes, landscape evolution in response to sea-level change and geophysical responses to submerged archaeology. His paper charted the development of high-resolution imaging to identify small objects associated with wrecks and presented a number of case studies including an impressive bathymetric dataset of *La Surviellante* an 18th century wreck in Bantry Bay, County Cork.

Gavin Duffy (NUI Galway) continued the watery theme with a multi-technique presentation of research at Clonmacnoise, an Early Medieval ecclesiastical site located at a major crossing point on the River Shannon. The use of bathymetric, side scan sonar backscatter, Chirp and magnetometer surveys revealed the presence of log boats, their scour marks, small artefacts, river bed sediment classification, palaeo-landscape depth and even allowed for hypothesises concerning medieval mineral extraction.

Armin Schmidt (University of Bradford) rounded off the specialist techniques by examining the development and current use of Ground Penetrating Radar and Frequency Domain Electromagnetic techniques in archaeological prospection. The use of GPR timeslices as a means of effective interpretation and presentation was discussed. FDEM case studies included comparisons between Geoscan fluxgate gradiometer and earth resistance instruments with the Geonics EM38 and the GSSI GEM-300, concluding that EM instruments are unable to replace magnetometer and earth resistance methods as an all-in-one technique, but stressed their important contribution to interpret the underlying archaeology. Taking the opportunity to address a number of archaeologists, geologists and geophysicists at once, the presentation ended with an unabashed advertisement for ISAP from its very own Honorary Secretary.

A presentation of case studies finished the seminar in the final session of the day. **Paul Gibson (NUI Maynooth) and Niall Brady (Discovery Programme)** presented recent work carried out for the Medieval Rural Settlement Project. Although the fluxgate gradiometer, GPR and earth resistance surveys failed to elucidate significant archaeology within two enclosures, the methodology could be successfully applied to similar sites within the Project' s remit.

Martin Roseveare (ArchaeoPhysica Ltd) ended the seminar with an overview of the development and current use of total field magnetometry in Europe. The main debate focused on the various examples of carts, sledges and chariots constructed by institutes, laboratories and contractors to carry the instruments and provide a steady platform, whilst performing a rapid survey (see ISAP Newsletter No.1 for examples from ArchaeoPhysica and English Heritage). The inevitable comparison between gradiometers and total field magnetometers soon began and continued long into the subsequent Q&A session, as it has done at various other conferences in recent years, focusing on instrument sensitivity, grid size, field procedure and ergonomic design.

The event was well hosted and with a turnout of 61 non-speaking attendees was well appreciated. Disappointment was felt however in the lack of GAI members attending (just 20), and that perhaps further encouragement could be given to the sub-discipline of archaeo-geophysics. The largest sectors attending

were geophysical contractors, followed by academia and government bodies. ISAP delegates numbered 10 (including 4 from the Management Committee), mostly travelling from the UK; this was a good representation for ISAP given we were only 8 months old at the time. It is hopeful that new technological developments, debate and the wide ranging geophysics carried out in Ireland will yield a similar archaeo-geophysics seminar in the not too distant future.

ENVIRONMENTAL AND INDUSTRIAL GEOPHYSICS GROUP

EIGG
Environmental & Industrial Geophysics Group

Two day meetings at Burlington House, Piccadilly, London

15th and 16th December 2004

I would like to register for the following day meeting(s):

15th December: Recent Work in Archaeological Geophysics __
16th December: Forensic Remote Sensing and Geophysics __

Participant details:

Title ____ First name _____ Surname _____

Address: _____
_____
_____
_____

Telephone _____
Email: _____

Registration fee:

Geological Society member	membership number:	_____	free	__
Non-member – 1 day			£20	__
Non-member – 2 days			£30	__
Student – 1 day			£10	__
Student – 2 days			£20	__

Method of payment: (unfortunately we cannot accept credit/debit cards)

I am enclosing a cheque (made payable to EIGG). I understand that this will not be cashed until after the day meetings have taken place. __
I wish to pay on the day (by cash or cheque) __

Signature _____ Date _____

Please return to: Louise Martin, English Heritage, Fort Cumberland, Eastney, Portsmouth, PO4 9LD, UK by 30th November 2004

Recent magnetometer surveys in Eastern Canada

Jason Jeandron, Archaeological Prospectors, Fredericton, New Brunswick, Canada

I thought for my first submission to the newsletter, I'd throw together a potpourri of results over the past year from eastern Canada. I recently acquired a Bartington Grad601-1 fluxgate gradiometer with a 1m sensor separation that has turned out to be quite a little gem.

Archaeological sites in my area that are suitable for geophysical surveys tend to be on floodplains and often relatively deep. To date, several historic and prehistoric sites have been surveyed, all with positive results.

During an unsuccessful search for a 17th Century fort on the banks of the St. John River in New Brunswick, this anomaly was recorded. Although early aerial photographs (1920's) do show a house and barn complex nearby, this feature turned out to be unrelated. Subsequent ground-truthing revealed artifacts from a mid-19th C. homestead (centre) and midden (edge).

Artifacts typical of a homestead began showing up in the silty/sand matrix around 20cm below surface (to a depth of over 1m). Grids were surveyed at 1m traverses with readings every .125m, sensitivity at 0.1 nT and lowest sensor 30cm above ground surface. Grids are clipped at +/- 200 nT. (See Figure 1)

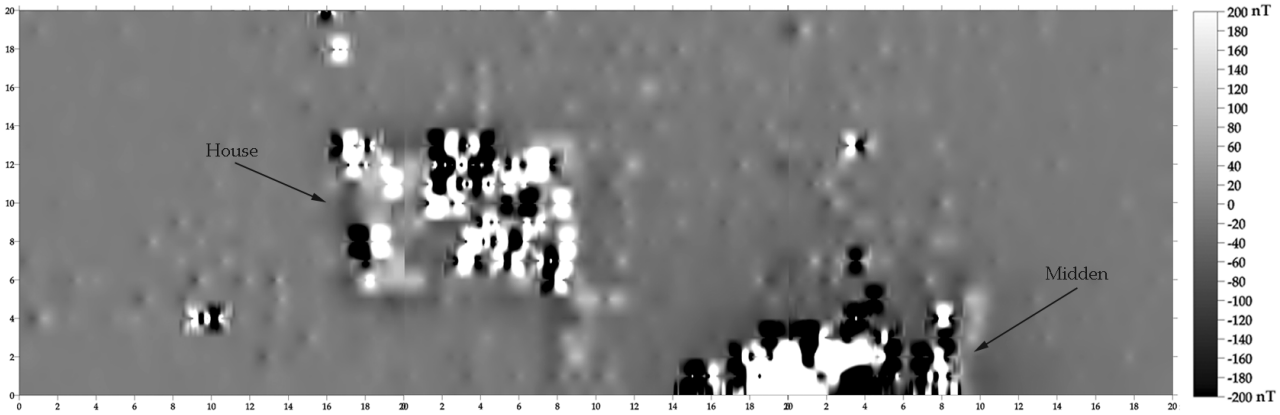


Figure 1

Figure 2

In aid of a graduate student examining a Middle Maritime Archaic prehistoric site in southern New Brunswick, we surveyed 13 10x10m grids with the Bartington fluxgate gradiometer. Ten of the grids are illustrated here, largely showing the underlying peat deposits on this sandy lacustrine shoreline. However, in Grid 1 (furthest right), three anomalies (at about 70 nT) represent hearths. One was excavated and radiocarbon dated to just over 6000 years. The hearths consisted of heat altered sediment with some lithic artifacts and calcined bone. Grids are clipped at +/- 10 nT. (See Figure 2)

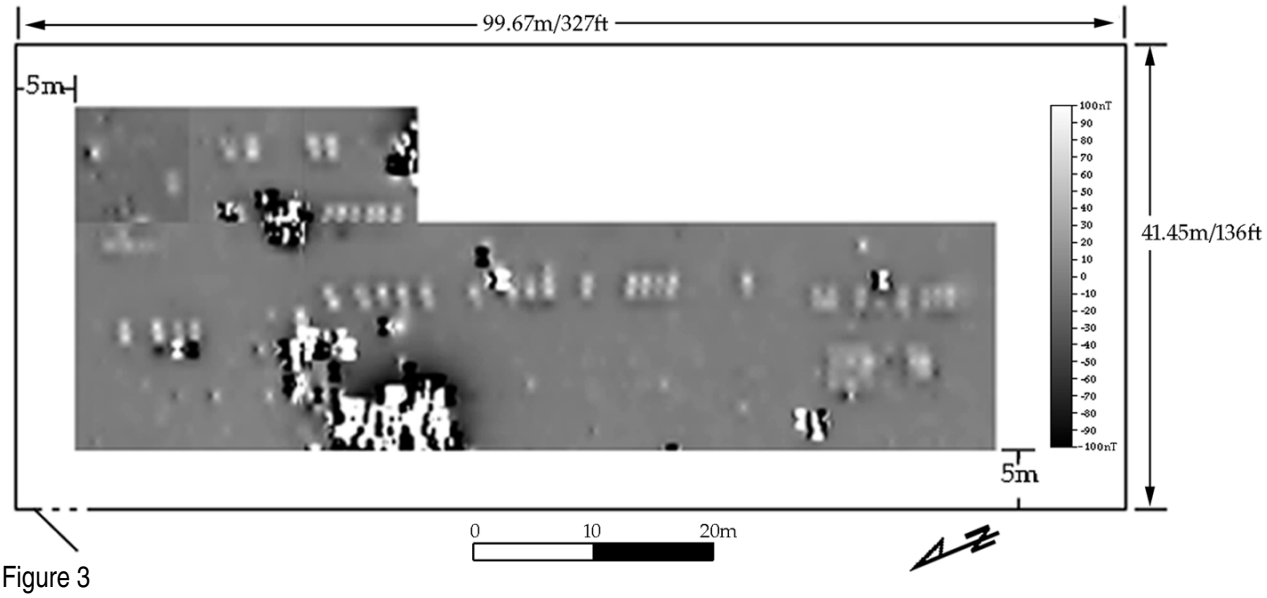


Figure 3

In the fall of last year, I was approached by a local cemetery group to provide them with a burial plot plan. The cemetery began use in 1858 and was associated with an Anglican Church that no longer exists. This location was likely chosen in part because of its sandy geological base probably glaciolacustrine in origin. Over time, the cemetery fell to the elements and was overgrown until just a few years ago. The cemetery has now been restored and is currently maintained by volunteers. Headstones of varying ages and composition are present, however, there was concern that some headstones may have been removed resulting in unmarked graves. The survey located 19 unmarked graves along with 29 marked graves. Note that some of the dipole anomalies are from more recent iron-rich granite headstones as well as a single cast-iron headstone. Grids are clipped at +/- 100 nT. (See Figure 3)

aarg Aerial Archaeology Research Group

NEOLITHIC STUDIES GROUP

BAYERISCHES LANDESAMT FÜR DENKMALPFLEGE

International aerial archaeology conference, Munich, Germany,

'Aerial Archaeology – European Advances'
A decade on from Kleinmachnow

Sunday 5th to Wednesday 8th September 2004

at:
Bayerisches Landesamt für Denkmalpflege, München, Deutschland -
Bavarian State Department for Monuments and Sites, Munich, Germany

For further details and online registration, please visit : http://aarg.univie.ac.at/
Or contact: Fiona Small, AARG Meetings Secretary, c/o English Heritage, Aerial Survey, National Monuments Record Centre, Kemble Drive, Swindon. SN2 2GZ. UK. **Tel**. + (0) 1793 414701/ **Fax** + (0)1793 414859. E-mail: Fiona.small@english-heritage.org.uk

Update from the Far East – Archaeological Prospection Society of Japan

Yasushi Nishimura,
Cultural Heritage Protection Cooperation Office, Asia/Pacific Cultural Centre for UNESCO (ACCU), Nara, Japan

The Archaeological Prospection Society of Japan (APSJ) was established in 1997. The membership in the society is currently about 150 natural scientists, researchers and students from Universities, National Laboratories and commercial companies. We have been holding annual meetings once a year for presenting new research results, and the conference proceedings are published in a societal journal.

The 2004 APSJ annual meeting was held June from 11th to 12th in the newly constructed Saitobaru Archaeological Museum, located on the southern island of Kyushu. The museum is adorned with innovative display techniques and imaging to convey archaeological information of ancient Kyushu in a very interesting way for the public. The meeting also had an invited special lecture entitled "A subterranean burial and mounded-tomb period human skeleton: An overview of the history of Southern Kyushu".

The lectures were opened to the public on the first day of the conference. A total of 11 oral and 5 poster presentations including company displays for new resistivity equipment were given on the second day.

A new light weight and mobile resistivity equipment named "Handy-ARM", developed in cooperation between a university professor and a private geotechnical company, was shown at the conference. This new equipment is specifically designed for archaeological prospection, and comes with specially designed software for real-time inversion of pseudosections. Several field demonstrations with this new resistivity meter as well as GPR were set up in noon break of the second day.

Oral presentations presented at the 2004 APSJ meeting included:

1. Provenance survey on Tatsuyama-ishi (tuff) by magnetic susceptibility and remanent magnetization measurement.

2. Geophysical survey of Kamui-yaki kiln site on Tokunoshima Island.
3. On site measurement of remanent magnetization.
4. Archaeological prospection by seismic tomography: A 3-D imaging trial survey.
5. An application of GPR on a late Kofun period mounded tomb.
6. GPR survey and f-k migration data processing on moat and depression features.
7. Aim and tasks for the GPR survey of Osaho and Mesao in Saitobaru mounded tomb group: A special address by the board of education, Miyazaki prefecture.
8. Investigation of megalithic stone alignment by archaeogeomagnetic survey.
9. Ultrasonic CT sounding on Tokikuni historic wooden house pillars.
10. Ultrasonic CT sounding on three storied pagoda pillars at Rinnoji temple
11. GPR Survey of Ikime Kofun burial mound #4, Miyazaki City, Japan

Poster presentations on display at the 2004 APSJ meeting included:

1. GPR survey for detecting tree rhizome distributions.
2. Subterranean burial chamber tomb investigation by 3-D magnetometer.
3. GPR survey of the stone wall for the loading port.
4. Resistivity survey of a wooden conduit within an earthen rampart in Mizuki.
5. GPS navigation and implementation for GPR surveying of subsurface archaeology.

"Lost chapel" of Henllan, Wales

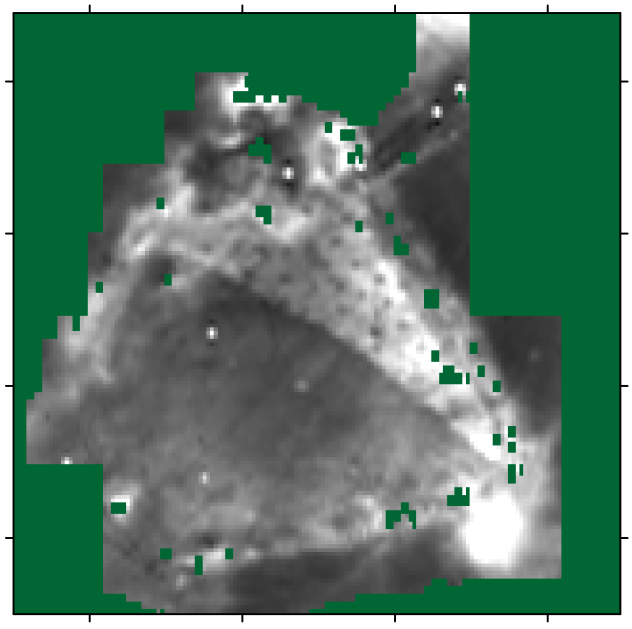
Martin Roseveare, ArchaeoPhysica Ltd., Shrewsbury, UK

Twin probe electrical resistance survey revealed an unusual hilltop complex of an abandoned church (top) within the northern apex of a triangular burial ground. This seems to have replaced a circular enclosure and within the burial ground itself there are numerous linear features of unknown date. The site occupies the top of a prominent knoll, in the valley below which there is a medieval town. The antiquity of the site is uncertain but the church is medieval and the circular enclosure is probably early medieval if not prehistoric.

The church is partly overlaid by another building of unknown function and at a different angle. Extending south from these buildings is an extensive stony area through which individual burials have been cut, visible in the data as discrete low resistance (dark) anomalies. Within the centre of the burial ground, though not obvious in this image, there is a large circular area of lower resistance thought to correspond to the highest density of burials, most of which are probably medieval.

The principle entrance climbs the side of the knoll from the north-east between two flanking walls while there is a possibility of a second entrance in the south-east corner, above the town below.

Plot graduations are at 20m intervals and plot limits are 45 to 200 ohm-metres (white high). Data were collected at 1m x 0.5m sampling intervals.



The survey was commissioned by the Clwyd-Powys Archaeological Trust. (Henllan can be translated from Welsh as "old church/enclosure".)

News from Glasgow:
a round-up of what's happening at the Department of Archaeology

Lorna Sharpe and Louise McAllan, Dept. Of Archaeology, University of Glasgow, UK

Greetings from Glasgow

Here we provide a brief summary of some of the current and recent geophysical survey work in the department. This is not an exhaustive or comprehensive list, but we hope to be able to expand on some of the projects over the coming months if ISAP members will indulge us.

The Department abroad: survey in Sardinia

Last September, under the directorship of Dr Peter Van Dommelen, a team comprising Lorna Sharpe, Louise McAllan, Christine Rennie and Chris Connor began a programme of survey over selected Punic sites in the Terralba region of west central Sardinia.

The project is funded by the British Academy and seeks to investigate the composition and organisation of the Punic rural settlement pattern in the Terralba district as well as gaining a better understanding of the Sardinian agrarian economy.

During the first season of survey in combination with surface pottery collection, four Punic settlements and a possible shrine site were investigated. The combined survey methodology proved to be very successful, with initial results from the surveys, particularly in combination with analysis of the surface ceramic distributions, proving to be very informative (Van Dommelen and Sharpe, 2004).

The second season of survey commences in September this year, and this time we hope to do some collaborative work with Prof. Gaetano Ranieri of the Universita` di Cagliari, Facolto di Ingegneria, Sezione di geologia applicata e geofisica applicata. This year's team sees the substitution of Christine Rennie, who will be busily completing her MPhil thesis, more of which shortly, for Kirsteen McLellan of GUARD, the Department' s commercial unit.

Louise McAllan will complete her MPhil dissertation around this time, which focuses on the integrated application of ceramic and geophysical survey for the study of rural settlement, based on the results from the first season of fieldwork in Sardinia.

Teaching and Learning: The Departmental field school

This is the third year that we have run a field school for our undergraduate students, aimed mainly at those students entering their junior honours year. The students, together with a group of mature students from the Department of Adult and Continuing Education (DACE), will undertake a geophysical survey, amongst other activities, at a possible Neolithic enclosure at Annieston, Upper Clydesdale, Lanarkshire. This site was identified during aerial reconnaissance and is about to be destroyed by gravel extraction works. The enclosure, which has already undergone an archaeological evaluation in fulfilment of planning regulations (Conolly 2003) has been almost completely stripped of topsoil, leaving only a small portion of the enclosed area in the east under soil cover. The ditch is the main feature visible as a cropmark on aerial photography, although several internal features have been identified during the evaluation, and artefacts, including a polished stone axe and sherds of Neolithic pottery have been recovered from them.

Geophysically this is not an opportunity to be missed, and one that will be taken full advantage of by Christine Rennie, postgraduate in the department, who will be evaluating the site geophysically for her MPhil dissertation. This provides an excellent opportunity to examine responses from stripped and undisturbed areas, and to try out the department's new Bartington GRAD 601 gradiometer and its responses compared to that of Geoscan's FM36. During the evaluations in December 2003, it seems that the main enclosure ditch was not sampled, and six months later appears as a very subtle feature in the stripped area. Depending on the responses we get from this feature of course, it may be a candidate for investigation as one of the 'ghost features' described in the last volume.

PhD Thesis

Lorna Sharpe is about to submit her PhD thesis, which examines the chemical links between cropmarks and geophysical responses at selected sites in the Upper Clyde Valley, Lanarkshire. Of the emerging conclusions, one interesting point to note is that the 'ghost geophysical sites' mentioned in the last newsletter are also a known phenomenon at cropmark sites. It is suggested in the course of her research, and the results appear so far to confirm it, that both crop growth and geophysical responses may be due, at least in part, to chemical differences remaining in the soil. These chemical differences affect plant metabolism and growth, and are also responsible for electromagnetic changes in the soil solution that can be detected geophysically. It is early days for this hypothesis but Lorna would welcome any comments or discussion on the subject, and would be more than happy to make contact with anyone with an interest in this area, either on or off the email list.

Projects

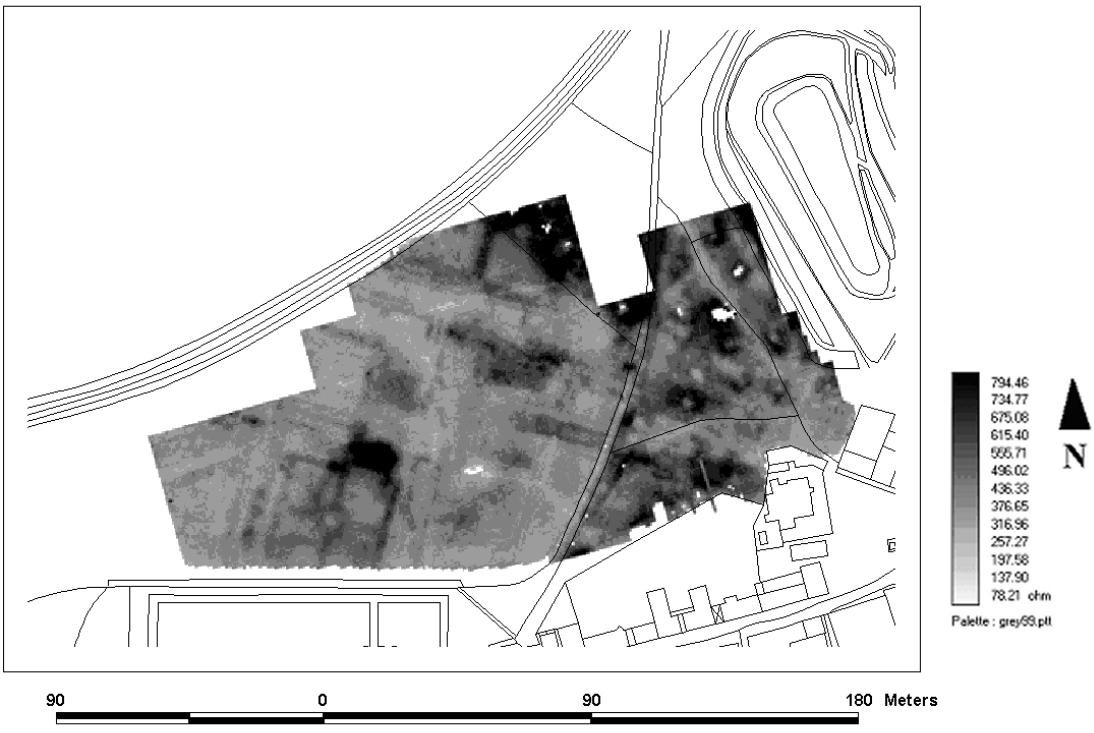
Working with the National Trust for Scotland

Notwithstanding a survey undertaken in Dumfries and Galloway in 2002 for the second departmental field school, of a prehistoric enclosure (Sharpe et al in prep), where the tenant farmer undertook a very interesting experiment that compared his dowsing responses to our geophysical survey, the department, often in collaboration with GUARD, has undertaken a number of surveys funded by, and on behalf of, the National Trust for Scotland (NTS). One of the first of these surveys was of Ossian's Hall, Dunkeld, where GPR (Utsi Electronics Ltd) was used to determine whether the folly had underground vaults.

The department also surveyed around the site of Dunkeld Cathedral under the directorship of Dr Richard Jones. This was aimed at detecting the remains of the now levelled Dunkeld House, which appears regularly on aerial photographs as a series of parchmarks, as well as investigating a number of suspected structural remains appearing as topographic features close to Stanley Hill. The surveys were extremely successful in locating several phases of Dunkeld House, as well as defining structural remains in the area close to Stanley Hill, and will be very useful in the future management of the site.

Shown below are results of the resistivity survey at Dunkeld, showing the remains of Dunkeld House and formal gardens (McAllan and Kellogg, 2003).

At another NTS property, this time an upstanding stately home, a geophysical survey was undertaken in the environs of Haddo House, Aberdeenshire, under



the directorship of Louise McAllan. The survey was followed by trial excavation, in order to evaluate an area of grass that NTS planned to use for outdoor events. The evaluation did not result in the detection of any archaeological remains, but a GPR survey of the car park revealed structural remains which may be related to the earlier Haddo House, which was destroyed by fire, known as the 'Place of Kelly'. If this is proven to be the case, this is a remarkable discovery of a structure known only from patchy documentary evidence and local legend (McAllan, Timoney and Noble, 2004).

Colstoun

In 2003 a survey commenced at Colstoun in East Lothian as part of the training programme for postgraduate students studying for the degree of MPhil in Aerial Photography with Geophysical Survey in Archaeology (Millican in prep). The project brief was to identify the location of the kilns at the pottery factory there (the only site of its kind in Scotland). The site had been previously surveyed and partly excavated, so an additional aim was to monitor the condition of the site, which lies in a cultivated field. The magnetic results located the kilns as well as providing clear evidence that the effects of ploughing are affecting them adversely. This survey is ongoing, and this summer's season focussed on the identification of further 'industrial' activity, as well as the continuing aim of investigating the surrounding medieval landscape and placing this important site into context.

Geophysical Survey at Mesolithic Sites

Various members of the department have been involved in testing the efficacy of geophysical techniques for detecting features associated with lithic scatters (McAllan and Sharpe in prep; Barrowman and Hamer 1999). This has met with some success in the Upper Clyde Valley, Lanarkshire (Hanson and Sharpe in prep), and on Islay and at Applecross in north-west Scotland (Finlay and McAllan, in prep) although at the former site survey suggests that what was at first hoped to be a group of Mesolithic hut circles (N Finlay pers. comm.) have in fact produced responses characteristic of barrows of later date. It is hoped that a paper evaluating geophysical survey at such early and ephemeral sites will be completed soon (McAllan and Sharpe in prep). Thanks in advance to Andrew David at the AML for providing information from the EH database on similar work undertaken in the past in England. If anyone else has surveyed any Mesolithic sites we would be very interested to hear how the work went and how valuable you feel the results were.

Publications

We are aiming to publish the proceedings of the conference Going over old Ground: Geophysical and Geochemical survey in Scotland (or GOOG as it has affectionately come to be known!) this year. Editors Dr Richard Jones and Lorna Sharpe are approaching the final stages of compilation of papers from contributors. The papers are excellent and we hope that this will provide a good overview of the work that is going on in Scotland, and be of value to researchers, students and interested observers equally. Thanks to Historic Scotland for generously funding the conference.

And finally……

For anyone that is around Glasgow and interested in remote sensing and its applications in archaeology, we would like to introduce a new short course on the subject. Beginning in January 2005, and running as part of the adult learning series from DACE, 'Searching for Scotland's Past: Remote Sensing Techniques in Archaeology' will run for 10 weeks, and aims to give an introduction to the theory and practice of archaeological geophysics and aerial photographic interpretation. If you are interested in receiving further details of this course, please contact us in the ways listed below.

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Louise McAllan: louisemcallan@yahoo.com

References

Barrowman, C. and Hamer, J., 1999. Survey and Excavation at Garvald Burn, Upper Clyde Valley Interim Report to Historic Scotland, Hanson, W. S. and Sharpe, L.

Conolly, R. 2003. Archaeological Excavations at Tinto Quarry, Thankerton, South Lanarkshire: Station Cottage Phase 1 Data Structure Report. Headland Archaeology, Project Code TSG 02

Finlay, N. and McAllan, L., In Prep. The Scottish Mesolithic Geophysical Survey Project 2004

McAllan, L. and Kellogg, D., 2003. Dunkeld House: Geophysical Survey and Trial Excavation, Unpublished NTS Report.

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Sharpe, L. and Finlay, N, and McEwan, L. In Prep. Geophysical survey of an enclosure at Lodge Island, Castle Douglas.

McAllan, L., Noble, G. and Timoney, S. Geophysical Survey and Trial Excavation at Haddo House, Aberdeenshire. GUARD project 1598, Unpublished GUARD Report.

Millican, K., in Prep. Geophysical survey at the Medieval pottery production centre of Colstoun, East Lothian. In Jones, R. and Sharpe, L. (Ed.s) Going Over Old Ground: Perspectives on Archaeological Geophysical and Geochemical Survey in Scotland. Proceedings of the conference held at Glasgow University Archaeology Department, August 2003.

Terralba Project Website:
www.sardinia.arts.gla.ac.uk/Terralba/Terralba.htm

ISAP Membership Benefits: the journal Archaeological Prospection

One of the first things that the ISAP committee organized on behalf of the membership was a reduced price for the only journal dedicated to our discipline. The journal, as you all know, is Archaeological Prospection. The journal is truly international in scope and covers all issues relating to near surface investigation. The publisher, Wileys, has agreed to a substantial reduction in the personal copy price and applies to the printed version of the journal. The cost to ISAP members is only £75 (sterling) and that is a reduction of about 77% on the normal rate.

In order to benefit from this offer you must contact Anne Holman, who personally looks after the ISAP offer. Her contact details are as follows:

Anne Holman
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Tel: 01243 843190
Fax: 01243 843232
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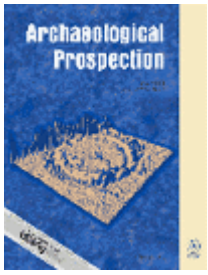

According to Anne Holman the best way to take up this offer is to phone her direct and pay by credit card. This will ensure prompt delivery of the journal. However, if you can' t or don' t wish to pay over the phone you can ask her to send an invoice and members can pay on receipt. Paying by invoice will take a little longer, so if you want the journal quickly then pay by card.

If any of the payment details or charges change in the future this information will be posted on the ISAP website www.archprospection.org

Chris Gaffney

Update from the UK & Eire

Ed. Anne Roseveare, ArchaeoPhysica Ltd., Shrewsbury, UK

On 24th May, **Allied Associates Geophysical** had an equipment demonstration at Wroxeter Roman City in conjunction with **Geostudi Astier** and **Foerster**. On show were the **Ferex** 4-channel fluxgate gradiometer and the **Terravision** multichannel radar system. Meg Watters of Birmingham University (seated in the pickup) has been testing the Terravision over building complexes near the baths at Wroxeter.

The **Geophysical Association of Ireland** held their annual seminar in Dublin on May 26th: this year the topic was ArchaeoGeophysics. (See article p9.)

How to deal with archaeology when building major roads is a hot topic in Ireland at the moment, with controversy surrounding high-profile projects including the M50 south of Dublin and the M3 near the Hill of Tara.

The **EIGG** (Environmental and Industrial Geophysics Group of the Geological Society) were at the Leicester test site on 9th July for their annual equipment demonstration. The displays included **AAG**, **Bartington**, **Geomatrix Earth Science, GeoSoft** and the **University of Leicester**'s Multi Sensor Platform. Also, **DWConsulting BV** were presenting a new software package for archaeological geophysics: **ArcheoSurveyor**.

Geoscan Research have updated their web site www.geoscan-research.co.uk including an update for their **GeoPlot** software.

The UK's **National Archaeology Days** (July 17th & 18th) included some geophysics demonstrations.

At Wroxeter an event was organised by Dr. Roger White. On site were: **ArchaeoPhysica** (4-channel Cs mag. chariot); **Birmingham University** (RTK GPS and GPR); **Keele University** (resistance meter and fluxgate gradiometer) and **Stratascan** (conductivity meter). ArchaeoPhysica also collected some high-resolution magnetometer data, which looks likely to add to what is known about the potential "church" building.

Although the Ermine Street Guard were attracting a lot of attention with their re-enactment displays (especially their artillery) the public kept us all very busy for the weekend. One thing still puzzles us: why is it the smallest children who want to push the chariot the furthest?

The **English Heritage Centre for Archaeology Geophysics Team** were at Kenilworth Castle (reported on by Louise Martin & Neil Linford).

Following on from our recent survey at the end of June at Kenilworth Castle we presented initial results from our work and demonstrated geophysical techniques to visitors at the Castle on Sunday 18th July. This survey forms part of a wider project to investigate evidence for the remains of original, magnificent garden created by Robert Dudley, Earl of Leicester, in an effort to impress Elizabeth I during her visit to Kenilworth in 1575.

To make things more interesting, the site of the original garden has been replanted with a reconstructed layout that required much clambering over box hedges and through lavender, sage and rosemary, but it certainly made for a more fragrant survey than we are used to! We finished up the week surveying over the Pleasance,

a diamond shaped moated platform containing buildings constructed by Henry V and later removed to the castle, once reached from the castle by boating across a large defensive lake or mere. Preliminary assessment of the results from the garden indicates the presence of several structures that will, hopefully, be tested in the autumn by a small evaluation excavation.

For NAD we demonstrated GPR, resistivity profiling and earth resistance survey on site. On top of talking to the visitors, we (and some enthusiastic volunteers) managed to collect a little more data which will further inform our interpretations and feed into the wider Kenilworth Castle Tudor Garden Development Project. We received an enthusiastic welcome from both staff at the site and members of the public who enjoyed being able to see (and take part in) hands on geophysical survey.

Above:
NAD at Kenilworth, clockwise from top left - a couple of youthful volunteers assist with the GPR survey; Louise and Andrew talk through the techniques and results

Noticeboard

Logo competition

Thanks to those who entered the competition: it's clear there is some latent artistic talent among the ISAP membership! The management committee has yet to reach a decision on the design so this will be announced in the next issue of **ISAP News**.

Events

Topical conferences and other events around the world.

AARG Munich, September 2004 – see notice p13
Papers from Armenia to Wales: a wide range of subjects

CIPEG International Association of Egyptology 9th Annual Congress, Grenoble, 6–12th September 2004

Contact: Krzysztof Grzymski, Secretary of CIPEG, Egyptian Department, Royal Ontario Museum,
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Fax: +1 416 586 5877
E-mail: Krzysg@rom.on.ca
Web: www.egyptologie-grenoble.com

EAGE Near Surface 2004, Utrecht, 6-9th September
Near Surface Division annual conference, European Association of Geoscientists and Engineers. Two sessions on archaeological and historical subjects.
Web: www.eage.nl/conferences

EIGG "Recent work in Archaeological Geophysics" and "Forensic Remote Sensing and Geophysics", London, December 2004 – see registration form p11

International Conference on Remote Sensing and Archaeology

Beijing Friendship Hotel, October 18th – 21st 2004

Contact: Dr. Wang Changlin
Institute of Remote Sensing Applications, Chinese Academy of Sciences, P.O. Box 9718, Beijing 100101, China
Tel: 86-10-64838047, Fax: 86-10-64879740
Email: wcl@irsa.irsa.ac.cn
Web: www.rsarch.cn

Korean Society of Exploration Geophysicists

National Research Institute of Cultural Properties, Daejon, Korea August 27th – 28th 2004

Membership

The ISAP web site, www.archprospection.org, is currently hosted by the University of Bradford. For enquiries about membership and subscriptions, go to the ISAP web site or contact Hon. Secretary Armin Schmidt (e-mail A.Schmidt@Bradford.ac.uk).

Current benefits include access to the mailing list, the newsletter and a reduction in the subscription fee for Wiley's *Archaeological Prospection* journal. (See p19.)

Contributors to ISAP News

The Editor wishes to thank those who contributed to this issue:

James Bonsall; Chris Gaffney; Jason Jeandron; Louise Martin & Neil Linford; Yasushi Nishimura; Salvatore Piro; Martin Roseveare and Lorna Sharpe & Louise McAllan.

Regional updates in ISAP News

A number of people have said they think having regional correspondents is a good idea – please contact the Editor if you feel you could contribute.

The next issue of ISAP News

Issue 3 of the newsletter is planned for release in November - the **deadline is 31st October 2004**. Send your contributions (e-mail preferred) to:

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Post: ArchaeoPhysica, PO Box 530, Shrewsbury, Shropshire. SY5 6WH UK
Tel: +44 (0) 7050 369 789

Please follow these guidelines for contributions:

- text as MS Word document
- photos as .jpg or .gif
- data images as .tif
- label e-mail attachments clearly, try to keep the size reasonable and zip them if possible.

Anne Roseveare