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ISAP NEWS

The newsletter of the International Society for Archaeological Prospection

Contents

Editor's Note

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Welcome to the 30th 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.

As it's the beginning of the year, I would like to remind all to renew their ISAP membership, which was due on the 1st January. The price is still only £7 / €10. For details of how to renew, please click the following link: http://www.bradford.ac.uk/acad/archsci/archprospection/renew.php

*Please send any contributions or queries for the next newsletter (ISAP News 31) to the address above by the **30th April 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
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Heritage Preservation and Planning at the Longfellow House – Washington's Headquarters National Historic Site, Cambridge, MA

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It is essential that in North America, leading academic programs, preservation organizations, and agencies including the National Park Service, must explore and embrace preservation technology that is responsive, accurate, and cost effective. The value of imaging archaeological properties through laser scanning is beginning to be recognized by the Historic American Buildings Survey (HABS) and Historic American Engineering Record (HAER). Geophysical surveys of archaeological sites and landscapes are increasing across the United States; however, the value of combining subsurface and above-ground imaging has rarely been realized.

To address this need, the National Center for Preservation Technology Training[i] sponsored the *Archaeological Survey Technologies, Data Integration, and Applications* Workshop and Seminar[ii] *(ASTDA)* to explore the integration of these imaging methods. This project is the first to address the application of these combined methods for the management of historic properties, especially those threatened by erosion, development, and other destructive processes. The *ASTDA* Workshop and Seminar were hosted at the Longfellow House – Washington's Headquarters National Historic Site in Cambridge, MA (Figure 1).

Figure 1 The Longfellow House - Washington's Headquarters National Historic Site in Cambridge, with ASTDA Workshop participants.

The *ASTDA* Workshop trained participants in the practical applications of data capture, processing, and 3D visualization for laser scanning and geophysical survey techniques, combining subsurface and above-ground imaging for placing the Longfellow House in context to its broader historic landscape. The main objective of the workshop was to teach participants specific skills of non-invasive data acquisition and the fusion of sub-surface features, existing archaeological structures, and landscapes. Equally important, the workshop focused on how to effectively engage the results of these methods in the investigation, planning, and preservation of archaeological properties.

Using the integrated results from the *ASTDA* Workshop, the *ASTDA* Seminar targeted three specific groups associated with historic properties: managers, developers, and public outreach groups with the aim to teach them not only the benefit of using these methods, but also how to successfully integrate these methods into their existing work flow. The seminar concluded with a panel discussion which included: Michael Feldman (President, Harry R. Feldman, Inc.), Nina Zannieri (Executive Director, Paul Revere Memorial Association), Ellen Berkland (Archaeologist, Massachusetts Department of Conservation and Recreation), Meg Watters, and moderator Steven Pendery. The panel discussed personal experience engaging these methods, challenges, and future development ideas for a more integrated approach to archaeological preservation and planning.

The host site for the *ASTDA* Workshop and Seminar contains a cultural landscape, architecture, and collections reflecting the use of its core area from pre-contact occupation through its use as Commander-in-Chief George Washington's Headquarters and later as the residence of poet Henry W. Longfellow. As part of the *ASTDA* project, instructors (Steve Pendery, Bryan Haley, Ken Kvamme, Meg Watters, and

Figure 2 Survey techniques for the ASTDA workshop included: the SIR3000 GPR with a 400 MHz antenna, the FM256 Fluxgate Gradiometer (with instructor Ken Kvamme), the TR/CIA Resistance Meter (with instructor Bryan Haley), the EM38B conductivity meter, and a Leica ScanStation C10 3D laser scanner (with instructor Steve Wilkes).

Steve Wilkes) collected complete surveys of targeted areas of interest. Survey methods included GPR, electrical resistivity, magnetometry, conductivity, magnetic susceptibility, and 3D laser scanning (Figure 2).

Generation of standard data maps and imaging identified a number of modern, archaeological, and geological anomalies. Of particular interest, the geophysical surveys identified historic garden features and colonial-period structures (Figure 3).

3D laser scanning demonstrated different mapping contexts (interior and exterior of standing structures) and mapped existing conditions of the site. This site survey method provides final materials which include architectural detail, 3D models of the house structure, as well as places the historic structure in context to its surrounding landscape (Figure 4 overleaf).

Until recently, there has been no simple, off the shelf process to examine or to visualize the combined three-dimensional qualities of sub-surface and surface features distributed across a site. Data integration and visualization is a key component for data investigation and can provide easy to use information from complex data. The *ASTDA* Workshop and Seminar not only focused on the methods for non-invasive mapping, but also on how to understand and implement results for site planning and preservation. GIS was used as a first step toward a 2D spatially integrated management and analysis tool. However, exploration of the true 3D component of data from the Longfellow House – Washington's Headquarters NHS was conducted using Pointools (Figure 5 overleaf). This basic visualization software was used because it provides an affordable platform for viewing multiple types of spatially related information. Crossing the spectrum from specialized data capture and analysis to client presentation and the application of resulting information by property managers is fundamental to realizing the full potential of available data.

While Pointools is a simple and effective platform for presenting information to end users, continuing research considers other visualization methods (such as Avizo[iii] visualization software and third party GIS modules) for the integration of additional data types

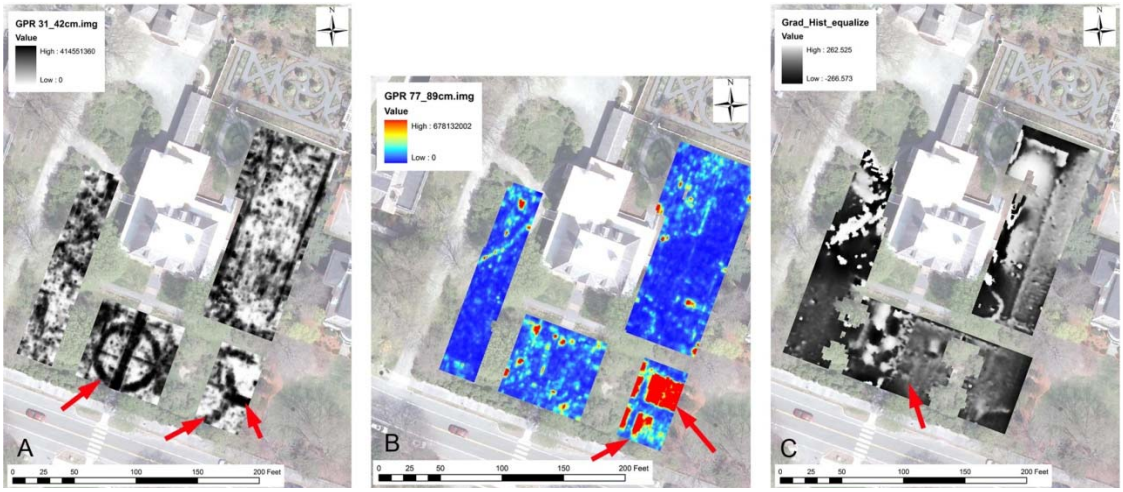

Figure 3 The GPR slice from 0.31 to 0.42 m reveals circular garden features (A, not identified during previous excavations) while at a slightly lower depth GPR reveals additional garden features at 0.77 to 0.89 m (B). Magnetometry survey identifies the basement of an historic structure pre-dating the Longfellow House – Washington's Headquarters NHS.

including more traditional 2D geophysical survey results, excavation information, modern utilities, and geological mapping for spatially accurate presentation, query, and quantitative assessment for site management and preservation[iv].

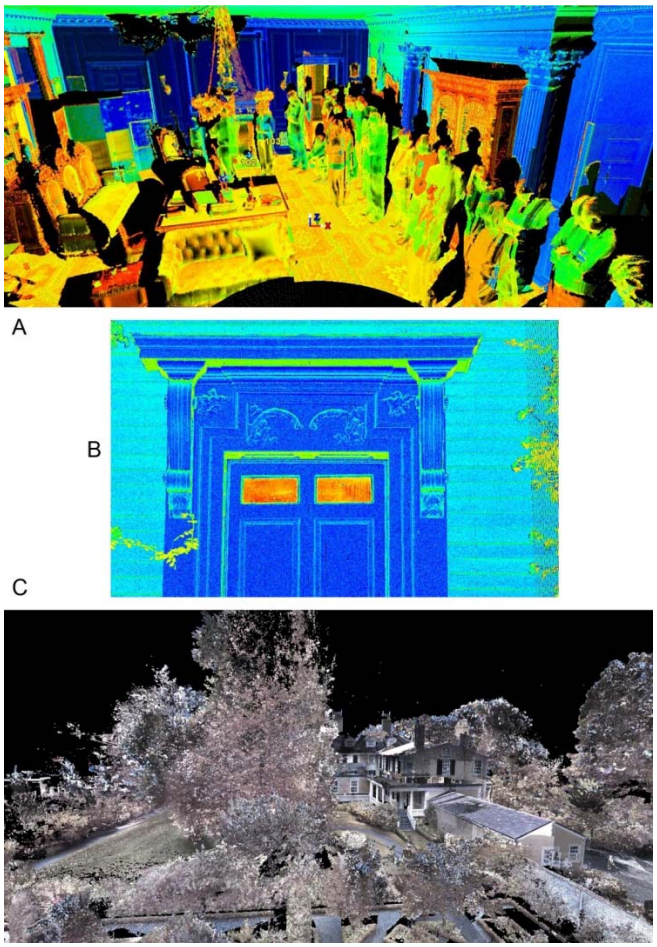

Figure 4 3D laser scanning documenting interior spaces (A), architectural details (B), and the building within its surrounding landscape (C).

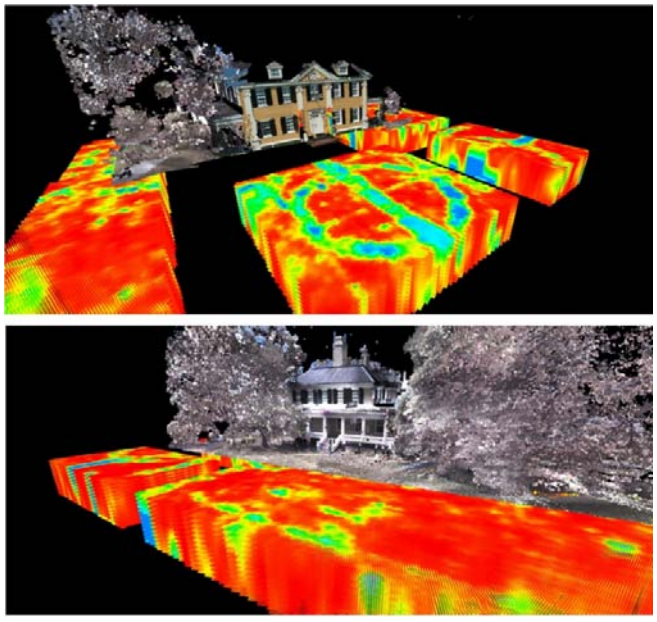

Figure 5 Integrated 3D laser scan and GPR survey results in Pointools visualization environment.

An Important Reminder:

Cutting edge research is pursuing fast and accurate data capture, visualization, and interpretation. In our growth toward this goal we must also provide simple and comprehensive information to the end user, something they can use as an integral step in their approach to site preservation and management. While on this path it is important that we do not forget what can be gained from the rawest form of our data.

During the preliminary site review, I[v] conducted a small GPR survey over an area in which a sondage had been investigated in the early 1990s. Steve Pendery, who was part of those excavations, kept asking me if I had found the basement of the structure pre-dating the current Longfellow House that they had unearthed. For the life of me, I could not locate what should have been clear cut walls and the basement floor. He even drew a line in the grass where the structure should have been, but still, I could not see a thing. Instead I put him off; certainly it will appear when I post process and image the data. My normal processing, data review, and time slice imaging did not readily reveal the basement feature (have I mentioned that it showed up clearly in the magnetometry survey?) Only after very careful transect-by-transect analysis of the original vertical profiles was I able to clearly identify the position and depth of the basement feature. This serves as an important reminder to all of us doing geophysical surveys – always ***exhaustively*** *examine your data in every way possible, do not rely on 'imaging' techniques only for results. Think of what we might miss if we don't take the time to look at every detail, something to keep in mind as we continue moving toward large scale landscape data capture and assessment!*

Further information on the ASTDA Workshop will be posted at:
http://proteus.brown.edu/astda/8895

[i] http://ncptt.nps.gov/
[ii] http://proteus.brown.edu/astda/Home
[iii] http://www.vsg3d.com/avizo/overview
[iv] http://www.vsg3d.com/sites/default/files/spotlights/VSG_cs_Birmingham_0.pdf
[v] Meg Watters

Large scale archaeological prospection of the Iron Age central place Uppåkra in Sweden

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Ludwig Boltzmann Institute for Archaeological Prospection and Virtual Archaeology

The Iron Age archaeological site of Uppåkra in Scania, south-western Sweden, is one of Sweden's most prominent proto-urban settlements. Uppåkra is situated in the wide open, agriculturally used Scanian landscape about five kilometres south of the town of Lund. In 1996, members of different research institutes started the scientific project "*The Social Structures of Southern Sweden during the Iron Age*" lead by Prof. Lars Larsson from the University of Lund, focusing on the settlement site Uppåkra (Larsson 2002: 3-30). Since then several archaeological excavation campaigns have revealed the presence of thick occupational layers, rich archaeological finds, large hall buildings, as well as an exceptional ceremonial house. Numerous metal detector surveys have outlined a continuous settlement sequence from the 1st century BC until the 11th century AD (Larsson 2010: 189). The results of these investigations have been published in the series *Uppåkrastudier 1-11*.

In 2010 the Ludwig Boltzmann Institute for Archaeological Prospection and Virtual Archaeology (LBI ArchPro – http://archpro.lbg.ac.at) selected the site of Uppåkra and its surrounding landscape as large-scale case study area for the test and development of novel high-resolution archaeological prospection technology and methodology.

In collaboration with the Swedish LBI ArchPro partner, the Contract Archaeology Unit of the Central Swedish Heritage Board, and Prof. Larsson in August/September 2010 a team from the LBI ArchPro, started motorized magnetic and GPR surveys at Uppåkra. In total 40 hectares of magnetic and 10 hectares of GPR measurements were conducted over the course of seven days. The magnetometer system used, consisted of five Foerster gradiometer probes mounted with 50 cm spacing on a non-magnetic trailer, towed by a Quad bike. The novel GPR system employed was a 16 channel 400 MHz MALÅ Imaging Radar Array (MIRA) with 8 cm in-line and 8 cm cross-line trace spacing (Fig. 1), mounted in front of a small tractor (Trinks et al. 2010). In April 2011, the fieldwork continued with the intention to cover all accessible areas surrounding the known Iron Age settlement site using magnetic prospection.

Figure 1: GPR measurements with the 16 channel 400 MHz MALÅ Imaging Radar Array (MIRA) with 8 cm channel spacing using a robotic total-station together with a prism for automated data positioning.

Additionally, a high-resolution digital terrain model of the central area was generated by using terrestrial laser scanning with a Riegl LMS Z420i. The application of two motorized magnetometer systems with five and ten channels (Fig. 2) made it possible to acquire more than 110 hectares of magnetic data over the course of nine measurement days. The investigated area located in wide open farmland offers perfect measurement conditions. The friendly support of the landowners, the University of Lund, and the Uppåkra Arkeologiska Center made it possible to survey the so far largest interconnected archaeological magnetometer prospection area in Scandinavia, covering in total over 1,75 km^2 (Fig. 3).

Figure 2: Motorized magnetic survey with 10-channel Foerster gradiometer array mounted with 25 cm probe spacing on a nonmagnetic cart in April 2011. The RTK-GPS antenna for data positioning is visible on the cart. In the background Uppåkra church can be seen.

The magnetometer measurements illustrate a large number of previously unknown archaeological structures, such as pits, pit alignments, postholes, hearths and over-ploughed grave mounds surrounding the central settlement area of Uppåkra. Whether the detected structures, which partly differ in character, are contemporary to the Iron Age settlement or not, is currently unknown (Trinks et al.: 2011). Within the high-resolution geophysical data and through the combination of the GPR and magnetic method, several large longhouses with associated smaller buildings were identified south of the central area containing the earlier excavated ceremonial house (Gabler: 2011). In the west of the ceremonial house, round structures with central east-west oriented burials have been visible in the GPR data (Fig. 4). The most prominent of these structures was excavated in May 2011 by the University of Lund in collaboration with the Central Swedish Heritage Board. The excavation results showed very good agreement between the by high-resolution GPR predicted and the excavated structures. The archaeological interpretation of the GPR data as burial under a layer of packed stones with surrounding circular ditch has been confirmed (www.uppakra.se).

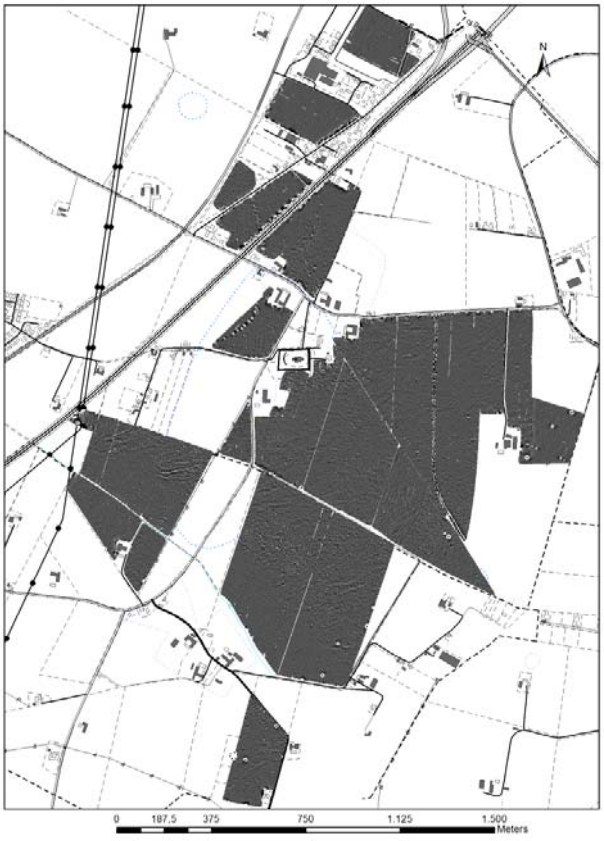

Figure 3: Area surveyed with motorized magnetic systems in 2010 and 2011 covering 175 hectares in total. Uppåkra church is located in the centre of the map. The magnetic data is plotted with 254 greyscale values distributed linearly between -8 nT (white) and 16 nT (black).

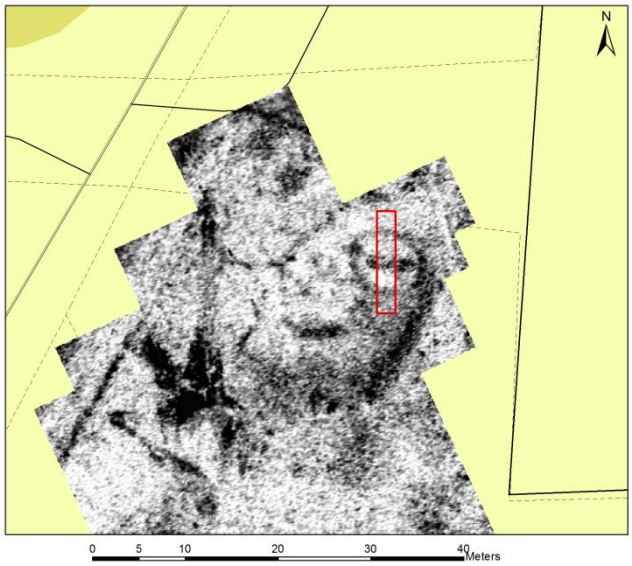

Figure 4: Circular burial outside Uppåkra churchyard with central east-west oriented grave. Mapped 2010 with single channel GPR (25 cm profile spacing) and 2011 with MALÅ Imaging Radar Array (8 cm profile spacing). The red rectangle shows the excavation trench from the University Lund in May 2011.

In 2012 it is planned to complete the magnetometer prospection of the central areas and to generate a high resolution digital terrain model using airborne laser scanning. Together with local experts the collected data will be interpreted within a GIS. The analysis of the data is expected to result in considerably new archaeological knowledge about this important site. The case study contributes to the advancement of the state-of-the-art of both archaeological prospection technology and methodology.

Acknowledgements

The Ludwig Boltzmann Institute for Archaeological Prospection and Virtual Archaeology (http://archpro.lbg.ac.at) is based on an international cooperation of the Austrian Ludwig Boltzmann Gesellschaft, the University of Vienna (A), the Vienna University of Technology (A), the Austrian Central Institute for Meteorology and Geodynamics, the office of the provincial government of Lower Austria, the Roman-Germanic Central Museum in Mainz - Germany, the Swedish Central National Heritage Board, the IBM Visual and Spatial Technology Centre (VISTA) at the University of Birmingham (UK) and the Norwegian Institute for Cultural Heritage Research (NIKU).

The project members of the case study in Uppåkra are Anders Biwall, Pär Karlsson and Håkan Thorén (Contract Archaeology Unit of the Central Swedish Heritage Board), Lars Larsson (Department of Archaeology and Ancient History, University of Lund), and Manuel Gabler, Alois Hinterleitner, Matthias Kucera, Klaus Löcker, Erich Nau, Wolfgang Neubauer, Daniel Scherzer, Immo Trinks, Mario Wallner, and Thomas Zitz (LBI ArchPro).

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A free set of tools for automated imagery rectification

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Georeferencing an image may be considered as a time consuming operation to combine or to compare data from different sources or dates, searching for possible changes in the features under study.

Several software packages that are available on the market allow us to rectify an image given a series of relative and absolute coordinates. Combined time and accuracy with manual user input is not easy. The proposed software, freely available at the web site of the Laboratory of Geophysical-Satellite Remote Sensing & Archaeo-environment of IMS-FORTH (http://www.ims.forth.gr/AutoGR), allows the user to quickly identify hundreds of common points in 2 given images and geo-reference the one on the other accordingly in matters of seconds and in a completely automated process.

AutoGR-Toolkit, which will be officially presented in the next CAA meeting, is a set of 4 scripts (GGRAB, AuttoGR-Sift, GeoRef Filtering, GeoTiff Converter) and 2 algorithm libraries (ASift and GDAL) to assist the user in geo-referencing one image on another one according to the specific geographical projection in an easy, fast and accurate way. No special skills are required and the whole procedure can be completed within a few minutes interval.

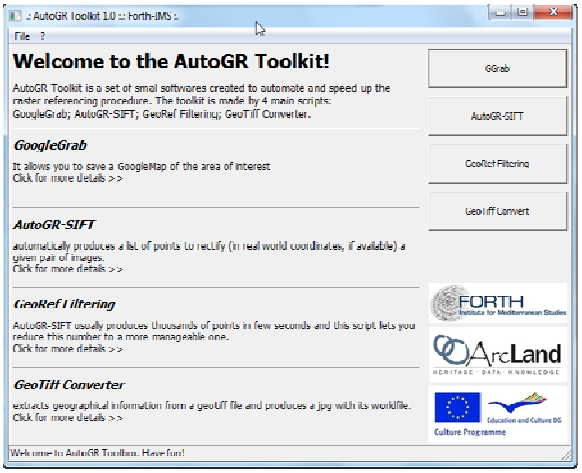

Figure 1. Main menu of AutoGR-Toolkit. In the right panel are the buttons for the 4 embedded scripts: GGrab; Autogr-SIFT; GeoFiltering; GeoTiff Converter.

With AutoGR-Toolkit, a user can now easily profit of a powerful tool to put in real world position whatever aerial, oblique or satellite image, even starting from a Google screenshot (thanks to the GGrab tool).

This paper describes the basic principles and functionalities behind each tool in the application.

GoogleGrab

From the main window of AutoGR-Toolkit, the user can access 4 different tools. GoogleGrab is the first of them and it is designed to give a draft background for image positioning.

GGrab allows the user to save a GoogleMap of the area of interest by specifying its North-Western and South-Eastern coordinates in the international WGS84 projection system.

The user may also specify a different scale (affecting the final pixel size and image resolution) and name for the output image. The script will query the Google server, through the Gdal Library, for the specific area and download a raster of the area with a world file. These files may be easily used in the next step (see the following paragraph) to convert matching points into real world coordinates.

AutoGR-SIFT

AutoGR-SIFT is the core and the most interesting part of the Toolkit. As said before, this script "prepares" two input images (essentially by scaling and saving a copy of them in PNG format) to be processed by the SIFT algorithm (Scale-invariant feature transform, introduced for the first time by David Lowe in 1999 [1] and now sided by several variants; for the SIFT patent, visit http://www.google.com/patents?id=clcSAAAAEBAJ) and converts the output for a GIS environment.

ASift (an improvement of Lowe's SIFT by Yu and Morel's) extracts key points [2, 3] from two

images (in PNG, JPG or TIFF/GeoTIFF format) to provide a "feature description" of the object depicted in each of them. Such descriptions can then be used to locate the same object in both images. Once the relation between x and y coordinates of the key points in both images has been found, a structured text file and visual preview (horizontal and vertical) of matching points connected by vectors are created. The conversion of common points in first and second image from relative XY pixel coordinate into geographical Easting Northing information, according to the input projection, is carried out by AutoGR without any user interaction.

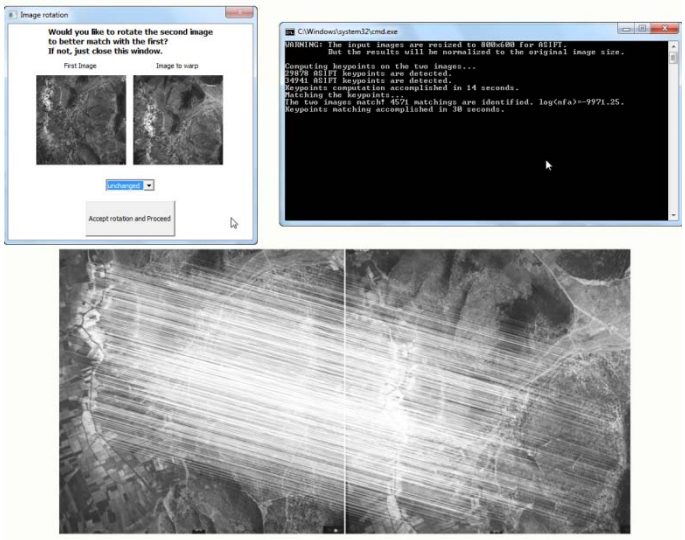

Figure 2. Three different steps of the AutoGR-ASift processing: in the first (top left) the user is asked to check the reciprocal rotation (unchanged, 90,180 or 270 degrees) of the 2 selected images to best fit each other. In the second step, the ASift algorithm searches and compares keypoints (4571 have been found in this specific case). In the lower part, a print of the two images with common points connected with white vectors.

Profiting of the powerful GDAL library, an automated rectification of the second image is attempted and the result presented for the evaluation of the user. Experimental tests, with photos from different contexts, suggested some general parameters for this automated image distortion to produce acceptable results, such as 10 unit for the average residual and 100 as maximum number of points to be used for processing with "gdalwarp".

Even if some of the matching points may not be correct ("false matching" may appear in specific contexts, well known and documented in literature), this application represents a huge speed-up in the traditional manual photo positioning and provides a sub-pixel digital accuracy that has no comparison with the traditional "manual work".

GeoRef Filtering

The hundreds of points (usually) produced in few seconds by AutoGR-SIFT often need to be decimated in order to be processed by most of the GIS applications. Indeed, to load more than 200 matching points into the georeferencing utility of ArcGIS or QGis may result in software crashes due to lack of memory. For this reason the user is provided with the possibility to filter the points to a lower number (still keeping copy of the whole raw data file).

Since the distribution of matching points generated by the Asift algorithm is not homogeneous in the frame area and it does not cover equally every part of it, the process employs the maximization of the minimum distance between points starting from a randomly selected one.

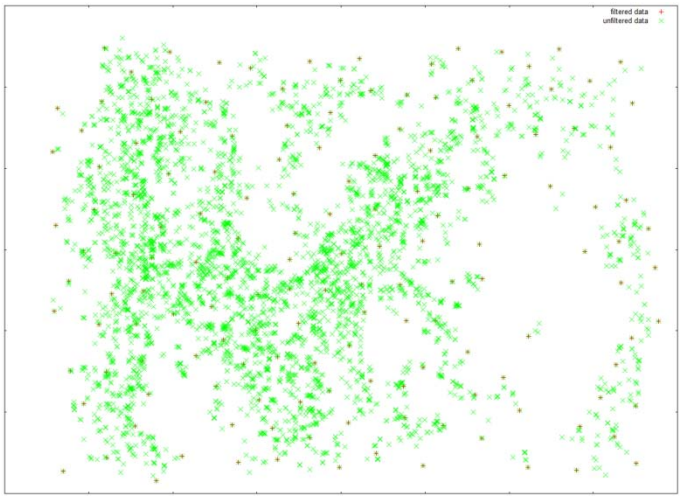

Figure 3. Plot view of keypoints distribution: in green the unfiltered data; in red a selection of 150 points produced with GeoRef Filtering.

As a general idea, a decimation of around 100 or 200 points should be enough for a correct rectification and a good coverage; the process may be repeated if the result is not satisfactory.

GeoTiff Converter

Geotiff Converter is a simple tool to extract the geographical information from any GeoTiff file and save it into a world file via the GDAL library. Through its selection, the source geotiff file will be converted in a regular tiff and jpg file with world files for both to be used for another georectification with AutoGR-Toolkit or any other GIS tool.

AutoGR-Toolkit, and the embedded tools (GGrab, AutoGR-SIFT, GeoRef-Filtering and GeoTiff-Converter) are distributed for free and can be redistributed (free of charge).

The automated installation procedure does not require any special IT skills and it does not require either any special hardware or software configuration (even though a good amount of RAM, a multi processor system and a good graphic-card may obviously make the difference in processing time).

Two basic improvements are actually in an evaluation stage: to build and distribute a linux version and to substitute the ASift with another algorithm (just to mention the most important alternatives: ANN; FLANN; I-Asift; OpenCV; OpenSurf; Sift Open Source; SiftGPU; Sift++). Also an iterative folder content processing may be introduced, to speed up even more the entire procedure. The particular research was implemented under the Culture 2007-2013 Archaeolandscapes Europe project (http://www.archaeolandscapes.eu/).

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New Geophysical Survey in the United Arab Emirates

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A series of geophysical surveys have been undertaken at two coastal settlements in the United Arab Emirates, forming part of a collaborative strategy initiated by the Maritime Archaeology Stewardship Trust (MAST). The project is being run in coordination with the Ruler's Office, Government of Sharjah and the Abu Dhabi Culture and Heritage Department (ADACH), with the recent geophysical surveys being conducted by the University of Southampton. This project is driven by the aspiration to develop capacity and awareness for the protection of the coastal and underwater heritage of the region. Apart from a detailed archaeological record of the sites and the obvious research benefits relating to an investigation of Late Islamic period coastal trading settlements, the project also offers training and experience in the deployment of geophysical survey techniques, and ultimately maritime archaeological field techniques, to government employees responsible for the coastal heritage. The immediate scope of the project enables a quick and effective methodology integrating a combination of available satellite images, photographic techniques, ancient maps and aerial photographs, alongside the geophysical survey of different sites. The use of geophysical survey in both locations was derived from the need to map the extent of buried archaeological deposits and structural remains, facilitating a programme of conservation and protection for the archaeology of the sites.

The first season of survey work, conducted in October 2011, focussed on survey of archaeological remains along the coast of the island of Dalma, Abu Dhabi, and a geophysical survey of the settlement of Al Khan, Sharjah (Fig. 1). On Dalma the geophysical survey centred on the old town of Dalma, and the location of a cemetery to the north. An area to the south-east of the town, in the Women's Institute compound was also targeted as a potentially important site containing remains of an 'Ubaid Neolithic settlement. The settlement of Al Khan, close to the town of Sharjah, is formed on a narrow strip of land between the coastline and an inlet, and contains the remains of a 19th and 20th century settlement of beach stone and coral-built houses.

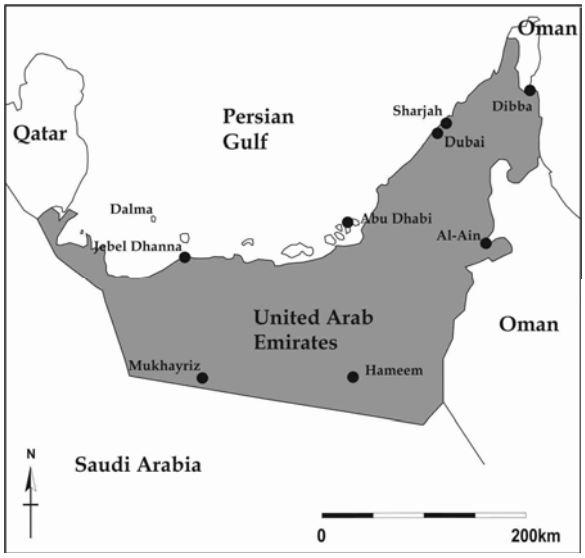


Figure 1. Location map of the island of Dalma and Sharjah

Magnetometry and Ground Penetrating Radar (GPR) survey were applied at the locations, with the aim of mapping buried archaeological features. The magnetometry was utilised as extensively as possible (Fig. 2) over each of the survey areas to provide a high resolution comprehensive assessment of potential archaeological features. A Bartington Instruments Grad 601 fluxgate gradiometer was used for the survey, with measurements taken at 0.25m intervals along traverses spaced 0.5m apart. The GPR survey (Fig. 3) was conducted by the geophysical survey team from ADACH, under the direction of Waleed Omar, and was targeted over areas of specific interest in Dalma Old Town and Al Khan, and also across a portion of the 'Ubaid settlement. A GSSI 250Mhz antenna with SIR 3000 system was utilised, with traces being recorded at 0.05m intervals along traverses spaced 0.5m apart.

Results of the survey revealed a number of interesting features at the different locations. Within Dalma Old Town a number of possible

structures were highlighted in both the magnetometry and GPR results (Figs 4 and 5 Overleaf), running on a north-west to south-east axis, indicating the line of buildings associated with a possible soukh, close to the extant remains of the Pearl Merchant's House. Linear and rectilinear anomalies in the magnetometry in gardens immediately to the north also indicate the possible continuation of the settlement northwards from the Pearl Merchant's House. The GPR results from the area verified the presence of structures in the area. Results of the survey from the Old Cemetery and 'Ubaid settlement also indicated the presence of archaeological material, including medieval and later tombs, possible structures, and occupation layers associated with the prehistoric settlement.

Figure 2. Magnetometry Survey using a Bartington Grad 601

Figure 3. GPR survey using a 250MHz GSSI antenna

The survey of Al Khan proved to be a more challenging dataset for interpretation. The magnetometry data included significant disturbance from modern ferrous material, but evidence of destroyed buildings from the settlement was nonetheless apparent. The application of GPR in a core area of the settlement, close to the extant remains of one of the mosques (Fig. 6), proved the potential for the technique in locating beach stone and coral structures. The remains of walls of buildings, courtyards and streets show clearly in the results.

Sharjah being the principle port in the Lower Gulf for most of the 19th century, the Ruler's Office requested whether the team could provide a geophysical survey of the large areas of tarmac and paving in the Bank Street area of the town. Bank Street was the first modern "10-storey high-rise" business street in Sharjah, constructed in the 1970s, and cutting across the core of the historic settlement. The area today is the focus of a new urban regeneration master plan, "The Heart of Sharjah", which aims to restore the scale and texture of a traditional Arab medina, and restore the original pattern of narrow shady lanes, with a lively mix of original historic buildings and sensitive well-scaled contemporary interventions in what is already the artistic and cultural hub of the city.

The object of the survey has been two-fold: it is identifying a large part of the 1960s footprint of the town to assist the setting-out of the new plan, rather than just working approximately based on aerial photographs. In doing so it is also hoped to identify locations where archaeology might assist us identify earlier layers of Sharjah that might help us to identify its oldest structures. The survey was completed over ten days in late January, including two other vacant areas in the old town area. The analysis and results are expected to be complete by the end of March.

The initial success of these surveys along the coastline of the UAE indicates the potential of integrated geophysical survey s for the future. The survey of the sites at Dalma and Al Khan forms a component of the larger Maritime Archaeology Stewardship Trust (MAST) initiative that aims to promote an awareness of coastal and underwater heritage in the region through research and education. MAST has formed a scientific collaboration with ADACH Historic Environment Department, Sharjah Directorate of Heritage and the University of Southampton. During the team's visit to Sharjah in January, a meeting was held with other UAE Emirates with a view to extending the existing collaborations. It is hoped that the collaboration will soon be extended geographically to facilitate further seasons of survey work along both the east and west coasts of the UAE.

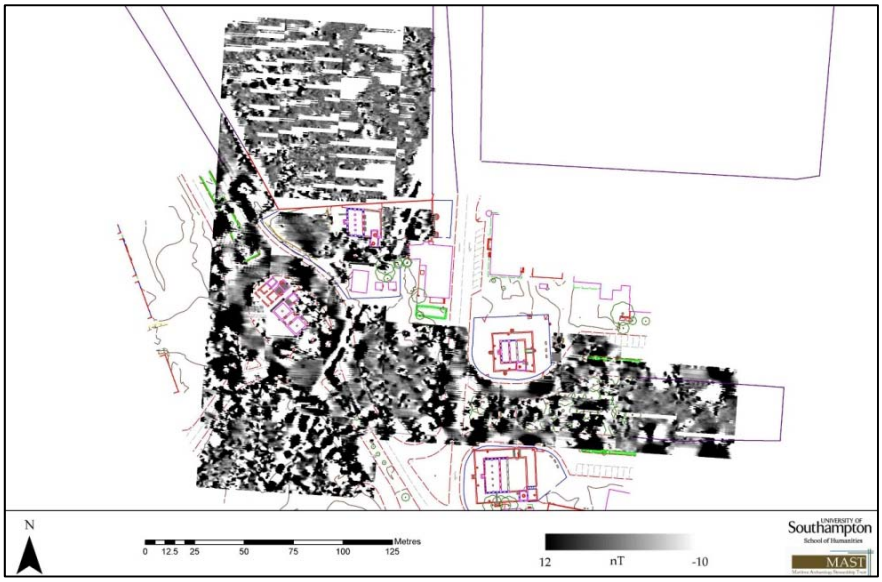


Figure 4 (Top)
Magnetometry greyscale over the Dalma Old Town

Figure 5 (Right)
GPR greyscale over the the Dalma Old Town

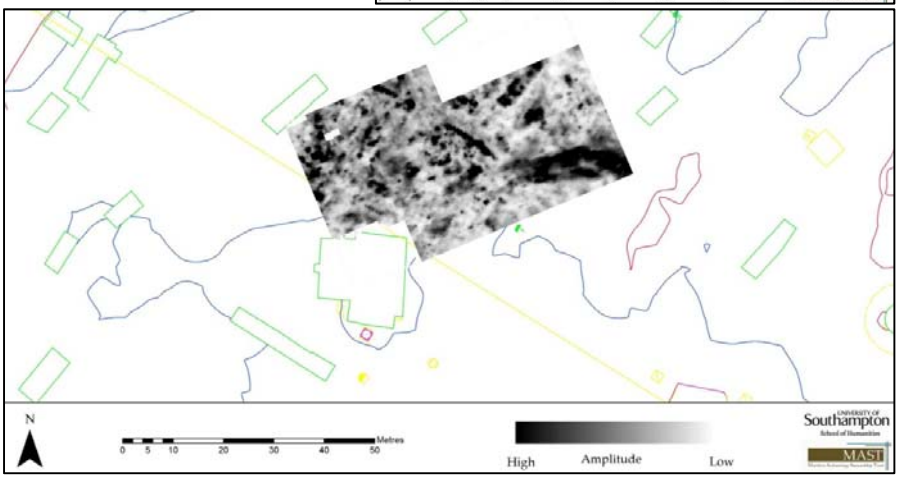


Figure 6 (Bottom)
GPR results from Al Kahn

Call for Papers!

NSGG Meeting on Recent Work in Archaeological Geophysics

The Geological Society, London 4th December 2012

NSGG Meeting on Recent Work in Archaeological Geophysics
4th December 2012, The Geological Society, London.

The Near Surface Geophysics Group of the Geological Society of London (NSGG, formerly EIGG) is pleased to announce the tenth in a succession of biennial day meetings devoted to archaeological geophysics. Near surface geophysical techniques have become increasingly established in archaeological research and evaluation over the past decade and are now routinely applied in archaeological investigations. This meeting offers a forum where contributors from the UK and further afield can 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 both archaeological and geophysical practitioners to exchange information about recent developments.

Owing to a prior commitment with a Soil Forensics Conference earlier in the year our colleagues from the Forensic Geosciences Group will not be holding a meeting on the following day this time and therefore this will be a one day event

Call for papers

Those interested in contributing either a talk or poster 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.

Convenor: Paul Linford, English Heritage, Fort Cumberland, Eastney, Portsmouth, PO4 9LD, UK; Tel.: +44 (0)23 9285 6749 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)

The 1st International Conference on Best Practices in World Heritage: Archaeology

Menorca, Balearic Islands, Spain. April 9-13th 2012

April 9-13th, 2012 at Menorca, Balearic Islands, (Spain)
http://www.congresopatrimoniomundialmenorca.cime.es/

The Universidad Complutense de Madrid, together with the Consell Insular de Menorca are organizing this international conference to generate a meeting point on Archaeology management and treatment of World Heritage Sites.

The main aim of the Conference is to draw up and publish a "Guide of Best Practices in World Heritage: Archaeology". To this end, sessions about the following topics will be organized:

1) Social action and Archaeology in World Heritage
2) ICT, Archaeology and World Heritage
3) Architecture, World Heritage and Archaeology
4) Land planning, Archaeology and World Heritage
5) Preventive Archaeology and World Heritage
6) Education, diffusion, World Heritage and Archaeology

congresopatrimonio.menorca@cime.es

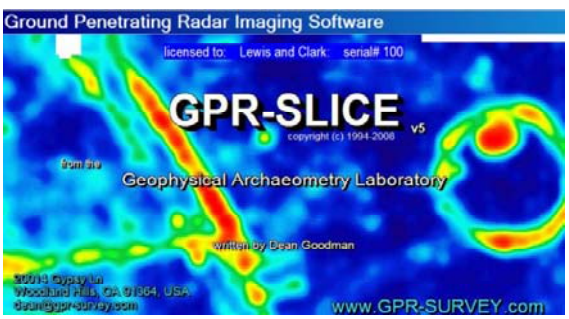
VI Short Workshop on 3D GPR Imaging – GPR-SLICE

University of Vigo, Pontevedra, Spain 13th-14th February 2012

A new advanced course on GPR-SLICE v7.0 Ground Penetrating Radar Imaging Software is being sponsored by the University of Vigo, Spain. The two day course (13-14 February) is a data processing workshop for those users that are already familiar with the basic operations in GPR-SLICE. The workshop is also opened up to new users of GPR-SLICE. The cost of the course is 300 EUR. There are 10-12 places for advanced users and 3-5 for beginners.

The course will be taught by Dr Alex Novo, official distributor of the software (www.gpr-slice.es) and the GPR-SLICE specialist of the University of Vigo. The course will concentrate on the following topics:

- Signal processing
- Image processing
- Open GL operations
- GPS imaging for all the major manufacturers
- Total station navigation
- 0ns offset radargram editing
- Automatic topographic corrections (regular surveys and GPS)
- Horizon imaging and layer detection (road layer imaging)
- Concrete imaging, XY decoupled gridding
- Vector imaging (tunnel imaging)
- Auto-hyperbola detection and amplitude mapping (bridgedeck imaging)



• BlueBox Batch Processing, one button operation from raw data to processed 3D volumes
• Introduction to GPR via real time simulation software
• Mosaic noise correction
• Some other advanced analyses

A special portion of the workshop will be dedicated to processing data from multi-channel GPR systems. Selected example folders will be used during the processing workshop. The processing of example folders will be distributed at the course or they can be downloaded off the www.GPR-SURVEY.com/practice ftp site: **\Kisatchie\part1 and part2 - Advanced User Project Folders.zip.** The password to unzip these folders "Kisatchie". On this ftp site there is also an **Advanced Users Notebook** which all users should download and print out in advance of coming to the workshop.

All attendees should bring their own notebook computers as well as their own software installation with the latest GPR-SLICE update. Computers with NVIDIA graphic cards is recommended or with graphic cards from ATI that have their latest drivers installed is fine. Notebooks with just integrated graphic chip cards is not recommended. The course is being sponsored by Dr. Henrique Lorenzo from the TF-1 Group, University of Vigo (Spain).

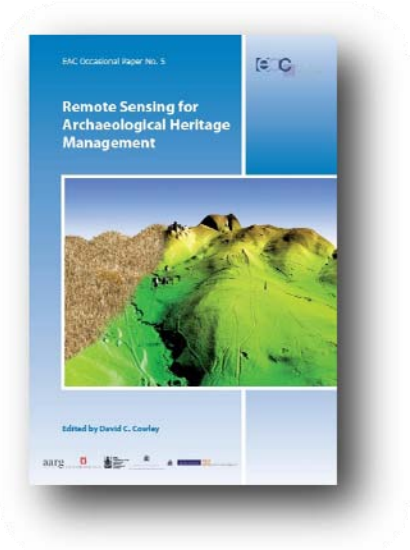
For additional information on the workshop please contact Alex Novo alexnovo@gpr-slice.es

Books

Remote Sensing for Archaeological Heritage Management
Edited by David C Cowley

Remote sensing is one of the main foundations of archaeological data, under pinning knowledge and understanding of the historic environment. The volume, arising from a symposium organised by the Europae Archaeologiae Consilium (EAC) and the Aerial Archaeology Research Group (AARG), provides up to date expert statements on the methodologies, achievements and potential of remote sensing with a particular focus on archaeological heritage management. Well-established approaches and techniques are set alongside new technologies and data-sources, with discussion covering relative merits and applicability, and the need for integrated approaches to understanding and managing the landscape.

Discussions cover aerial photography, both modern and historic, LiDAR, satellite imagery, multi- and hyper-spectral data, sonar and geophysical survey, addressing both terrestrial and maritime contexts. Case studies drawn from the contrasting landscapes of Europe illustrate best practice and innovative projects.



See http://www.univie.ac.at/aarg/php/cms/Occasional-Publications/ for contents list.

Language: English with abstracts in French and German
Distribution: Archaeolingua, Budapest
Format: 312 pp + 218 illustrations in full colour throughout, 297 × 210mm, hardback
ISBN: 978-963-9911-20-8
Price: € 40 + packing and shipping
Copies of the book can be ordered from:
Archaeolingua, H-1014 Budapest, Úri utca 49, Hungary
tel/fax: +36 1 3758939
email: kovacsr@archaeolingua.hu
web: http://www.archaeolingua.hu/books/eac.html

Journal Notification

Archaeological Prospection

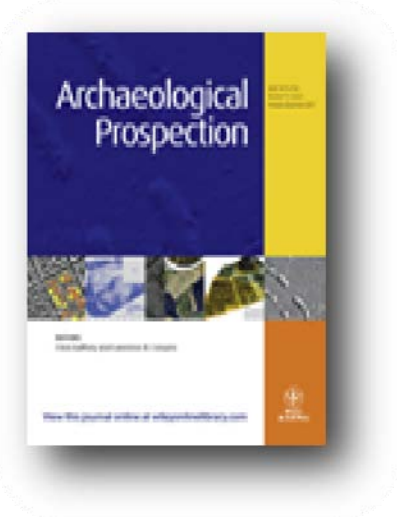
The first issue of Archaeological prospection of 2012 is currently at the printers. Below you will find the main articles, short reports and book reviews that comprise volume 19(1). This is, of course, a great time to get a subscription to the journal. As an ISAP member you are entitled to a large discount via our webpage - see http://www.bradford.ac.uk/archsci/archprospection/membersonly/wiley.php.

Blake Weissling	Historical tracks and trail resources as delineated by near-field ground penetrating radar: two case studies
Meeuws *et al*.	EC-depth modelling with a multi-receiver EMI sensor for prospecting archaeological features
McBride and **Mercer**	Assessing damage to archaeological artefacts in compacted soil using micro-CT scanning
Daniel Bigman	The use of EM Induction in locating graves and mapping cemeteries: an example from native north America
Bennett *et al*.	A comparison of visualisation techniques for models created from airborne laser scanned data
Mohamed-Ali *et al*.	Gradient and Electrical Resistivity Surveys in Meroe, the Capital City of the Kush Kingdom, Sudan
Wake *et al.*	Electrical Resistivity Surveying and Pseudo Three-Dimensional Tomographic Imaging at Sitio Drago, Bocas del Toro, Panama"

The issue will also include reviews of two books:

Field Geophysics, Fourth Edition, John Milsom and Asger Eriksen, Wiley. Review of Landscapes through a Lens.

Aerial Photographs and Historic Environment, edited by David Cowley, Robin Standring and Matthew Abicht, Oxbow.



MSc Archaeological Prospection

MSc. Archaeological Prospection, 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

- 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)

Course Syllabus

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

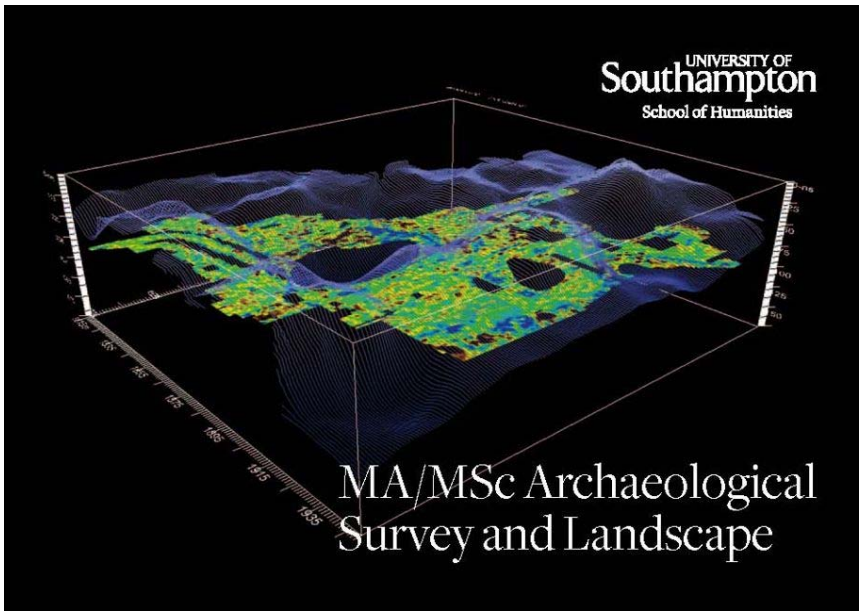
UNIVERSITY OF BRADFORD
MAKING KNOWLEDGE WORK

MA/MSc Archaeological Survey and Landscape

MA/MSc. Archaeological Survey and Landscape, The University of Southampton, UK.

The study of archaeological landscapes and the use of survey methods is one of the most fundamental areas of research within the discipline of Archaeology. It includes the development of scientific methods of survey and archaeological practice in the field, and the analysis and interpretation of sites and landscapes.

This is achieved through interdisciplinary skills and the application of theoretical frameworks to understand the past. An emphasis on archaeological survey and fieldwork is a longstanding strength of Archaeology at Southampton and the discipline has made many key contributions to the development of archaeological field techniques in Britain and abroad. The discipline is dedicated to teaching cutting-edge and progressive scientific techniques for the survey and analysis of archaeological sites and landscapes, including geophysical survey and GIS-based skills, backed by first class computing facilities. Our survey projects include research on the landscape of the South Downs, and the survey and excavation at Portus, Rome's ancient port, carried out in collaboration with the British School at Rome. Students on the MA/MSc are fully involved in fieldwork and data processing on these projects. Different scientific methods are taught to a high standard, preparing postgraduates for professional employment in the archaeological sector and allowing students to develop their research abilities. We actively support students with the potential for continuing within a research degree programme.



Typical Core Modules:
Research Skills
Core Computing
Archaeological Evaluation
CAD/GIS for Archaeologists

Typical Optional Modules:
Archaeological Survey and Recording
Archaeological Geophysics
Geoarchaeology
Social and Spatial Landscapes

Find out all the details of the programme and about the funding available on the Archaeology Discipline website: **www.southampton.ac.uk/archaeology** and **www.southampton.ac.uk/humanities**

Or contact Kris Strutt for further information **(K.D.Strutt@soton.ac.uk)**