ISAP NEWS

The newsletter of the International Society for Archaeological Prospection

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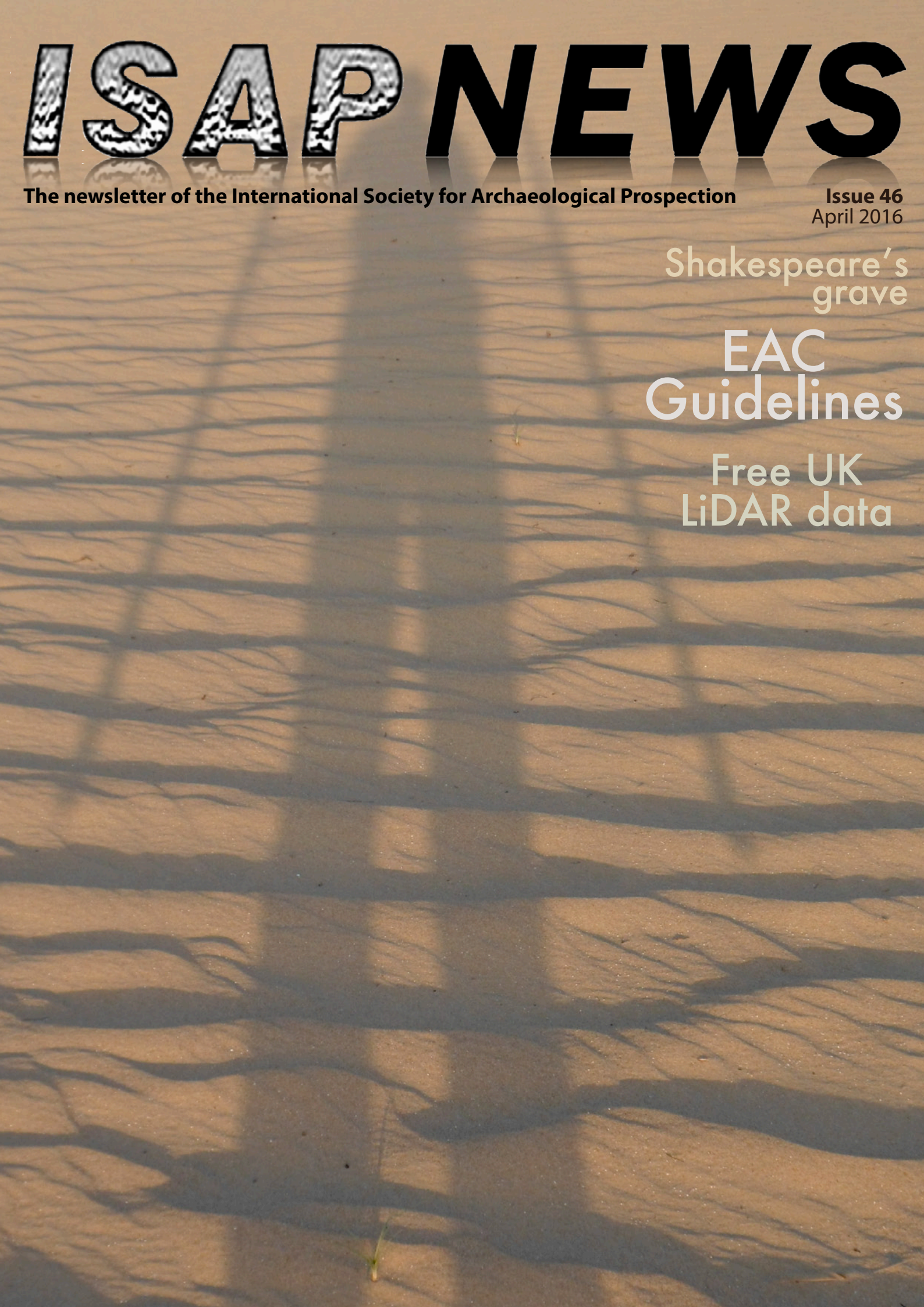

Shakespeare's grave

EAC Guidelines

Free UK LiDAR data

Welcome to the 46th issue of ISAP News, where Shakespeare rubs shoulders with European guidelines, UK LiDAR data and scientific soundbites.

The European Archaeological Council guidelines are now available as a pdf via the ISAP website: **www.archprospection.org/eacguidelines** and there is an introduction to them below. There is also information about the useful free LiDAR data for the UK, including a link to a marvellous website that might cost you hours: you have been warned! And there is a tantalising glimpse into survey work being carried out to commemorate the 400th anniversary of Shakespeare's death, as well as a piece on soundbites in science: don't forget the ISAP email list for any forthcoming opinions!

As ever, please send any contributions, notifications, and cover images for the next newsletter (ISAP News 47) to the email address below by the 31st May 2016. All entries are gratefully received!

Hannah Brown & Paul Johnson

editor@archprospection.org

The Cover Photograph Duncan Hale 'selfie' in the Rub' al Khali desert, Dubai (Photo: Duncan Hale, Archaeological Services Durham University)

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EAC Guidelines for the use of geophysics in archaeology

Armin Schmidt, Paul Linford, Neil Linford, Andrew David, Chris Gaffney, Apostolos Sarris & Joerg Fassbinder
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In 2012 the European Archaeological Council (EAC) commissioned several European ISAP members to write a document on the use of geophysics in archaeology as the second volume in the EAC guidelines series for archaeological practice. It was soon established that the only feasible approach to such a task was to base these European guidelines on the existing and already thoroughly edited English Heritage guidelines (English Heritage 2008). The authors were clear that trying to obtain a pan-European agreement on standards would lead to a very basic, and possibly useless, documentation of the lowest common denominator. Therefore a different approach was used and the text is hence not a 'standard' as to how archaeological geophysics must be done, but a 'guidance' that aims to help practitioners with selecting and undertaking geophysical work in such a way that its utility for archaeology is optimised. Hence the subtitle of this document: "questions to ask and points to consider". In particular, the first part was completely rewritten from the version presented in the English Heritage guidelines and now lists a number of items that should be taken into account when a geophysical survey is planned. The two most important aspects are the clarification of the archaeological aims prior to any further investigations, and the need to obtain expert advice from experienced archaeological geophysicists. Both of these points are stressed throughout the document. For the first of these aspects a simple classification of archaeological investigations into three levels was used (Prospection, Delineation and Characterisation), similar to those proposed by Gaffney and Gater (2003). The second aspect proved more difficult to define, and became nearly philosophical: who is an "experienced archaeological geophysicist"? Even the authors had differing views about the minimum requirements on a European level and this aspect eventually had to be left vague in the guidelines. There is definitely room for further discussion. After presenting a draft version of the document to the EAC Board it emerged that even on this level country-specific sensitivities are prevalent and it was then decided to remove all references to practice and legislation in individual European countries from the text. Instead, this information will now be hosted on the ISAP website and is intended to be updated regularly. In fact several ISAP members have already contributed experience from their own country and this information will soon be converted to online content.

The document underwent a thorough review process, passing through several EAC review cycles and was presented for final input to ISAP members. Many ISAP members commented with great detail and the

guidelines have improved considerably for this. Those ISAP members who channelled their comments through other professional organisations (CIfA GeoSIG and EuroGPR) and who are not individually named in the acknowledgement are thanked here.

The 137-page guidelines are now available as a pdf document on the EAC website and directly linked from:

www.archprospection.org/eacguidelines

where the country-specific information will be made available soon. The guidelines are also available as a beautiful colour print, with a very convenient spiral binding for keeping it easily available on one's desktop. ISAP was able to obtain 200 copies of this print for resale to ISAP members at a greatly reduced price (ca. £2 plus postage and packing). Ordering will soon be possible from the same web site; we will have to share the load of packing, labelling and carrying the items to the post office. At the moment this is intended to be done from the UK and from Germany to cover Britain and the rest of the World, respectively.

The authors would like to express their sincere gratitude to Dave Cowley, co-chairman of the EAC Remote Sensing for Archaeology Working Party, who guided us through the process of publishing with the EAC.

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Gaffney, C. & J. Gater 2003. Revealing the Buried Past: Geophysics for Archaeologists. Stroud: Tempus Publishing.

Free LiDAR data in the UK

Roger Ainslie[1] & Armin Schmidt[2]

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It may be of interest to ISAP members, that the UK Environment Agency has made a large amount of gridded LiDAR data available as Open Data through #OpenDefra:

http://environment.data.gov.uk/ds/survey/index.jsp#/survey

The data are made available under the Open Government

http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/

Licence and are free for private and commercial use. The website makes different data products available: gridded data at 0.5 m, 1 m and 2 m spatial resolution, both as DTM (Digital Terrain models, with all trees stripped off) and DSM (Digital Surface Model) including the highest elevations (including trees). There are also some older data products available reaching back to 2001. On the website, it is best to first select an area of interest and then check the availability of the different products. For example, the 0.5 m resolution data are only available in few areas.

The data were cut into 1 km wide tiles in ESRI ASCII grid format, and are delivered in zip files of 10 km blocks (i.e. containing a maximum of 100 tiles), of ca. 30-110 MB size, depending on the grid resolution.

The data can easily be used with QGIS and the workflow there is fairly straightforward. To create a seamless assembly of all grid tiles it is easiest to generate a Virtual Raster (.vrt) first, which is just a small ASCII file that lists all the individual raster files used (Raster|Miscellaneous|Build Virtual Raster (Catalog), in the dialog that then opens select "Choose input directory instead of files", and finally select OSGB 1936, EPSG:27700 as the grid system). This Virtual Raster can then be saved as a single, binary, GeoTIFF file (right click on the layer, then Save As). Afterwards all the large ASCII grid tiles can be deleted to save space. To see the topographic features it is recommended to generate a hillshade display (Raster|Terrain Analysis|Hillshade); it is often sufficient to start with the default options. Other processing that can be done is high-pass filtering, and various colour displays or colour overlays. It is worth noting that the TerraSurveyor software now also includes an option to import these grid tiles.

How can these data be used in archaeological prospection? They provide an interesting additional layer of information

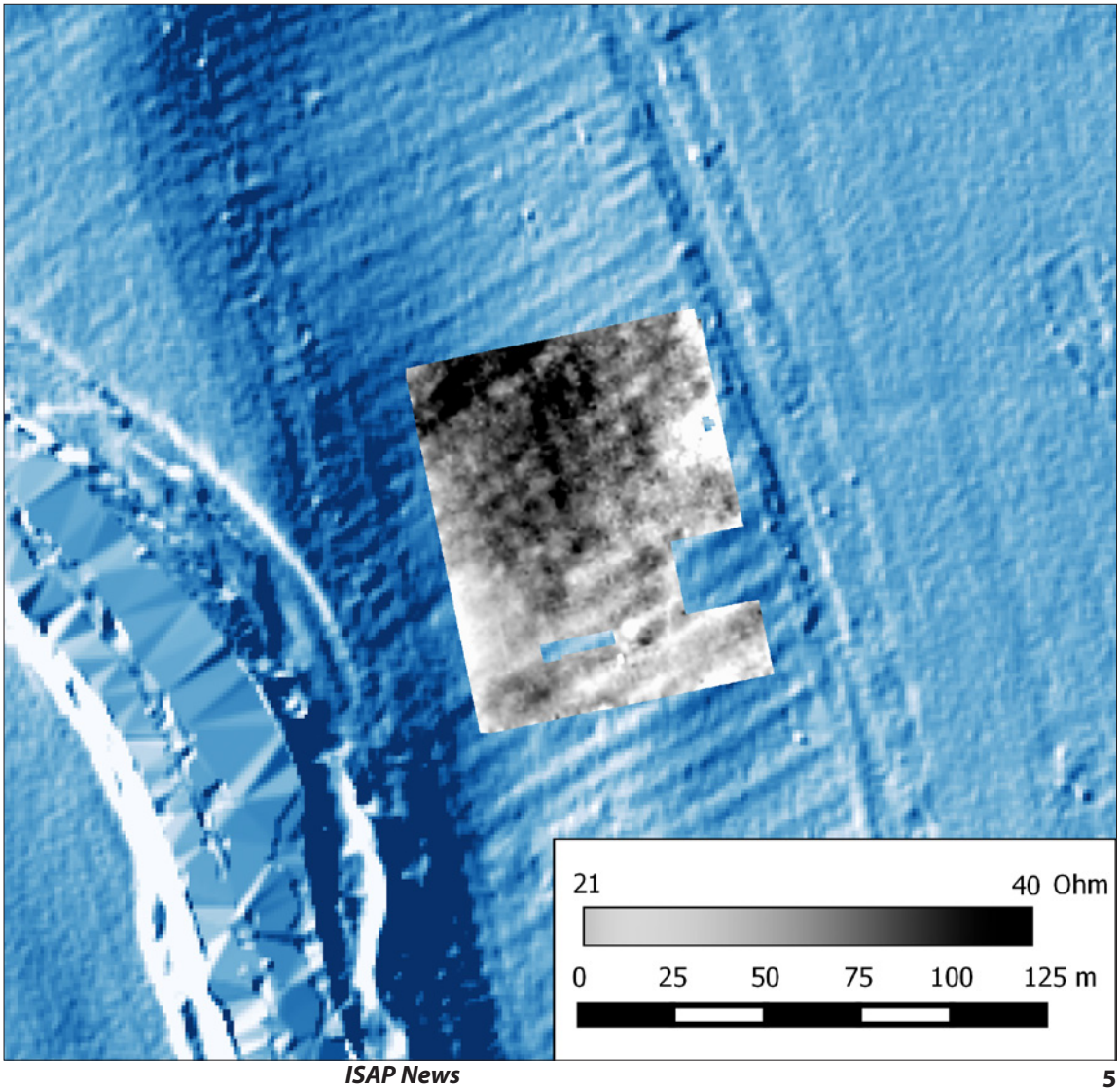

Figure 1 *Area of the probable Roman Villa at Beningbrough Hall, North Yorkshire. The continuation of ridge and furrow as displayed in the LiDAR data (blue) is clearly visible in the earth resistance data (grey).*

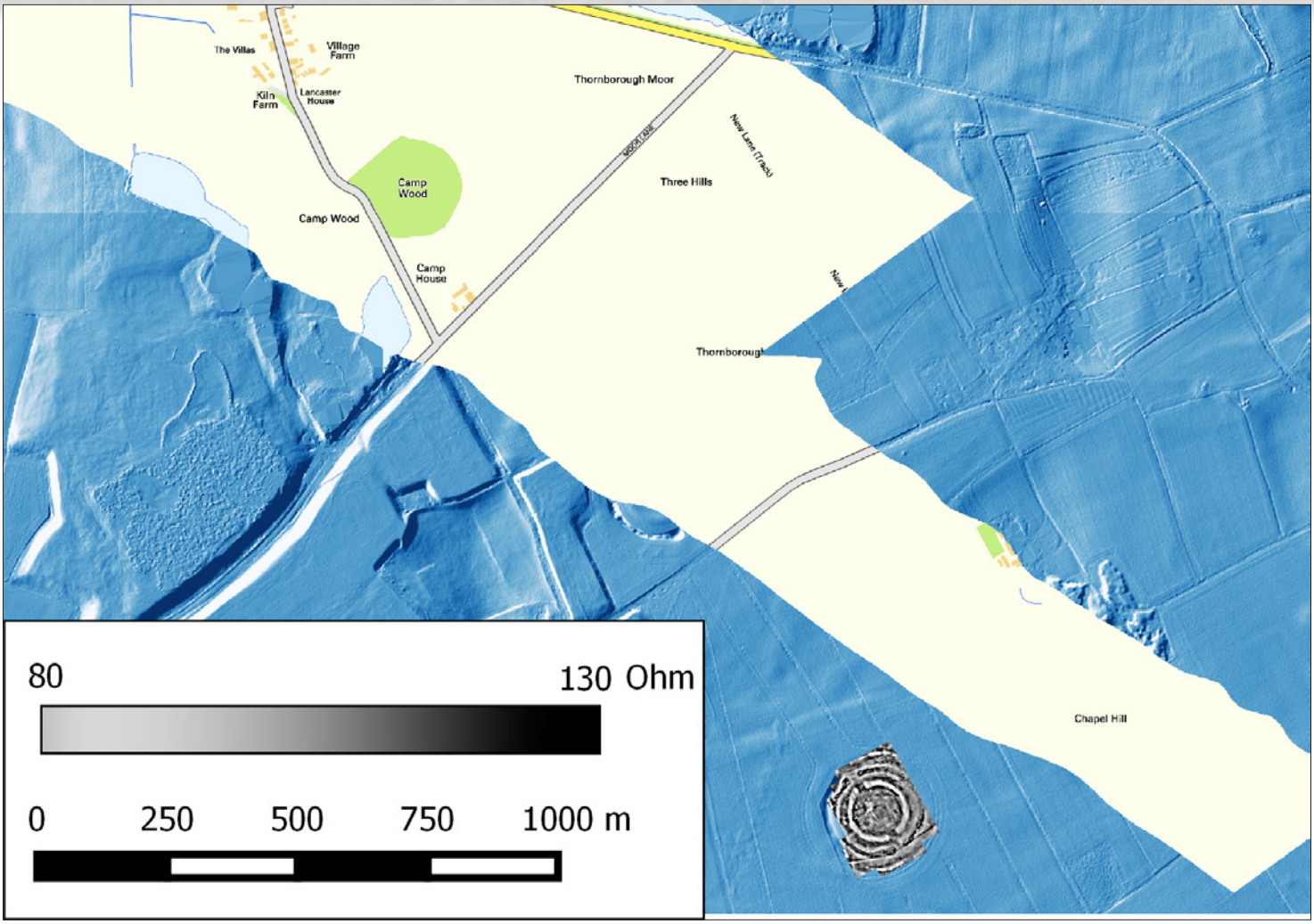

Figure 2 *Area of the three henges near Thornborough, North Yorkshire. The LiDAR data (blue) only cover the southern henge, for which the earth resistance data are shown (grey).*

as they show some of the hidden historic and prehistoric features that are preserved in the landscape as faint earthworks. In many areas by using high pass filtering and clipping, the data shows ridge and furrow field systems, which with the naked eye often cannot be noticed, being often only about 0.1 m high. Figure 1 shows the clear continuation of the ridge and furrow into the earth resistance data at the Roman villa at Beningbrough Hall.

However, after the first enthusiasm about these data, it turned out that many archaeological monuments have no or only very limited LiDAR coverage. The most likely reason is that the data appear to have been mostly collected for flood prevention purposes, whereas many archaeological sites are on uplands. In Yorkshire, the following sites were missing from the LiDAR data: Adel Roman Fort, Harewood House South Lawn, Kirkby Overblow, vicus of Slack Roman Fort, High Cayton DMV and Thornborough northern and central Henges (Figure 2 shows the earth resistance data of the southern henge overlaid on the LiDAR data). In addition to the use as interesting hillshade background the data, without hillshade processing, can be used for topographic visualisation and analysis (e.g. slope and aspect). Even the differencing of DTM and DSM data could be a valuable tree-cover estimator.

The data will no doubt also be used by many others, either as mash-ups or after acquisition of the full national dataset. One such application uses the data for England and Wales and made hillshade pictures available online:

https://houseprices.io/lab/lidar/map

This site provides no topographical background map, so you need to know your way round the UK, but otherwise it is easy to spend far too long looking at lost landscapes throughout the country. The web site is probably linked to work by estate agents, but is otherwise remarkably useful and the person who did it should get an award.

The GPR investigation of William Shakespeare's grave

Erica Carrick Utsi[1] & Kevin Colls[2]

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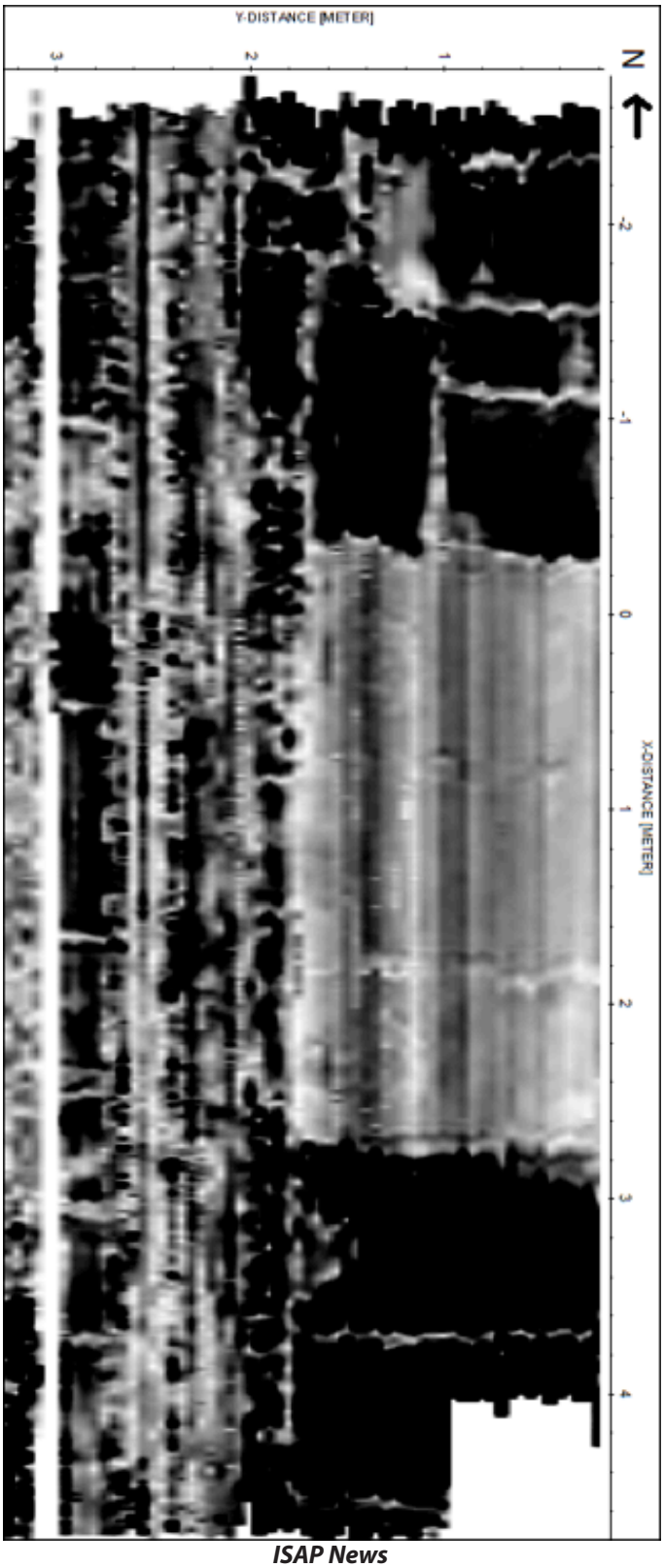
As part of the 400th anniversary commemorations of William Shakespeare's death, an investigation of his grave has been led by Kevin Colls of Staffordshire University. This included a multi-frequency GPR survey of the chancel of Holy Trinity, Stratford, carried out by Erica Carrick Utsi. A 400MHz antenna was used to check on burial depth. On finding that this was much shallower than anticipated, 1.5GHz and 4GHz antennas were used to give better target definition. The 1.5GHz time slice illustrates the intrusive North/South feature cutting across the head of Shakespeare's grave (centred - 0.95, 1.25), unexpected evidence of earlier disturbance. Kevin and Erica are planning to publish the GPR results in full in *Archaeological Prospection*.



Soundbites?

Armin Schmidt

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Several years ago I attended a training seminar entitled "Communicating Science to the Public" and came away with great unease. I still remember the two main messages: a) scientists are legally obliged to communicate their research to the public and b) one can only provide the public with soundbites. While I mildly disagree with the former I strongly disagree with the latter. And since many recent events reminded me of my experience at this training event I decided to write down some of the thoughts, to provoke discussion, maybe on the ISAP email list.

Of course it is desirable to communicate our findings as widely as possible, and not just to peers in archaeology and/or geophysics. This has many benefits and NERC now focuses on these, encouraging researchers to achieve such 'impact':

> *Seeing the public's reaction to your work, and answering their often unexpected questions, can lead to new perspectives on your research, reinvigorate your own interest in what you're doing and boost your job satisfaction. Engaging the public can enhance your research by raising questions you might not have considered before, and increase its impact by showing you the best ways to communicate your results.* [1]

This is far more convincing than NERC's old view expressed in that training seminar, that research that was funded with public money gave the public the right to understand fully what the results were. Obviously, with funding comes responsibility towards the funder, but with the same argument one could request explanations for spending state revenues on infrastructure projects that the public does not want, or for bailing out large corporations with public money; nobody even contemplates providing such justifications.

Which leaves the second notion of the requirement for soundbites. There are not many issues in life that are simple. Therefore, pretending that feeding the public with abbreviated headlines is all it wants, or can digest, is at best a partial answer. Is it not the role of a journalist to present even complex issues in such a way that they can be at least partially understood? I would even go as far as arguing that it can be a virtuous circle whereby journalists, by presenting nuanced information, gradually decrease the assumed necessity for soundbites. Quality and understanding instead of quantity of simplified headlines.

In politics simplifications have contributed, for example, to the rise of ultra-nationalist parties, and in archaeological prospection simplifications do not help much either. There is no simple path to successful archaeological geophysics (e.g. "if you look for a henge, a standard magnetometer survey is all you needed to do") and the new EAC guidelines (see elsewhere in this issue) focus on underlying archaeological questions instead of presenting immediate answers. In 1989 Stove and Addyman stated

> *[GPR] operates over ranges of tens of centimetres to metres or tens of metres … Its resolution is of the order of tens of centimetres* [2]

and gave rise to the notion amongst archaeologists that even a golf ball may be found at several metres depth. The disappointing results from difficult sites in London (wet clay with deep stratigraphy) led to a backlash along the lines of "GPR doesn't work for archaeology" (reminds me of "magnetometer surveys don't work in Scotland"). From the inappropriate use of the technology, archaeological GPR only recovered through the excellent results obtained in the US, for example from one-phase buildings buried in dry soil. More recently, we witnessed the media hype about 'scans' in Tutankhamun's tomb. These turned out to be single GPR transects (radargrams) on four of the tomb's walls [3], collected with a GPR device of somewhat unknown make (Koden, see image in [4] and earlier results in [5]). It appears doubtful that these vague radargrams should have resulted in subsequent soundbite-interpretations for such an important site:

> *The radar scan tells us that on this side of the north wall, we have two different materials.* (Mamdouh Eldamaty [4])

> *[The radar scans] suggest the presence of two empty spaces or cavities beyond the decorated North and West walls of the Burial Chamber … [and the] presence of metallic and organic substances.* [6]

Inevitably, this led to archaeologists' incredulity and resulted in the reply:

> *Radar is not scientific. Radar is art* (Zahi Hawass [7])

Here one has to add that Zahi Hawass was a predecessor of Mamdouh Eldamaty in the post of Minister for Antiquities Affairs and has always maintained that there is no hidden tomb [8]. However, even he admits that the whole media spectacle may be good for Egypt's tourist industry [8]. But what does it do for the reputation of archaeological geophysics? Larry Conyers rightly pointed out in a statement [9] that for such an important site peer review of the results would have been highly desirable, and

would certainly have been in the interest of the profession overall. Even with the best intentions, doing geophysical investigations for Cultural Heritage naively can severely undermine the credibility of archaeological prospection in the long term. This is the reason why I have a critical view of some of the archaeological projects undertaken as part of the excellent "Geoscientists without Borders" [10] initiative. For example the magnetometer data from the archaeological geophysics field school organised by Boise State University in northern Thailand are unconvincing and are possibly caused by poor data collection or unsuitable processing:

> *While some anomalous regions can be tentatively identified [in] the radar and magnetic gradient data, it is difficult to draw further conclusions about the shape or sources (i.e. buried walls, floors, walkways, etc) of these anomalies*. [11] (see Fig. 3 therein)

We have all seen anomalies that are difficult to interpret but usually at least the underlying data are good. I hope that the disappointing results will not deter Thai archaeologists from using geophysical methods (maybe according to the EAC standards) in future.

This brings me to the main reason for writing this text. Wolfgang Neubauer was awarded the highly prestigious accolade of Austrian Researcher of the Year 2015 (Wissenschaftler des Jahres 2015) by the Association of Journalists for Education and Science (Klub der Bildungs- und WissenschaftsjournalistInnen) [12]. This is magnificent news and a highly deserved honour, as Wolfgang Neubauer, throughout his career, has always engaged the public in his work and not resorted to simplistic soundbites. He knows that great visuals are far better than soundbites; they generate immediate impact, stay with us for a long time, and often even allow us to explore issues in greater detail if we wish. Hence visualisation is a core part of the LBI's remit and used to present results of thorough archaeological analysis of excellent geophysical data in a user-friendly way. Visualisation instead of soundbites, that seems to be the solution. Many thanks Wolfgang and team!

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[6] http://www.livescience.com/54081-king-tut-hidden-chambers-seen-radar-scans.html

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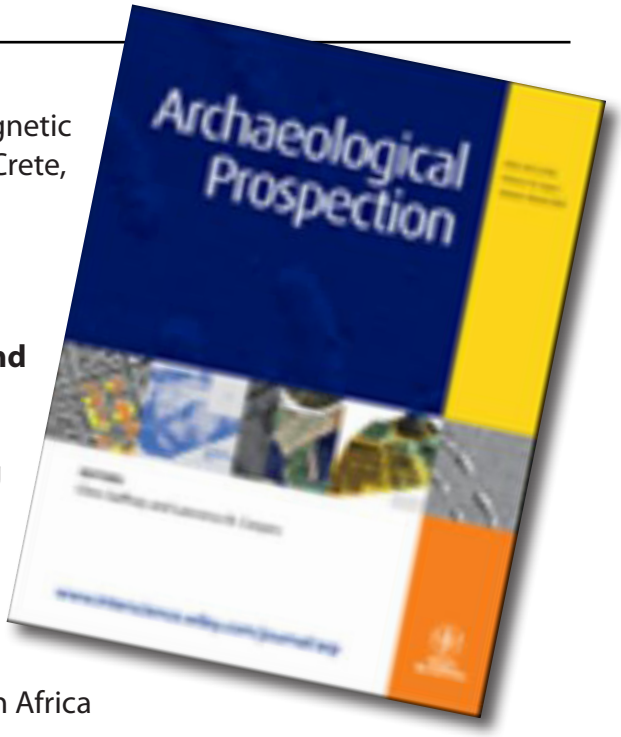
Journal Notification

Archaeological Prospection 23 (1)



3D Reconstruction of Buried Structures from Magnetic, Electromagnetic and ERT Data: Example from the Archaeological Site of Phaistos (Crete, Greece)
Rosa Di Maio, Mauro La Manna and Ester Piegari

The Discovery of an Ancient Greek Vineyard
Tatiana N. Smekalova, Bruce W. Bevan, Andrei V. Chudin and Alexander S. Garipov

The Roman City of Altinum, Venice Lagoon, from Remote Sensing and Geophysical Prospection
Paolo Mozzi, Alessandro Fontana, Francesco Ferrarese, Andrea Ninfo, Stefano Campana and Roberto Francese

The Impact of Coder Reliability on Reconstructing Archaeological Settlement Patterns from Satellite Imagery: a Case Study from South Africa
Karim Sadr

Cone Penetration Testing: A Sound Method for Urban Archaeological Prospection
Kay Koster

Ground-Penetrating Radar for Archaeology (3rd Edn) Lawrence B. Conyers, Series Editors: Lawrence B. Conyers and Kenneth L. Kvamme, Geophysical Methods for Archaeology No. 4, AltaMira Press, Lanham, MD, 2013, xv + 241 pp., £22.95, ISBN 978-0-7591-2349-6 (paperback)
Lieven Verdonck

UNIVERSITY of BRADFORD

MSc Archaeological Prospection at the University of Bradford, UK

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