ISAP NEWS

Issue 51

August 2017

Magnetic survey in Ohio

The Old Sarum Landscapes Project

Archaeological Geophysics Toolbox for QGIS

Welcome to the 51st issue of ISAP News. As we move into our second half-centry of issues,it is perhaps time to reflect on how far the discipline has come since the formation of ISAP. We also have ICAP 2017 to look forward to in Bradford this September, hopefully many of you will be attending and presenting recent and ongoing research there.

Read on for details of two interesting projects - one in Ohio, and the other in Wiltshire, along with news of the development of a geophysical toolkit for QGIS.

As usual we must make our not-very-subtle plug for contributions, the Newsletter is only as good as the material we're given to put in it... 700-ish words and a couple of images for the next issue would be great!

Hannah Brown & Paul Johnson

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The Cover Photograph shows survey underway at the Old Sarum Landscapes Project, Salisbury, Wiltshire, UK. More details on pages 10–16. (Photo: Kristian Strutt)

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New Magnetic Gradiometer Survey at the Steel Group Earthworks, Ohio, USA

Jarrod Burks

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The Steel Group Earthworks site is a cluster of ditch-and-embankment enclosures near the town of Chillicothe, Ohio (USA)--an area rich in Woodland period mound and enclosure sites (burial ceremonial sites) dating from ca. 300 BC to AD 400. The site was first mapped in the 1840s by Squier and Davis (1848) as two relatively small circular enclosures and a nearby mound (Figure 1). A magnetic gradiometer survey in 2007/2008 greatly expanded the extent of the site, revealing 11 earthen enclosures and at least two probable circular arrangements of posts, also known as "post circles" (Burks 2014; Burks and Cook 2011). This initial survey was conducted with a Geoscan Research FM256 fluxgate gradiometer, with a data density of eight readings per meter along transects spaced one meter apart. The original magnetic survey results helped to highlight the importance and uniqueness of the site and in 2015 The Archaeological Conservancy (TAC) purchased the earthworks and the entire farm containing them. The property was then sold to a local conservation organization, the Arc of Appalachia, and is now in the process of being converted to a prairie and public-access park.

In the winter of 2016/2017, and in advance of planting the farm fields and earthworks in mixed prairie species, Ohio Valley Archaeology, Inc. conducted a new magnetic gradiometer survey of the farm covering 22.3 ha. Funding for the survey was secured by the Heartland Earthworks

Figure 1 *A portion of Squier and Davis's (1848) nineteenth-century map of the Chillicothe, Ohio area earthworks.*

Figure 2 *An aerial view of the magnetic survey in progress—the ditch of the large circle is visible with lighter colored vegetation to the left of the survey crew (photo Tim Anderson Jr).*

Conservancy and The Archaeological Conservancy with a grant from the Ohio History Fund, a state-level program administered by the Ohio History Connection. For this new survey the goal was 100% coverage of the ploughed fields with a higher data density to aid in the detection of post circles. The new survey was undertaken with a Foerster Instruments Ferex 4.032 DLG 4-probe fluxgate gradiometer (Figure 2). The data were collected at a density of ten samples per meter along transects spaced 50 cm apart.

As expected, the new results captured the known enclosures in higher resolution, revealing a few additional internal features (Figure 3). Magnetic indications of the underlying terrace structure, a mixture of sand and gravel, are prevalent, as is a relic stream channel that is now a depression running through the field. Four previously undocumented earthen enclosures were detected in areas not covered in the previous survey, including two traditional ditch-and-embankment enclosures and two small, less common enclosure types characterized by a very narrow ditch or trench (embankments have yet to be detected around these small trench enclosures). The new data also revealed many more post circles, nearly all of which cluster at the northeastern corner of the site.

In summary, the new magnetic gradiometer survey at the Steel Group Earthworks brings the site's enclosure count up to 24 (Figure 4). Ditch-and-embankment enclosures number 12, with four distinct shapes: circles, squircles (i.e., squares with rounded corners), crescents, and a small square with one corner opened as an entrance. There are three small enclosures with what appear to be

narrow ditches/trenches but no indications of surrounding embankments. The smallest of these, just 13 meters across, is located on what was once a small island in the relic stream channel. The two others are located not far away and appear to overlap one another. It may be that these small enclosures are extremely plough damaged examples of ditch-and-embankment enclosures. And finally, there are nine post circles in the new magnetic data, ranging from 12 to 20 meters in diameter. One of these clearly overlaps, and likely preceded, a ditch-and-embankment enclosure. Though the enclosures are not randomly arranged, the new finds strongly suggest that the site accreted over time, with at least two instances of enclosure overlap. Enclosures do seem to cluster into groups based on location and entrance orientation, and hints of a larger design plan are present. The site will open to the public in the next year or two.

References

Burks, J., 2014: Geophysical Survey at Ohio Earthworks: Updating Nineteenth Century Maps and Filling the "Empty" Spaces. Archaeological Prospection, 21:5-13.

Burks, J., and R. A. Cook, 2011: Beyond Squier and Davis: Rediscovering Ohio's Earthworks Using Geophysical Remote Sensing. American Antiquity, 76(4):667-689.

Squier, E. G., and E. H. Davis, 1848: Ancient Monuments of the Mississippi Valley. Contributions to Knowledge, vol. 1. Smithsonian Institution, Washington, D.C.

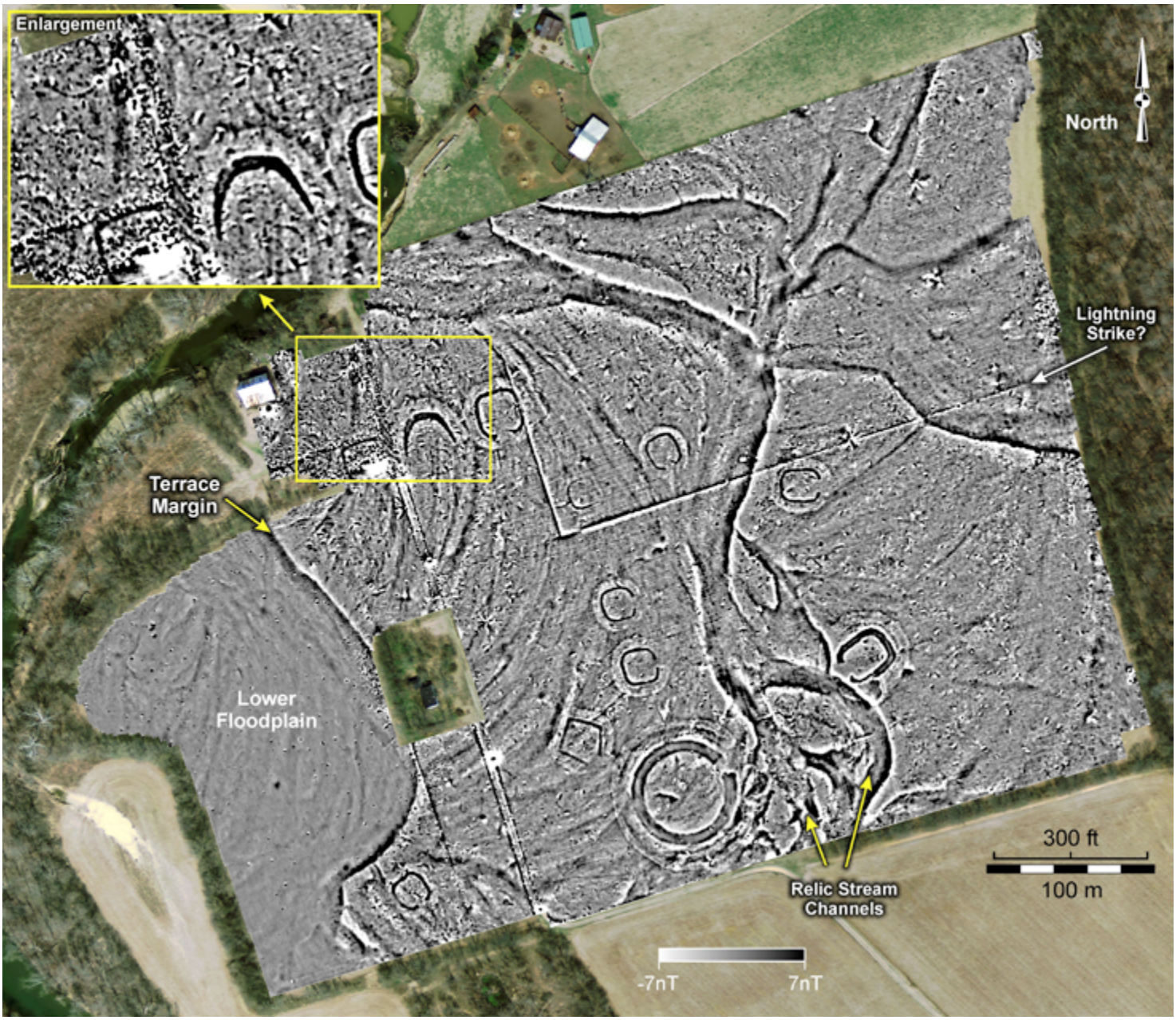

Figure 3 *2016/2017 magnetic gradiometer data from Steel Group, note the numerous post circles in the enlargement.*

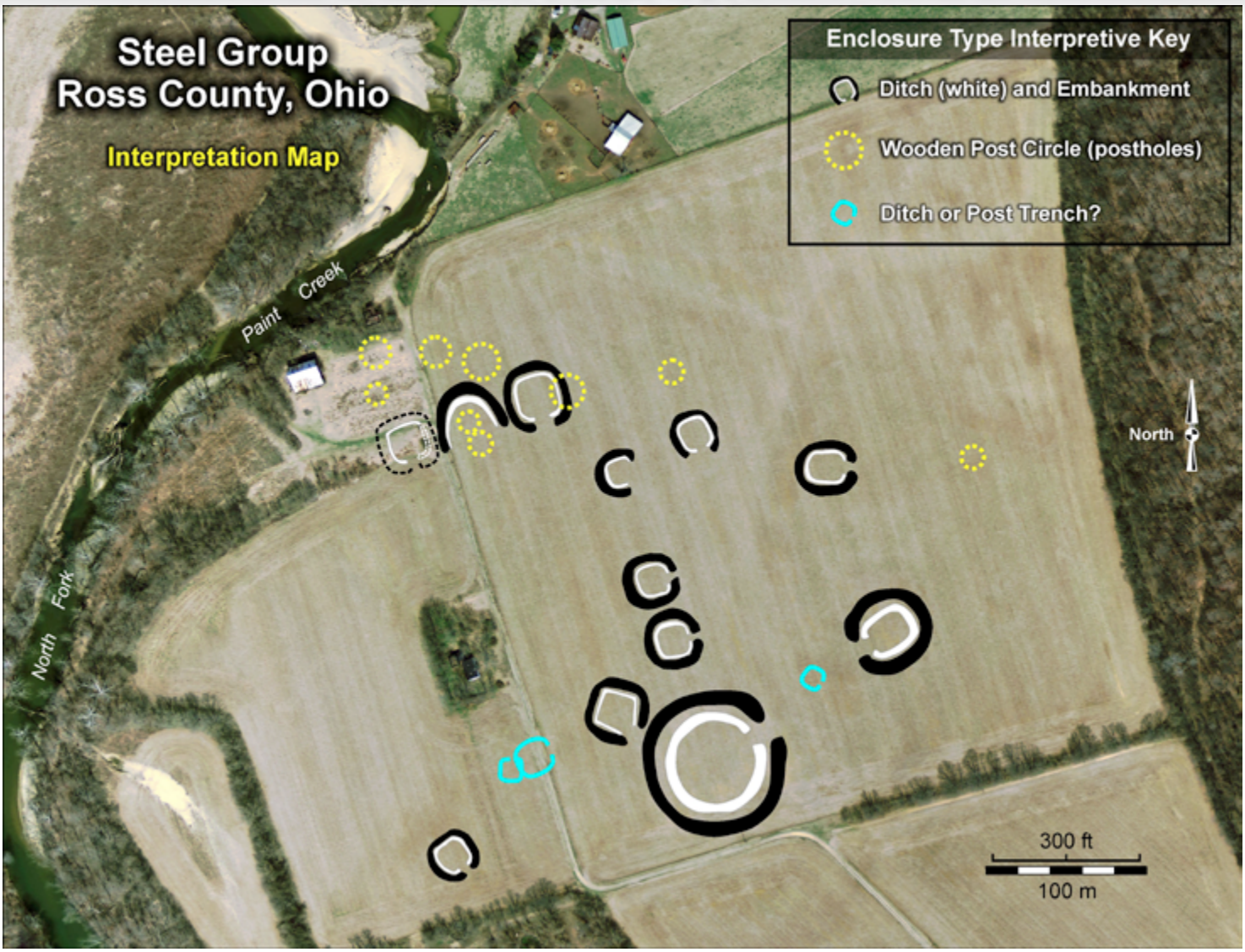

Figure 4 *General interpretation map of the 24 enclosures in the Steel Group magnetic survey results.*

AGT – Archaeological Geophysics Toolbox for QGIS

Guillaume Hulin, François-Xavier Simon, Nariman Hatami

Inrap (Institut National de Recherches Archéologiques Préventives) guillaume.hulin@inrap.fr

A new plugin designed for QGIS was published by Inrap in May 2017. This plugin named AGT - Archaeological Geophysics Toolbox is the first QGIS plugin entirely dedicated to archaeo-geophysical data processing. This plugin has been validated by QGIS.org and can be now downloaded directly via QGIS.

The first version of AGT allows processing of resistivity data from Geoscan Research RM15/RM85 (grid survey) and magnetic data from Sensys MXPDA collected with GPS. In each case, shapefiles are created as a basis for further QGIS processing (interpolation, geostatistical processing). File format .dat is also available.

For RM15/RM85:

- Resistivity calculation (pole-pole array)

- Spatial redistribution

- 2D median filtering

- Georeferencing

For MXPDA:

- Data decimation

- 1D median removal

- 1D trend removal

- Stationary point removal

Basic processing is supplied for the moment but AGT is rapidly evolving. A module for EM data processing is in progress and will be included very shortly. Importing data files from other manufacturers and advanced processing will be available in the near future. After the first installation, new developments will be easily updated by QGIS.

As an open source software, AGT could be greatly improved with the help of the user community so do not hesitate to contact us for any questions or remarks at developpement-qgis@inrap.fr. Any suggestions or contributions would be welcomed.

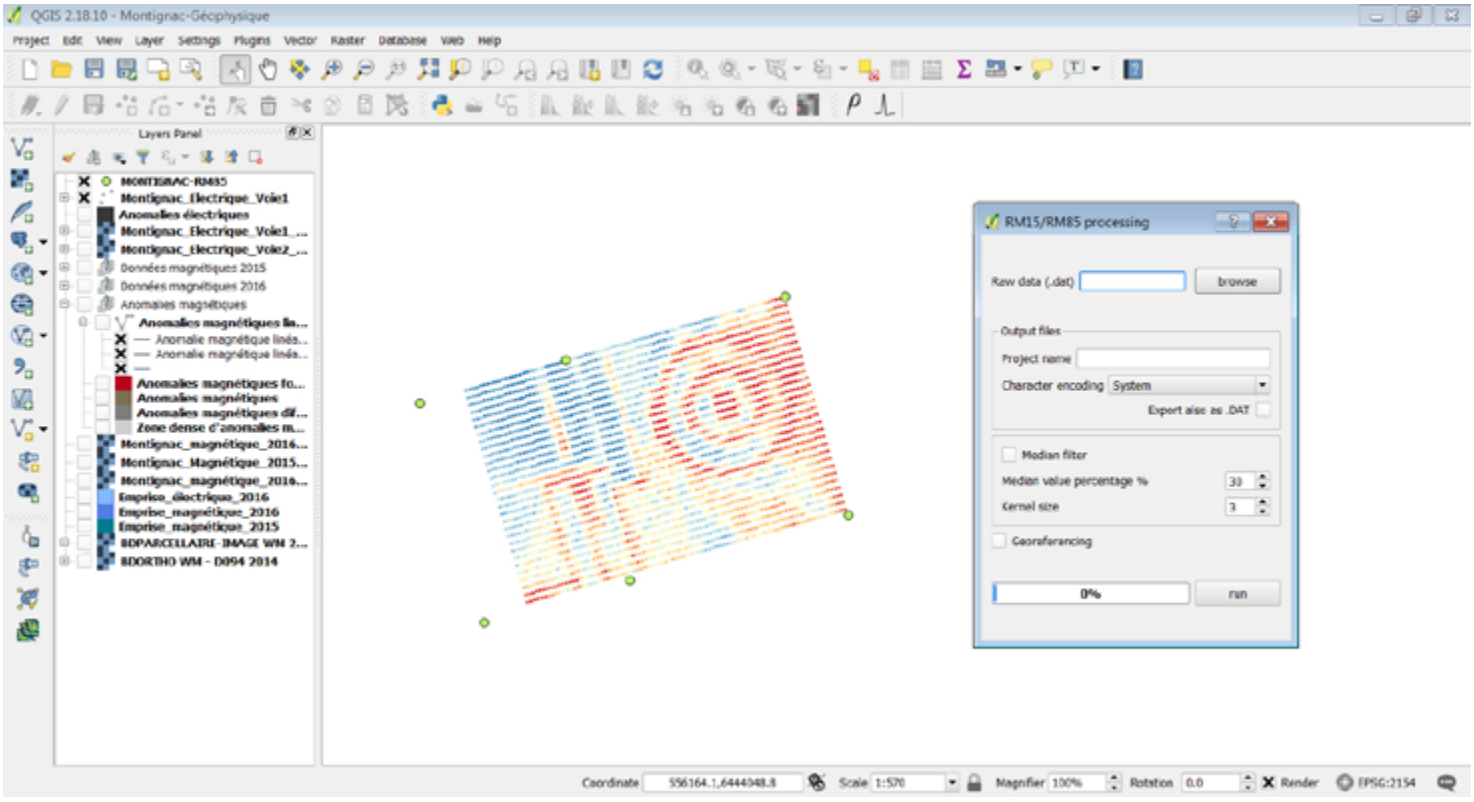

Figure 1 *Electrical Resitance data processing with AGT.*

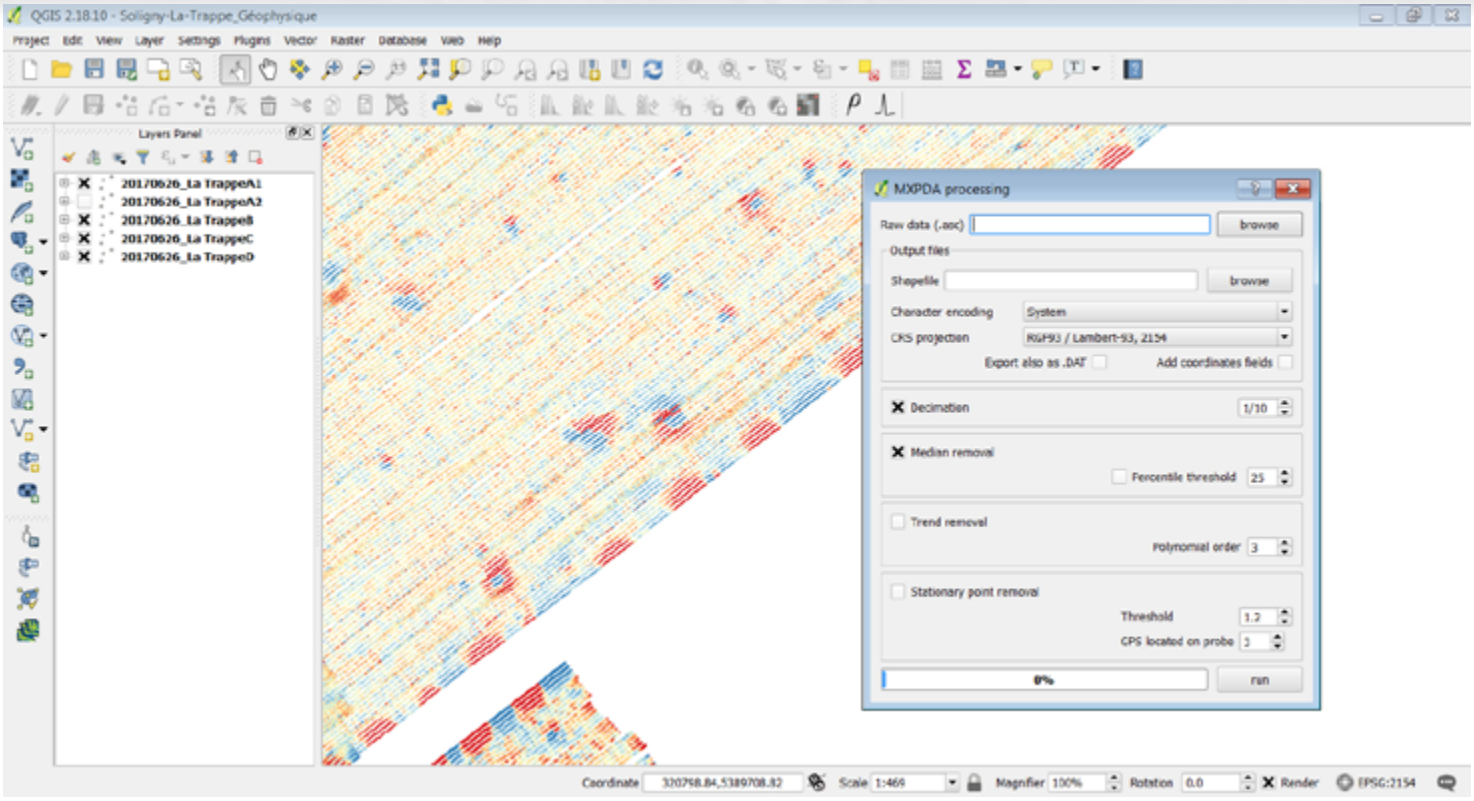

Figure 2 *Magnetic data processing with AGT.*

The Old Sarum Landscapes Project. Geophysical Survey and Excavation of a Medieval City and its Environs.

Kristian Strutt[1], Alex Langlands[2], Dominic Barker[1], Jamie Ingram[1]

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The Old Sarum Landscapes Project aims to produce new and extensive data and interpretation for the site of Old Sarum and its environs, using archive research, archaeological survey, and targeted excavation to assess the role of this key site in the Wiltshire landscape. It aims to map the full nature and extent of Old Sarum and the surrounding settlement, including the eastern suburbs and the road settlement running down to the River Avon, and to define the phases of growth and decline in the fortunes of the city. Following on from the geophysical surveys within the curtilage of Old Sarum in 2014, 2015 and 2016 (Fig. 1; ISAP Newsletter 48) the project is now focusing on the area of landscape between Old Sarum and the River Avon.

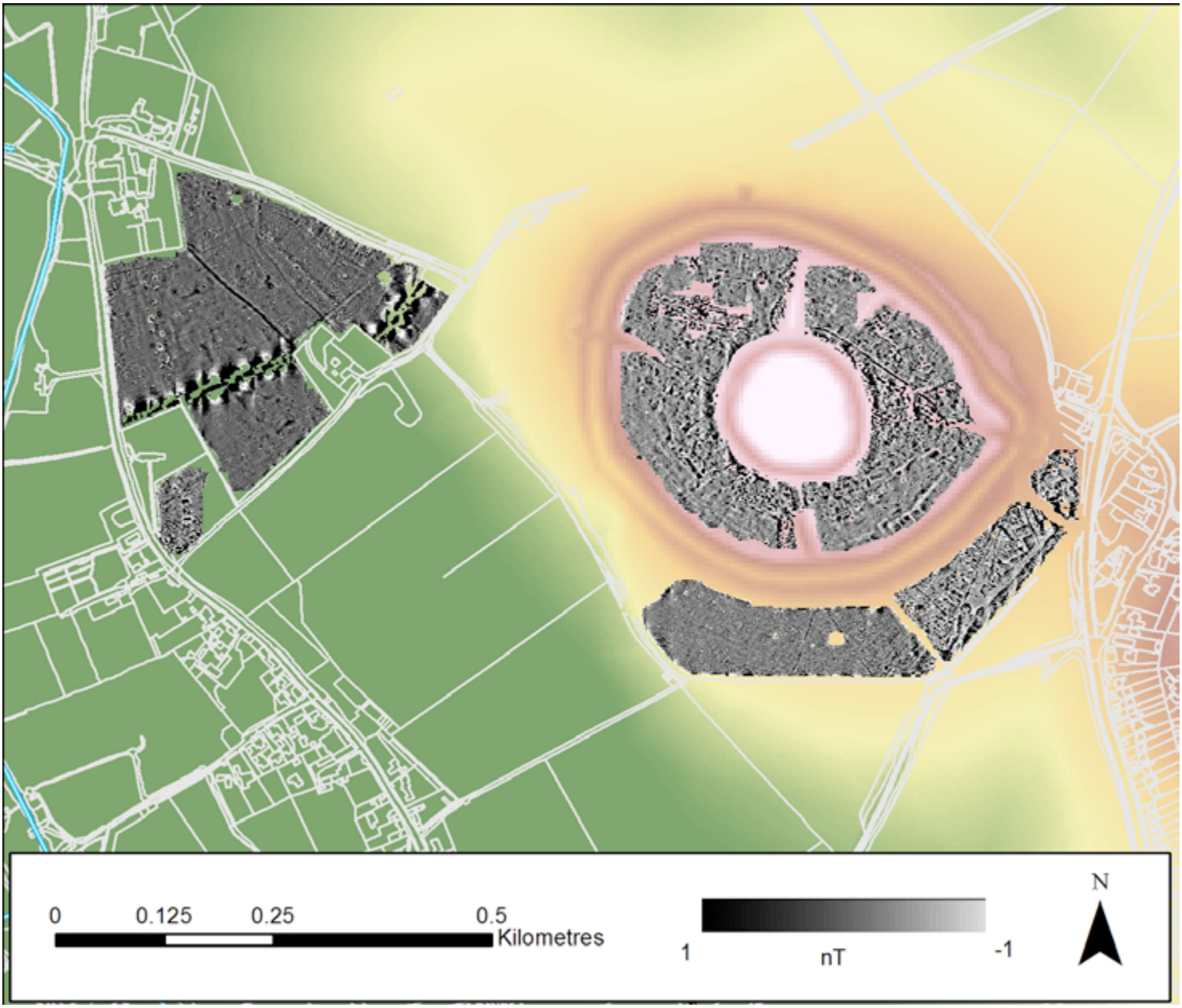

Figure 1 *Areas of magnetometer survey at Old Sarum and the surrounding landscape 2014–2017.*

FIgure 2 *Field school students with Dominic Barker setting out the survey grid and trenches using a Leica GPS with Smartnet (photo: K. Strutt).*

Our depth of information for the development of Old Sarum and the surrounding landscape is limited to previous fieldwork, most predominantly the published excavations of the monument in the early part of the 20th century by Hawley and Hope, and the later published works by Musty and Rahtz within the ancient monument and in the eastern suburbs of the site. Some synthesis of archaeological remains has been produced by David James for the area to the west of the monument. However, the nature of this area in relation to Old Sarum, bearing in mind the dynamics between the site and the River Avon, requires a programme of fieldwork and analysis to add to the body of evidence in the HER and grey literature excavation reports for the area. Thus the geophysical survey undertaken at Easter 2017 and the 2017 Old Sarum summer field school focused on the archaeology of the area to the west of Old Sarum.

The geophysical survey methodology for the project has been dealt with in a previous issue of ISAP News (Issue 48, Geophysical surveys at Old Sarum and Stratford Sub-Castle), and the survey methodology of magnetometer and earth resistance survey was continued in the field season for 2017. The grid was established using a Leica GS16 GPS with Smartnet (Fig. 2) and magnetometry was conducted using the Bartington Instruments Grad601-2 fluxgate gradiometers (Fig. 3), with some earth resistance survey undertaken using Geoscan Research RM15s. The fieldwork focused on land between Old Sarum and the River Avon, in Dean's Park Field.

The results of the geophysical survey indicate a palimpsest of different anomalies across the entire survey area (Fig. 4), broadly indicative of a possible suburb to the medieval city of Old Sarum, and the presence of a medieval settlement along the River Avon indicating earlier phases of what is now Stratford sub-Castle. The earth resistance survey results generally indicate the broad changes in the gravels along the lower portion of the survey area. However, the magnetometry provides a more appropriate indicator of the nature and extent of the archaeology of the area. A substantial bank feature is visible as a slightly negative anomaly in the magnetometry (Fig. 5) running from north to south for approximately 50m, before turning to the south-east and running for a further 160m to the edge of the field. Within this enclosed space a number of positive and dipolar anomalies mark a substantial number of possible ditches, structures and other features. To the south of this a large positive anomaly, measuring 4-5m across and running from north-west to south-east, marks

Figure 3 *Magnetometer survey being conducted using a Bartington Instruments Grad 601-2 fluxgate gradiometer.*

Figure 4 *The magnetometer survey results from Dean's Park Field.*

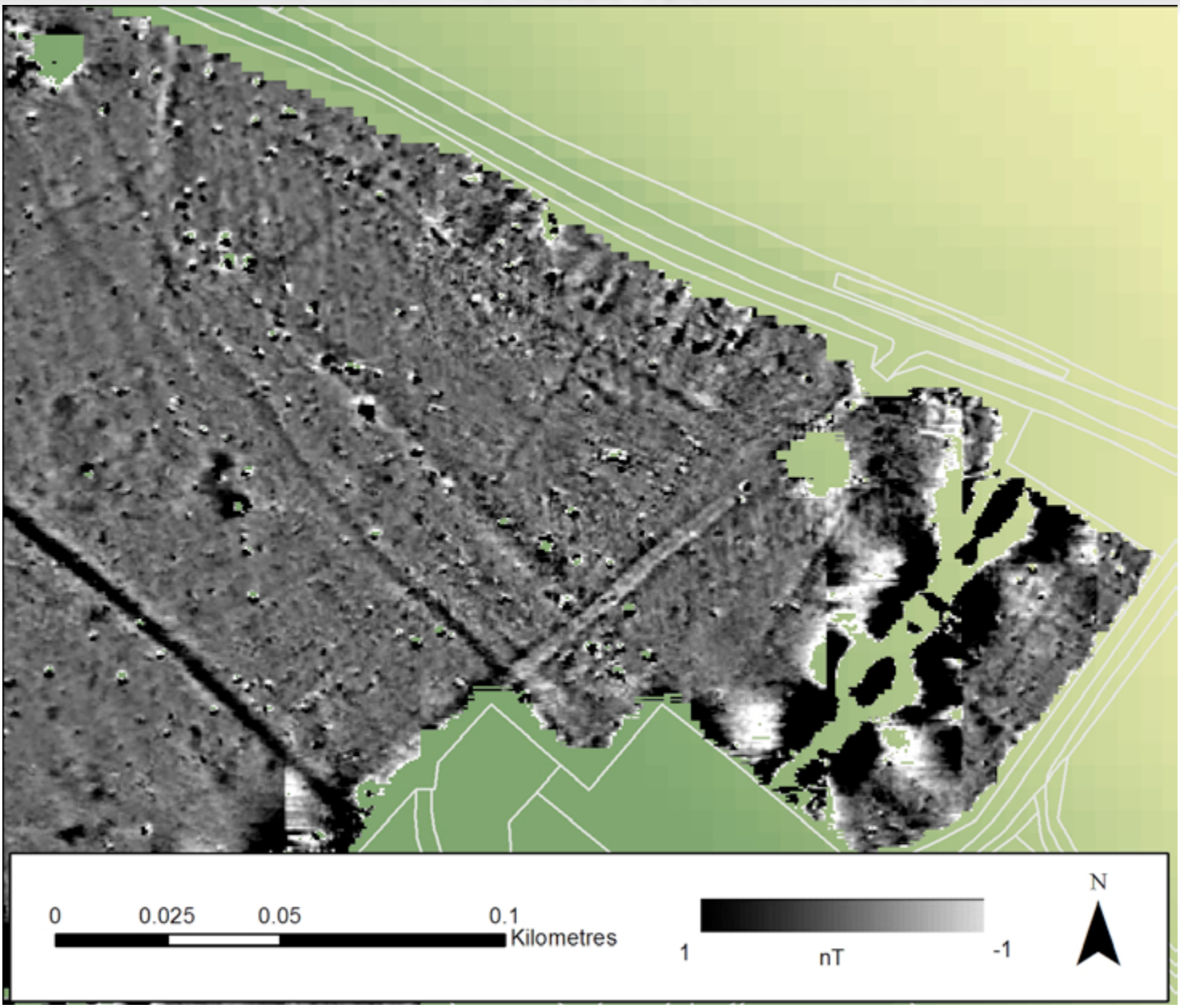

Figure 5 *Detail of the magnetometer survey results showing the negative bank anomaly, marking a possible enclosure or suburb to the west of Old Sarum.*

a possible ditch or holloway. In addition a large number of more ephemeral anomalies mark ditches cutting across Dean's Park Field, including one that respects the line of the possible ditch or holloway.

Along the modern Stratford sub-Castle road (Fig. 6) a series of parallel positive anomalies mark the boundary ditches of possible medieval burgage plots, together with a number of other ditch and pit features in the area, and a line of dipolar anomalies running from north to south across the area.

As part of the summer field school in July 2017, in addition to a programme of geophysical survey, six evaluation trenches were located to help characterise the results of the geophysical survey. The trench located over the bank anomaly produced a significant feature indicating a bank and small ditch, and a slightly earlier double ditch feature underlying the bank and cut into the natural chalk. The bank material produced finds including a well-preserved 13th century pitcher (Fig. 7), and other 12th and 13th century wares including locally-produced Laverstock ware. The trench excavating the large linear anomaly running across Dean's Park Field provided some useful material both in terms of the nature of the anomaly, and the depth of deposits in the lower part of the field. The feature was covered by c. 0.7m of colluvium, containing worked Neolithic and Bronze Age flint, suggesting the possible location of a settlement or working site at Old Sarum or immediately below the monument. The main feature (Fig. 8) appears to be either a ditch or infilled road or track, containing colluvium with worked flint and underlying infilling of the feature. Further excavation in the 2018 season will be required to elucidate on the nature of this feature.

Excavation of one of the linear anomalies marking a

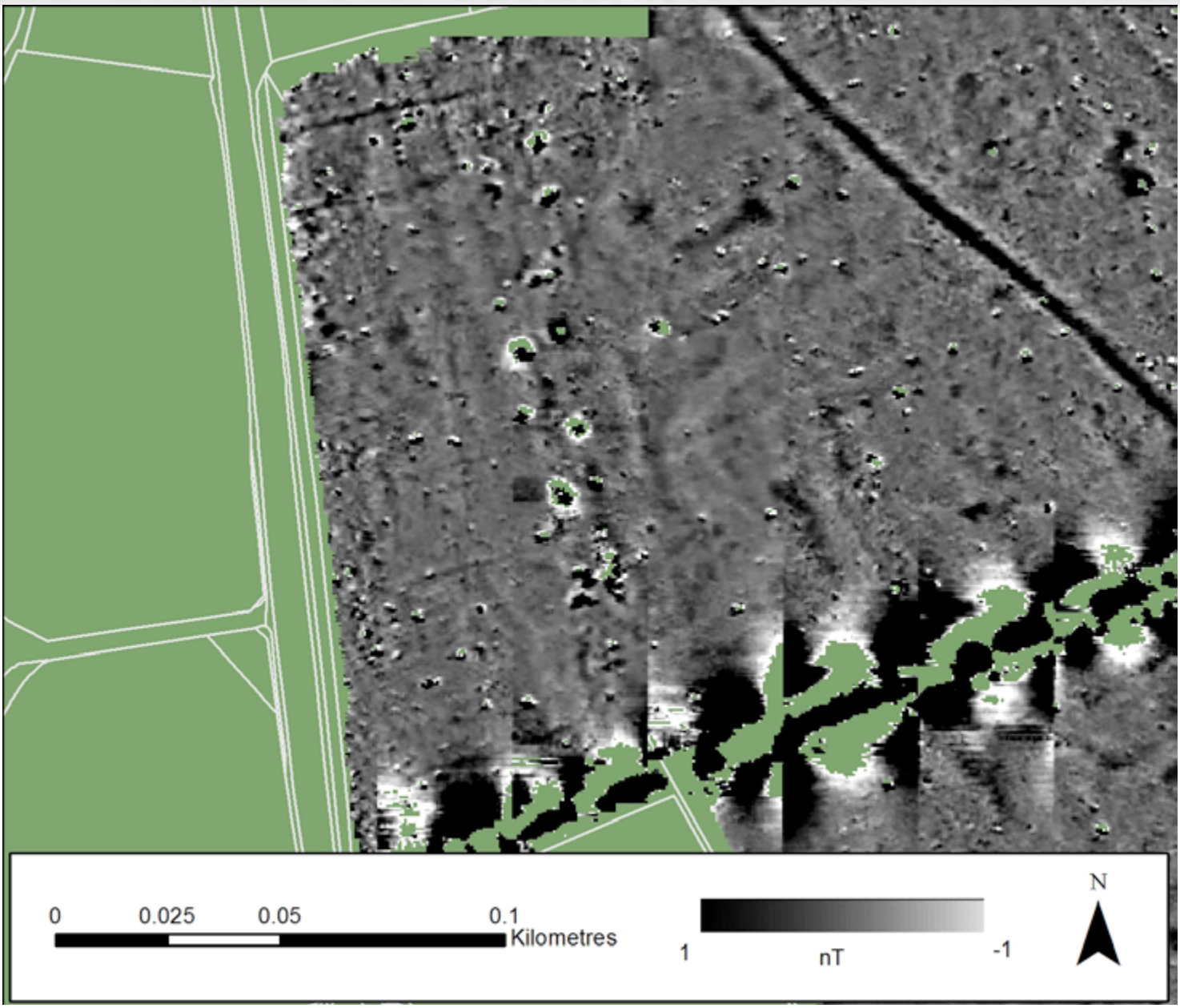

Figure 6 *Anomalies in the magnetometer data indicating medieval burgage plots along the Stratford sub-Castle road, and the large ditch/ holloway feature across the centre of Dean's Park Field.*

possible burgage plot boundary in the western part of the field revealed a ditch (Fig. 9) with 12th and 13th century pottery and faunal remains, with ditch upcast and possible occupation layers to the south of the ditch. What is apparent from the excavation is that the ditch is cut into natural gravels of the River Avon, and that underlying the medieval upcast and occupation layers are other ditches and postholes cut into the gravel. The results in this area will help to span the period between the high-point of the city of Old Sarum, its decline, and the extant Tudor and later buildings of modern Stratford sub-Castle.

A photographic survey was also conducted at St Lawrence

Figure 7 *Finds from the excavation of the bank feature, including Laverstock ware and a medieval pitcher (photo: K. Strutt)*

Figure 8 *Dominic Barker and students excavating the large ditch/ holloway*

church, Stratford Sub Castle, as part of a graffiti survey of churches in Wiltshire (http://wiltshireafg.weebly.com/wiltshire-digital-recording-project---medieval-graffiti.html). The principle survey technique utilised was raking light photography. This method uses a light source placed at a shallow oblique angle to the surface under investigation enhancing the shadows cast by alterations in surface detail such as cuts and scratches.

Through this method 220 images were captured recording in excess of 300 individual graffiti marks. In addition to this survey six areas were recorded using Polynomial Texture Mapping, generated from highlight method Reflectance Transformation Imaging. This process allowed for additional detail to be recorded in the areas of interest and resulted in additional marks becoming visible in the area on the western door jamb of the South Porch. Initial analysis of

Figure 9 *Excavation of one of the plot ditches, showing the ditch cut, and deposits overlying the natural gravels*

the recorded marks suggests that they range from the pre-reformation period into the 19th century, with many of the later marks including dates inscribed during their creation (figure 10). Further analysis of these marks continues and a full report of the findings will be produced.

The results of the geophysics, excavation and graffiti survey form part of research that is very much 'in progress'. The team will return to Old Sarum in 2018 to continue the geophysical survey in and around the monument, and a field school is planned for July 2018.

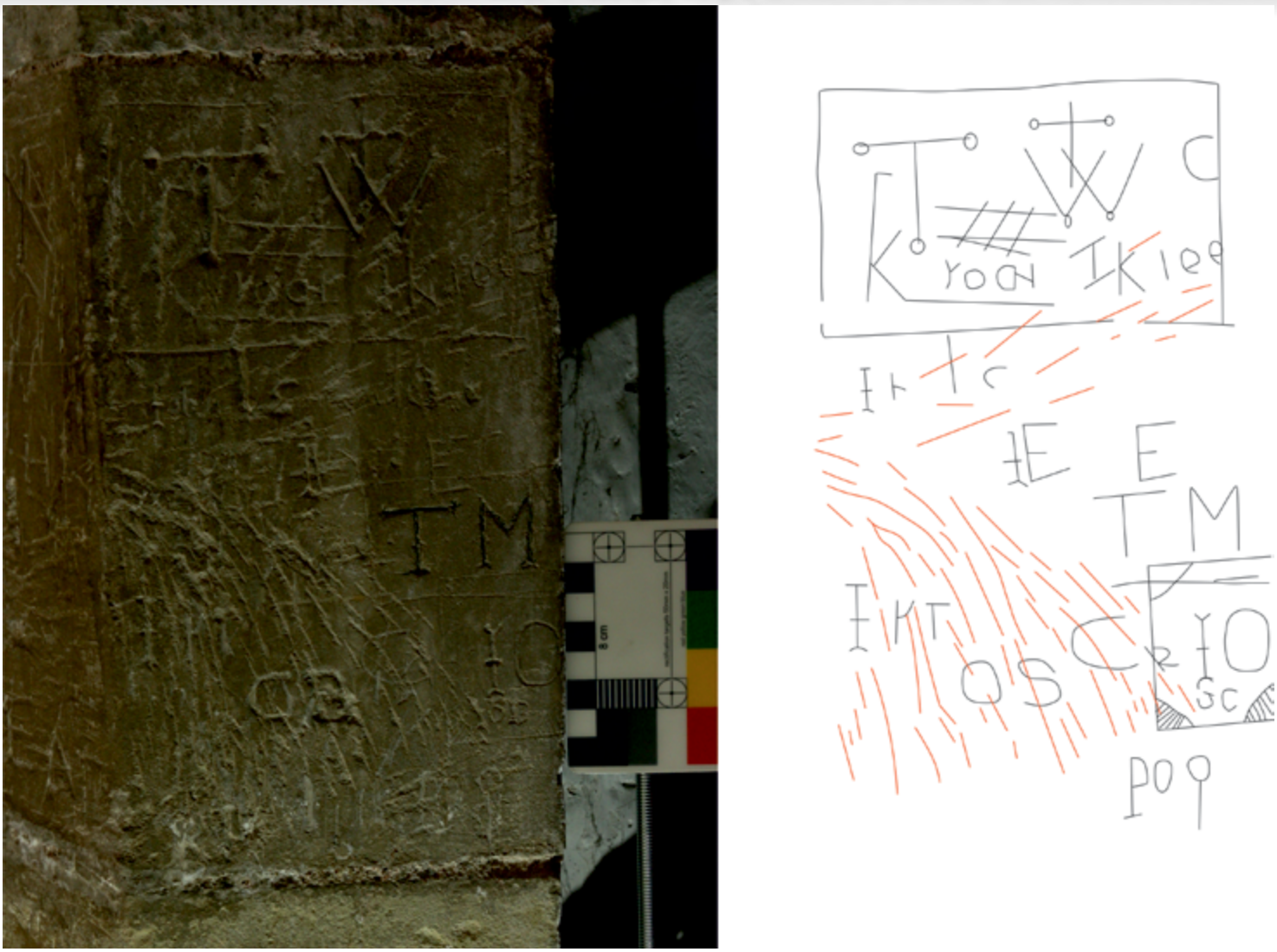

Figure 10 *Raking Light Image from south porch, internal door jamb at St Lawrence Church, Stratford Sub Castle (Photo: J. Ingram).*

12th International Conference of Archaeological Prospection

The Organising Committee is pleased to invite you to take part in the 12th International Conference on Archaeological Prospection, held at the University of Bradford, UK. Further details of the venue, extended programme, accommodation and events can be found on the Conference website:

www.ap2017.brad-vis.com

The Conference will be run from **12th to 16th September 2017**.

The scientific programme has sessions covering:

Landscapes, applications and interpretation

Integration and visualisation of methods and results

Technological developments and applications

Marine and inter-tidal archaeological prospection

Low altitude prospection

Commercial prospection

Over 100 papers and posters present research from around the world, and range from specific research projects to technological developments and emerging applications.

In conjunction with the Commercial prospection session, the GEOSIG are running a CPD workshop focussing on communication procedures, standards, techniques and trouble shooting errors.

For registration details, including day rates, see www.ap2017.brad-vis.com

The ISAP AGM will occur directly after the conference programme on the 15th September.

We hope to see you in Bradford!

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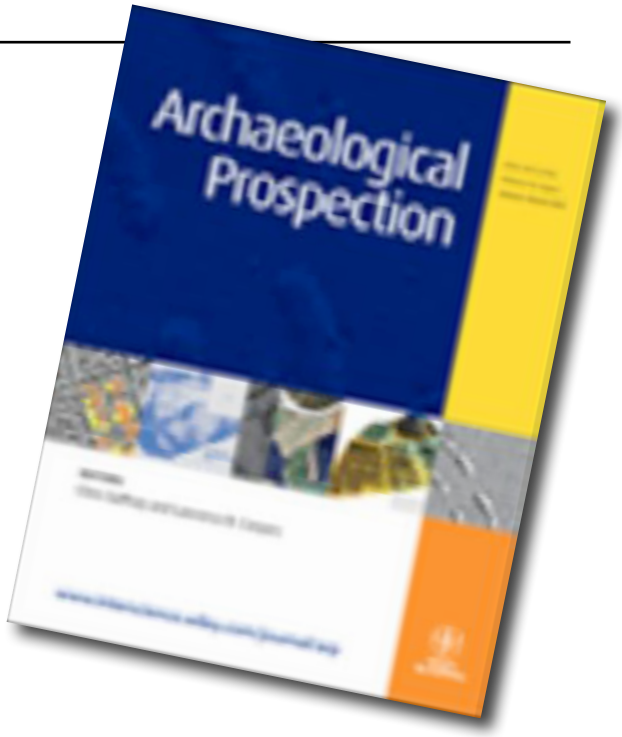
Journal Notification

Archaeological Prospection 24 (1)



Searching for the Antigonea Theatre: A Magnetic Survey in an Ancient Epirus City

Antonio Schettino, Dhimiter Çondi, Roberto Perna, Pietro Paolo Pierantoni & Annalisa Ghezzi

Under the Park. Recent Geophysical Surveys at Verulamium (St Albans, Hertfordshire, UK)

Kris Lockyear & Ellen Shlasko

Archaeological Applications of Low-Cost Integrated Sidescan Sonar/Single-Beam Echosounder Systems in Irish Inland Waterways

Kieran Westley & Rory Mcneary

On the Use of Fluxgate 3-Axis Magnetometers in Archaeology: Application with a Multi-sensor Device on the Site of Qasr 'Allam in the Western Desert of Egypt

Bruno Gavazzi, Rozan Alkhatib-Alkontar, Marc Munschy, Frédéric Colin & Catherine Duvette

The Value of Complementarity. Integrating the Evidence from Air Survey and ALS in Bohemia

Martin Gojda

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