

ISAP NEWS

The newsletter of the International Society for Archaeological Prospection

Issue 52

November 2017

Geophysical surveys
at Durobrivae

The Impact of Prospection

Meet your Management
Committee

Dear ISAP members welcome to the 52nd issue of ISAP News, for those of you not able to be at the AGM, hello! I'm Kayt Armstrong and I've taken over from Hannah Brown and Paul Johnson as editor of the ISAP newsletter for a two-year term. Paul will be helping out with the first few issues as part of the handover process, and I'd just like to take this chance to thank Hannah for her sterling work over the last few years, and Paul for his ongoing help! We hope over the course of the year to bring you the usual combination of project write-ups, topical discussions and reports from the research we've helped to support via the ISAP fund.

In this issue, we have some excellent results from a community geophysical survey project at the Roman "small town" of Durobrivae (Water Newton), which lies just to the west of the city of Peterborough in the UK.

We also have a write-up of the ICAP 2017 meeting in Bradford, from Petra Schneidhofer, and an update from Paul Johnson in his new role as Fund Secretary about the activities supported by the ISAP Fund.

Finally, with the AGM in September, some minor changes occurred to the management committee and we decided to provide updated information about ourselves so you could all get to know us a bit better; these are re-printed on page 10

I'm excited to hear about what you are all up to and to help you share it with ISAP members, so please get started sending your short articles (700-ish words and a couple of images) and updates!

Kayt Armstrong

editor@archprospection.org

Membership renewal

£7 or €10 for the whole year. Please visit:

<http://www.archprospection.org/renew>

Archaeological Prospection Journal

Take advantage of the great deal offered to ISAP members by Wiley-Blackwell for this journal:

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The Cover Photograph shows the AP2017 branded glassware given to attendees at the ICAP 2017 conference. (Photo: Kayt Armstrong)

The views expressed in all articles are of the author, and by publishing the article in ISAP News, the ISAP management committee does not endorse them either positively or negatively. Members are encouraged to contact authors directly or to use the discussion list to air their views, should they have any comments about any particular article.

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The 2017 International Conference on Archaeological Prospection

Petra Schneidhofer

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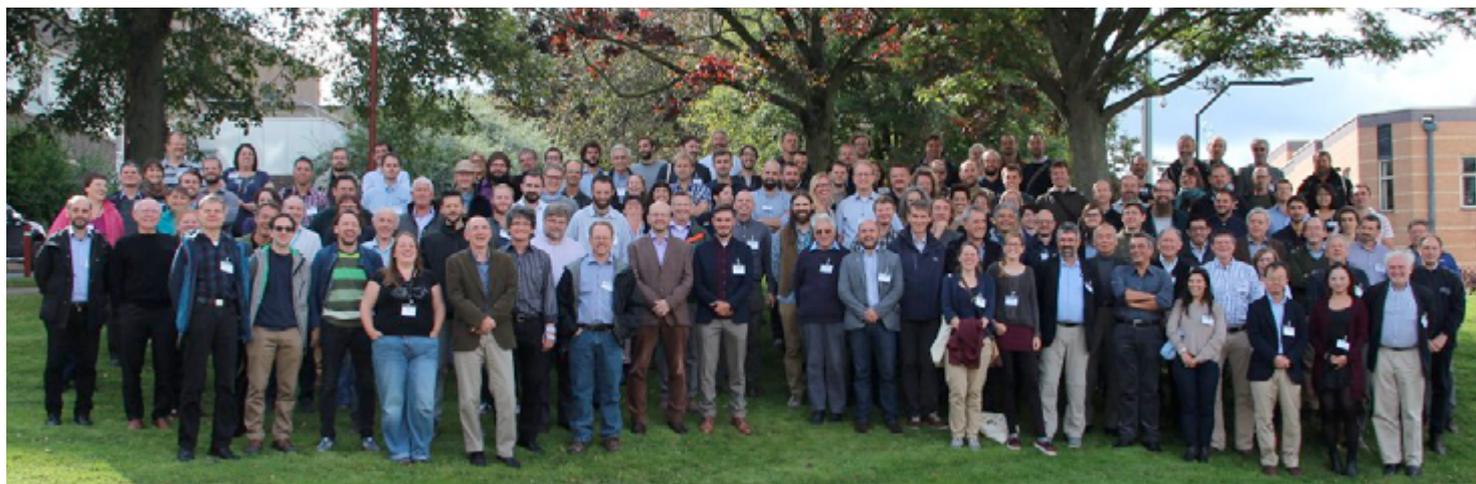


Figure 1 The delegates at the 2017 12th International Conference on Archaeological Prospection in Bradford (photo Mike Langton).

The 12th International Conference on Archaeological Prospection was held from 12th–16th September 2017 at the University of Bradford, UK, in the place where ICAP was launched 22 years ago by a group of prospection enthusiasts. Warmly welcoming us to the Norfolk Centre, the organisation committee with Ben Jennings and Chris Gaffney at the forefront, ensured the wellbeing of all presenters and attendees.

The conference started with four keynote speeches given by Armin Schmidt, Vince Gaffney, Rinita Dalan and John Gater. In total, 72 papers were presented, divided into six sessions including “Techniques and new technological developments”, “Applications and reconstructing landscapes and urban environments”, “Integration of techniques and interdisciplinary, with focus on visualisation and interpretation” and “Commercial archaeological prospection in the contemporary world”.

Paper topics demonstrated the nowadays wide-spread use of integrated archaeological prospection approaches in projects around the globe with many highlighting the need for semi-automated interpretation to handle the amounts of data resulting from landscape-scale prospection surveys. A growing number of papers discussed the influence of environmental factors for individual prospection techniques. Special sessions focusing on marine, intertidal and wetland prospection techniques and applications as well as low altitude prospection techniques and applications brought attention to these rapidly expanding fields of research within archaeological prospection.

The conference closed with two workshops given by The Chartered Institute for Archaeologists’ (CIfA) Geophysics Special Interest Group (GeoSIG) and New Generation Group to discuss careers in commercial archaeological geophysics, and by Matt Guy who held a CPD Workshop for practical trouble shooting of communications ports in the field.

Three poster sessions during coffee breaks showcased 37 posters with this year’s poster prizes being awarded to Duncan Hale, Andreas Viberg and Jakob Kainz.

Kayt Armstrong, alias @girlwithtrowel, provided us once more with an excellent live Twitter feed covering key points of every paper online for colleagues all over the world who could take part in the conference virtually, including questions and answers. Kayt has storified all tweets with the official conference hashtag #ICAP2017, which can be accessed here:

<https://storify.com/girlwithtrowel/international-conference-on-archaeological-prospec>

In short, ICAP 2017 was as always a very well organised and exciting opportunity to hear the latest in Archaeological Prospection, to meet colleagues from all over the world, discuss exciting new developments in the field and of course get that excellent conference glass! We look very much forward to #ICAP2019 in Sligo, Ireland.

The ISAP Fund

Paul Johnson (ISAP Fund Secretary)

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The ISAP fund has recently awarded its third round of funding, and is in the process of reviewing applications received for the fourth round. To date we have funded projects looking at the use of Electrical Resistivity Tomography and Photogrammetry in shallow-marine environments (reported on in ISAP News 47), the use of geophysics and UAVs in the challenging environment of South Australia; and most recently a study of the relationship between soil characteristics and the interpretative potential of frequency domain electromagnetic induction as an archaeological prospection technique.

The ISAP Fund is designed to support research undertaken by members of the society which might otherwise be difficult to conduct, which advances the discipline, and seeks to further the objectives of the society. Full details and the application form are available at:

<http://www.archprospection.org/isap-fund>

Please note that we are currently assessing applications for the most recent round of funding. Opening and closing dates for the next round will be circulated through the usual channels.

Geophysical Surveys at Durobrivae

Kris Lockyear and Ruth Halliwell

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The Roman “small town” of Durobrivae (Water Newton) lies just to the west of the city of Peterborough in the UK. It is one of the larger “small towns” with 21ha lying within the town walls, and extensive extramural settlements. The town straddles Ermine Street, a major Roman road which was built on a raised agger in this area. The town was built on a sand and gravel terrace on the south side of the River Nene. Durobrivae was first noted in the literature in Henry of Huntingdon’s *Historia Anglorum* of 1154 which Camden referred to in his *Brittania* of 1607. The town name has also been found on two mortaria in Peterborough museum that provide evidence of the name and status of Durobrivae. One locally produced mortarium has the inscription ‘Sennianus (the potter) of Durobrivae fired this’ (Upex 2008)

Most of what we know about the town within the walls is derived from early 18th and 19th century excavations or from aerial photography. The first systematic excavations took place in the 1820’s, by Edmund Tyrell Artis, an antiquarian who was also the house steward to Earl Fitzwilliam. Having access to the Earl’s land, he carried out archaeological investigations throughout his working life. Artis recorded in detailed drawings of the excavations he undertook and published a book of the drawings and maps in 1828, *The Durobrivae of Antoninus*. Subsequent excavations, largely outside the town walls, were carried out between 1956–8 by Ernest Greenfield ahead of widening the A1 and in 1957–8 by the newly set up Water Newton Research Committee prior to work on the Water Newton and Sibson bypass. The best understanding of the town however comes from 20th century aerial photographs from which much of the town plan was drawn up (Upex 2008).

The Community Archaeology Geophysics Group (CAGG; www.hertsgeosurvey.wordpress.com) teamed-up with Stephen Upex and the Nene Valley Archaeological Trust to undertake three days of survey at the end of October 2016. The aim of this short survey season was to assess which of the three main survey techniques —magnetic gradiometry, Earth Resistance and GPR — would provide good results for the site. A transect 80×360m was surveyed using a Foerster Ferex cart system with a 50cm transect spacing and 10 readings per metre. GPR data were collected using a Mala GX with a 450MHz antenna, kindly on loan from the doctoral training centre Science and Engineering in Arts, Heritage and Archaeology. A 50cm transect spacing was again employed, and two blocks, one 80×80m, another



Figure 1 The magnetic gradiometer data.

40×80m, were completed. The Earth Resistance survey was undertaken using a Geoscan RM85 on loan from the Institute of Archaeology, UCL. An area 60×80m was completed at 50cm intervals between readings in both directions. A pole-pole configuration was used to minimise the need for grid-matching. The majority of the site is quite flat, but where the surveys crossed Ermine Street we undertook two topographic surveys: one using a Leica dGPS and a second using a UAV with Structure from Motion analysis of the resultant aerial imagery.

In terms of our original research question, the short answer is that all three methods provided excellent results. The magnetometry data (Fig. 1) clearly shows the known roads matching the parch marks visible on the Google Earth image, as well as the north-south road which leads to Ircchester. Either side of Ermine Street, a series of linear low-magnetic responses would appear to be structures alongside the road. These have their short-axis to the main street, a feature which has been observed in many excavated examples, for example in London and elsewhere (Perring 2002, pp. 55–60). It seems probable that these are



Figure 2 Peter Alley operates the DJI Phantom UAV (A); Mike Smith with the GPR (B); Richard Cushing and Stephen Upex using the RM85 (C); the “tumulus” showing in the late afternoon mist (D).

foundations made of non-magnetic material contrasting with a build-up of more magnetic, probably organic, soils either side of the agger on which Ermine Street was constructed. A large, probably public, building can also be seen comparing well with the aerial photographs of the site. A brown dust (Fig. 2 A), possibly from the nearby brickworks, covered all of the equipment and caused problems by turning into a sticky slurry in the gears for the mag cart’s odometer!

The most obvious feature of the Earth Resistance survey (Fig. 3) is the Romano-Celtic temple, seen previously in aerial imagery, which shows as a light square of low resistance readings. This type of building consisting of a square central room or tower with an ambulatory is well known across the north-western provinces of the Roman Empire. The Earth Resistance survey also suggests there is a small room at the back of the ambulatory, and that the structure is set in a courtyard with a broad entranceway facing west, similar in plan to the temple at Harlow (France et al. 1985).

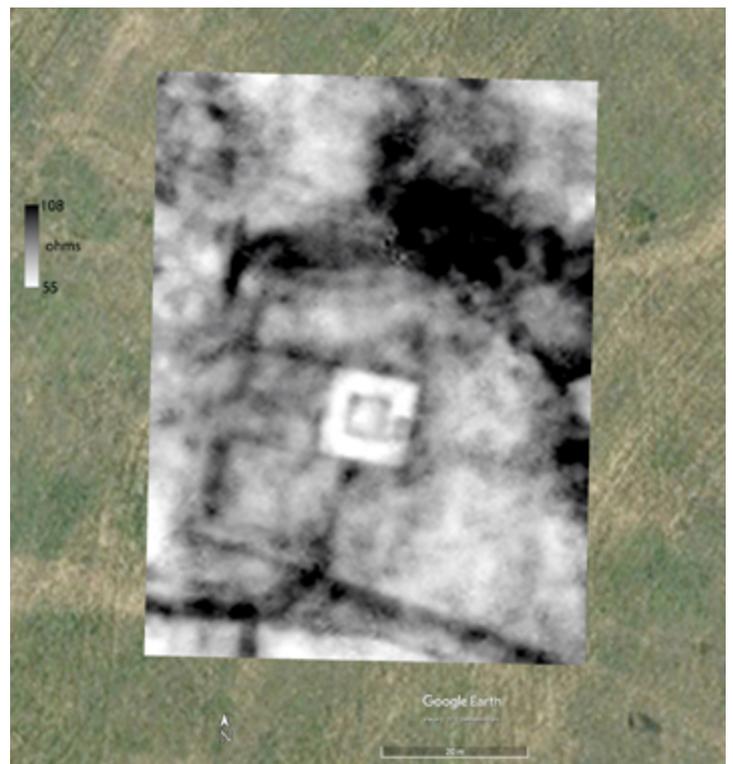


Figure 3 The Earth Resistance Data.



Figure 4 The GPR data. Time-slices between 16.5 and 19.5ns.

The GPR data (Fig. 4) adds some useful details, especially to the large public building. Examination of the radar data by Lawrence Conyers showed that the interior of the temple is almost entirely devoid of rubble. A combination of probably silty fills and the continuous square foundations would hold moisture and this explains the Earth Resistance results from the temple. The GPR data requires further processing, especially over the line of Ermine Street, where the topography has to be built into the data processing. A direct comparison of the satellite imagery and the three data sets shows the highly complementary nature of the results.

Having shown the value of all methods, CAGG hopes to team-up with Stephen and the local groups again this autumn to extend the survey, especially over the mysterious mound called a "tumulus" in the early reports (Fig. 2D), which can be seen in the topographic survey (Fig. 6). We would also like to extend the surveys into the field to the west of the A1 where aerial photographs reveal a series of henge-like circular features.

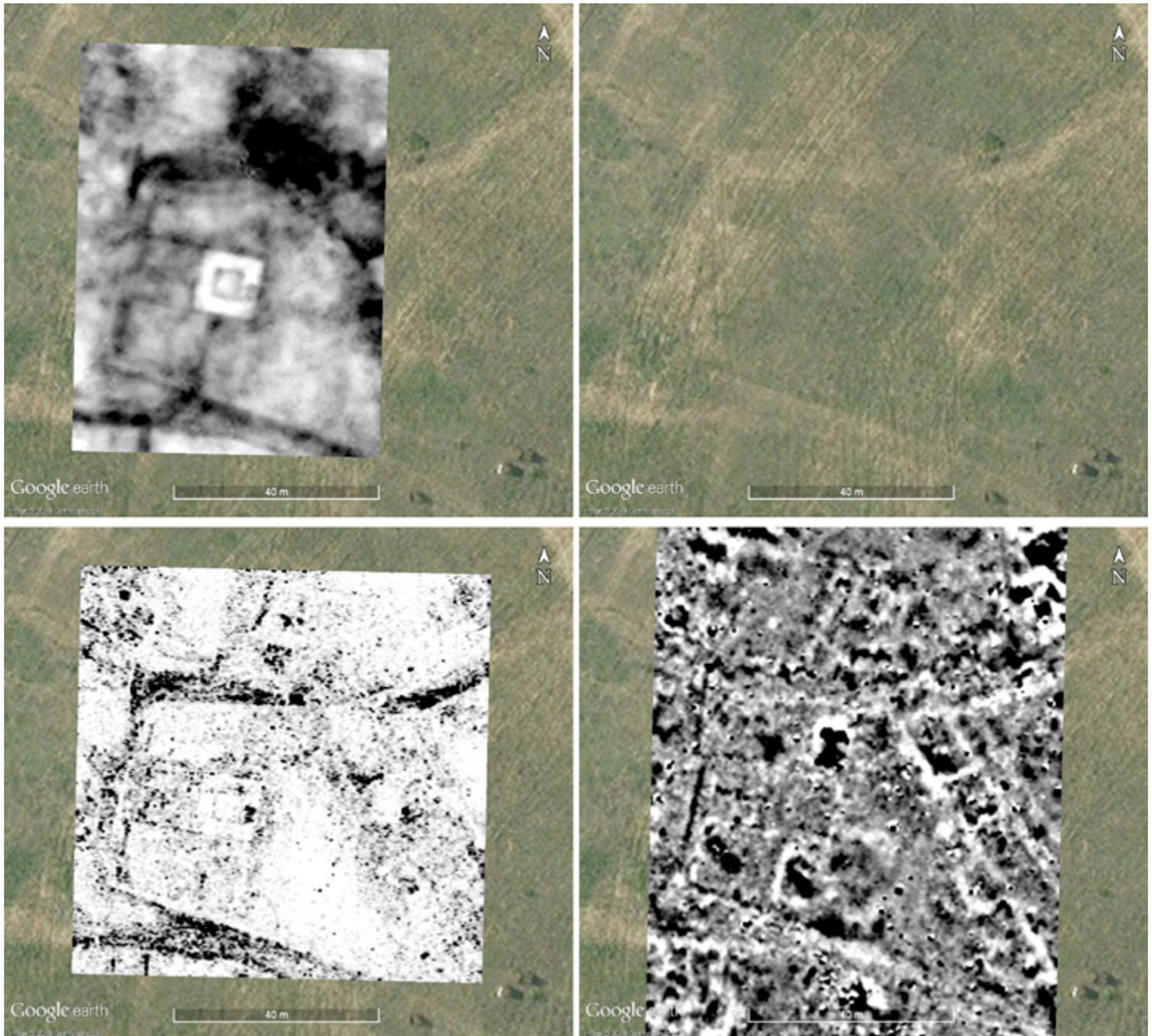


Figure 5 Comparison of the four data sets over the Romano-Celtic temple.

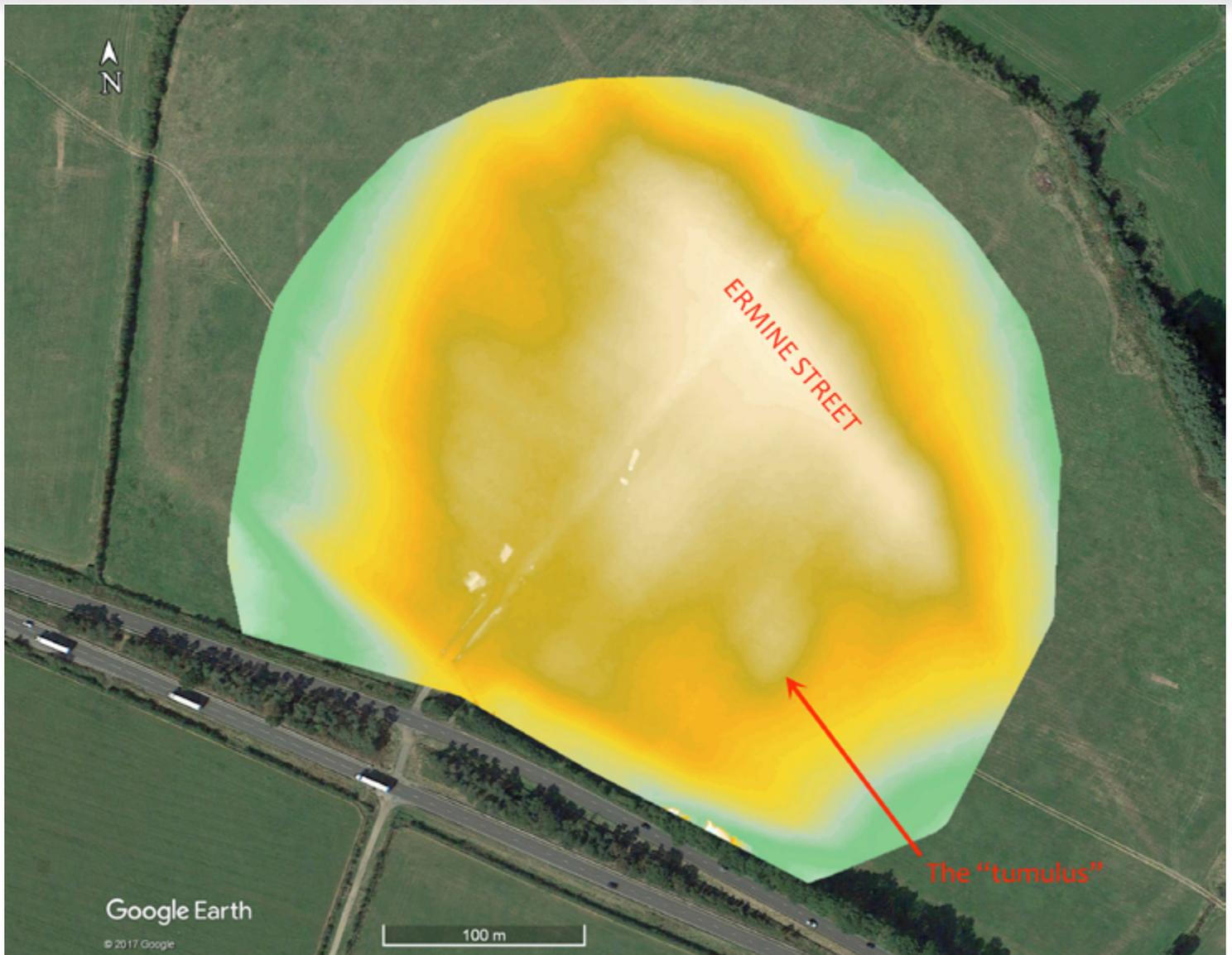


Figure 6 Che topographic survey created using UAV photographs and structure-from-motion. Scale goes from 8.8m (light green) to 10.5m on Ermine Street. Survey by Peter Alley.

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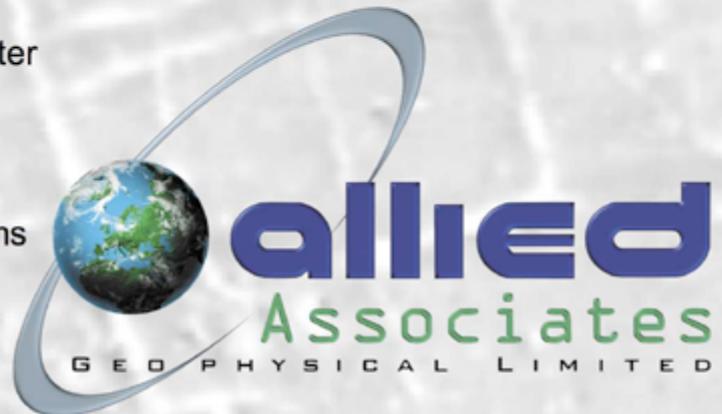
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The ISAP Management Committee: They work for YOU!

As of 15/09/2017, the following have been elected to the ISAP Management Committee:

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Chair

Chris Gaffney

chair@archprospection.net



Chris Gaffney is Head of Archaeological & Forensic Sciences at the University of Bradford. His doctoral research was conducted under Arnold Aspinall at Bradford on the Schlumberger resistance array, investigating its suitability for archaeological surveys. On leaving academia

he worked in the commercial sector, including 18 years at GSB Prospection (in Bradford), which he led together with John Gater. And yes, he did appear in Time Team! Since 2007 Chris has worked at the University of Bradford teaching prospection to all grades of students and leading the MSc in Archaeological Prospection since 2010. He has undertaken fieldwork in many different places, ranging from Cyrene (Libya) to Stonehenge (UK).

Chris has been on the Editorial Board of the journal Archaeological Prospection since its inception and became Editor in 2004, after Arnold Aspinall's retirement. His current research overlaps with most areas of archaeological prospection and its applications.

Vice-Chair

Gregory Tsokas



Gregory Tsokas is Professor of Exploration Geophysics since 12/2000 at the Geophysical Laboratory, School of Geology, University of Thessaloniki, Greece.

Vice-Chair

Chrys Harris



Chrys is currently a Director of Magnitude Surveys Ltd, a social enterprise and specialist archaeological geophysics contractor to the community, public outreach and commercial sectors. Her passion for archaeological geophysics developed during her BA degree (Anthropology – emphasis

in Archaeology) at Minnesota State University Moorhead in the United States. This led her to pursue the specialised MSc in Archaeological Prospection at the University of Bradford in the United Kingdom. Following a brief stint as a field surveyor in the commercial sector, Chrys returned to Bradford to undertake a PhD entitled 'Pieces of puzzle: fitting electromagnetic induction into geophysical strategies to produce enhanced archaeological characterisation'. While writing up her PhD, Chrys co-founded Magnitude Surveys, which has since expanded to become one of the largest independent archaeological geophysics companies in the UK. Chrys is passionate about using geophysical techniques as an interactive tool to facilitate engagement of people of all ages and backgrounds with cultural heritage. She will try to channel this passion into ISAP and focus on improving engagement and inspiring the participation of new members.

Honorary Secretary

Armin Schmidt



Although my earliest aspirations were to become an 'inventor' (a suitably broad job description), my fascination was always with history and ancient civilisations. However, in the end the natural sciences got the better of me and in 1982 I began to study Physics at the University of Technology Munich

(Technische Universität München). One of the key events for me during that time was a seminar given by Helmut Becker in which he described the amazing results from archaeological prospection using Caesium magnetometers. I was hooked. Unfortunately, the university's lecture series on archaeometry had, for my taste, far too little geophysics in it and in the end I decided to do my master's dissertation on electron mobility in liquid Argon at the Max-Planck-Institut für Physik (Heisenberg Institute). Thereby, I had entered the path of low temperature physics and continued with a PhD at the Rheinisch Westfälische Technische Hochschule (RWTH) in Aachen on the subject of magnetostriction on high-temperature superconductors. Very interesting, but time had come for me to move into archaeological prospection. When I looked round for the best place to go in 1994 it became very clear that Bradford was the lead institution for archaeological geophysics and eventually I became Senior Lecturer in Archaeological Geophysics there. Archaeological geophysics had been built up in Bradford by Arnold Aspinall and for me, like for many others, he was a constant source of inspiration. He and Mark Pollard were the founding editors of the journal Archaeological Prospection. Even after retirement he actively carried out his research, undertaking experiments with different electrode array geometries in the water tank. I was involved in Bradford's MSc in Archaeological Prospection since its beginning in 1994 and the training of highly motivated students in this area has been very rewarding. After leaving the University I carry out research, teaching and consultations in the consultancy firm GeodataWIZ.

I have been involved in many interesting research projects over the years. From the surveys of a twice-deserted Medieval Village in Yorkshire, England to the investigation of pre-Hispanic shaft graves along the Ecuadorian coast, they all have been exciting. One of my favourite sites is Lumbini in Nepal where we investigated the birthplace and childhood palace of The Lord Buddha during several UNESCO missions.

In all these projects the interaction between archaeologist and geophysicist was crucial for the final interpretation of results and it is the challenge of working at an interdisciplinary level that makes these missions so rewarding. There has to be a willingness to listen to each other and accept that people have different expertise and research cultures (think: 'developing a new type of magnetometer' vs. 'the investigation of 100 Roman villas'). My more geophysics-orientated research has concentrated on the development of new magnetometer techniques and on GPR processing. I also undertook integrated geoarchaeological projects, especially in Iran. Archaeological prospection is a rich subject and it has never bored me. Joining this Society of like-minded researchers and practitioners is a good way of connecting the different strands and ideas that make this such an exciting subject.

Conference Secretary

James Bonsall



James is an archaeological geophysicist working in both the academic and private commercial sectors, with specialisms in the use of legacy data; 4D time-lapse assessments; the application of electromagnetic induction for the assessment of archaeological sites within challenging environments

and variable geological backgrounds; induced polarisation, upland archaeology; conflict archaeology and archaeological deposits threatened by coastal erosion.

James developed an interest in archaeological geophysics during his BA (King Alfred's College, 2000) and specialised in geophysics with an MSc in Archaeological Prospection (University of Bradford, 2001). James worked for a small number of private sector archaeological and geophysical companies in the UK before moving to Ireland and creating Earthsound Archaeological Geophysics. Between 2010-2014, James carried out PhD research funded by a National Roads Authority Fellowship Programme "A reappraisal of archaeological geophysical surveys on Irish road corridors 2001-2010" (University of Bradford, 2014), which resulted in a number of peer review publications and a procedural guidance document for the NRA (now TII, Transport Infrastructure Ireland) staff on commissioning and procuring of geophysical surveys on infrastructure projects.

James has been a Lecturer since 2014 at the Department of Environmental Sciences, Institute of Technology Sligo, Ireland, where he's responsible for delivering modules in Applied Archaeology including practical and theoretical Archaeological Geophysics, GIS and Geoarchaeology as well as supervising post-graduate projects.

James is the current Conference Secretary and is organizing the 13th International Conference on Archaeological Prospection, which has been awarded to IT Sligo, Ireland.

Conference Vice-Secretary

Immo Trinks



Immo Trinks is the vice director of the Ludwig Boltzmann Institute for Archaeological Prospection and Virtual Archaeology (LBI ArchPro) and key researcher of Propramme Line 2 - Archaeological Geophysical Prospection.

Editor

Kayt Armstrong

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Kayt Armstrong is currently a PDRA on a landscape archaeology project at Durham University looking at the impacts of the Great Depression on the north east of England. She completed her BA at Southampton and went on to take an MSc there in Archaeological Computing, before doing her PhD in archaeological geophysics at Bournemouth University. Since then she has worked on landscape archaeological projects in Italy and on Crete, specialising in 'difficult' geophysical surveys in challenging environments, as well as a recent stint in commercial archaeology in the UK. She has published research on the women's peace camps at Greenham Common and is particularly interested in contested landscapes and integrating different scales and types of information using GIS. An ISAP member since 2007, she's excited to be editing ISAP news and helping James with the 2019 conference, and hopes to promote greater diversity in the ISAP community during her time on the management committee.

ISAP Fund Secretary

Paul Johnson

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Paul Johnson studied for a BA in Archaeology at the University of Southampton, at which time he began his interest in archaeological geophysics, subsequently receiving an MA and PhD in Roman Archaeology from the same institution. During the course of these studies, in addition to

working as a commercial archaeological geophysicist, he used geophysical survey and remote sensing as part of a number of projects at the Universities of Southampton and Cambridge, as well as for English Heritage, and the British School at Rome.

Since completing his doctorate, Paul has held a Marie Curie Fellowship focussing on the application of geophysical survey to Roman urban sites at the Universidade de Évora in Portugal, and was involved in helping develop a geophysical survey capacity within that institution. More recently, he spent c. 3 years working in the commercial sector as a Project Manager at Trent & Peak Archaeology, managing archaeological geophysics across the York Archaeological Trust.

Paul has published extensively on archaeological geophysics and the relationship between landscape and

Treasurer

Paul Linford

treasurer@archprospection.net



Paul Linford is the leader of the archaeological geophysics team at Historic England, UK.

Auditor

Rob Vernon



Rob Vernon was born in Liverpool in 1945. He graduated in 1969 with a BSc (Hons) in geology from London University. Between 1969 and 1993 he held a variety of senior posts as a geologist in the British coal industry (deep mines), where he became familiar with downhole geophysical

logging and seismic surveying. After leaving the coal industry, Rob gained an MSc in Archaeological Prospection in 1995, from the Department of Archaeological Sciences, University of Bradford where he continued to conduct part-time research on the geophysical responses produced by British smelting sites. He was awarded a PhD in 2004. He has published various papers on his PhD topic and is currently researching the early history of geophysical prospection in Britain. Rob is also a Chartered Geologist, a Chartered Scientist and is a Fellow of the Geological Society of London.

Rob's other interest is mining history. He has co-written a series of books on the lead mining history of the Conway Valley and the Llanengan area in North Wales. He is also involved with the National Association of Mining History Organisations and has edited three editions of their



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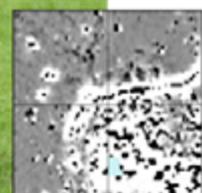


Geoplot 4
Upgrades
From Geoplot 3
Discounts



3 Gradiometer Mode - New

RM85 + Sensys FGM650 + adapter box
Optional GPS (coming soon.....)



The Impact of Prospection.

Chris Gaffney, Tom Sparrow, Alex Corkum

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The UK has regularly 'tested' the quality of university research via a snapshot of each academic unit, usually every 6–7 years. The last event, known as REF2014, introduced impact of research beyond higher education as a measure of value. The universities were expected to link themed publications directly to measurable outcomes in a series of case studies. The number of case studies required was dependent upon the number of individuals in each unit of assessment and usually two or three studies were needed. The government is very keen to see a justification for the money that they put into higher education and in the next return, REF2021, will see impact jump to 25% of the overall score. The final score is linked to funding that the university will receive between REFs and is, therefore, of considerable importance.

The key elements to a high score for impact are around concepts known as 'reach' and 'significance'. That is - how far did the research travel and how important was the change that occurred. A couple of broad examples might be as follows:

- Working with a local group might change the way that they think about their community and alter the way that they create a local context for the community. The very act of engagement isn't really very impactful, but longer-term changes are. Put simply, doing a geophysical survey with a community by itself may not be great impact but if they then purchase their own equipment and undertake significant surveys themselves then that activity could be important. Alternatively the results from the original survey may significantly change the research trajectory, thereby having impact.

- A different scenario might be if some publications written by an individual are used in guidelines for the profession then the guidelines themselves could be described as impact.

Evidence is required to produce metrics to help substantiate the impact. This is often very difficult for archaeological work; actually, it is much easier than say for those who are researching history but much more difficult than for those researching in engineering. A recent piece of work that we were part of throws some light on the potential and problems of producing metrics on impact.

Bradford Park Avenue Football Club

For the majority of the last century Bradford had two professional football teams. With time one club prospered while the other, Bradford Park Avenue, reduced in popularity and eventually their ground was abandoned. Over the last few years a number of people wanted to know more about the club's original home and funding was won to investigate the ground using archaeology and use art to describe the process and significance of discovery. As part of this we used the open area of the ground to train undergraduates from the University of Bradford. Largely this was undertaken using earth resistance and magnetometer surveys, but we also used GPR and ERT, and mapped the standing terraces that still survived at one end of the ground with a laser scanner. Cutting the story short, the pitch was mapped with earth resistance despite 40 years of abandonment. Whilst delighted to see the outline of the pitch, this is not a unique occurrence with other soccer and baseball examples within the literature or known anecdotally.

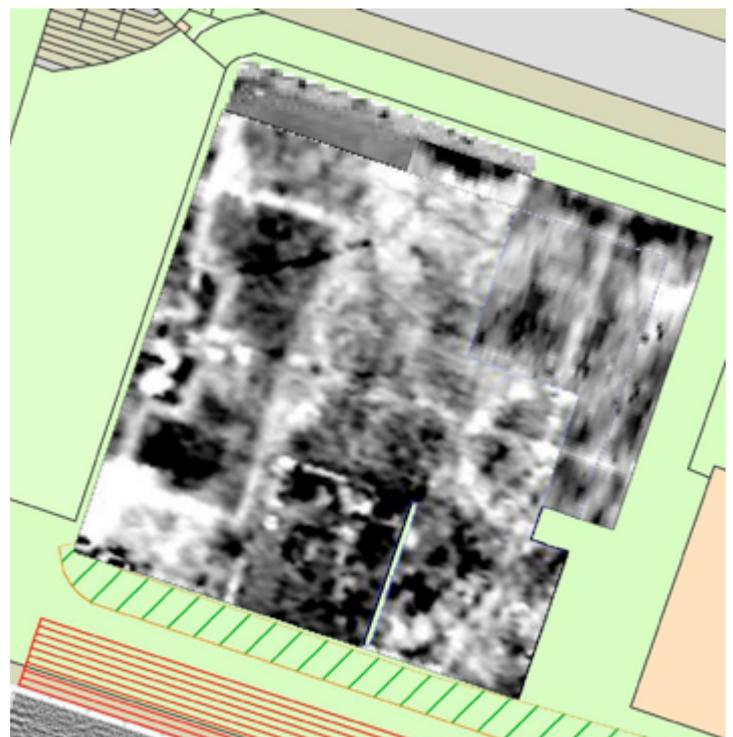


Figure 1 Outline of the football pitch.



Figure 2 Alex undertaking GPR survey with the Bradford Park Avenue mascot.

The project had community involvement particularly in the small scale excavations that were undertaken. Turning to impact, what can be taken from this project? Obviously the community engagement is important but it is difficult to work out any long-standing impact. There are three outputs from the project that may be more relevant.

- A book
- A museum display
- A vinyl record

The vinyl record is effectively a sound installation which captures the geophysics data and re-purposes the data in an audio format. The outcome is thought provoking sound that captures the evocative nature of the data and the vibrant setting of a football ground. While it is a unique / significant reuse of geophysical data and can be defined as impact, the reach is not huge as the LP was produced in very limited numbers... no chance of reaching the top ten! As the project ended, an agreement was reached with the National Football Museum for a temporary exhibition at the museum in Manchester (<http://www.nationalfootballmuseum.com/football-art/residencies/breaking-ground>). The geophysics plot was reproduced across a whole wall and it was amazing to see so many people studying the outputs that included a plaster cast of one of the pits that held the goalposts. For a

week thousands of football fans visited the exhibition, ensuring that the work had fabulous reach. Metrics exist that prove how many people visited the museum during the exhibition and this is very valuable in proving impact. However, it is difficult to prove that the impact was very significant as other exhibitions were about national and international competitions.

The final output was a book which captured all aspects of the investigations – it isn't an academic treatise, more an artistic re-interpretation of the events that formed the project. Such a book would usually be part of the 'tick-box' approach that some take to fulfilling the requirements of a grant. Not in this case. The book has been named on the Shortlist for the 2017 Sportsbook of the Year (<https://www.williamhillplc.com/newsmedia/newsroom/media-releases/2017/shortlist/>). This is an eagerly awaited and highly prestigious award and the longlist is just 7 titles. By this metric alone the project, which is underpinned by the earth resistance data, has risen to a completely new level of reach and significance.

In telling the story of the geophysical survey of a long lost, but still loved, football pitch we have highlighted how we might work out the significance of our research. Understanding how impactful our research is will allow us to explain why our discipline is important to other people. We are sure that you will be able to think of surveys that you have undertaken that have a resonance outside of the people who undertook the work – sharing those experiences, even if they relate to a modern football pitch, provides the discipline as a whole a way to estimate our influence and, therefore, our worth to the wider public. It is time to celebrate our work.

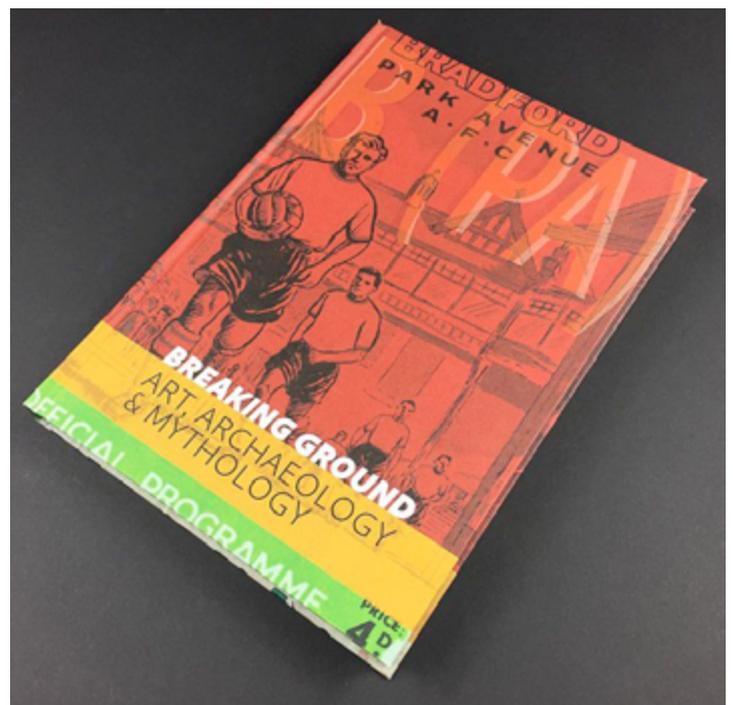


Figure 3 The book.



Figure 4 A record of the survey.

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