Contents

Editorial
Chairman’s Piece by Oscar Aldred
AARG 2013, Amersfoort
Interpreting Archaeological Topography: blurb + ordering information
YAARG – an open working party of AARG by Johanna Dreßler and Oscar Aldred
Forthcoming conference; Workshop; Information for contributors
Aerial Archaeology Workshop in Doha, Qatar: February 10-14 2013 by Bob Bewley, David Kennedy and Włodek Rączkowski
What do you see here? Review of Archaeology from Aerial Photographs, an International Workshop at Bamberg, Germany by Marko Barisić and Alexander Veling
53 years of technical progress in aerial archaeology 1960-2013: a cursus at Karden Kreis Cochem, Germany by Irwin Scollar and Otto Braasch
A geoarchaeologist’s view of aerial archaeology by David Jordan
Integrating magnetometer surveys and oblique aerial photographs by Jörg Fassbinder
Musings on a past and future for AARG? by Rog Palmer
Cropmarks
Review article (Roman Camps in Scotland) by Toby Driver
Books of interest?
Martin Gojda and Martin Trejny (ed). Archeologie Krajiny pod Řípem ( Archaeology in the Landscape around the Hill of Říp)
Lis Helles Olesen and Kira Jørstad Klinkby. Fredede fortidsminder fra luften: muligheder for registrering fra luften
Hanson, W.S and Oltean, I.A. (ed). Archaeology from Historical Aerial and Satellite Archives
Comer, D.C. and Harrower, M.J. (ed). Mapping Archaeological Landscapes from Space
Plus shorter notices....
AARG: general information, membership, addresses, student bursaries
AARGnews is the newsletter of the Aerial Archaeology Research Group

Published twice yearly in March and September

Edited by Rog Palmer
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Editorial

AARG online photo library?
One night in January I received a Facebook message from Antiquity’s editors: “Rog, do you have a good quality colour, aerial photo of somewhere overseas that we can put in Antiquity – by tomorrow?” To which my reply began, “pfhhhhhhhhhhhhhhhhhhhh...”. Of course I have a few aerial photos, even if they are only the Christmas cards that are sent among us but these are scattered through my computer and sorted mostly by place, project or dumped in my ‘odd-aerial’ directory. It led me to think that it may be a good idea to create an AARG collection of ‘good illustrations’ from wherever we have been working or playing. I know we have the worldwide part of the homepage (http://www.univie.ac.at/aarg/php/cms/Aerial-Archaeology/worldwide-aerial-archaeology) but that has stagnated as do so many things that have a web presence. Either the AARG website or our Facebook page may be the place for this and I know from my dance albums that presentable pics of 600 x 600 pixels can be watermarked and uploaded that are perfectly good for people to make choices for publication or enlargement. Those of you who take aerial photos may also think of such a site as an advertisement for your work – maybe even a sales point. The Flickr site that David Kennedy runs is such an example of this (http://www.flickr.com/photos/apaame). Sites of this kind will attract a level of non-specialist interest and are also ideal places to direct enquiries that need to view and select aerial photos ‘now’ – although delivery of a ‘now’ image to a client requires an immediate response by the web manager.

I’m not much of an aerial photographer, so if this is an idea that’s worth pursuing it will be up to others to select and contribute images and also for someone to volunteer to act as a focal point (sorry) to get things organised and started.

Antiquity photographic competition
It turned out that the reason for the Antiquity lark was that their March issue was about to go to press and they had no entries for their photo competition (http://antiquity.ac.uk/photo) for which the annual prize is £500. Some of you have a few lovely aerial photos and ought to have little trouble getting them accepted for publication and you might even win. I appreciate that by selling this idea to you I am perpetuating the concept that aerial photos can be stand-alone things rather than just a means to make a map but by publishing a few random images in an international journal we may be getting some publicity that could feed back to AARG.

The March 2013 issue of Antiquity, the first under the new editorship of Chris Scarre, includes two aerial-related contributions: Ioana Oltean’s ‘Burial mounds and settlement patterns: a quantitative approach to their identification from the air and interpretation’ and Rebecca Bennett, et al’s ‘Airborne spectral imagery for archaeological prospection in grassland environments – and evaluation of performance’. Ioana’s paper analyses the distribution of and relationships between the 16,500 mapped archaeological features (half of which are identified as burial mounds) that were recognised on a wide mixture of aerial sources. Rebecca’s paper is another offshoot from her recent PhD research and is an addition to other recent publications that examine the potential of non-visual wavelengths for detecting archaeological and non-archaeological information on grass.

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Photo interpretation
I’ve had an interest in military photo reconnaissance and PI for longer than I’ve been involved in archaeological PI. Good photo interpretation during wartime laid down a lot of the basics that we still follow even now when a lot of work is done on screen. One of my recently-acquired books on this is *V Weapons Hunt* by Colonel Roy M. Stanley II who is a retired USAF interpreter and author of four other books on military PI and reconnaissance. This book concentrates on the fairly-narrow theme of V weapons and the chapter on Peenemünde has been written from analysis of WW2 reports, books and manuscripts while the writer has been sitting with his stereoscope looking at copies of the same contemporary photographs that the WW2 interpreters used. For me, reading this as a person who works with aerial photos, I found this chapter (3) included some of the clearest descriptions of what we do, of the roles of knowledge and experience, and the basic concept that as long as we do not know about something we may not understand it from the photographs even if we are able to see it. This book has now been added to my student reading list on archaeological uses of aerial photographs.

Elsewhere (see Books of interest? Carrie Hritz) it is reassuring to find an archaeologist-researcher using satellite images (Google Earth and Corona) to examine a new area without the need for complex algorithms or a reliance on GIS. She appears to have done it by looking. In the same serial (*Journal of Archaeological Science*) and contra to this – although perhaps more in line with the title of the journal – are papers in which photographs cannot be examined unless they have been corrected photogrammetrically or where the GIS does everything. One may wonder, sometimes, just where image examination is leading and whether AARG and its members have any part in this.

Ancient Monuments Act
We should also, perhaps, raise a glass and say happy centenary to the British Ancient Monuments Act which became law in 1913. Perhaps…. And maybe they’ll use the centenary to ‘ground truth’ those levelled sites known only from aerial photographs for which we have no idea of how much survives under the ground. It should be a pre-condition of listing/scheduling sites that they are tested by digging a small hole(s) in them, not just to identify the presence of walls or ditches but to get to the bottom of a sample of surviving features to establish how much plough truncation has occurred and whether those (mainly) pretty sites should still have a place on a schedule for supposed preservation.

On a use of ‘the’
I spent a while one Sunday morning trying to understand what the term ‘landscape’ could mean at various sites. Those of you who attended AARG 2012 will remember the position paper on landscapes given by Rachel Opitz and Steve Davis. Their case study was the Irish Brú na Bóinne WHS – a smallish ‘site’ within a smallish buffer zone of 3500ha. At the time I was not all that happy with this as a ‘landscape’ although the presentation showed good results from a wide range of questions. What worried me then, but remained unarticulated, was that if Brú na Bóinne was the important site it is claimed to be, surely it should have had a series of radiating landscape zones that may have extended over the whole of Ireland. My Sunday morning problem began with Stonehenge and concept of *The Stonehenge Landscape* as it is may be called when builders have finished removing roads and building a new heritage centre. The small patch of land that EH, NT, etc manage around Stonehenge is no more ‘the’ Stonehenge landscape than is my back garden. More correctly, perhaps, the land around
Stonehenge is the *Stonehenge environs* as, if that site is the grand focus of whatever theory is current this week, it would have had tentacles reaching over a lot of (at least) southern England. In a way this is a form of site catchment analysis on a grand scale but with ‘control’ or ‘religion’ as its focus rather than food for the family. I realize that such vast ‘landscapes’ are likely to be difficult to identify or model but they must have existed in some form from at least the time of causewayed enclosures, which seem to have been gathering focii for their ‘landscapes’. Such a concept makes nonsense out of the few fields ‘landscapes’ that excavators publish after they’ve looked over the fence and maybe calls for a bit more thought when we claim to study ‘the’ landscape centred on a specific location. Sorry – this is me questioning our use of words again…

*AARGnews enlargements*

Irwin Scollar asked me to remind you that Adobe Reader offers a range of enlargements that may help readers see details in pictures.

**AARG at 30**

This year, 2013, we celebrate 30 years of AARG being called AARG (see *AARGnews* 28, 10-18) and ask for any stories for possible publication in the September issue which, we hope, will look forward as well as provide a few notes about our past. In this issue, my ‘Musings’ starts this off and gives others something to kick around and, although it was not intended as part of these celebrations, the contribution by Irwin Scollar and Otto Braasch covers more than AARG’s lifetime and notes some of the changes in technology that have occurred in recent (in archaeological terms) times.

The committee and various members are planning an evening session at AARG this year which will return to the original idea of a series of fairly frivolous (with alcohol) presentations which, this time, may be embarrassing to AARG oldies and others. Contributions to this session are welcomed and offers should be made to Oscar Aldred at aargchair@gmail.com

**This issue**

Thanks to the contributors of this issue for usually rapid response to my questions and for providing texts more or less on time. Publication was delayed because the ‘February’ committee meeting did not take place until mid-March and the final details for the 2013 conference were arranged and we could issue a *Call for Papers*. The reports on two workshops show the range of topics that is being taught now and, perhaps, the differences show fitness-for-purpose in each country – something that is necessary at every course or workshop. David Jordan’s contribution follows his presentation to AARG in 2012 and may get some of us thinking about uses of ground/soil data especially if sites are visited on the ground. I’ll be interested in responses for future issues to this paper and how others see relevance (or practicality) to aerial work. Geophysics in *AARGnews*? Sorry, but when I visited the Denkmalpflege in Munich, some of those pictures were on the walls and seemed, perhaps a bit tongue-in-cheek, to be a good use of aerial photographs. At this time of year there seem to be masses of new books or interesting publications (see Oxbow’s offer for *Interpreting Archaeological Topography* in this issue). Many have little more than notes of titles and journals but there are some longer comments and I particularly thank Toby Driver for his enthusiastic review of Beccy Jones’ *Roman Camps in Scotland* which may have been reprinted by the time this *AARGnews* hits the shelves.
Chairman’s Piece

Oscar Aldred

With a somewhat quiet start after the last conference in Budapest (a success by all accounts) at the beginning of the year, AARG has resumed its ‘business as usual’. Preparations for the forthcoming conference in Amersfoort in the Netherlands (September 26\textsuperscript{th}-28\textsuperscript{th} 2013) are well in hand by the hosts DECARS and RCE. There’ll soon be information on the conference via its website and AARG’s home page. Keep a look out.

Thirty-one years ago - in 1982 - a group of likeminded individuals felt that there was enough interest in setting up a research group with which to hold workshops and dissemination of the aerial archaeology work going on the UK. In this respect, the 2013 conference in Amersfoort will be an exciting event, coinciding with a special year in AARG’s history as it celebrates its official 30\textsuperscript{th} birthday. While there has been some consternation at precisely when AARG was established (alluded to in \textit{AARGnews} 44; is it 30 or 31 years old), 1983 was when the first meeting took place under the banner of the Aerial Archaeology Research Group (AARG).

A quick glance at notes from the meeting which took place in Cambridge between 5\textsuperscript{th} to 6\textsuperscript{th} September 1983, demonstrates how little outwardly has changed today. We are a rather conservative bunch, aren’t we? For example, the format of the conference has been a 2 day meeting since 1983, and from 1992 onwards, has also had an accompanying field trip. What is more, the topics discussed in 1983 are still a part of our discussions today: techniques, mapping and the organization of resources. That is not say there hasn’t been progress in these areas, rather that the scope of interest and advancement of new technologies and techniques has meant that these topics remain relevant. However, a glance at the AARG archive shows that while the focus in 1983 was on post-reconnaissance and aerial survey, and mapping conventions, later meetings fostered discussion on the capture of archaeological information. The two topics of how to capture archaeological information and the means of representing this information are steadfast components of contemporary discourses. And, as we have been discussing in recent years, they were, and remain today, very much inter-twined.

The trajectory of the AARG from its meetings (symposium from 1994, and conference since 1996) from reading the programmes, as well as the minutes from the committee (those that have survived unadulterated and substantive), show that AARG has been committed to the maintenance of the relationship between the production of knowledge and its practices of documentation and dissemination. This evolved out of the first few meetings, but also emerged as a tension between what were referred to as different species of the genus Aerial (\textit{AARGnews} 1 (1990): 42).

While creating divisions between specific kinds of specialisms inside the genus Aerial was a necessary part of finding out more about what constituted aerial archaeology and AARG, such an autopsy today of the AARG organism (as I suggested in \textit{AARGnews} 44) is no longer necessary in order to develop research agendas and applications. AARG demonstrates by its 30\textsuperscript{th} anniversary alone that it has matured from the child in 1983 that was full of insecurities, to a fully-fledged adult with greater confidence. I talked to many members at last year’s

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conference about AARG, collating opinions, and what I have concluded is that I have faith in AARG’s ability to recognise that what binds us together, irrespective of our ‘species’ type, is that we are all archaeologists. Archaeologists in the sense of whether we have a passing interest, are trained in its techniques, or are active professionals conducting its business day-after-day. As David Clarke told us, archaeology is archaeology is archaeology and we should not perhaps lose sight of this idiom. But I also have the fear that we are losing this archaeological focus in what we are presenting and discussing at our conferences. I am not being flippant in what I say, as this will inevitably involve discussing techniques and technology, but it should also encourage us all to tell more stories about what we observe from the air and what is in the landscape, whether from the perspective of the minutiae of particular features in its specific context, or in the generalities that can be suggested from intensive surveys.

In the service of the broad church of archaeology just consider what AARG has contributed in last 30 years by default and through the hard work of its members. We have made accessible a huge archive, wealth of knowledge and resources for the study of archaeology from above – online and through publications, including AARGnews (since 1990) and many books. We have discussed the latest technologies and their suitability to our examination of archaeological remains, honing our techniques and data standards, and fuelling new discussions and directions for interpretation. We have helped to train many new YAAAs (‘young’ aerial archaeologists - including this Chairman) across Europe, and now have over 100 members from 29 countries. Every year for the last 30 years (except in 1987 when there was no meeting) we have met to discuss the inner-workings of our specialism, finding ways to entertain each other, to encourage the ‘young’, and debate future directions and opportunities. The group has made a good deal of headway in increasing its network, widening its participation from a particular England-centric focus (based in Cambridge), to the UK (including Wales, Ireland and Scotland) with the occasional dabble in the Middle East - where ‘Home-thoughts from abroad’ were first introduced in 1986 – and finally to a European and Global context, first appearing in 1990 at York in the session Continental Europe. AARG Meetings, Symposiums and Conferences have always been social, to the extent that until 1992 - coinciding with Professor St Joseph’s ‘After Dinner Talk’ – The Bar was always an itemised part of the programme. Not that drinking is to be encouraged by such a serious lot of researchers and professionals (?), just that the social nature and friendliness of AARG is one of its most redeeming qualities in the light of the arresting professionalization of archaeology. And The Bar is one of the best venues to remedy this!

What of AARG’s actual impact outside and beyond its own self-imposed borders? There is no doubt that AARG and its members have greatly contributed to archaeological knowledge and in matters of organization and effect over the last 30 years. Yet, as an archaeological tool and technique, and as a way of operating and experiencing the landscape, we need to do more to promote aerial archaeology/remote sensing outside of our immediate radar. ArcLand is providing some guidance here, but so too are other groups that AARG has been associated with in recent years, such as EAC and our sister research groups such as ISAP and EARSeL. But we need to start sticking our heads above the parapet, and start shouting a little louder to others (not just at ourselves!), proclaiming the value of what AARG does well, and contributing more to the potential role and usefulness that many of aerial archaeology/remote sensing projects being carried out by AARG members have for the broader discipline of archaeology, landscape studies and environmental sciences. And while many of the
participating AARG member’s countries are at different stages in the development and application of aerial surveys, lidar coverage, satellite imagery analysis, and mapping, it is through AARG, and other organizations like it, such as ArcLand, that we have a collective voice that has a much greater impact on directing National, European and Global research and heritage strategies and policies.

The purpose of these kinds of future developments is probably familiar to many AARG members, especially the wise dog-eared, hard-nuts who attended the first meeting who still participate in AARG. But the future is always uncertain, and in order to mitigate a more positive direction for AARG we should be having a clearer notion of where we want to go. As Eric Blair aka George Orwell reminds us in his book 1984, whoever owns the present controls the past, and whoever owns the past controls the future. AARG certainly doesn’t have exclusive ownership on the archaeological present but we have a stake in it, and we can at least make claim to some aspects of the past (from an aerial perspective and through some examination of the AARG archives). Therefore AARG has some control over shaping its own future by engaging with others and reflecting on its own past. These will be especially important in shaping the emerging discussions that will be taking place in the coming years, not least with the various groups that are associated with AARG. And if the next 30 years are anything like the last 30, then we’re in for a very productive and fun time.

* FIRST CALL FOR PAPERS *

International Aerial Archaeology Conference

AARG 2013
Amersfoort, Netherlands
26th – 28th September 2013

Suggested conference themes:
Archaeological Remote Sensing in the Low countries; 30 years of AARG; Trends in Remote Sensing (open software); Management of cultural heritage and landscapes; Human-environment interactions in fluvial systems; Close range and 3D photogrammetry

Organised by:
Aerial Archaeology Research Group &
Dutch Expertise Centre for Archaeological Remote Sensing

Hosted by:
Cultural Heritage Agency of the Netherlands

Papers and posters are invited for 26th – 27th September
28th September: Field Trip
(Nieuwland erfgoedcentrum (Lelystad) - and – UNESCO heritage site of Schokland)

All conference paper and poster offers:
Oscar Aldred, School of History, Classics and Archaeology, Newcastle University
Oral papers are 20 minutes in duration.
Email: aargchair@gmail.com

Closing date for all proposals (with title and abstract) is 31st May 2012

AARG website: http://www.univie.ac.at/aarg/php/cms/Next-AARG-Events/
Facebook: https://www.facebook.com/aerialarchaeologyresearchgroup

STUDENT/YOUNG RESEARCHERS BURSARIES FOR AARG 2013

These are to support bona fide students and young researchers who are interested in aerial archaeology and wish to attend the conference. There is no formal application form but please provide the following information: Your interests in archaeology and aerial archaeology; place of study; the name and contact details of a supervisor or employer (email) who can provide a reference; why you would benefit from attending the conference; and an estimate of travel costs to attend. Furthermore, you should also be willing to give a short paper (10 mins) in a session for first time/inexperienced speakers or provide a poster. Failure to provide an abstract will mean no bursary. Applications 

Addressed to Oscar Aldred by email aargchair@gmail.com

In addition, there will be a competition for the best Student/Young researcher poster or paper, judged by the Chairman and Vice-Chairman. The prize will be a free 2014 conference package (registration fee, dinner and field trip). All entries must apply for the Student/Young Researchers Bursaries to be eligible.

Closing date for applications (with title and abstract) is 31st May 2012
Interpreting Archaeological Topography
Lasers, 3D Data, Observation
Visualisation and Applications

edited by Rachel S Opitz and Dave C Cowley

Airborne Laser Scanning (ALS), or lidar, is an enormously important innovation for data collection and interpretation in archaeology. The application of archaeological 3D data deriving from sources including ALS, close-range photogrammetry and terrestrial and photogrammetric scanners has grown exponentially over the last decade. Such data present numerous possibilities and challenges, from ensuring that applications remain archaeologically relevant, to developing practices that integrate the manipulation and interrogation of complex digital datasets with the skills of archaeological observation and interpretation. This volume addresses the implications of multi-scaled topographic data for contemporary archaeological practice in a rapidly developing field, drawing on examples of ongoing projects and reflections on best practice. Twenty papers from across Europe explore the implications of these digital 3D datasets for the recording and interpretation of archaeological topography, whether at the landscape, site or artefact scale. The papers illustrate the variety of ways in which we engage with archaeological topography through 3D data, from discussions of its role in landscape archaeology, to issues of context and integration, and to the methodological challenges of processing, visualisation and manipulation. Critical reflection on developing practice and implications for cultural resource management and research contextualise the case studies and applications, illustrating the diverse and evolving roles played by multi-scalar topographic data in contemporary archaeology. 288p, 185 col illus, HB (Oxbow Books 2013)

Normally £40
Pre-pub price £30
Ordering Information

You can place an order by telephone or email or by completing the form and returning it to the address below. To order at the pre-publication price you can place an order by telephone, email, online or by completing the form and returning it to the address below. Postage and handling: Postage within the UK (excluding Highlands, Islands, Northern Ireland and BFPO) costs £3.95 for one book and £5.95 for two or more. All other areas are charged according to weight.
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Contact Number/Email: .................................................................................................................................................
In September 2012 at the annual AARG conference in Budapest the first YAARG (Young AARG) meeting took place, one day before the conference (Wednesday 12th). YAARG is a working party of AARG which is open to those not only young in age but also in the field of Aerial Archaeology, especially from countries where the technique is currently neglected or under-developed. This is not to diminish the role that AARG plays in fostering the development of newbies to AARG and Aerial Archaeology. Both authors have benefited from AARG and its friendly environment. This short-piece aims to address some of the concerns of AARG members on the motivation and reasons for YAARG.

The main idea behind YAARG and the working party is to provide a platform for young researchers to ask questions, talk about problems and get hints, tips and information. This is similar to the ethos of AARG but rather than polished ideas, at the cutting edge of Aerial Archaeology, the activities are those of novices.

Below is an outline of the first meeting:

At the first meeting, all expectations were exceeded and we had a dynamic and interactive discussion. All in all fourteen archaeologists from Croatia, Germany, Montenegro, Poland, Slovenia, Serbia and UK took part. In addition there were also three ‘Honorary Youngsters’ who were invited to the meeting. Their job was to provide support with experience and advice but not in a heavy handed way.

Let’s be honest: would you want to talk for the first time in another language in front of those with profoundly more experience and knowledge of aerial matters; people that we call ‘adults’. Of the fourteen ‘YAARGsters’ attending, four gave presentations of about 10-15 minutes length after which discussion ranged between 30 and 40 minutes. At which conference are you able to give a 10 minute presentation and have a 30 min discussion afterwards? The questions posed have been quite different from: “How do I squeeze a 3D landscape into a 2D map?” to “How do I get access to archives if I don’t have a friend who knows someone in the government?” to: “How do my credentials compare to other specialists in aerial archaeology?”

The final discussion, after the presentations, was the most interesting part of the meeting. All agreed that they want to have another meeting in 2013.

One shouldn’t underestimate the social factor of a working party like this. Nearly all the participants have to struggle with the denial of Aerial Archaeology as proper and real archaeology and a lack of access to education and knowledge in their home countries. A meeting like this helps to keep motivation up and motivation is needed to continue work and research against the negation of other colleagues who should know better.

One of the results of the final discussion concerns the Honorary Youngsters (HY).
The way this works is that YAARGsters who want to participate are encouraged to send a brief description about their main problems and questions so that appropriate HY can be picked and asked for help according to their expertise. But there are no restrictions on attendance by other ‘adults’ who will be warmly welcomed to YAARG.

Some of the suggestions that came up during the meeting were:

- New YAARGsters should be recommended by an AARG member.
- A YAARGster will reach a certain point where she/he is not ‘Young’ anymore. We all agreed that this selection will be done naturally but the future will show if this will work out.

All in all, the YAARG meeting was a great success and had clear objectives. It was not to be a splinter group from AARG but rather to provide a more formal setting and forum for discussion on topics that need to be discussed for a length of time that the AARG conference cannot provide. We appreciate that informal talks with ‘adults’ in the bar are useful and necessary part of the learning process, but there are other discussions that need a more formal setting. In future AARGnews editions, we hope to provide a further voice to YAARGsters and welcome the opinions of AARG members on these matters.
Forthcoming conference and workshop

Conference: Archaeological Prospection 2013
If any of you are still deciding whether or not to go to the 10th Conference of Archaeological Prospection (May 29th to June 2nd 2013) in Vienna, the programme is now available for download at ap2013.univie.ac.at/programme

Workshop: Lidar – innovative technology for archaeology
The main aim of the workshop is to understanding of practical methods for data capture, processing algorithms and formal analysis of the results, as well as how Lidar data can be used to develop appropriate archaeological inferences. The course considers Lidar/ALS data and will be taught using a combination of lectures and practical sessions.

The main aim of the school is to give students understanding of practical methods for data capture, processing algorithms and formal analysis of the results, as well as how Lidar data can be used to develop appropriate archaeological inferences. The course considers airborne laser scanning method. The course will be taught using a combination of lectures and practical sessions. This course provides students with a detailed knowledge of the theory, method, equipment and software associated with Lidar technology for archaeology. It allows students to develop key skills frequently expected in landscape archaeology as well as management of archaeological heritage.

Organised by the Institute of Prehistory, Adam Mickiewicz University in Poznań, the course is for a maximum of 14 participants, MA and PhD archaeology students as well as professional archaeologists mostly from Central Europe and working on past landscape projects. Details: http://archeo.amu.edu.pl/lidar/

There is a limited number of grants available: http://www.archaeolscapes.eu/ALE/downloads/arcland-grants.zip

Information for AARGnews contributors
AARGnews is published at six-monthly intervals. Copy for AARGnews 47 needs to be with me by August 24. Editorial policy (for want of a better word) tends to be that if I am sent interesting contributions they go in up to an issue limit of about 50 pages. Vague instructions for contributors are on the AARG website and please do not use any ‘clever’ formatting.

Address for contributions: rog.palmer@ntlworld.com
Aerial Archaeology Workshop in Doha, Qatar: February 10th to 14th 2013

Bob Bewley¹, David Kennedy, Wlodek Rączkowski

Strange how passing remarks during a conversation over coffee a year ago can lead to a workshop taking place in a country which we had never anticipated being a venue. As many readers will know there have been two aerial archaeology workshops in Jordan (2006 and 2008) and we had hoped for more (see www.appaame.org for more on the Jordan project). However changes in personnel in the antiquities department there meant that decisions on funding and future collaboration was unlikely. So, over coffee on another subject, a member of staff at the Institute of Archaeology, University College London, mentioned there was now “UCL Qatar” – an offshoot of the Institute of Archaeology but based in Doha, Qatar. Further, that UCL Qatar was looking to create and expand its “short-courses” – and so I contacted the organiser, Lisa Usman; a short but productive meeting in 2012 lead to reality in February 2013, with many thanks to Lisa and all involved in UCL Qatar, and of course David and Wlodek, as fellow tutors.

The success of any workshop is, though, about the quality and calibre of the students. We had 7 dedicated students from a wide variety of skills, background and levels of archaeological knowledge; many were employees of the QMA (Qatar Museum Authority) based in the amazing Qatar Museum of Islamic Art (MIA). We had an excellent teaching room in the Education Centre of the MIA. The workshop was planned to be 5 days, with one day flying or a field trip; however, the 12th of February turned out to be a national holiday to celebrate National Sports Day (which we did by driving south, getting stuck in the sand, but swimming in the inland sea at Khwar al-Udaid).

Our concern, as tutors, was teaching students who did not have a background in European archaeology or European landscapes, but this did not matter at all; they caught on very quickly. We used as many Jordanian examples as we could, and were also very fortunate to be able to borrow some imagery of a wonderful site – Zubara on the north-west coast of Qatar (see below).

Needless to say we covered the essentials and also went through the ritual humiliation that is the stereo viewing of anaglyphs, which they all found extremely good fun. One of the students also received top marks from Wlodek for his interpretation (sketch) of those long trapezoidal Neolithic houses in Poland. As we know, Wlodek does not give out top marks lightly, so we are hoping we can develop the skills of this small group.

Another (pleasant) surprise was that the whole workshop was undertaken in English, no need for simultaneous translation, which we had to use in Jordan in 2008, and thus more productive. Being a small class meant that the atmosphere was informal so that the participants could, and did, ask frequent and searching questions.

We covered a number aspects of aerial archaeology in an introductory manner; reconnaissance, air photo interpretation, lidar, and a short history; we discussed “how we see what we see” (perceptions) and had the added bonus of David’s presentations on Aerial Archaeology in the Middle East, the Romans in Jordan and the use of Google Earth and Bing

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We started mapping exercises using manual methods, which was a real challenge, but they found it useful in having to make decisions about control points: a difficult concept if you have lived in an unbounded, boundary-less landscape. The only enclosures we saw (when driving around) were high fences, to enclose the desert for private ranches.

We were unable to ignite the authorities’ interest (or make right the contact) to a sufficient degree to be able to allow us to take even a tourist flight, in a helicopter or a light aircraft, but we are working on it; having done the workshop and made our (small) presence known we are hopeful of a return visit. Future workshops will concentrate on getting airborne and more detailed mapping and interpretation, and linking data to GIS, see MEGA-Jordan website for example, www.megajordan.org, and our blog on the GIS workshop held in Amman in November 2012 (www.apaame.org).

As there was no possibility of a flying day we decided the field visit would be to the one outstanding archaeological site in Qatar, the ancient city and port of Zubara (c 60 ha in area), a famous merchant and cultural centre noted for its pearling industry. This provided the opportunity to discuss the uses of aerial imagery and the differences of what one can see at ground level. Also to highlight its contribution for the excavators (a Danish team, lead by Alan Walmsley) in understanding not only the site but its surrounding landscape, which includes a canal, and two long walls to assist the movement of goods and the one essential for life – fresh water. Zubara is famous as a pearl fishing port, but as always there is more to it than that. It was founded in the 1760s and eventually abandoned in the early twentieth century. There is also a well-preserved, and now restored “fort”, built in 1938, as a defence against invaders from land and sea. The site is on the north-west coast of Qatar and is well worth a visit if this short note inspires you to travel to Doha, which we thoroughly recommend (or just explore vicariously on Google Earth). However, if you do visit, do not expect the usual Middle East country, it is truly a “new world”.

So, what’s next? There is every possibility of a return visit and we talked about a possible exhibition on aerial photography and archaeology in the Middle East. We are still trying to find a way to get airborne, but this may be a chimera.

References:

Anaglyph viewing in Qatar. © R H Bewley

Ancient port and city of Zubara, famous for pearl fishing. The site is being investigated by a joint Qatar-Danish team. © Qatar Museums Authority (Qatar Islamic Archaeology and Heritage Project/University of Copenhagen) 0352.
Detail of the excavations of the “palace” in the old port and city of Zubara. © Qatar Museums Authority (Qatar Islamic Archaeology and Heritage Project/University of Copenhagen) 0349.

Workshop participants inside the Fort at Zubara on February 14th 2013. © W. Rączkowski
So different the participants were, so different were the reasons why they went to this workshop that took place from 18 - 22 February 2013 at the University of Bamberg in Bavaria, Germany, but one thing they all had common – they came to learn more about Archaeology from Aerial Photography. The 15 participants from Germany, Austria, USA and Croatia (Bosnia and Herzegovina) covered not only the whole range from undergraduate students up to PostDoc’s but also came from different fields of archaeology: one of many aspects that enriched the experience this workshop gave all of us. Another is surely the brilliant Lecture team, consisting of Dave Cowley (RCAHMS, Edinburgh), Rog Palmer (Air Photo Services, Cambridge and AARG), Johanna Dreßler (University of Bamberg and AARG) and Karsten Lambers (University of Bamberg).

The programme of this workshop was very well balanced, beginning with an introductory lecture on Monday evening and a following Welcome reception with orange juice, pastry,

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cookies and wine. The participants quickly began to make contact, and they even took the language barriers without big problems, maybe not in the first seconds, but at the latest after a few glasses of wine. The next day began, like every other following day, at 9 o’clock in the morning. You can call that a fair time for beginning an archaeological workshop. Theory and interactive practices followed each other and we got familiar with the methods of Aerial Archaeology, and got a basic feeling for interpretation of oblique and vertical photographs of archaeological features, and on the guided city tour in the evening also a basic feeling for the beauty of the World Heritage Site Bamberg and afterwards for the delicious products Bamberg is most famous for – its great bandwidth of different kinds of beer.

The following day was primarily about transformation of images and mapping of features we detected on the photos and the participants worked for the first time on own projects, trying to transform oblique to vertical images, supported by the lecturer and more experienced participants. The program on Thursday was mainly about practical aspects of transformation, interpretation and mapping that the participants did through little projects they worked on in small groups. It was very interesting to compare afterwards different results of the same site, which was one of many situations when we learned a lot through an open and a more-and-more competent discussion. After that we all visited one of the many traditional pubs, and some of us ended up late at night discussing the more philosophic aspects of the workshop and it was a pity that we all had to say goodbye after a final discussion on the following Friday just when we were becoming a group of archaeologists working with Aerial Photography.

All the lectures and exercises were very interactive. The point was not just to give quick answers or recipes on the photographs and archaeological sites but to show us how to keep our minds open, alert and cautious. Coloured with great humour of Rog and Dave, in this relaxed atmosphere, everyone was free to stop the lecturers, ask their own questions, point observation and feel like one is at home. Teachers sometimes would not even conclude or summarize some of our own views on certain pictures since they wanted probably to stress importance of discussion and acceptance of other people’s views, suggestions and solutions. Being an aerial archaeologist is not about working alone but is about discussion and team. Although we learned a lot and were always asking ourselves what we can see in the pictures, it would be also a good thing that the course included additional field practice. From that point the question would still be what we see but this time from the different perspective, air...ground.

Finally, we also want to thank Karsten and Johanna for all the nicely done organization, and to Rog and Dave for unselfish share of their enormous knowledge among us.
In class at the Bamberg workshop
53 years of technical progress in aerial archaeology 1960-2013: A Cursus at Karden Kreis Cochem, Germany

Irwin Scollar¹ and Otto Braasch

Today, well-corrected digital cameras with chips that can hold thousands of high resolution images, GPS positioning triggered from the camera and perhaps inertial navigation hardware along with software for mapping imagery are but the latest steps in a long period of development in aerial archaeology.

When the first author flew a borrowed military Dornier 27 high-wing monoplane observation aircraft placed at his disposal by the new post-war German army, systematic searching for sites in the Rhein-Moselle valley area and low level oblique photography became possible. A pre-World War 2 (1938) second-hand Voigtlander Bessa folding camera was all that could be bought to make high resolution images. Agfacolor negative film could make black and white prints, colour contact transparencies or poor colour prints on paper with only one film type flown. The 120 size rollfilm with but twelve 6 x 6 cm images was a great nuisance, since much time in the air was lost changing film in a dark cloth “change bag”.

In June 1960, a Cursus was found for the first time on the Continent. Pictures showed part of its length of ca. 552 meters and 32 meters width along with a number of adjacent barrow circles and square Iron Age enclosures. It is similar in size to one at Springfield, Essex cited by Loveday.

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A year later, three solid Fairchild K 20 aerial cameras with vacuum backs to hold the film flat, a fairly well corrected lens and black and white rollfilm in 5 inch width and up to 40 images were bought from a war surplus supplier in London. These cameras cost very little, and they could best be loaded in the darkroom before flying. Reloading in the air in a rented cloth-covered vintage 1937 Piper Cub J3 was still very awkward. Film was cut to size on special request by Agfa, but later production film with good sharpness became available on special order from Kodak USA. The resulting 5 x 4 inch images taken on revisiting the site at Karden in 1962 were much better than in the earlier 6 x 6 cm pictures. Films were developed by the first author using reel-to-reel processing tanks as illustrated.
In 1961, an electrically operated Fairchild K 24 was also bought as war surplus, but it weighed nearly 10 kg and was too difficult to handle. It was replaced later with two much lighter Williamson F 117s with cast aluminium bodies as then furnished to RAF Costal Command. With this suite of cameras, the first author and his collaborators filled the aerial archive at the Landesmuseum in Bonn.

Mapping of sites was done manually using either the “Paper Strip” or the “Möbius Network” methods for recording at 1:5000 if a map was available as simple point at 1:25,000 when not. By the end of 1975, digital image processing was installed at the Landesmuseum, the first in a non-classified context in Germany, software written, and negatives scanned precisely with digital rectification and new images on 10 x 10 inch format film for contact printing, enlargement and archiving.

In the meantime, the quality of 35 mm SLR cameras, lenses and films had improved enough so that by the late 1960s they were in active use by the second author and others using Cessna 172s. This continued until digital cameras became available.

After the publication in the last number of AARGnews of Jim Pickering’s image of the Karden site (wrongly labelled Cochem by him, although some 12km distant from the true location), the second author answered an e-mail from the first:

Thu, 06 Sep 2012 09:36:12 +0200 From: Otto Braasch otto.braasch@landshut.org

“APs of your Karden, Lkrs. Cochem, Cursus are at tables 42a and b, 43, 44a and b in your book.

Jim was with me on 2nd July 1993 when we by chance came across your Cursus. I covered the site with colour and Kodak EIR slides.”
The greatest surprise came shortly after that when checking the local Rheinland Palatinate GeoPortal on the internet for the precise position of the Cursus. More than half the site and many surrounding features were beautifully visible in the precise digital orthophotos of 25 May 2011 made at very high resolution, and these could be also used to rectify all the earlier images. Nothing was visible in Google Earth.

The old pictures with examples of results from rectification for images using the GeoPortal data using the first author’s software AirPhotoSE are shown in the following images.
BY34 1962 rectified to RLP Orthophoto with Cadastral

Otto Braasch 1993 rectified to RLP GeoPortal image
References in chronological order


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Internet Links


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[http://www.uni-koeln.de/~a000/airphotose.html](http://www.uni-koeln.de/~a000/airphotose.html)

Click to download AirPhotoSE and the Reference Manual in PDF format. Original images on request.
A Geoarchaeologists view of Aerial Archaeology

David Jordan

It is 36 years since Davidson and Shackley popularised the term “Geoarchaeology” as the title of a seminal symposium volume (Davidson and Shackley 1976). In the foreword Colin Renfrew commented “every archaeological problem starts as a problem in Geoarchaeology”, pointing out how fundamental the soil and landscape are to most sources of archaeological knowledge, aerial archaeology as much as any. In those 36 years geoarchaeology has matured into an identifiable field with its own professionals, a journal and graduate courses. It remains a very broad discipline (an indiscipline perhaps?), encompassing most of the common ground between archaeology and the earth sciences – whether that be the sources of stone artefacts, the geomorphology of inhabited river basins or the microscopic structure of Neolithic wood-ash. Among other sub-disciplines, we can clearly discern a “landscape” geoarchaeology, with its roots in geomorphology, and a “site” or “excavation” geoarchaeology, with its roots in soil science. Site geoarchaeology, with its detailed analysis of archaeological strata, is exerting an influence on routine excavation practice, especially in Great Britain where geoarchaeologists are now involved in many routine excavation and survey projects. Despite this geoarchaeology remains surprisingly marginal to much of the business of archaeology – and more marginal to archaeological prospection, including aerial archaeology, than we might expect. Indeed, there is almost no recognisable “prospection” geoarchaeology.

We now have a suite of effective geoarchaeological tools for the detailed analysis of archaeological deposits and, as a consequence, an abundance of insights into the way sites form and function as systems within a wide range of soil environments. Yet very few aerial photography, remote sensing or geophysical survey campaigns involve any observation of soil profiles as a means of direct calibration and control. Where observations are made to compare excavation and prospection data (Hey and Lacy 2001, for example) they almost always form part of subsequent, not contemporary, excavations and, with rare exceptions, they remain informal and qualitative. However, because those site properties which control our imagery (soil moisture especially) are constantly changing we cannot get beyond qualitative comparison of aerial imagery with excavations without contemporary soil data gathered explicitly for the purpose. Thus until Archaeological Prospectors start digging holes and analysing soils as a matter of routine there will remain a crucial gap between our prospected imagery and the archaeological reality in the soil which it represents.

Yet the development of geoarchaeology opens up great opportunities for aerial archaeology. The ability of remote sensing (RS) methods to extend the spectral range and resolution of traditional film photography poses a geoarchaeological challenge. RS can, in principle, detect archaeological patterns in crops and soils beyond the visible spectrum and in very small subdivisions of the spectrum, too narrow to be detected in normal photography. But it is expensive to commission a remote-sensing flight – much more expensive and complex than normal hand-held air-photography. The cost of airborne RS data can, however, be low per hectare because of the large areas of the ground which a single flight can cover – but the benefit of this is only apparent if the flight is successful. Success in this context means that RS imagery gives us information which we could not get from simpler, cheaper means – in practice from air-photographs or from low-cost RS using standard cameras, such as the recent

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red-edge imagery research carried out by Verhoeven and Doneus (2011). The justification of airborne RS for archaeology therefore depends critically on predicting where and when it will prove better than the cheap alternatives.

We could identify where and when airborne RS offers advantages simply by gathering a lot of images and observing the conditions under which the results were significantly more revealing than simple photography. Such try-it-and-see research is not, however, practicable. The cost of RS flights is too high and the complexity of the spectral variations observed too great for us to reach reliable conclusions by luck alone. It is much better to have a good understanding of the underlying ground properties and processes which produce the spectral variations we observe so that we can predict where and when airborne RS has advantages on the basis of an explicit model which describes how they form and then to test this model against reality in order to improve it. The complexity of sites, soils and crops is such that models of ground spectral properties can only ever be approximate if they are to be valid beyond the confines of a single site, but imprecise models that narrow the range of conditions (soil moisture state, land use ...) we must seek in order to make the best use of airborne RS are considerably better than none. By the term “model” here I mean a description of the components and workings of a system which produces predictions of observable behaviour, whether as formal as a set of equations or as simple as a flow diagram. The concept is already familiar since we use the product of one kind of model, which derives values of Potential Soil Moisture Deficit, to predict the formation of crop marks.

Such models of ground spectral behaviour are common and form the basis of much image interpretation in environmental remote-sensing research (Ben-Dor et al. 2002, Scull et al. 2003, McBratney et al. 2003, Anderson and Croft 2009). But in archaeology, beyond PSMD, they are almost unknown. In order to find detailed and comprehensive, quantitative studies of the physical relationship between archaeological remains and their representation from the air, we must go back almost 35 years to the work of Alain Tabbagh on thermal imaging in the 1970s (Tabbagh 1973, 1976, 1977, Scollar et al. 1990). Tabbagh measured the thermal properties of archaeological remains and used this to create numerical models of the development of thermal anomalies at the ground surface. This allowed him to predict under what weather conditions, and at what time of day, detectable anomalies would occur, predictions which he then verified with thermal images of bare soil surfaces taken from flights using the Aries radiometer. Tabbagh’s work also forms the foundation for inverse modelling of soil thermal anomalies detected by such remote-sensing instruments, given some knowledge about the nature of the soil – turning the pattern of temperatures into a range of possible interpretations of the buried archaeological structures beneath. Such interpretations, based on inverse solutions, are not unique – which means that a particular thermal pattern at the ground surface can be produced by a range of possible remains in the ground - but Tabbagh’s work shows that thermal imagery can be a useful means of detecting and analysing buried remains if combined sensibly with what we know about archaeological remains across our landscapes.

Tabbagh’s work remains unique in archaeology. Yet the issues which justify such effort - the high cost of airborne thermal imaging – apply to most airborne RS. His research demonstrated both the relative rarity of the occasions on which detectable archaeological thermal anomalies develop on bare soils, and the value of the information they can give us when they do occur. Without such research, and the definition of the precise flight timing and instrumentation it made possible, bare soil thermal survey would have very little chance of being used
successfully for archaeology except under specific, and rarer, melting snow conditions. As Tabbagh showed, simply flying an aircraft and hoping to get a useful thermal image on bare soils will not be cost-effective because such detectable thermal anomalies are rare. However, studying the properties of archaeological remains, and the soils around them makes it possible to understand and model the appearance of detectable anomalies in order to target data-gathering correctly, thus turning a marginal and expensive technique into something both useful and cost-effective. Tabbagh also showed that extracting the information about buried remains presented in an image requires a good idea about the kind of remains which might be present and about their possible physical behaviours – which in turn requires a geoarchaeological perspective on the physical properties of remains and not only an archaeological description of their stratigraphic relationships.

Effective targeting and interpretation are issues for all our prospection methods. No prospection method detects all archaeological remains under all circumstances. We tend to favour those which have proved effective in many cases and which cover the ground quickly at low cost – which is why magnetometry and simple oblique air-photography are so dominant. Yet the formulaic approaches to prospection which dominate now are efficient only if we wish to observe the patterns of buried remains and are less concerned about analysing their composition or 3-dimensional structure. Indeed, one of the striking things about magnetometry is that it is arguably one of our least informative survey methods since it gives us only one kind of information and in only two spatial dimensions. As the range of available prospection methods and the ground properties they detect expands the potential to go beyond simple pattern recognitions increases. But if we want to use prospection methods to analyse remains, making full use of the many methods available to us and the insights they provide, we need to understand much more fully the structure and behaviour of remains and their environments. This requires feedback – we need to compare prospection results with measurements of the properties of remains revealed by excavation carried under the conditions of the prospection and thus, more or less, at the same time. This need not be complex. A simple spade-pit or auger-hole reveals a great deal about the nature of the soil and factors affecting plant-growth, but it does require familiarity with the soil and thus expertise in soil science or geoarchaeology. Moreover, since sites and soils are so very variable, it needs to be carried out routinely so that we accumulate as much information about site structures and behaviours as we can and develop models which represent enough of the complexity of buried remains.

The studies of site thermal behaviour carried out by Tabbagh validated equations which relate soil physical properties to their thermal behaviour. Such equations can be used in reverse, taking soil thermal behaviour measured by airborne RS, to calculate more fundamental soil properties such as moisture and texture. Agronomic soil scientists make extensive use of this approach, combining a range of measurements made at or above the ground surface to calculate fundamental soil properties using empirical or semi-empirical equations called transfer functions. Similar equations allow us to calculate some geophysical properties of importance to archaeology, such as soil electrical resistance, from underlying properties such as soil moisture and texture (Rhoades et al. 1989) and, conversely, to study the effects of changing soil moisture on electrical resistance survey results. This allows us to target such surveys to the soils and the soil moisture conditions where they will be most effective in revealing buried remains. The key point is that a more analytical approach to prospection, including to the use of RS data, has potential to give us quantitative information about the
nature of buried remains, especially when used in combination, unlocking potential for archaeological site analysis which “pattern-recognition” prospection alone cannot achieve.

The implications for identifying the locations of buried remains may not be very great – knowing the pattern of remains in 2D is usually good enough – but the implications for modelling their moisture content, for example, and thus their changing hydrochemistry and the preservation of artefacts within them under changing climate or soil drainage conditions may be very great indeed. Further evidence of the properties of remains is available to us through short-period multi-temporal thermal (and other) imagery, an approach which might be much more used in archaeological remote sensing as it should – but is not – in archaeological geophysics. While some soil physical properties within archaeological remains change little through the year (magnetic susceptibility, for example) others change a great deal – in particular those which depend on the distribution of soil moisture. Thus, while the results of a European magnetometer survey in July will differ little from those obtained in January the results of a ground penetrating radar or an electrical resistance survey will often differ a lot because the soil moisture distribution differs. And since different distributions of strata properties within sites (texture, for example) will produce different soil moisture distributions at different times of year variations in remotely-detectable soil properties which depend on them, such as electrical resistance and bare-soil surface temperature, will also vary. The implication is that prospection results from surveys repeated through the year, using moisture-sensitive geophysical and remote-sensing methods, can be more revealing than any one prospection on its own. Repeated prospection therefore has the potential to provide us with quantitative, if tentative, information about the geoarchaeological properties of buried remains – but only if we move beyond a pattern-recognition approach to geophysical and remotely-sensed data and integrate prospection with the detailed application of geoarchaeological insights. This requires also that geoarchaeology become more relevant to archaeological prospection by developing a closer relationship to soil physics, making wider use of the insights which site geoarchaeology gives us about soil components and structure from a largely pedological perspective.

Even if we do no more than record the nature of soils and buried remains revealed by prospection, including aerial imagery, using rapid, low-impact contemporary excavation we might improve our ability to target and interpret such prospection better. At present that lack of such coordinated air and ground research means that we are simply not learning about the reasons why prospections succeed or fail and we are relying for our improvements in prospection practice on technical developments alone – better imaging systems and better processing methods but not a better understanding of the targets we wish to reveal. Certainly better instrumentation and processing methods improve our ability to detect the patterns of remains – whether that be through multiple magnetometer arrays or IR-sensitive digital cameras – but they do nothing to advance our understanding the remains and they fail to make use of the richness of evidence available.

Air photography arguably remains more closely tied to the reality of soils and archaeological remains beneath the ground than other archaeological prospection methods because the results of air photography – the quality of crop and soil marks especially – are so clearly tied to the changing nature of the soil and the plants growing on it. While starkly different geophysical survey results can be obtained at the same site at different times of year from those methods most affected by soil moisture (as described above) such surveys are most often carried out only once and, since comparison is less common, the difference is not so obvious. Crop and
soil marks, by contrast, only appear clearly under certain soil and crop conditions and the repeated, re-flying of areas in successive years which has been common in parts of Britain, makes this obvious. Moreover, since air-photography is a central method in soil survey and agronomy the influence of soil on crop mark appearance has been a significant theme in aerial archaeology research, with the aid of soil scientists such as Bob Evans (1997, 2007). The result is that air-photography for crop and soil marks are simply not carried out in unfavourable conditions whereas geophysical surveys often are – even though the results may be poor. One reason I perceive for the disconnection of archaeological prospection more generally from the soil is the degree to which archaeological specialisms have become divided into compartments. Prospection is simply not associated with the environmental archaeology category into which geoarchaeology broadly falls. One can see this most clearly, perhaps, in the scant mention made of soils in the leading textbooks and journals across the prospection field, where the focus is principally on advances in instruments and data processing and the presentation of (almost exclusively positive) results.

Because it reveals so much about the landscape, aerial photography has always played a central role in geoarchaeology and, since it became truly useable, so has satellite remote sensing. Thus there are many publications on archaeo-landscape interpretation which include aerial imagery – a natural extension of its use in Physical Geography in soil and landform mapping. Soil surveyors spend as much time with air-photographs as with soil pits in the field. But when they use APs to understand the pattern of soil distribution, and accompany their AP studies with studies of the soil in test pits and auger holes they are translating the topography and tones visible in APs not only into the patterns of soil distribution but, further, into the distribution of soil water behaviour, texture, depth, certain chemical properties and soil horizonation – going considerably beyond pattern to get at properties. And the more that soil surveyors gain experience of this the more time they spend with their APs and the less time in the field digging holes, because their interpretations of the physical and structural properties of the soil become increasingly correct. But they become correct by repeated validation against analyses – including many laboratory analyses - of the properties that aerial images allow them to identify. There is a continuous process of formal calibration of variations in ground surface reflectance against soil properties identified in excavation and measured from samples which has no counterpart in archaeological prospection practice.

Another persistent cause of separation between prospection and the soil is the fact that Geoarchaeology (as such or as something like “soil studies”) remains only a very minor element of most university teaching in archaeology. A brief survey I carried out in 2006 (Jordan D., 2006) found that, of sixteen departments teaching single honours archaeology courses in Britain, four taught no relevant earth sciences at all, six taught two hours or less, four taught up to six hours and only two taught substantially more during a whole 3 year course. And almost all of this teaching is in the lecture hall, not in the field even though soil science and geoarchaeology are most definitely field disciplines requiring direct field experience. This is strong evidence that most recent graduates have entered the world of professional field archaeology underprepared for daily contact with the soil.

How is an excavator expected to distinguish the common natural soil colours (such as the brown redoximorphic mottles found in wet soils) from archaeological stratigraphy, and their meaning in terms of soil formation, if they have never seen them in the field before? My experience from teaching geoarchaeology courses to archaeological excavators is that this unfamiliarity with basic soil science has made archaeologists too cautious in recording sites.
during excavation. Aware that there is much they don’t understand when they look at an archaeological section they take refuge in a stratigraphic interpretation, drawing lines on the complex intergrading colours and textures to represent boundaries which they know “must” be there so that they can end up with a manageable Harris matrix. One can hardly blame them since they have no time to do otherwise. Yet formulaic descriptions of sites which impose stratigraphic “order” on a complex soil reality can misrepresent much valuable archaeological information, making a fiction of our archaeological records and the process of “preservation by record” with which we seek to meet our obligations to the past. And it buries the abundant clues to the connection between the structure of buried remains and our ability to detect them as crop marks and magnetic anomalies which might be easily recorded if the excavator went about excavations armed with a simple soil moisture meter and a few other basic soil scientists’ tools.

The lack of undergraduate teaching implies, moreover, that many students moving on from archaeology degrees to more specialised courses, research and practical work in archaeological prospection – including aerial archaeology - do so without a strong grounding in the geology, geomorphology, soils and hydrology which are the key properties controlling the anomalies they will intend to interpret. The result is that the conservatism and formalism of archaeological excavation recording has been extended to the recording and interpretation of air-photograph details. Most AP transcripts, though they may note the presence of tonal changes which result from changes in soil depth or moisture do not interpret these as an integral part of the archaeological interpretation process because they are seen as separate from it. Yet the archaeological features in the ground are not isolated structures within clear bounds. In most cases they are an integral part of the soil system – physical, chemical, mineral, biological and hydrological – and an accurate record and interpretation of soil and crop marks will surely place them within this system, just as an accurate description of strata in excavation will acknowledge the gradations of boundaries and the complexity of mixed parent materials and the results of post-depositional soil formation.

Yet this requires the transcriber and interpreter to understand and use air-photographs as soil scientists do, as continuous descriptions of soil properties across the landscape, within which archaeological remains are embedded – and that requires that the aerial archaeologist is trained in soil science or geoarchaeology.

Thus it seems clear to me that we must give archaeology students more understanding and experience of soils and archaeological strata, and the processes by which they form, if they are to have a solid basis for their professional work. And, given the complexity and range of behaviours we find in soils and sites we must give them this where they need it – on field courses and in professional training in the landscapes where they are working (since clearly Scottish archaeologists need to know more about ferrous podzols, and Hungarian students about loess than either needs to know about tropical laterites). This probably means that they need continuing geoarchaeology training after they have qualified and are tackling their first independent fieldwork – as well as on their degree courses.

The same applies to students of aerial archaeology. Aerial images contain a wealth of soil subtlety we are unable to analyse unless we know what it means and have a background in soil landscapes on which to draw. And I don’t just mean understanding, for example, that crop marks behave in certain ways in clay or gravel landscapes. Air-photographs give us evidence about the context of our archaeological sites which is crucial in understanding the way in
which they formed and, from this, their archaeological interpretation when seen in excavations – but understanding this context requires an understanding of geomorphology and soil formation sufficiently complete to deal with the complexity of soils and landscapes.

Moreover, traditional archaeological recording regards the soil within excavations as static. The range of colours which the soil presents in different moisture states, for example, is simply not captured in section drawings and recording forms – deliberately so. Aerial archaeologists have a much more subtle view since crop marks, soil marks, snow marks reflecting soil temperature anomalies come and go. This is not the same as treating soils as the dynamic systems they are but it makes the teaching of aerial archaeology an immensely useful support for the teaching of archaeological site analysis and geoarchaeology as the interpretation of dynamic systems.

To sum up: 35 years of experience has reinforced Renfrew’s message. Substantial advances in geoarchaeological understanding of archaeological sites have yet to be truly incorporated into aerial archaeology and archaeological geophysics. The importance of understanding the relationship between our images of the ground and its physical properties which Tabbagh showed so clearly, and so long ago, has yet to result in the daily rapprochement we need between the disciplines – and the benefits it can clearly bring in better flight timing and fuller image interpretation. If we are to exploit the wealth of information which air-photography and remote-sensing can reveal archaeological prospectors need a more subtle and complete view of the soil. They need to combine data from different flights and survey methods quantitatively making use of the developing understanding of soil physical behaviour which is informing modern soil science and agriculture. And they need to start digging holes. Until we start gathering quantitative data on soil state and plant growth at the time of our flights and surveys (all of them – or as many as we can) we will remain stuck in an era of interpretation by pattern recognition which wastes the opportunities which new (and old) sensing technologies present.

Is digging holes so hard? Judging from the reactions of some flying colleagues you might think so. Yet the combination of air-photograph and soil test-pit or auger-hole information as a basis for quantitative soil interpretation is the daily business of soil scientists. They don’t find it hard. Why should it be so different for us? It is not just a problem for aerial archaeology. We have, wrongly I think, come to accept that geophysical survey is carried out with geophysical instruments alone – and that the auger-hole and spade-pit have no place in the geophysicist’s toolkit. The result is reports of geophysical survey results incorporating inaccurate soil information taken from soil maps instead of simple observations made directly in the field. The geophysical surveyor, armed with spade, auger and a few minutes could not only correct such errors and avoid perpetuating them in their reports but could also add to our common knowledge of soil distributions and improve their own survey interpretations in the light of what they find that their spades and augers have revealed. A spade, an auger, some sample bags and a simple soil recording kit is all it takes.

It is arguably easier for the geophysical surveyor than the aerial archaeologist – they are on the ground, and work at only one site at a time. The air-photographer and remote-sensor have to land their planes and drive around a bit if they are to gather the near-contemporary soil and plant-growth data they need in order to calibrate aerial data against ground conditions. But
how hard can that be? If our answer is “too hard” perhaps we do not care enough about what our imagery really means.

References


Integrating magnetometer surveys and oblique aerial photographs

Jörg Fassbinder

In November 2012, Johanna Dreßler and I spent a week in Munich at Bayerisches Landesamt für Denkmalpflege to examine their collection of oblique aerial photographs. Many walls displayed large prints of merged geophysical output and oblique aerial photos. Jörg explained that these were partly for fun but that the aerial photographs often provided context for the smaller areas of geophysical results. He was kind enough to copy me some examples to use in AARGnews and write brief explanatory texts. The contribution ends with a nice lesson in interpretation and reality. [Rog Palmer]

Theilenhofen. Magnetogramm of the Roman fort. The ground plan of a typical Roman fort that was constructed on stone fundamentals (right side) as well as the older fort that simply consists of wooden barracks which were later overbuilt by the civil settlement (left side). Dynamics +/- 20 Nanotesla, in 256 greyscales, grid size 40 x 40 meters, sampling rate interpolated to 25 x 25 cm. Pasted into an infra red air photo by Otto Braasch. Archive No. 6930/006. 3184IR, 15.

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Eining: air photo (Otto Braasch)
Archive No 7136/074B, 7775-34

Böhm: air photo (Otto Braasch)
Archive No 7134/052a, 7223-5

Oberheimbuch: The square enclosures
data Archive Nr. 7140/092, 3232-25. Magnetometer as before but with
dynamics of +/- 4 Nanotesla
Egweil: The square enclosures data Archive Nr. 7332/156, iR3196-28. Magnetometer as before but with dynamics of +/- 4 Nanotesla

Dambach: air photo Archive Nr 6928/294, 2798-10
Below: Oberhochstatt. Aerial photo 2008 of the site combined with the results of magnetic prospection (Archive No. 6932/119-10s09253 Photographer: K. Leidorf) bottom is north.

Oberhochstatt. Magnetogram of the Roman fort. Part of the ground plan of a typical numerous castle with stone wall and one fortification ditch. The left side of the magnetogram is dominated by geological structures most probably fractures in the bedrock of Jurassic limestone, that was filled up by magnetic topsoil. Dynamics +/- 20 Nanotesla, in 256 greyscales, grid size 40 x 40 meters, sampling rate interpolated to 25 x 25 cm.

Left: Early medieval enclosure Oberpörring in lower Bavaria: air photo archive no 7342/032, 5245-25 Oberpörring
In a series of emails to sort out some confusion over left and right in the preceding image, Jörg told me the story of this site. “Below is the ‘discovery photo’ by Otto Braasch in 1978 and it was because of that road, built 1983, was constructed around it. But in 2008 we ‘discovered’ that by this action they preserved only the geological structure and destroyed the real Roman fort. Later we heard that during the road construction they saw, of course, that there was something there.”

The misinterpretation is understandable. The photograph is centred on what appears to be a real Roman fort with nice regular-width ditches, a curved corner and an entrance. The real fort is visible if you know where to look (see above) but is much less obvious. The other (real) fort in the picture above was discovered by Otto Braasch in 2011. The Oberhochstatt story is detailed in Fassbinder 2010.

Reference

Musings on a past and future for AARG?

Rog Palmer

In another of Rog’s Rambles we look at one biased person’s view of the origins and development of AARG’s first 30 years and ways in which we may move in the future. In places, my thoughts spread a little wider than AARG and include more general ideas about our data collection and examination and ways in which that material can be used to tell archaeological stories. As usual, I hope to cause a bit of unrest and your responses will be welcomed as contributions in future issues of *AARGnews*.

Early AARG and aerial photographers

In the beginning (to quote an anonymous source) there were aerial photographs from a range of sources and AARG, or its un-named forebear, was created so that users of those photographs could meet and discuss problems of interpretation, depiction and understanding (Palmer and Ashbee 2004). At a later date, but still early in the life of AARG, Derrick Riley asked if ‘aerial photographers’ could also attend the meetings and so it came to pass that the focus of AARG shifted from using any photographs to taking oblique shots of features that had been observed from the air. Sessions at annual meetings could be full of pictures that were displayed for no better reason than they had been taken of archaeological targets. Was this the founding of the ghetto in which various people (eg Rączkowski 2009) suggested that ‘aerial archaeology’ had lodged?

Virtually no reference was made to the much larger numbers of vertical photographs that existed other than to dismiss them as a source of information because they may not have been taken at the optimal time of year to show archaeological features with the clarity that observers could take from 300m (about 1000 feet for our UK and USA readers). In those early days AARG was a fairly Britto-centric group with little concern for the wider world and Britain had relative freedom of the sky as well as targeted photographs going back to the 1920s. At this time (early 1980s) a lot of archaeology in Britain was site based (ideal targets for oblique photographs) and landscapes were but a glint in the eye of a few people. Most ‘aerial photographers’ thought we had little need to reference those non-archaeological vertical sources which tended ‘only’ to show vast areas of medieval or Celtic fields and other ‘uninteresting’ stuff. This preference for oblique photographs and the methods used to take them was reinforced when Otto Braasch joined AARG and showed us the work he had been doing in Germany. Otto is a superb aerial artist and showed us beautiful photographs of archaeological sites which tended to confirm that ‘aerial archaeologists’ were doing the right thing.

With our aerial observers trying to emulate Otto, as previously they may have tried to match the eye of St Joseph, a dichotomy was created, or continued, in which the collectors of our data took little heed of the requirements of the users. In my view, our preferred method of data collecting has left us with a highly selective and unreliable source of evidence for study of past landscapes (Palmer 1978; Brophy 2005; Brophy and Cowley 2005). It was a cheap and cheerful way of collecting information that satisfied the urges of man (sometimes also woman) the hunter and on it still goes and some of you continue to teach it as a Good Thing.

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Before and during the lifetime of AARG, archaeological interests had been shifting from the site-specific to examination and study of wider landscapes and it became obvious that those targeted photographs of ‘sites’ could, and had, left gaping holes in past landscapes. These holes may have been unnoticed by aerial photographers because, other than making a blob on a flying map, the relationship of one site to another may not have been considered and if photographs were taken on slide film it is very difficult to look at more than one picture at a time and they cannot be laid out in context. Quite possibly, the only person not to leave holes in his data was Derrick Riley who, in preparation of his Early Landscape book (Riley 1980), was taking, and mapping from, his own photographs. Derrick was probably the only person to work this way, the rest did either one or the other, but Derrick was able to converse with himself (and others) and amend his flying practice to meet the needs of the user. His talks to AARG showed how quickly he became aware of the need to fly a bit higher (these were the days of using a standard 50mm lens on a 35mm camera) and think about control points and, by mapping from his own photographs, he could identify gaps and try to fill them during later flights. For the rest of us, the best we can do is try to examine all available aerial photographs regardless (almost) of type or date (Winton and Horne 2010).

However, in places where there are concurrent mapping and flying programmes – assuming the personnel speak and listen to each other – there may be opportunities to fill holes if the airborne crew are instructed appropriately by the mappers. This has been my ideal for some time and dates back to when the Danebury environs book was being prepared (Palmer 1984) and both John Hampton (then the airborne observer in RCHME) and John Boyden (a local flying farmer) were given a list of target coordinates to be photographed. The outcome was that the fliers were pleased to be given specific things to look for and photograph rather than roaming around looking for random crop marks while I got some useful photographs of new features that helped to fill in and link together parts of my study area. This seemed to be a sensible way to operate, and ideas along these lines were bounced around at some of the early AARG meetings when photographers and mappers were together around a table.

**Satellites and UAS**

Use of a wider range of aerial photographs may have expanded the ghetto slightly but stronger walls were built around it when satellite photographs/images of good resolution became available. Aerial photographers at AARG compared those with images they had taken from 500m (we tended to fly a little higher by then) and declared them not as good, and they still had that ‘wrong time of year’ flag attached to them. But, as one who had bought satellite images when I was working in Wessex in the mid-1970s, I could see that they were improving in resolution and, once Corona photographs had been declassified and were available, archaeological use began in the Middle East and similar places where features remained upstanding (Fowler 2013). AARG’s satellite person, Martin Fowler, wrote a series of contributions for AARGnews and weightier journals that showed the increases in resolving power of a range of satellite sources. Use of satellite images became widespread – almost all of it done by people outside the AARG community – and is now almost a separate thread of research. We can, however, read examples of uses of satellite images among papers in recent books on uses of archive photographs (Cowley, Standring and Abicht 2010; Hanson and Oltean 2013). The first of those books is an AARG Occasional Publication so we can imply a positive connection to AARG. Satellite images can be looked at as well as manipulated in computers so I see no reason why they cannot be considered as another source of aerial image and examined along with whatever else is available. If uses of these data are to expand, and if there is the will to use them, I would like to see the AARG community following the lead set
in Romania (Oltean and Hanson 2013) by making simple use of satellite images which, often, can be of better clarity than old prints of 1940-50s aerial photographs.

It seems to me that, in the early 21st century, there are two parallel strands of uses of aerial images – let’s call them ‘low altitude’ and ‘orbiting’ – which rarely meet and whose practitioners may have trouble understanding one another. This division may stem from the data collectors who, in the case of observer-photographers, want to be in control of how, where and when their photographs are taken. However, there is no excuse not to use all available material when examining aerial images for archaeological projects especially when ‘orbiting’ images may be easier and cheaper to obtain than conventional ‘low altitude’ photographs. The two strands are perhaps divided by archaeological interest so that site-centred foci may be better met by low-level oblique photographs whereas past landscapes need to be compiled from a range of sources. In a way, we can perhaps see the division with one strand producing a series of disconnected high-resolution pictures while the other constructs a map that attempts (and often succeeds) to recreate links between those dots and to show them in context. This strand of thinking echoes back to archaeological priorities and the question of which should be more important, the way we collect our data or the range of uses that can be made of them? Satellite information, I think, is more important than just being a source of control points or left to ‘non-aerial’ people to use.

I would include ALS/lidar with ‘low altitude’ survey as it is usually captured using aircraft or helicopters. ALS was accepted as a wonderful technique by AARG as soon as its first results were demonstrated – probably by Nick Holden of the UK’s Environment Agency. Some of our recent annual meetings tended to suffer from overdoses of ALS but I think that the first ‘falling in love’ phase has now passed and we are now seeing archaeological results overtaking the pretty pictures and technical discussions. But why was ALS so acceptable when satellite images were not? I suggest it was because ALS shows the detail beloved by the oblique aerial photographers although it could, at the same time, record large areas of land and so satisfied the needs of those studying past landscapes. ALS projects are high fashion now and can produce excellent results on land that has not been completely plough levelled. The archaeological range of these projects runs from study of specific sites to whole state surveys as carried out by Ralf Hesse in Baden-Württemberg (2013). ALS also produces the best topographical ‘background’ maps that are available and so can be used as a base on which to transform aerial photographs and underlay mapped features. All this is Good Stuff and has been part of AARG members’ work, research and presentations for the past ten years or so.

There is also a third parallel thread to aerial observation which is use of unmanned aerial systems. AARGnews has included contributions about these and, in very few years, their use has become commonplace in a wide range of archaeological projects. At present UAS uses tend to be restricted to site-specific recording which have made use of Structure from Motion programs – something that ‘aerial archaeologists’ may never have discovered if left to their own traditional devices. SfM also offers advantages to those using higher-altitude photographs and their tie-point stitching facilities may help us accurately geolocate the mass of hitherto unusable oblique images that were taken with no regard to their uses for mapping.

Civilian use of UAS is, of course, governed by regulations which may differ from country to country. In Britain for example, the Civil Aviation Authority introduced new regulations in 2010 (CAA 2013) that deal with airworthiness, pilot qualifications and insurance. As a rough
guide these state a maximum weight for the vehicle, the maximum flying height, rules about built-up areas and the need to keep the vehicle within sight of the ‘pilot’. There are many varieties of UAS. Some can be flown manually, others semi automatically or completely automatically via preset GPS with a possible range of 10km (or perhaps 40km – see Vision du Ciel 2013) which, if legal, may herald use of UAS for area survey albeit, because of height restrictions, using a wide angle lens with all its distortion problems. I haven’t thoroughly read all the rules and regulations – and these high-performance machines, plus a camera, will cost more than €10,000. At present, use of UAS seems limited to an ‘in sight’ area of not much more than a few hectares cover per flight. But this is another part of ‘aerial archaeology’ that seems not to interest most AARG members (but see Campana 2011) although we may be able to awaken this interest in September when there will be a session at AARG on this topic.

Teaching and outreach
Teaching which has been a considerable part of AARG’s ‘outreach’ since the mid 1990s and ‘education’ was examined by an AARG/EAC working party (Cowley and Palmer 2009). Many teaching initiatives have been part of the EU-funded Culture 2000 and ArcLand programmes but they would not have been possible without the AARG membership who provided most of the teaching staff. From the hurriedly-improvised start in Hungary in 1996 to the most recent in Bamberg (which ended a few hours before this paragraph was written on 22 February 2013) we have introduced more than 200 ‘students’ to using and taking aerial photographs. Responses and continuity have varied during those years. Students at the first course included many professionals who have since established strong aerial presences in their own countries (for example: Włodek Rączkowski, Ants Kraut, Romas Jarockis, Darja Grosman, Martin Gojda, Gabor Bertok). Most of the following courses were for younger students of whom few have continued to focus solely on aerial work, especially the expensive flying, although many became better-equipped to include aerial evidence as one strand of evidence in broader research. All, however, must have left these courses with a higher awareness of the potential and possibilities of aerial images. Contacts made during these courses have contributed towards establishing a strong network of colleagues who are able to help one another and exchange information.

All this is good and useful stuff, and I am pleased to be asked to teach aspects of these workshops. But teaching cannot remain static and changes are frequently needed to make each course fit-for-purpose. I have always questioned the need for flying to be part of our teaching – yes, it is fun but it may be better done for individuals or small groups of people who have a real need to learn and are likely to continue to work in that way. Ground teaching should, I think, be forward looking and teach what is relevant to each student group in a way that has a definite beginning, theme and end. Increasing amounts of time now seem to be spent helping students to learn to ‘see’ information on aerial images, to think logically about them and not jump to conclusions. The technical stuff (image transforming and use of GIS/CAD) seems to be a smaller part of courses if only because most students know more about GIS than the teachers. So focus may change to photo reading and interpretation, which means that people attending those courses should leave with basic knowledge of doing those things and also with an awareness that we are all continuing to learn and to go wrong in our reading of photos. The message for our Bamberg students included the need to know what local farmers did, know your local geology, look at sites on the ground and relate ground and aerial evidence. This may seem a long way from that irrelevant division into oblique and vertical photographs, or the confusion of negative and positive crop marks, but we saw it as a
move forwards rather than a blinkered entrenchment in things that may have been relevant 50 years ago.

In recent years, AARG has established a series of Occasional Publications which help to promote AARG and its activities as well as providing a ‘stamp of approval’ for those publications. The most recent of these is Interpreting Archaeological Topography (Opitz and Cowley 2013) which offers guidance, through examples, to use of ALS and to archaeological interpretation in general. In producing this work, the editors (and presumably AARG too) can be seen to have embraced and promoted the new technology and explored its uses for archaeology. What a shame that we didn’t have the people, the contacts, or the time to do the same for uses of satellite images.

**A future?**

I admit to a degree of confusion. The present AARG does many things ‘aerial’ yet at the same time there seem to be many things it does not do. So where are we going? Why do we have AARG? Such questions have been aired in many of the past and current Chairman’s Piece and we have been given a wide range of options which show that such thoughts (and discussions among the committee) are always bubbling near the surface so that AARG remains flexible and able to incorporate and adjust to modern trends that may or do affect it.

Several of us – mostly committee members past and present – have talked about the future of AARG, whether it is any longer relevant as a ghetto organisation and whether there should be amalgamation with other societies that undertake archaeological prospection. We have our annual meeting which is a good time to talk with friends who we only see once a year and to hear a range of papers that relate to aerial matters but beyond that we seem to have become somewhat stagnant. Those of you who are members of ISAP (the International Society for Archaeological Prospection, which was established as a geophysical equivalent to AARG by Armin Schmidt after he talked to several of our committee members at the Munich meeting) will be aware of the immediate and expert response to email questions raised by other members. AARG has nothing like that, and the Facebook page that was created for AARG a year ago is virtually unvisited. Membership of the two groups is, in fact, quite different with ISAP members comprising almost entirely professional users or manufacturers of geophysical equipment while AARG, by comparison, is a silent interest group (isn’t that what SIG stands for?) or is, perhaps, a sufficiently small community for us to know which individual will best answer a particular question and to ask them direct? Which can’t be a bad thing.

For several years now I have thought that we, AARG members, have reached the stage where we no longer ask archaeological questions or show doubt. I think I wrote this somewhere a while ago and suggested that one reason may have been that those people with ‘important’ jobs could no longer be seen to be uncertain. This seems to be an unhealthy position to be in as it is only by questioning what we do, how we do it and what effect these have on our understanding of the past, that changes and developments may occur. We now get polished presentations of either finished projects or work in progress both at the annual meetings and in *AARGnews* but, other than from somewhat theoretical positions, we have had few thoughts on what we are doing and whether our fairly standard practice can be changed or improved. Yes, there have been technical changes – quite significant ones within AARG’s short history, the introduction of CAD, GIS, GPS, ALS, DSLR, NMP, GE, SfM (to keep everything in code) and computer methods of transforming and enhancing images – but fewer (noticeable) changes in our archaeological approaches and directions. Along with this, we have seen
wheels reinvented to accommodate new technology. This is a valid part of the ‘growing up’ experience and may provide us with new ways of viewing the ground but, perhaps, with few archaeological results or new insights into the past. We may be competent technicians but, despite the pre-eminence of the aerial view for landscape study, does much new thinking about the longest word in AARG come from us?

Technical stuff is relevant to AARG, and the past few years have seen a lot of that – sometimes to overdose levels. It is easy to be a technician and easy to forget the reasons for which we want to use that technology. So if I had to suggest a direction in which more could be done and demonstrated by AARG members it would be in the archaeological results of applying new and old technology. These should go beyond showing that ALS can show a few more bumps to explaining the relevance of those bumps to extend our knowledge of the past in the area being examined. This has been beautifully done in the study of St Anna in der Wüste (Doneus and Kühteiber 2013).

Musing towards a conclusion
At this point I confess to being a bit lost and am unsure what I expect from AARG or whether any expectations are realistic. I suppose I would like a return to the 1980s when there were a few research projects of archaeological interest and I was involved in some of those. In retrospect, I then enjoyed the state of ignorance that we were in and the fun of inventing and trying new things or ideas that may or may not help move towards increased archaeological understanding. My use of the word ‘fun’ is deliberate as I sense that things are now seen to be more serious and, even during the 1970s Cambridge coffee room discussions about the role of archaeology and archaeologists that tried to put things on a much higher plane, I have always maintained that I am ‘doing’ archaeology for fun. A move to commercial archaeology (for reasons of keeping alive) reduced chances for research but along with that came AARG’s strengthening links with European archaeologists and my own opportunities to engage with this through teaching. Good things have come from the European connections as evidenced by many publications (eg Martin Gojda 2004), the establishment of the Ludwig Boltzmann Institute in Vienna and the EU-funded ArchaeoLandscapes project. These rank as important achievements in which AARG has played a part and fruitful output has come from these people and places in their researches to understand aspects of the past.

Research begins with a question, hopefully an archaeological one, but will also need to consider and discuss the strengths, weaknesses and biases of the methods of collecting and analysing the data. This may be as close to a theoretical question as many of us will get, but without ‘knowing’ our data, our uses and any results culled from them are weakened. Our aims for this research, if we still consider ourselves to be archaeologists, are to merge those data into something that will answer and explain that original question. Without a starting question we can do no more than collect stamps – be these ‘stamps’ photographs or the output from mapping programmes – although it is possible that further and different uses will be made of those stamps. So, in a way, I see our future returning to our beginning and would invite the AARG community to ask a few archaeological questions which we can then try to answer with the knowledge, experience and enthusiasm that has grown as the nub of AARG.

Does much of the above seem to be doom and gloom because it is not intended to be? Membership of AARG, and since 1990 editing AARGnews, has brought me into contact with some great work and people. I’ve had the pleasure of watching the development of aerial work in places – Austria, Czech Republic and Poland to name but three in alphabetical order
– where ‘local’ approaches have differed from those I’m used to in my small patch of England. Since people from ‘foreign’ countries joined the AARG community we have seen technological development that is perhaps now at the leading edge (Austria), the solid integration of aerial information with other sources (Czech Republic and Italy) and meaningful attempts to link aerial practice with theory (Poland). I don’t use the word ‘exciting’ but all this is exciting to observe and, occasionally, to participate in. This is the stuff that is extending uses of aerial images and it is good to be associated with that work through presentations at AARG and the flow of published work from around Europe.

Teaching in different parts of Europe has given me and many others the opportunity to see, fly over and work in many countries and to link with new colleagues at all levels of experience. These people have swelled and broadened the AARG membership and have introduced us to their local sites, landscapes and problems. Contact and contacts can sometimes help overcome those problems or suggest ways around them and it is good to be able (sometimes) to help in this way. At other levels, the kit that some of us use can excite interest and I have got as much enjoyment from showing young kids to use a stereoscope as I did when I insisted that a bewigged judge at a legal dispute take a stereo test before I let him see the photos (“Ooh, height”, was his response).

A recent manifestation is the YAARG working group in which I was delighted to be asked to be an honorary child at their inaugural meeting in 2012 (summarised by Drefler and Aldred in this issue). YAARG, I suppose, takes me back to the beginnings of my AARG and the innocence(?) and ignorance that I was happy to display in a very similar ‘round table’ situation with, at early AARG meetings where there were good responses from some participants and a lot of discussion time. People new to the aerial world need time and guidance to find their way around, and this type of working group is an important part of that process now our September meetings have become formalised conferences.

So, all is not too bad in AARG. We have ‘youngsters’ to encourage. We have new work, new technology, and new ways of working to present in publication and at our annual meetings (I don’t think I’ll ever think of them as conferences). And somewhere among all that I hope we are making progress towards solving some of the archaeological questions that have arisen from the increased uses of aerial photographs.

Acknowledgement
I am grateful to Oscar Aldred and Dave Cowley for comments on an earlier version of these Musings. Some have been taken aboard but others ignored so as to encourage responses to what is presented as a personal view of the last 30(ish) years.

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Cropmarks

Interpreted by Rog Palmer1

Above Scotland with an aerial archaeologist
Text and a short movie comprising a news feature about an exhibition and book Above Scotland. AARGnews readers have missed the exhibition (which was in Glasgow until 23 January 2013) but may still be able to buy the book.  http://www.bbc.co.uk/news/uk-scotland-20116285

Palestine 1917-18
The Bavarian Military Archive has digitized its 2,500 aerial photographs from Palestine covering years 1917-1918. Those APs are now easily accessible through the internet. Perhaps the project could serve as an example for archives holding so many more photographs of the European theatre? The Bavarian effort should provide a guide to cost, time and manpower (ought that to be personpower?) for similar projects elsewhere. Access is via: http://www.gda.bayern.de/findmittel/ead/index.php?f8=478

(Thanks to Otto Braasch via Dave Cowley)

SfM progress
A website showing case studies from an ongoing PhD by Susie Green (UCL) who has been using Bundler software to apply SfM to aerial and ground subjects, including artefacts. http://www.archaeologysfm.co.uk/

(Thanks to Dave Cowley)

UAV community
Supposedly a website for the ‘UAV professional community’, it includes news, reviews of hardware and software, UAVs and the law (what you can fly and where – possibly useful) and is hosted by Menci Software who, by coincidence, offer photogrammetric software suitable for UAV data. http://www.uavpeople.com/ Trial versions of programs can be downloaded as can data sets for those of you who want to play and have not taken sufficient photos from your real aircraft.

(Thanks to Irwin Scollar)

And more UAVs
A UK CAA-approved UAS operator offers a range of services including DSM’s and RGB, NIR and multispectral photography. www.gubagroup.com

Cleaning old images
Just to make you think a bit – although the point was mentioned somewhere by Dave Cowley several years ago – cleaning of a 17th French century painting revealed two ‘lost’ figures as well as changing the reclining nude from a greenish hue to a more natural-looking European pink (http://www.theartnewspaper.com/articles/Texas+gets+the+full+picture/28124). Dave’s point was that, when reprints have been made from 1940s negatives, there is a lot more to be seen than on the mass-produced prints we have in our libraries. A point, as with the painting, based on observation and not assumption.

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TARA ‘feature’
I discovered some potentially-useful examples on the TARA website: a ‘feature’ that includes some basic things – vertical/oblique, scale, geography, anaglyphs – and then a whole load of case studies of (mostly) WW2 topics. This would be a great educational collection if only these government organisations weren’t so paranoid about people stealing ‘their’ photographs and they’d upload them at resolutions that were appropriate to the task in hand. The feature includes – or seems to include – some excellent photo reading examples but, from my point of view, none of the images can be seen at a size which allows them to be read unless one subscribes (£18 per year) to see good quality zoomable scans. If TARA wants this stuff to be put to use, they really ought to be generous enough to make a handful of their millions of photographs freely accessible. I suggested to them that by so doing they may even attract a few new customers. http://aerial.rcahms.gov.uk/database/results.php?search_term=feature&QUICKSEARCH=1

The Moon
Those of you who are bored with working locally may be interested in some aerial images of the US landing sites on the moon that have the resolution to show astronaut’s tracks. These, together with a list of the 200,000kg of junk that has been crashed on to the surface or left behind by US visitors were included in an item in Heritage Daily last December:
http://www.heritagedaily.com/2012/12/68936/ In advance of tourist trips to the Moon, NASA is recommending levels of protection for the US landing sites and associated remains, the concept of which seems to raise interesting questions of ownership and location. For example, if a Viking group had sailed from Denmark to what is now America and left house remains and other bits and pieces, would those artefacts be Danish or American and which country would have the right to legalise protection of them? NASA seem to be suggesting that the Danes have the right to do this - or am I being obtuse?

For the full NASA news release and guidelines, see: http://www.nasa.gov/home/hqnews/2012/may/HQ_12-168_Lunar_Protection_Guidelines.html

Discover Caithness
Following an ALS survey for a windfarm at Baillie, Caithness, by AOC Archaeology Group, the dataset (at 0.5m resolution) has been made available as part of a rather good website that presents the work done. The full data set can be ‘flown over’ and, in case you can’t find anything yourself, various goodies have been cropped and are presented as smaller images. Three movies also show on-screen manipulation of the data over selected targets. This is a nice teaching and visual aid for those of us without our own data sets.
http://www.aocarchaeology.com/Baillie/new/ (Thanks to Chris Cox)

Photo calibration targets
Any of you flying over the USA may find these things useful for camera checks. Apparently put there as a means of calibration and testing resolution in the 1950s and 60s and can now be seen on Google Earth as relics of a bygone age of film.
http://www.clui.org/newsletter/winter-2013/photo-calibration-targets

[Apologies for the wavy lines that have crept into Cropmarks and which I can’t remove]
Review article (Roman Camps in Scotland)

Toby Driver


Establishing a formidable reputation for herself in the field of Roman studies, 2012 saw Rebecca Jones publish not one, but two books on Roman camps; a smaller popular guide on Roman Camps in Britain (Amberley 2012) and this masterful, definitive study of Roman Camps in Scotland that will stand for many decades as a work of reference. This new book, the public fruition of her 2006 doctoral thesis on the same topic, is a beautifully-produced hardback which forms part of an enviable new range of publications from the Society of Antiquaries of Scotland. All seem to set exceptionally high standards for style, content and production whilst retaining affordable cover prices. So affordable are these new works that Jones’ book has entirely sold out within a few months of publication in April 2012. Following an enquiry about availability, the Society of Antiquaries said that they intend to have the book available in some format by May/June this year in print or digital format.

Despite having lived with Roman camps and the Antonine wall for many years, Rebecca clearly took on a significant challenge in compiling this definitive study. No other province in the Roman Empire has such a proliferation of Roman camps – nearly 500 – as Britain (Jones 2011, 29), and Scotland is home to the largest number of surviving Roman camps in Europe, a remarkable statistic considering the campaigns which the Romans steadily waged across their expanding Empire. Perhaps more remarkable is that Scotland is home to the two largest camps in Britain, St Leonards and Newstead V. That at St Leonards is the largest known camp in the whole Roman Empire enclosing a staggering 70ha (by comparison, the largest Welsh camp encloses 27ha). One hopes that this particular milestone in the campaigns of the Roman Empire is at least a scheduled monument; with Scotland’s current bids for independence and growing sense of nationhood perhaps this enormous camp deserves higher fame as testament to the resilience of, and challenge posed by, the Scottish population in the face of the Roman machine. It appears that these exceptional camps, holding up to 40,000 men, date to Severus’ campaigns of the 3rd century AD where the presence of the Emperor himself and his sons may have necessitated such a large accompanying force and baggage train (ibid., 2012, 112).

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Jones’ book sets out to complete the trilogy of gazetteers for the Roman camps of Britain, which began with Welfare and Swan for English Heritage in 1995 and continued with Davies and Jones’ 2006 study for Wales, published by the University of Wales Press and the Royal Commission. Yet Jones also sets out to ‘...draw together some common strands from the three’ (*ibid.*., xxv), establishing this Scottish book as a vital synthesis of the issues of the Roman campaigns in Britain as a whole.

The volume will be of considerable interest to aerial archaeologists and Roman scholars beyond the confines of Scotland. Such a key campaigning ground for the Roman army contains a corpus of camps as varied in morphology and design as they are numerous. Here are gathering grounds of multiple camps, re-used and re-built camps and those constrained or shaped by the Scottish terrain. There are notable examples; the pair of Roman camps which flank the later prehistoric hillfort on Burnswark Hill (*ibid.*., pp 154-156) have been oft illustrated and described as vivid evidence of a Roman siege on a ‘native’ stronghold. Jones comprehensively discusses the field evidence, the literature surrounding the site and each campaign of excavation; every visiting specialist seems to have arrived at a different conclusion. While she suggests that the camps may yet relate to ‘... a practice siege, or an actual siege of the hill’ there seems to be no definitive answer yet for this famous site. She concludes that ‘Burnswark remains an enigmatic site’. So it is with other better-known and oft-discussed sites in Scotland, that we can look to this book provide a definitive statement of fact or at least a comprehensive summary of past opinion.

Jones begins by discussing the historical sources for the camps, in a discussion which stretches across the Empire. The strong antiquarian tradition of recording the camps of Scotland is then described, particularly the contribution of Scotsman General William Roy who assisted with the Survey of Scotland in the late eighteenth century before completing the survey of *The Military Antiquities of the Romans in Britain*, published after his death in 1793. A handful of Roy’s fine maps and plans are published throughout Jones’ volume; it is noted that when these are computer-rectified and overlaid on modern maps and aerial photographic transcriptions, they remain extremely accurate. The ‘rates of discovery’ of the camps in Scotland is introduced in this chapter, where the soaring numbers discovered from the 1940s to the 1980s clearly results from increased aerial survey. This particular survey method, which has contributed so strongly to the rediscovery of camps in Scotland, is discussed in Chapter 5 almost as a historiography of the personalities involved over the decades. Two non-archaeological vertical aerial photographs are reproduced showing the discovery of the camp at Oakwood, and a 1965 view of Raedykes camp which poses a challenge for the most talented air photo interpreter with its non-standard layout and angles.

Chapter 5 discusses excavation and survey of the camps; the case of Kintore camp is discussed both here and in Chapter 7, subjected to modern open-area excavation over a number of years providing a unique sample of a site type which has normally been under-investigated by the spade. Chapter 6 widens out the discussion on distribution to the rest of Britain and further afield. Gathering grounds and strategies for military zones are discussed, together with the relative proximity of camps to Roman roads. Arguably this chapter, and Chapter 9 which deals with camp ‘series’, both build upon earlier discussions of choice of site, layout and strategy in Davies and Jones 2006. Some of the most significant discussion occurs in Chapter 7, The Field Evidence, where each camp is illustrated to scale and their various parts described including defences, gates, proportions and morphology, internal features etc. Particularly useful are the sections on the rare internal features including ovens, with a particularly fine example illustrated from Kintore, and the variety and purpose of pits.
both excavated and observed on aerial photographs. Clearly further open-area excavation, together with excavation of potential defences features beyond the camp rampart, are required to further extend and refine our knowledge. Following concluding chapters on Historical Context, ‘Series’ of camps, and Dating and conclusions, the impressive Gazetteer of 140 or so known, probable and possible camps completes the study.

One minor gripe of this reviewer is the lack of colour illustration within the book, after so much is promised with a sumptuous montage of drama, colour, and gold-block lettering on the dustcover. Colour would add nothing to the academic content of the book, but might have assisted with the clarity of cropmarks in some of the oblique aerial photographs reproduced, as the back cover aerial of the camp at Dun shows. Overall this is a slightly unfair detraction from the achievement that this book represents.

We are increasingly used to hearing of Scotland as a strong and confident nation, striving for independence and to set itself apart from the rest of the UK. In an age of Kindles and e-books, The Society of Antiquaries of Scotland is clearly doing its bit to publish some of the finest archaeological books currently available on the UK market. For a few months, before it sold out, Jones’ Roman Camps was available to aerial archaeologists, Roman scholars and field archaeologists across Europe, far beyond the confines of Scotland. Written with passion, skill and a deep professional knowledge, Rebecca can be proud of this book which will still be consulted in decades to come.

[And congratulations to Rebecca and her book for winning Current Archaeology’s Book of the Year, 2013 – RP]
Books of interest?

Rog Palmer


*From the author’s abstract:* The use of airborne remote sensing data for archaeological prospection is not a novel concept, but it is one that has been brought to the forefront of current work in the discipline of landscape archaeology by the increasing availability and application of airborne laser scanning data (ALS). It is considered that ALS, coupled with imaging of the non-visible wavelengths using digital spectral sensors has the potential to revolutionise the field of archaeological remote sensing, overcoming some of the issues identified with the most common current technique of oblique aerial photography. However, as with many methods borrowed from geographic or environmental sciences, archaeologists have yet to understand or utilise the full potential of these sensors for deriving archaeological feature information. This thesis presents the work undertaken between 2008-11 at Bournemouth University that aimed to assess the full information content of airborne laser scanned and digital spectral data systematically with respect to identifying archaeological remains in non-alluvial environments.

This thesis concludes that the airborne remote sensing techniques studied have quantifiable benefit for detection of archaeological features at a landscape scale especially when used in conjunction with one another. The caveat to this is that appropriate use of the sensors from deployment, to processing, analysis and interpretation of features must be underpinned by a detailed understanding of how and why archaeological features might be represented in the data collected. This research goes some way towards achieving this, especially for grass-dominated environments but it is only with repeated, comparative analyses of these airborne data in conjunction with environmental observations that archaeologists will be able to advance knowledge in this field and thus put airborne remote sensing data to most effective use.

The full abstract and download link for the thesis can be found at [http://eprints.bournemouth.ac.uk/20459/](http://eprints.bournemouth.ac.uk/20459/) or via Rebecca’s informative web site: [http://www.pushingthesensors.com/](http://www.pushingthesensors.com/)


In Czech but with a Foreword, summary and captions in English, this volume is the final publication of a research project undertaken between 2006 and 2010 by the Department of Archaeology, University of West Bohemia and presents an overview of specialist papers

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published elsewhere as well as some new work. Apologies in advance for any misunderstandings below that may be due to my lack of Czech.

The aims of the project were to increase our understanding of the dynamics of Neolithic to Medieval settlement around the hill of Říp and to examine how these had changed the appearance of the landscape (p146). Methodology included field walking, ground based ‘remote’ sensing, and targeted excavation. Aerial elements included the effectiveness of long-term visual aerial prospection compared to possibilities provided by orthophotos available on internet map servers (p146). It could be argued whether these sources should be compared, and whether they can be fairly compared, or whether they are simply complementary to one another. What may be more interesting is to ask why Czech crops or farming practices enable pits and ditches to stand 30cm or so above the ‘background’ field (Fig 3.13) or to show as considerable colour contrasts (Figs 3.9 and 3.12). These need to become an EU cultivation standard!

Chapter 6 shows results of field walking surveys and uses transformed aerial photographs as backgrounds to the walked grids and finds densities. In one case, at Litoměřice (Figs 6.3-6.8) finds were dated between the Middle Bronze Age and Early La Tene period although none seem to be concentrated significantly within enclosures recorded on the aerial photograph. The English summary shows there is some discussion in Chapter 9 (Conclusions) of field walking and the validity of its results but I would like to see this expanded. As it is a common method through which an idea of date can be given to sites known from aerial photos it is of relevance to AARG. The Litoměřice demonstration increases my disquiet about field walking and what it tells us. Are we really able to say more than it shows the depth the plough has reached? Problems such as this seem to be avoided by field walkers but it seems time that the method is subjected to some science. For years I have asked how many ‘fields’ have been walked more than once – and what difference was there in results obtained (this was something noticed during the Fenland Survey) – to which I would now add the need for small-scale excavations to check the amount of plough truncation in features within walked areas. Several years ago, I suggested an explanation for Saxon surface finds above an apparently Romano-British ditched site recorded on APs (Palmer 1996, Fig 7) to which there has never been a response of any kind. Surely surface survey, like ‘cropmarkology’, needs some substance on which to base its analysis and at present this seems to be lacking.

Sorry to go on… back to the book…which shows the value of archaeological research using a wide range of methods of prospection and testing – mixing non-destructive survey with limited question-orientated small-scale excavations. Martin Godja has attracted a number of students to Pilsen who are doing good work in integrated projects as is evidenced by this book and other publications. We look forward to more results from this group.

[Palmer, R.,1996. Air photo interpretation and the Lincolnshire Fenland. Landscape History 18, 5-16]


The Austrian Science Fund (FWF) who funded this research has a policy of open access for publications derived from that research. This magnificent volume is a 300-page download
file of some 400MB and comes complete with high-quality maps and aerial photographs that can take at least 400% enlargement in Adobe Reader. The book details the results of long-term aerial photography, systematic rectification and interpretative mapping and links them to those from published excavations. The book is in German but Google Translator makes a comprehensible job of parts I have tried. It presents an excellent demonstration of the power of analytical aerial work and sets standards for future work in its archaeological scholarship and the generosity of publishing high-resolution images for detailed study by others.


This 72-page booklet reports on part of a four-year project and evaluates the effectiveness of purpose-taken aerial photographs to monitor scheduled monuments in Denmark. Similar trials have taken place in England and Wales. Of the 33,000 scheduled monuments in Denmark, about 50% are in open country and can probably be recorded from the air. Flights were made in 2009, 2010 and 2011 to record the status of SMs which should have a 2m zone of ‘no agricultural activity’ and a 100m zone in which certain changes are not permitted. Examination of APs checked whether those zones could be identified from the air, whether the 2m zone had been breached and evaluated the effectiveness of monitoring SMs from the air compared with ground visits.

Positive results show that the 2m zone can almost always be identified on aerial photographs and, in many cases, they provide a better overview of the 100m zone than can be obtained on the ground. Flights made for monitoring have the potential to record new information in the environs of SMs and aerial photographs are also a useful thing to show a farmer/landowner if there have been contraventions.

However, it is difficult to obtain the same precision from APs and it can be difficult to accurately identify, for example, the foot of a mound. It is hoped that ALS and improved computer software may help overcome those problems. Recommendations propose that aerial photographs could replace part of the ground monitoring on open land.

My one small criticism is that, as the book has an English summary it would have been useful to extend this to paired Danish and English captions for illustrations.


Following an introduction on the potential of historical archive material by the editors, the book is divided into two parts. Three contributions deal with archives (TARA, finding aids and declassified satellite photographs) while the greater part of the book comprises 14 chapters on the use of historical material for archaeological research. Topics in that part include First World War landscapes, Cornwall, Italy, Lower Danube, Central and Eastern Europe, Spain and Portugal, Southern Urals, Jordan and the Middle East, Uruguay, Syria,
Armenia, Cambodia, Romania. This book complements the earlier *Landscape Through the Lens* without too much repetition, deviation or hesitation and together they provide a wide range of examples, locations and archaeological applications.


This five-part book includes papers using historic air and spaceborne photographs, multi- and hyperspectral images, SAR (synthetic aperture radar), ALS, and a final section about archaeological site detection an modelling. I haven’t had time to properly read it but from a flick through it seems likely to be a potential replacement for Sarah Parcak’s *Satellite Remote Sensing for Archaeology* (see AARGnews 39, 43).


*Author’s abstract:* The winter drought led to the discovery and documentation in spring 2011 of a number of protohistoric,Gallo-Roman and medieval sites. Large sites in Burgundy (Alésia, Autun, Mirebeau-sur-Bèze, Vix) have benefited from a thorough aerial survey that have provided additional data. Totally new discoveries have included traces of a Celtic occupation at the foot of Mont Lassois in Vix, a protohistoric necropolis in Vitteaux, two large villae on the Lyon–Trier road, and three new, smallish isolated Gallo-Roman settlements.

*This is a lengthy report full of extracts from oblique aerial photos together with oblique interpretative sketches and descriptions. [RP] Available as a pdf at:* [http://www.academia.edu/2301066/_Archeologie_aerienne_en_Cote-dOr_en_2011_les_aleas_dune_secheresse_precoce](http://www.academia.edu/2301066/_Archeologie_aerienne_en_Cote-dOr_en_2011_les_aleas_dune_secheresse_precoce) (thanks to Dave Cowley)

Recent issues of *Journal of Archaeological Science* have included papers that may be of interest to AARG members. For example:


*From the Author’s abstract:* … explores the benefit of satellite survey for archaeological landscapes where traditional cartographic and digital datasets are scarce, and ground reconnaissance is not possible….. The methods presented demonstrate a cost effective and integrative protocol for remote survey in an alluvial landscape. Using satellite survey methods merging data from different time periods, seasons and sensors, it was possible to recognize archaeological sites, reconstruct floodplain evolution, and present a provisional picture of the settlement landscape in the unsurveyed southern Balikh valley, Syria.

Athos Agapiou, Diofantos G. Hadjimitsis, Apostolos Sarris, Andreas Georgopoulos, Dimitrios D. Alexakis, 2013. *Optimum temporal and spectral window for monitoring crop*
marks over archaeological remains in the Mediterranean region. *Journal of Archaeological Science* 40, 1479-1492

Investigations to determine the ‘best’ period for monitoring crop marks and the best spectral region for enhancing them on satellite images. They hit on a 15 day window and – no surprise – the red edge of the spectrum. Further evaluation is promised, using different types of crops and satellite images and the results may be of worldwide significance.


Using proper photogrammetric restitution to produce terrain models and orthophotos from older vertical photographs (1956, 1957, 1984, 2005) and then to use photos of different dates to study natural and anthropogenic landuse changes that may affect the visibility, survival and recovery of surface evidence.


*From the authors’ abstract:* The paper reports the latest developments of UAV image processing methods for photogrammetric applications, mapping and 3D modelling issues. Automation is necessary and feasible at the image orientation, DSM generation and orthophoto production stages, while accurate feature extraction is still an interactive procedure.

*Flying and data processing for test cases in the paper seem to have been done to ‘best’ standards to achieve real photogrammetric output which has given ground sampling distances of 1cm – which is perhaps a bit of an overkill for archaeological excavations? The paper ends with a sentence noting that regulations for UAV flying are ‘under development’ and, indeed, in most (civilised) countries their operation is already covered by existing air laws. [RP]*


Received at the *AARGnews* office but has nothing to do with anything aerial. *Integrating archaeology examines community and public, different approaches, all ages, working world and economic issues, excluded groups, ethnic groups, new media. However, the volume seems to include nothing about working with disabled people.*
The Aerial Archaeology Research Group

AARG provides an international forum for the exchange of ideas and experience on archaeology and landscape studies using all forms of remote sensing, especially airborne and satellite based techniques.

AARG is actively involved in promoting the collection, interpretation and application of remote sensing data in fostering research, conservation and public understanding.

Since its foundation in the early 1980s AARG has vigorously encouraged discussion and cooperation through its annual conferences, workshops, specialist publications and biannual newsletter, AARGnews.

Membership is open to all who have an interest or practical involvement in aerial archaeology, remote sensing and landscape studies.

AARG is a registered charity: number SC 023162.

AARG homepage.  http://aarg.univie.ac.at/

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* and applicants from Albania, Bulgaria, Croatia, Czech Republic, Hungary, Montenegro, Poland, Romania, Serbia, Slovakia, Slovenia, and countries of the former Soviet Union.

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Student bursaries. AARG has a limited number of student bursaries for attendance at its annual meeting. These are aimed at supporting bona fide students who are interested in aerial archaeology and who wish to attend.

Anyone wishing to apply should write to Oscar Aldred, School of Historical Studies, Faculty of Humanities and Social Sciences, Newcastle University, Newcastle upon Tyne, NE1 7RU, United Kingdom (aargchair@gmail.com) with information about their interests in archaeology and aerial archaeology, as well as their place of study. Annual closing date for applications to the annual AARG conference is 31 May, other meetings for which bursaries may be available will be advertised on an ad hoc basis.