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Editorial

AARG 2011
Without going into details, most of the old lags attending AARG in Poznań reckoned that it was the best organised to date and our thanks go to Włodek Rączkowski, Lidka Żuk and the band of students who were there to help us and serve beer. Thanks also to Dave Cowley for organising the conference contributions in what was supposed to be a joint meeting with EARSeL but at which they were noticeably absent.

My favourite quote from the meeting was, “I wanted to speak shortly but I didn’t have the time.”, and it was amusing to see Geert Verhoeven mobbed like a pop singer after his presentation on PhotoScan – a program that can stitch together APs to produce an orthophoto and create a terrain model on which it drapes the image (see the technical section in this issue).

There were quite a lot of new faces at AARG, many of them students from ArcLand workshops and some of them working on landscape studies. Several of them told me that they had expected there to be a higher content of archaeology – ie results from using aerial photos – than of technical stuff. All AARG conferences are different and I enjoyed most of the presentations in September, but it is good to see that our new Chairman, Oscar Aldred, is encouraging ‘archaeology’ as much as ‘aerial’ (see Chairman’s Piece below).

More TV aerials
During the past six months, local news programmes on British TV have included at least two features that include archaeological aerial work. One of these was usefully in Gaelic and (as far as I can remember three months later) showed Dave Cowley working on some of his coastal projects. This work also appeared in UK’s Current Archaeology as noted in last issue’s ‘Books…’. In conversation, Dave told me that a lot of this coastal work can only be recorded effectively by placing the camera in the right position to see structures, etc, through water and so it makes a good case for observer-survey.

The second feature was quite well-rounded as it moved from Ben Robinson’s aerial surveys using his microlight through to excavation of some of the sites he had recorded. Ben had insisted that if they were talking about flying and photography they needed to include something on use of aerial photographs, so I was roped in and showed some maps after which they moved on to Google Earth and the ‘now anyone find archaeological features’ attitude.

I don’t know if there was any feedback on either programme but this kind of thing can’t do any harm and may help to keep archaeology in the public’s mind and uses of aerial photographs in the minds of ground-based archaeologists. It also shows that TV people never learn as Ben told me that he was first contacted last October and told, “We want to go and photograph crop marks now.” – but he managed to put them off until summer 2011.

CUCAP, TARA, photo libraries
As noted in the last issue, CUCAP has reopened on a part-time basis but with a minimum of customer space. The university – or maybe Geography Department, its ‘owner’ – seems to have given it two years (probably until the end of summer term 2013) to be a viable collection. Perhaps where ‘viable’ means paying for itself. Will it happen? Almost certainly not, unless they can find a previously-undiscovered customer group who wants to buy photos rather than, as most

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archaeological visitors and users, just looking at library copies. I would guess that TARA may have the same problem (or worse as their storage costs must be astronomical) if they are expected to become self-financing. To keep an archive of that size alive needs continuous and high sales of photos, even at their over-inflated prices. An alternative – unlikely, but still an alternative – is for the present keepers of this stuff to get it all digitised and then to either throw out the originals or lock them away somewhere in case someone in 3012 wants to see what paper prints and negatives looked like. As a ‘private’ collection, CUCAP may be able to charge for access to their digital archive, but we would expect the state-owned material to be freely available as this already would have been paid for by public funds and there would be virtually no maintenance costs. Yes, dream on Rog…

**Fun with photo interpretation**

During recent months I’ve had several people (usually PhD students or post-docs) visiting Cambridge who have been funded by ArcLand’s exchange scheme. Each of these exchanges lasted about a month and that gives us time to cover basics of photo interpretation and to have a look at their countries and problems therein. With their different backgrounds, each brings a new way of looking at photos, of finding information, and deciding how photos may be useful in their own projects. From my point of view this is good and interesting as it gets me out of my local field, and extends my knowledge and thoughts to new variations of human settlement and landuse. My teaching in the UK and elsewhere always begins by asking what was done in the past to leave traces that we may now record from above. So this is my first question in any country new to me, as without that knowledge we have little idea what to look for nor can we begin to comprehend how, or why, the aerial view may ‘work’ on different terrain.

At the end of January, during the visit of Helena Kaldre from Estonia, we had some fun – sorry, did some serious interpretation – using internet resources. There were several examples but I’ll give you one about the cover photo for this issue. The observant among you will have noticed the unusually-large animal near the bottom of the photo which, Helena confessed, she only noticed when examining the photos after the flight. Our question, ‘What is this and why is it there?’, was answered in a few clicks by Googling the parish name (Abbots Ripton) and ‘wolf’. Check it yourself if you’re interested and see if you can find it on Google Earth.

**2012 – another drought year in England?**

On the BBC news towards the end of February it was announced that much of SE England is in drought. In Cambridgeshire, this will be the third consecutive year, so other than problems of making beer and having a bath what does this mean for us? Maybe crop marks… maybe crop marks over large extents of ‘difficult’ soils? Can we expect this to change the way we approach aerial survey this coming summer? Probably not, because our aerial photographers seem to be creatures of habit and will continue to meander around looking for sites to photograph rather than spending most of their money acquiring area cover from either an aircraft or a satellite. And I’m sorry to say that I may be joining those people looking for sites because – as they keep telling us – they’re cheaper and easier to activate than survey companies (but not, I think, satellites?). Isn’t it sad that we are the only discipline that doesn’t trust its people on the ground to find sites – and that it is reckoned that a pretty oblique picture is worth a thousand verts?

**AARG’s 30th anniversary…**

… is in 2013 as the first time the group met under the name of AARG was in September 1983. Your Committee has not yet decided whether to include special pieces in each of the 2013 issues of *AARGnews*, or to dedicate one issue to the anniversary, or even to make a special issue – it depends on contributions received. So we invite offerings (text and photos) from all of you to
help celebrate the occasion. We hope that, as well as occasional reminiscences, these include thoughts about the future and how the past thirty years may affect the directions of the next thirty years. Activities in which AARG was involved may have helped shape aerial survey in much of Europe and it would be good to hear of progress from those initial events that often led to long-lasting collaborations and friendships. The first issue of *AARGnews* lagged seven years behind AARG and in those early years we were a small, almost wholly UK, group who all knew one another quite well. In consequence – or maybe because it’s my way of writing – editorials were usually written to the population of that group. *AARGnews* began with no brief about style or structure and sometimes its contents have not always been to everyone’s taste. I remember Chris Musson (Chairman at the time) saying that issue 1 was ‘a bit informal’ – but so am I. To the best of my knowledge, there was never a move to make *AARGnews* represent the views of AARG as an organisation and – from my point of view – one of *AARGnews*’s strengths(?) is that it allows individuals to say what they like. I have been happy to share my opinions with AARG members and, sometimes, have had counter opinions submitted for the next issue. This was one reason for having issues every six months – to give space for arguments and help keep them ‘live’ – and it has allowed for the development of ideas and directions for AARG as is apparent from some of the Chairman’s Pieces. But such retrospection should perhaps wait for either *AARGnews*’s 30th birthday or perhaps issue 50 – whichever comes first.

This issue…

… begins with a technical section about computer vision techniques and automated orthophoto production (Geert Verhoeven and others), a free program that will do this (Irwin Scollar and Daniel Giradeau-Montaut), and a suite of programs that help those who need to georeference images (Gianluca Cantoro).

From AARG 2011 is Dimitrij Mlekuz’s *Messy Landscapes* which is well worth reading and thinking about. Information from aerial images feeds into past landscapes and helps bring them alive and Dimitrij’s wide-ranging thoughts on how to approach study of what we have interpreted and mapped are a welcome step in establishing ‘landscape archaeology’ as a means of understanding the past.

In 2008, *Antiquity* included a paper about generating orthophotos from Corona photographs and this led to the University of Arkansas creating and the Corona Atlas of Near East which is reviewed by Martin Fowler. Another review by Dave Cowley extends into a series of thoughts about publishing, delay and access which has relevance to many of us and which we hope will provoke discussion in *AARGnews* that moves towards identifying ways and means for future publications.

A contribution by Aelfwynn Freer examines uses of aerial photographs in monitoring and managing sites in Scotland and demonstrates their use for tracking land use change. We aerial people know that this is a useful method of monitoring monuments and change – but how long will it take ‘authority’ to accept this as being cost-effective and reliable? Can we, once again, place the blame on inadequate teaching that tells students that ‘aerial photography discovers sites’? Thanks to Dave Cowley for his help in polishing this contribution.

Apologies if this issue is a bit messier and later than usual but most of it was compiled without my usual use of printed copy when I was in Croatia having a ‘holiday’ working on Velebit with Vedrana Glavaš, who wrote about this difficult karst landscape in *AARGnews* 43. We managed some field visits and six+ hours of flying to record known sites, new sites and the mountainous landscape and coastline. Preliminary results should be presented at AARG in Budapest.
Chairman’s Piece

Oscar Aldred1

In time-honoured tradition I would like to thank the previous Chairman, Włodek Rączkowski, for his work on AARG matters over the last three years and in particular for a very successful conference in Poznań. I am fortunate that he continues as Vice-Chairman, as a source of experience and wisdom to draw on. I would also like to thank Dave Cowley as the outgoing Vice-Chairman. It is perhaps unusual to thank the outgoing Vice-Chairman, but Dave’s role in AARG over the last three years (and his time as Chairman previous to that) has been instrumental in defining AARG’s present shape, direction and confidence, and his energy is further evident in the number of recent publications that have been produced under the aegis of AARG. Between Włodek and Dave, I have big shoes to fit into!

In preparing to write this Chairman’s piece I re-read past issues of AARGnews that can be downloaded from the AARG web site (hint, hint). These make interesting reading to situate the contemporary practices in the context of earlier ones. And having read from 1990 to Davy Strachan’s tenure in AARGnews 20 (2000), which is about the time when I first became involved in the art of aerial matters and the science of systematic study of aerial photographs, I can see, a number of interesting perspectives emerge. Such retrospective is particularly relevant with AARG’s 30th anniversary approaching – more of which next year - although a cursory look at other histories on this matter identify 1981 (sic 2011) as the anniversary. But 2013 is perhaps more significant as this is 30 years after the current meeting format was established: as a place for formal and informal exchanges between practitioners. I digress slightly but for good reason.

Reading back over 20 years it is striking how relevant many of the earlier concerns were. Both Chris Musson’s Chairman’s piece in AARGnews 1 (1990) and Cathy Stoertz’s closing of her Chairmanship in AARGnews 19 (1999) highlight an increasing European engagement, with growing attendance of continental European colleagues in 1990, the European venture is now a confirmed reality as seen in ArcLAND (2011 – 2015: http://www.archaeolandscapes.eu/), and before that European Landscapes: Past, Present and Future (2004 – 2007). The hard work by many of AARG’s members has enabled the conversion of an informal group of interested individuals to an international network. The results of this will have some benefit to all of us, but in particular should give aerial archaeology a top-seat at the funding table and further recognition in the eyes of National policy makers.

Another perspective offered in the early days was that AARG should provide a politically neutral ‘think-tank’, which I think is also an important role to maintain. It would be remiss of AARG to become embroiled in any political wrangling. Though, I think the offer of support through providing advice and networking remains its ‘statutory’ roles.

One final perspective I would like to draw on is that in AARGnews 1 (1990) by ‘Anon’, that AARG is a forum for a host of Aerial ‘species’, further articulated by Cathy in her own way in 1999: ‘The great strength of this group is that it allows proponents of all aspects of aerial archaeology to meet and exchange views, and perhaps even to learn from each other.’ (AARGnews 19, 6). This to my mind is the most important role that AARG has, even though we may not necessarily agree with each other’s views (forbid that could ever happen!). Within

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AARG, debates and discussions (usually) occur in an amicable vein. This is partly because we do not take ourselves too seriously. For example, at what other conference could you have an incoming Chairman ritually humiliated as he sits on the outgoing Vice-Chairman’s lap? In all seriousness, to get back to the thread of amicability and purpose, AARG is a kind of organism, with several parts where research and heritage management are commensurable and not dirty words to each other, and where so-called experts mingle with novices.

What drives AARG is its care and enthusiasm towards the study of the past whether through a plane’s controls, or in the direction of a lens, from examining an aerial photograph or a satellite image (and its hyperspectral version), or in the processing and visualisation of millions of points that constitute a lidar image. I would argue that at least what also drives us is a commitment to understanding the archaeological landscape and on this note I will conclude with some of my own perspectives.

My own history of aerial archaeology practice has been concerned with landscape-scale studies, in particular their mapping and interpretation. I would be classed as that rare breed an ‘aerial archaeologist’, or, perhaps if I am to be so bold as to suggest, an archaeologist like Crawford who relied as much on field work (another term for landscape survey) as he did on the bird’s eye view for understanding the past and present-day. And so the natural path I will take in the hot-seat (as the AARG Chairmanship has frequently been referred to in AARGnews) is towards this tendency of a landscape understanding.

Techniques and methods must remain a central concern so that innovation will continue. However, I hope to see an increasing emphasis on the ‘front-end’ of our practices. By this I mean the application of knowledge to interpret our data, developed alongside the understanding of knowledge production (i.e. methods), which has been the main focus over the last few years. From my perspective, there has been little recent work that promotes these two aspects of practice together; perhaps with good reason. Indeed, it is often in the framework of landscape projects that these integrated perspectives emerge, but they take time to do and require considerable resources. And this is something that AARG should continue to encourage and bring to the fore.

With a lack of resources in the current economic climate, perhaps we may turn towards the archaeological record, by which I mean the archives of photographs in National and institutional collections. Many of these await consistent and systematic study. Yet, the knowledge gained in mapping and interpreting these will enable the specific strategies that are needed for identifying further targeted research, and aiding management, as well as promoting archaeology, whilst adding to our understanding of past landscapes. Furthermore, it is this diversity in practices that typifies AARG, that a person with a woolly interest in landscape can be associated with a group of people who conduct lidar analysis, as I experienced while a visiting scholar at the Scientific Research Centre of the Slovenian Academy of Sciences and Arts Institute of Anthropological and Spatial Science, Ljubljana, Slovenia in 2010. In a roundabout way this brings me to say that I think it is also important to maintain and nurture our ecology of practices in AARG. We are not so much specific genus within the species Aerial, but we are rather all things at all times; from the general practitioners of aerial archaeology to air photo archaeologists.

On that note I hope to see you all in Budapest for our next conference in September 2012.
* FIRST CALL FOR PAPERS *

International Aerial Archaeology Conference

**AARG 2012**

13th – 15th September 2012

Budapest, Hungary

*Conference narrative/session themes*: Knowledge production – Interpretation/Applications - Strategies/Agendas on aerial archaeology and remote sensing; local session on Carpathian Basin in Central Europe

Organised by:

Aerial Archaeology Research Group & Eötvös Loránd University, Budapest, Hungary

*Registration starts: 12th September*

Papers and posters are invited for 13th – 14th September

15th September: Field Trip (Százhalombatta, Bronze and Iron Age tumuli and hillfort, 'Matrica' Museum and Archaeological Park)

Oral papers are 20 minutes in duration. Equal value is given to poster presentations

**Conference Organising Committee**

Zoltán Czajlik, András Bődőcs & Szilvia Bartus-Szőllősi (all Eötvös Loránd University, Budapest, Hungary) Email: aarg2012budapest@gmail.com

**All conference paper and poster offers:**

Oscar Aldred, School of Historical Studies, Faculty of Humanities and Social Sciences, Newcastle University, Newcastle upon Tyne, NE1 7RU, United Kingdom

Email: aargchair@gmail.com

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

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**STUDENT/YOUNG RESEARCHERS BURSARIES FOR AARG 2012**

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 letter, or preferably, by email.

Closing date for applications (with title and abstract) is **31st May 2012**

**Conference website:** http://aarg2012.elte.hu/index.php

**AARG website:** http://aarg.univie.ac.at/

**Facebook:** https://www.facebook.com/aerialarchaeologyscience
Computer vision techniques: towards automated orthophoto production

G. Verhoeven\textsuperscript{1,2}, M. Doneus\textsuperscript{3,1} and Ch. Briese\textsuperscript{1,4}

Archaeological practice has always been facing huge challenges in ways of fast and accurate three-dimensional recording, whether it is during excavations, artefact study or mapping of archaeological remains throughout the landscape. Of all archaeological remote sensing techniques, aerial photographic reconnaissance from a low-flying aircraft has been the workhorse since it is one of the most effective methods for site discovery. Once airborne, the archaeologist flies around in a certain area, trying to detect possible archaeological and palaeoenvironmental remains, usually indicated by visible marks. After detection, the marks are orbited and captured in more or less oblique photographs from various positions using a hand-held camera equipped with a lens that is commonly uncalibrated.

However, before aerial images can be used to map the partly-eroded and sub-surface archaeological and palaeoenvironmental features, they need to be \textit{georeferenced}. This georeferencing process assigns spatial information to the imagery to explicitly define their location and rotation in respect to a specific Earth-related coordinate frame. Obviously, accurate airphoto georeferencing and subsequent orthophoto generation is an absolutely necessary prerequisite for the further study and integration of aerial images with other data sets (such as old maps and geophysical plots) or for a multi-temporal analysis in a GIS-like environment. As one can expect, there are a variety of georeferencing and orthophoto generation procedures and not all are equally-well suited for every type of aerial image. Since a photograph maps the geometric three-dimensional scene properties \((x, y, z)\) to a two-dimensional plane \((X, Y)\), the geometry of the scene gets seriously distorted. Amongst many other factors, the geometrical deformations induced by the topographical relief (called relief displacement), the tilt of the camera axis (called tilt displacement) and the distortion of the optics are most considerable. Although it is \textit{sensu stricto} not covered by its definition, georeferencing often involves the necessary steps to remove these factors in order to place each image pixel on its true location on the Earth’s surface. To do this, several approaches and software solutions exist.

In general, archaeologists georeference individual photographs using simple methods such as (planar) rectification, polynomial correction or piecewise affine warping embedded in dedicated low-cost packages such as Airphoto (Scollard 2002) and AERIAL (Haigh 2005) or almost any form of GIS-software. Although these approaches are popular and might deliver fairly good metrical information when the terrain variations are quite moderate, the methods are suboptimal in hilly areas or sites with considerable relief variations. To this end, advanced ortho-correction procedures embedded in more expensive photogrammetric packages such as Trimble INPHO Photogrammetric System or Leica Photogrammetry Suite must be applied (Doneus 2001). Although these rigorous corrections produce superior geometric quality because they consider all main geometric influencing factors, they suffer from the fact that calibrated camera information and an accurate, high-resolution digital surface model are essential: two prerequisites that are generally not met in aerial archaeology. Besides, the process is time-consuming while a varying degree of photogrammetric skills and experience are required. Thanks to some recent advances in the fields of computer vision and photogrammetry as well as the improvements in processing power of computer processors and graphical cards, it is currently possible to generate orthophotos of aerial imagery – collected during the previously described type of oblique aerial archaeological reconnaissance – with the straightforwardness of the former approach and the accuracy of the latter.

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In a first phase, the process uses a technique called Structure from Motion (SfM; Ullman 1979). In essence, SfM allows the reconstruction of three-dimensional scene geometry and the exact position of the cameras during image acquisition from a sequence of two-dimensional imagery captured by a camera moving around the scene (Szeliski 2011 – Figure A1). To do so, SfM relies on algorithms that detect feature points for each image (Figure A2) and subsequently tries to match those 2D points throughout the image series (Figure A3). Using these obtained point correspondences SfM computes the locations of those feature points and renders them as a sparse 3D point cloud that represents the structure of the scene in a local coordinate frame (Figure B). As SfM greatly depends on the accurate knowledge of camera positions, estimating the latter is one of the core components in the whole process (Hartley and Zisserman 2003). More specifically, the complete projection geometry of all images gets computed: the interior camera calibration parameters (focal length, the principal point location plus lens distortion coefficients), the position of the camera projection centre and six exterior orientation parameters defining the camera orientation at the moment of image acquisition (Robertson and Cipolla 2009 – Figure 1B). At this stage, the reconstruction is still expressed in a local coordinate framework and equivalent of the original scene up to a global scale and rotation factor. To transform the camera positions and point cloud into an absolute coordinate system a Helmert similarity transformation, using at least three ground control points with known altitude values, is applied.

Recently, SfM has received a great deal of attention due to Bundler, Microsoft’s Photosynth and Autodesk’s Project Photofly (now called 123D Catch): three SfM implementations that are freely available on the Web. Besides, commercial SfM solutions are also available (such as Agisoft’s PhotoScan or Pix4D’s cloud processing software). Most of these software solutions also come with additional functionality to yield a dense representation of the scene’s surface geometry using one or more multi-view stereo (MVS) algorithms. Because such dense MVS solutions operate on the pixel values instead of on the feature points (Seitz et al. 2006), this additional step enables the generation of detailed three-dimensional point clouds or triangular meshes (Figure C). When working with aerial images, the resulting model can be considered a digital surface model (DSM): a numerical representation of the topography and all its imposed structures such as trees and houses. As is known from conventional orthophoto generation, such a dense DSM is elementary when one wants to generate true orthophotos in which all objects with a certain height (such as houses, towers and trees) are also accurately positioned. Since all necessary information is available, a detailed and accurate orthophoto can now be produced (Figure D).

Although the presented algorithms are best run on computers with multicore processors, a decent amount of RAM (minimum 8 GB), a 64-bit operating system and a high-end graphical card, they offer the enormous advantage that they can be used with archaeologists’ usual oblique photographs. Apart from a sufficient number of sharp images covering the scene to be reconstructed and at least three GCPs to pin down the reconstruction, no other information is needed. Besides, only a minimal technical knowledge and user interaction are required. However, it has to be stressed that it is not all roses here: the method is not applicable for an individual image and the determination of the correct camera projection geometry can fail when dealing with blurred, noisy and badly exposed images or photographs that have a very dissimilar appearance (e.g. due to major underexposure or changing topographic terrain parameters). For a more elaborate overview and multiple examples of this orthophoto procedure applied on aerial archaeological imagery, consider Verhoeven et al. (2012a). Additionally, research by Doneus et al. (2011) proved how well this method holds up when compared with terrestrial laser scanning in an excavation context, while Verhoeven et al. (2012b) thoroughly evaluated the positional accuracy of the generated orthophotographs. This type of quality control and documentation is essential in order to ensure the proper quality of the final orthophoto.
Figure 1 – All individual workflow steps used to create an orthophotograph of the 2nd century AD amphitheatre of the civil Roman town of Carnuntum. (A1) displays two out of the forty digital photographs used; (A2) indicates the feature points that were detected in those images and (A3) the matches found between those feature points. (B) shows the sparse point cloud and the camera positions provided by the SfM solution. After the dense reconstruction stage, a DSM is created (C). Using all these data, an orthophotograph (D) can be generated. All aerial images were acquired at the end of March 2011 around 9.30 h using a radio-controlled Microdrone md4-1000 quadrocopter and an Olympus PEN E-P2 (a 12.3 megapixel mirrorless Micro Four Thirds camera) equipped with an Olympus M.Zuiko Digital 17 mm f/2.8 lens.
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Georeferenced Orthophotos and DTMs from Multiple Oblique Images

Irwin Scollar and Daniel Giradeau-Montaut

Recent interest in the application of computer vision methods to archaeological aerial images has concentrated on several commercial programmes which are designed for terrestrial 3D photo modelling. For making geo-referenced orthophotos from multiple oblique aerial images and combining them with maps or satellite imagery which is the main problem in aerial archaeology, this can now be accomplished with version 2 of AirPhotoSE (AirSE) which may be downloaded from the Internet and installed at no cost.

There is only one working window (figure below). First, a collection of images is selected by the user. These are then displayed as “thumbnail” pictures. Processing steps are shown in the left window. Calculations are faster than in the commercial programmes, and there is no need for special hardware or a 64 bit OS.

Thanks to Rog Palmer for providing this set of test images from southern England.

Clicking the Run button starts a series of programmes which are freely available from the Internet and whose code is not proprietary. The following steps are applied without user intervention:

- Image selection and automatic pre-treatment as set in an Options dialogue before starting: white-point correction, automatic global contrast and brightness correction, Retinex local contrast and brightness correction, luminance scaling, or local contrast and sharpness enhancement,

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Keypoint detection for matching images. A list of salient image points is made for each image,

Keypoint matching for correspondences between images,

Bundle adjustment for minimizing the reprojection error between corresponding points in all images,

A “Point Cloud” can be generated for inspection and further use by clicking on the Preview button. This starts:

Radial lens distortion correction with constants calculated during bundle adjustment is applied to each image,

Conversion of the bundle adjustment results to input acceptable for a patch-based multi-view stereo programme (PMVS2 or CMVS) is computed,

The computation of PMVS2 or CMVS follows automatically.

The resulting point cloud is displayed in the second author’s programme CCViewer (see below).

Alternatively, the Apply button may be clicked immediately after bundle adjustment terminates. This displays results in the second author’s programme CloudCompare where the set of rectified images is displayed on top of a digital terrain model computed from the point cloud or from the bundle adjustment (see the following two illustrations).
The DTM (below) receives the colours from the images and can be manipulated interactively to display relief.
The result of this sequence of operations is not oriented with north at the top, nor is it horizontal relative to the Earth’s surface, and it is not geo-referenced. By entering several control points in the result and at corresponding places in either a map, a satellite picture, a GeoPortal orthophoto saved in AirSE, or a Google Earth or Bing 3D image geo-referenced in AirSE, an accurate plan can be made quickly by transforming the result of the calculations above to a Google Earth geo-referenced target using the normal transformation tools in AirSE (see figure below). There are projection errors in the distant parts of the obliques, so it is necessary to use the selection tool in AirSE prior to transformation to limit the area to that of the DTM. Where image overlap is poor or non-existent it is not possible to produce an orthophoto and consequently those parts of the image will not be correctly located.
Here is an example with more relief in pictures made near Ram-Branicevski in Serbia by Rog Palmer.

The relief is shown clearly in the combined view of the six chosen images and can be manipulated interactively to look at the site from various angles as if flying around it.
The orthophoto (below) from the Serbian GeoPortal web site’s geo-referencing and orientation was transferred in AirPhotoSE to the result using a transformation with a few corresponding points. Only the geo-referencing of the GeoPortal site need be used for the transformation. The GeoPortal orthophoto itself need not be used.

Internet Links to the programmes spawned from AirPhotoSE and other details in alphabetical order:


More general:

There is free software for creating 3D surfaces (but not geo-referenced orthophotos) by Gianluca Cantoro at:  [http://www.archaeolandscape.eu/index.php/capture/aerial-photography/218.html](http://www.archaeolandscape.eu/index.php/capture/aerial-photography/218.html)

A general explanation with links can be found at:

AirPhotoSE may be downloaded without charge from:  [http://www.uni-koeln.de/~al001/airphotose.html](http://www.uni-koeln.de/~al001/airphotose.html)
Fast and automated image rectification with a small (free) software
Gianluca Cantoro

Combining and comparing data from different sources or different time period, searching for possible changes in the feature or in the whole landscape under study, is nowadays considered mandatory, thanks to the evolution of the archaeological discipline. This data integration implies also that the sources share the geographical information. If a geo-referencing world file is missing, every raster needs to be rectified and warped, usually through a time consuming manual operation.

AutoGR-Toolkit – a software produced at the Laboratory of Geophysical-Satellite Remote Sensing & Archaeo-environment of IMS-FORTH and freely available at http://www.ims.forth.gr/AutoGR – is a set of 4 scripts (GGRAB, AutoGR-Sift, GeoRef Filtering, GeoTiff Converter) inspired by 2 algorithm libraries: ASift and GDAL. The purpose of this software is to assist the user in geo-referencing one image on another according to the specific geographical projection, in an easy, fast and accurate way. No special skills are required and the whole procedure can be completed within a few minutes interval.

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

Here are the basic principles and functionalities behind each tool in the application:

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**GoogleGrab**: allows you to save a GoogleMap of the area of interest (for personal use only!) by specifying its North-West and South-East coordinates in the international WGS84 projection system. The user may also specify a different scale (affecting the final pixel size and image resolution) and name for the output image. The script will query the Google server, through the Gdal Library, for the specific area and download a raster of the area with a world file.

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

Three different steps of the AutoGR-ASift processing: in the first (top left) the user is asked to check the reciprocal rotation (unchanged, 90,180 or 270 degrees) of the 2 selected images to best fit each other. In the second step, the ASift algorithm searches and compares keypoints (4571 have been found in this specific case). In the lower part, a print of the two images with common points connected with white vectors.
ASift (an improvement of Lowe’s SIFT by Yu and Morel’s) extracts key points [2, 3] from two images (in PNG, JPG or TIFF/GeoTIFF format) to provide a “feature description” of the object depicted in each of them. Such descriptions can then be used to locate the same object in both images. Once the relation between x and y coordinates of the key points in both images has been found, a structured text file and a visual preview of matching points are created. The common points in XY pixel coordinates are converted into geographical Easting-Northing information by AutoGR without any user interaction.

An automated rectification of the second image is attempted (with the GDAL library). Default parameters have been set as follow: 10 unit for the average residual and 100 as maximum number of points to be used for processing. If this automated version is not satisfying, the user can still edit the point list in a GIS software and produce another version with different parameters.

We believe that this application represents a huge speed-up in the traditional manual photo positioning and provides a sub-pixel digital accuracy that has no comparison with the traditional “manual work”.

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

![Plot view of keypoints distribution](image)

Plot view of keypoints distribution: in green the unfiltered data; in red a selection of 150 points produced with GeoRef Filtering.
The decimation process employs the criteria of maximization of the minimum distance between points, starting from a randomly selected one.

As a general idea, a correct rectification should come from a sub-sample of around 100 or 200 points; the process may be repeated if the result is not satisfactory.

**GeoTiff Converter:** It is a simple tool to extract the geographical information from any GeoTiff file and save it into a world file via the GDAL library. The selected input geotiff file will be converted in a regular tiff and jpg file (with world files for both) to be used for another georectification with AutoGR-Toolkit or any other GIS tool.

AutoGR-Toolkit and its embedded tools are distributed for free and can be redistributed free of charge.

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

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

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Messy landscapes manifesto

Dimitrij Mlekuž

We, landscape archaeologists, study landscapes. Landscapes are vague, slippery things, always evading definition. Landscapes are difficult. But that doesn't mean that they should be dumbed down and made simple. We should not reduce them to just a set of features that can be put in an objective space of maps. Our job is harder than just to recognise, map and interpret those features. Our job is to understand landscapes, no matter how complex they might be.

1. We make landscapes

To study landscape is to be part of it. To forge a relation with it, to interact with it, to visit its places. Either on foot or through remote sensing. To go over it, in the airplane or with finger tracing lines on the map. To know it better. When we study landscapes we interact with people and other creatures who made landscapes in the past. Their material traces guide us when we move around landscapes. We reiterate past paths. We visit past places. We re-weave connection that once existed. We do not only observe, by observing, we meddle with landscape. Our work is itself part of life in the landscape. We produce knowledge. We leave traces. We make photographs, maps, papers, books. These accounts establish, fix and stabilise relations between places. They forge connections, make new associations. When we do our work, we are always situated somewhere: in the landscape, in our bodies, practices, in technologies, tools, theories and institutions. There is no detached, neutral position, there is no "god's trick", to be everywhere and nowhere in particular at the same time. Our landscapes are crafted from these positions, from institutions we are part of, theoretical positions we accept. They are made through bringing together places, photographs, point clouds, maps, bags of sherds. We participate in building of landscapes. We make landscapes.

2. Landscapes move

We make landscapes. Therefore landscapes are not static. They change, they move, they are constantly under construction, never finished. We change landscapes by building, farming, dumping, carrying stuff and moving it around. Our actions, tasks, movements, leaves traces, change landscapes. And we change landscapes by doing our work of landscape archaeology. We interact with places that are already there, we interact with things that our ancestors left. We bring things in new associations, rearrange and modify things. We move landscape forward in our rhythms of daily, seasonal, biographical time. But there are other movements, different, slower rhythms than ours. Trees grow, forests spread, rivers cut channels, glaciers flow, mountain chains rise, even continents change their shapes. Our tasks, our lives, are nested in those rhythms. Things that look fixed and static, the backstage for human drama, are actors, too. And they interact with us in interesting ways. Landscapes move. And they move us, too.

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3. Landscapes are not palimpsests

Landscapes move. And since landscapes are always under construction, there is no time to clear the mess and start from scratch. We are born in the world built by our ancestors. We patch the new from the old, we build over, we change and modify thing that are already here. But the present is not merely the sum of past episodes. It is also the world where we live, a lifeworld for people, animals and other creatures and things. And they live and change landscape with rhythms different than ours. Past is incorporated and reworked into the present landscape in different ways. The idea of palimpsest, of historical layering, of continuous erasing and creating anew is overly simplistic to capture the movement of landscape. Landscapes are much more than palimpsests.

4. Landscapes are messy

Landscapes are not palimpsests. They are messy. They are not messy because there are many traces of past activities in them. Having thousands and thousands of features in a landscape does not make landscape messy. They are messy because they were built in a messy way. They are messy because they were patched together with things already present, by reworking and changing older things, by combining things in different, new ways. They are messy because they are being built by many builders who work in different rhythms and by different speeds. And those rhythms interact in many ways. They are messy because we make landscape by re-using, re-working, patching together things that change in different rhythms. They are messy because features are combined together in a landscape in many ways.

5. Mess is not a problem

Landscapes are messy. But is this really a problem? Is it our job to clean them? We make landscapes, and we are not making them from scratch. We participate in them and help them move on. We build them from what we have at hand. And this is a messy work. Trying to describe complex, diffuse and messy things, landscapes, in simple terms would only make more mess out of them. This is because simple clear descriptions don't work if what they are describing is not itself very coherent. The very attempt to be clear simply increases the mess. So the only way is to describe thing as they are. We should describe how we participate in making landscapes, how are we part of this mess. How we build them, how we patch them together, how our rhythms interact with rhythms of those who built landscapes before us. And these accounts may be messy as well.

By practice of landscape archaeology we are also involved in the making of landscape. Our practices are intertwined with the practices of past people that left traces in the landscape. Thus practice of landscape archaeology is necessary a messy job. We are not dealing with discrete features, but a landscapes, a continuum of the traces. And there is no chronological succession, but a mess of temporaries. Landscapes are not palimpsest, but messy, and we should change our practice and politics in order to deal with the mess. That is the real challenge.
A review of the CORONA Atlas of the Middle East (Beta)

Martin J F Fowler

Since their declassification over 15 years ago, the photographs that were acquired by the CORONA photoreconnaissance satellite programme have become an invaluable resource for researchers in archaeology and other fields. Almost global in coverage, the photographs provide relatively high spatial resolution snapshots of the earth’s surface as it was in the 1960s and early 1970s. The archaeological potential of the photographs was quickly recognised (Kennedy 1998) and since then they have been used to great effect in areas where there is a shortage of conventional aerial photographs such as in Asia Minor and the Middle East (Fowler 2004a).

Whilst an increasing number of CORONA photographs are now available for download free of charge from the USGS EarthExplorer website (http://earthexplorer.usgs.gov/) as a result of a programme of digitisation of the original film archive, the coverage footprints of the individual images can have significant errors and consequently selecting the correct image for download or purchase can be somewhat hit and miss. Thankfully, the Center for Advanced Spatial Technologies at the University of Arkansas has developed methods for the efficient orthorectification of CORONA imagery and now provides free public access to their imagery database covering the Middle East and surrounding areas for non-commercial use. Known as the CORONA Atlas of the Middle East and funded by grants from the US National Endowment for the Humanities and the American Council of Learned Societies, the Beta version of the website can be accessed at http://corona.cast.uark.edu/index.html (Figure 1).

Figure 1. The CORONA Atlas of the Middle East (Beta) website showing the coverage footprints of the CORONA images that are included in the database.

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Best viewed at a screen resolution of 1280 x 1024 or higher, the Atlas presents the user with a ‘Google Maps’ type basemap that can be selected to show a street map, recent satellite imagery, a hybrid of both or a terrain map. Navigation is straightforward using the mouse (zoom in/out, box zoom, drag/pan) and although bookmarking locations is not explicit, saving to the browser’s Favourites can be used. Whilst a world-wide gazetteer can be searched for specific place names, it is not possible to navigate to specific geographical co-ordinates which, as will be seen later, is a serious limitation of the Atlas.

The Atlas includes a number of map layers that can be toggled on and off and comprise populated places and modern political boundaries, CORONA image footprints and the locations of over 800 archaeological sites in the Middle East. The locations and names of the latter are derived from the Oxford Atlas of the Middle East, the Atlas of PreClassical Upper Mesopotamia and the Ancient Near East (ANE) Placemarks for Google Earth (http://www.lingfil.uu.se/staff/olof_pedersen/Google_Earth/). Clicking on a particular name navigates to the location and presents a large scale view of the site.

CORONA images included in the Atlas comprise photographs acquired between 1967 and 1972 by missions 1042, 1101-1105, 1107, 1110 and 1116. At small scale, the basic outlines of the image footprints for the available CORONA missions are displayed as shown in Figure 1, whereas at larger scale individual CORONA images become visible together with details of the actual frame being displayed (Mission number, pass number and camera orientation). A swipe tool is provided to enable both the underlying map layer and the CORONA imagery to be displayed at the same time (Figure 2) as is a slider to adjust the transparency of the CORONA imagery.

![Figure 2. ‘Swipe view’ comparing CORONA and modern satellite imagery of the former Assyrian city of Nineveh, now overlain in part by the suburbs of the modern city of Mosul, Iraq.](image-url)
Figure 3. CORONA image of Nineveh that had been acquired on 16th August 1968 by CORONA mission 1104-2. An extract from a separate larger-scale saved image is shown of the area covering Tell Kuyunjik, the site of Sennacherib’s Southwest Palace that was built at the end of the 8th century BC. [http://corona.cast.uark.edu/index.html#bbox=4797801,4346876,4810690,4352809](http://corona.cast.uark.edu/index.html#bbox=4797801,4346876,4810690,4352809)

In addition to tools that permit location (latitude/longitude), distance and area measurements to be made, a snapshot tool opens a new tab in the browser with a portable network graphics version of the CORONA image being displayed which can then be saved locally (Figure 3). The coordinates of the bounding-box of the image in the WGS84 Web Mercator Projection (ESPG 3857) are reported within the URL of the Atlas, but various attempts to use these failed to produce accurately georeferenced images. The reason for this is unknown, but could be the result of ‘operator error’ by the author.

One limitation of the snapshot tool is that the size of the saved image is limited by the capabilities of graphics card, although a series of zoomed-in images can always be saved and used to produce a high resolution mosaic. Alternatively, the CORONA photograph at its original scanned resolution can be downloaded in its entirety from the Atlas, although using a domestic broadband connection the ~ 780 megabyte images will take about an hour to download. The downloaded image is provided as a file in the National Imagery Transmission Format (NITF) for use with suitable high-end Geographical Information Systems such as ArcGIS. For users who do not have access to such software, the image can be extracted using a suitable software package such as the freeware GeoGenesis LITE ([http://www.geogenesis.net/geogenesisle.htm](http://www.geogenesis.net/geogenesisle.htm)) and saved in TIF format for subsequent interpretation.

Whilst viewing CORONA images of those sites included in the Archaeological Site list is easy, the absence of a means to readily zoom to a specific geographical location makes locating other sites in the Atlas more difficult, if not extremely frustrating.
Figure 4. Contrast-stretched CORONA satellite photograph acquired by Mission 1101-1 on 26th September 1967 showing the remains of the Roman Legionary fortress at el-Lejjun and the smaller square fort at Khirbet el-Fityan, Jordan to the north west. To the south west of the fortress, two lines of buildings represent the remains of early 20th century Late Ottoman barracks.

http://corona.cast.uark.edu/index.html#bbox=3990715,3662980,3993938,3664464

In order to try and find some of sites that are included in Kennedy and Riley’s (1990) study of Rome’s desert frontier, several of which have previously been located on CORONA photographs (Fowler 2004b), an indirect strategy had to be adopted in which Google Earth was first used to locate the sites using their known geographical coordinates. Having found a site, the location in the Atlas was determined by progressive visual comparisons with the imagery shown in Google Earth. In this way, the location of the Roman Legionary fortress at el-Lejjun, Jordan, was found (Figure 4) (Kennedy and Riley 1990, 129-131) as was the smaller fort at Qasr el-Uweinid, Al-Asimah, Jordan (Figure 5) (Kennedy and Riley 1990, 159-161).

Of course, the Atlas is not limited to studies of ancient landscapes. The CORONA images were acquired at a time of on-going military conflict between Israel and the Arab world and the images included in the Atlas can be used to investigate aspects of the material culture of this struggle. Indeed, the Middle East was an important target for coverage by CORONA missions during this period with the readout from a typical mission covering over 600 targets in the region including airfields, surface to air missile (SAM) sites, naval bases, radar and communications sites and other military facilities (see Fowler (2009) for a description of the intelligence ‘take’ from such missions). Figure 6 shows a typical target that was photographed by Mission 1105-2 on the 18th of November 1968. A comparison of the location with present-day imagery shows that the SAM site is no longer present and the images that were captured by CORONA are now probably the only photographic record of its existence.
Figure 5. CORONA satellite photograph acquired by Mission 1105-2 on 12th November 1968 showing the remains of the small Roman fort at Qasr el-Uweinid, Jordan. A tower is located to the west and scattered clumps of vegetation can be seen in the wadi as well as groups of ‘hut circles’ arranged in rings. http://corona.cast.uark.edu/index.html#bbox=4088549,3734742,4090160,3735484

Figure 6. CORONA satellite photograph acquired by Mission 1105-2 on 18th November 1968 showing the SA-2 ‘Guideline’ SAM site Al Qahirah B33-2. The site is located to the north west of Cairo and comprises a circular roadway that surrounds six missile launch locations, which in turn surround a central area where the Fan Song radar and control vehicles were located. A road to the south leads to a support area. http://corona.cast.uark.edu/index.html#bbox=3463469,3540572,3464275,3540943

In conclusion, the CORONA Atlas of the Middle East is a useful archive of CORONA satellite photography for aerial archaeologists working in the Middle East. The ability to type in geographical coordinates and zoom to a particular location would significantly improve the
functionality of the Atlas, as would the ability to mark particular locations with push pins. Likewise, the ability to export world files that can be used to georeference images saved with the snapshot tool would be a useful addition. That said, the Atlas is still a very useful resource and hopefully these limitations will be addressed in later versions.

References


The role of aerial photographs in monitoring change and managing ancient monuments: a case study from Scotland

Aelfwynn Freer

Introduction

This paper presents a short case study on how information captured on existing archival aerial photographs can inform management, in particular assessments of condition and the wider landuse context of the monument. The potential of ongoing, systematic programmes of photography to build this approach into future are also highlighted. It is not within the remit of this paper to critique the basis for statutory protection, or scheduling, of ancients monuments in Scotland, but underpinning this discussion is the very basic assumption that monuments are preserved for the future as reservoirs of potential information and that management strategies can best be made on the basis of a structured assessment of condition. It is also assumed that combined sources of information, such as aerial photographs, historical maps and texts or field walking, should support the value judgments that must be made on preservation strategies (e.g. Simco 1983). Such information can reflect both the immediate condition and context of monuments but also place this information in the longer-term, certainly extending back into the mid-20th century, but by using historical sources, perhaps to the mid-19th century. Such contextual views can help to develop an understanding of site condition and under which conditions they are best preserved, complementing more interventionist approaches (e.g. Historic Scotland 2008).

Two case studies are presented below. Both are scheduled ancient monuments surviving as earthworks in the southern uplands of southeast Scotland, in a landscape that has undergone significant changes in landuse over the last century.

Ewieside Hill, Scottish Borders

“Archaeologists are very familiar with the varying states in which monuments survive... but all too seldom consider the pressures of contemporary land-use which continue to erode the archaeological resource in the landscape.” (Macinnes 1991)

This Iron Age multi-vallate settlement enclosure is situated at 250m above sea-level on the broad summit of Ewieside Hill, and offers a view of two contrasting states of preservation due to differing historical land use on either side of a 19th century drystone walled farm boundary that bisects the monument. To the north of the wall about two-thirds of the enclosure circuit survives as upstanding earthworks and is currently grazed by both sheep and cattle. To the south of the wall the earthwork has been truncated by modern and historical cultivation, but is visible under low-vegetation conditions as a slight swelling in the otherwise smooth field surface and has been recorded from the air as faint cropmarks (below). The earthwork portion of the site has been scheduled since 1936, while the truncated portion has no protection. The interior diameter of the site is about 80m, within three concentric ramparts of earth and stone, each flanked by an external ditch. Field observation suggested that the fort was constructed in two phases. Ewieside Hill provides an opportunity to observe the differing effects of modern agriculture on an ancient earthwork.
Ewieside Hill has been on record since as early as the mid 18th century, when it was included on General Roy’s Military Survey Map (1747-55). About a century later the site was recorded on the mid-19th century Ordnance Survey (OS) map as a complete circuit of earthworks, though the wall bisecting it is already shown. The 1908 OS map has a similar depiction. The OS rules on depiction dictate that a minimum height for a feature of 0.3m is necessary for it to be shown on a map, so this map evidence suggests that the southern arc of the enclosure circuit was a still an extant feature in the early 20th century. Ewieside was visited by the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS) in 1908 and a description was published in the Inventory of the County of Berwick under the heading ‘Defensive Constructions’ (RCAHMS 1915). According to the RCAHMS in 1908 the “defences are well preserved, except for one portion, lying in a field to the south, which has been almost obliterated by cultivation” (RCAHMS 1915). This account adds texture to the OS depictions of the site, which do not allow an interpretation of the varying state of the earthwork. It is worth noting that, while the mid-19th century map shows the field to the south of the wall as improved, the 1908 map shows the same field as rough ground, indicating that it was not under permanent cultivation or fully improved grassland. The 1908 report also notes that the greater portion to the north of the dyke was obscured by heather (RCAHMS 1915). Vegetation cover clearly varied and a report based on a field inspection by an OS surveyor in 1954 states that the earthworks were covered in dense bracken. A subsequent OS report in 1966 noted a number of vague circular hollows thought to be round houses in the interior. A further field visit by RCAHMS in 1980 led to the identification of a sequence of rampart construction and the slight remains of at least timber round houses in the interior. When visited by the author in August 2009 the grass was too high to detect internal features, but disturbance of the interior by cattle and of the ramparts by sheep was observed. It was also noted that the drystone wall (probably early 19th century in date) clearly rose and fell across the line of the ramparts, indicating that they were extant when the wall was built.

The field visits and map sources illustrate the changing character of the site since the mid-19th century, especially the changing vegetation cover. The site was photographed on 12 July 1948 by Cambridge University and confirmed the presence of bracken, but showed that it was not extensive and that large areas of the interior were heather-covered. When photographed by RCAHMS in 1979 the bracken had gone, but there were animal scrapes in the ramparts and a tractor track around the outer lip of the external ditch. In 1996 there were three heavily-disturbed patches in the interior where cattle had been fed, and in 2008 the site seemed stable apart from scrapes into the rampart, probably by sheep (e.g. http://canmore.rcahms.gov.uk/en/site/58747/digital_images/ewieside+hills/).

Black Castle, East Lothian

“Grazing archaeological sites is essential to control vegetation, but stocking levels and stock types need to be appropriate: overgrazing can lead to problems of erosion, while undergrazing allows the spread of bracken and other damaging vegetation.” (Macinnes 2006)

Black Castle, Newlands in East Lothian is another Iron Age defensive enclosure occupying a rise at 275m above sea level on a broad, open terrace. It has a long history of recording, which provides an insight into its condition land use history, and was scheduled in 1970.
The mid-19th century OS map provides a basic depiction of the site showing its outline at the east end of a woodland shelter belt. Shelter belts such as this are a common feature of the Scottish landscape, forming part of a suite of ‘improvements’ during the late 18th century including the laying out of regular field patterns. A small ‘Sandstone Quarry’ is depicted and labelled in the north of the interior. Black Castle was visited by RCAHMS in May of 1913 during the preparation of the Inventory of East Lothian (RCAHMS 1924), and noted as roughly circular, measuring some 117m by 104m within ramparts comprising two banks with a medial ditch. A more detailed depiction was produced by the OS in 1965.

To these documentary records can be added a large number of aerial photographs, which document the site and its land use context over 60 years since 1946. Vertical aerial photographs taken by the Royal Air Force in 1946 and by the OS in 1980 record little of the earthworks, but do show the shifting pattern of arable and pastoral land use in the surrounding fields, and the changing density of the woodland shelter belt. The site has since been recorded on oblique photographs repeatedly since the late 1980s showing the changing land use on, and around, the monument. By 1992 the site was half clear with fallen trees clearly visible. An adjacent pit alignment (prehistoric boundary) made its first appearance, hinting at the wider landscape beyond the monument. The pit alignment was clearly visible again in 1995, but these photographs revealed a vast change in land use as the trees had entirely gone. The site was again the focus of observer directed reconnaissance in 2008 and revealed a site naked of trees or vegetation, surrounded by cultivated fields. A site visit in 2009 showed that Black Castle was overrun with bracken and very difficult to access as the enclosure and part of the former plantation were fenced for use in rearing pheasant.

Monument condition and land use histories

“The landscape is in a state of continuous change and the preservation of archaeological sites and monuments has to be actively pursued, not left to chance.” (Macinnes 1991)

Two case studies from Scotland’s southern uplands highlight the varying patterns of historic land use on two Iron Age sites and the impact that these may have on monument condition. Aerial photographs, none of which have been taken with management specifically in mind, have proved valuable to tracking change and have the potential to systematically record damage and material changes in condition. Underpinning the importance of these sources of information is a view that management of sites in the present and their preservation as viable reservoirs of information for the future depends on robust data. An approach using archive aerial photographs to analyse past land use along with routine aerial recording in the future could be a valuable addition to the system of intermittent site visits by Monument Wardens in place at present. The value of aerial photographs as a monitoring tool capable of recording site condition, identifying damage and potential threats has been long recognised in England (Whimster 1989, 89). This practice is also well established in Wales, where about 20% of the 5,000 aerial photographs taken each year by RCAHMW are for monitoring of scheduled sites by Cadw, the historic environment service for Wales (Driver 2006). Though used in this way on an ad hoc basis in Scotland (Moira Greig pers. comm.), such an approach has not been adopted systematically in Scotland.

Monitoring monuments in Scotland: why use aerial photographs?

The benefits of an historic view of changing land use and monument condition are clear in both case studies. At Ewieside and Black Castle bracken is, or has been, a factor and as a
known source of major damage to archaeological monuments its presence and spread are highly relevant to the potential ‘information value’ of these sites. The aerial record provides a basis to easily and quickly quantify the extent of bracken cover, or other vegetation, such as the changing balance between grass and heather. Ongoing, systematic aerial recording could provide a ready means of assessing change and provide a tangible and quantifiable basis for management agreements in future.

Quantification of damage by grazing stock and other farming activities, such as farm vehicles, can also be readily achieved through aerial photographs. The 1995 images of Ewieside Hill record the damage caused by feed stances in the interior of the fort, identifying the extent of damage and its location. The same is true of the shifting locations of damage to ramparts by sheep. This type of information not only informs assessment of how effective management of monument condition is, but also bears on the future understanding of potential information return. While field visits, by Monument Wardens or Inspectors of Ancient Monuments for example, and discussions with farmers are crucial to successful management of monuments in active farming landscapes, the benefits of aerial photographs once more lie in the capability of ‘time-lapsed’ imagery to quantify material changes in condition, but also to graphically and powerfully convey the problems, which can aid communication and comprehension.

Aerial photographs also have the benefit of recording the wider landscape context of monuments, tracking broad changes in land use, such as the varying emphasis on arable cultivation in upland areas during the last 30 years. In an historic context, the potential role of woodland shelter belts in ensuring the preservation of earthworks in otherwise heavily ploughed landscapes is worth highlighting. Here, while the incorporation of earthworks in woodland may have helped to preserve their remains, the former tree cover has clear implications for the buried archaeology, especially, if for example, wind-throw has been a significant factor. The shifting emphasis of broad land use patterns also readily responds to the aerial perspective, as it is capable of recording changes in regimes of upland pasture management and extent of arable, which may be driven by national policies or vary from farm to farm, depending on the nature of the issue.

The issue of context also bears on the designation of the area afforded protection. For example, when Black Castle was scheduled in 1970 the presence of the pit-defined boundary was not suspected – though in hindsight it can be seen that the stub of ditch shown on the OS plan of 1965 extending to the southeast of the enclosure is a rare earthwork survival of the wider system. Thus ongoing, systematic programmes of recording scheduled monuments may bring with it unintended dividends, such as considerable new information. Finally, such a programme would strengthen the bridge between preservation and recording, optimising information return.

**Conclusion**

Aerial photographs have a demonstrable role in monitoring condition and informing management strategies for scheduled ancient monuments in England and Wales, but this approach has not been adopted in Scotland, where a system based on an intermittent cycle of site visits is applied. In examining the information return from archive aerial photographs and their benefits in tracking changing land use and condition, two case studies of Iron Age monuments in south-east Scotland demonstrate the considerable added value that such sources provide. It is argued that implementing a systematic programme of routine aerial
photography for scheduled ancient monuments would provide datasets for the future, informing management agreements and monitoring change at both site and landscape scale (see Olesen 2011 for an example from Denmark).

References


RCAHMS 1924. *Inventory of East Lothian: Volume 8*. Inventory of Monuments and Constructions in the County of East Lothian. Edinburgh.


AARG News

Information for contributors

*AARGnews* is published at six-monthly intervals. Copy for *AARGnews* 45 needs to be with me by **August 14**. 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.

Address for contributions:
Rog Palmer, 21 Gunhild Way, Cambridge, CB1 8QX, UK.  rog.palmer@ntlworld.com

Vacancy: AARG Treasurer

At the next Annual General Meeting during the conference in Budapest the vacancy of Treasurer will be voted on and filled. In the AARG constitution (Sept 2010 edition) it states:

5.1 The officers of the Group shall be elected by ballot at an Annual General Meeting. Nominations shall be sent to the Honorary Secretary, with the permission of the Nominee and the support of a Proposer and Seconder (who shall be individual or institutional members of the Group), not less than 30 days before the meeting. Forms bearing the names of the candidates and the names and signatures of single proposers and seconders (who shall be individual or institutional members of the Group) shall be returned to the Honorary Secretary not less than 30 days before the meeting, along with the written agreement of the candidate to stand for office.

Nominations are thereafter sought from AARG members in the way stated by the constitution:

1. Name of nominated person,
2. Single proposers and seconders named and signed,
3. The nomination returned to the Honorary Secretary ([aarg.secretary@gmail.com](mailto:aarg.secretary@gmail.com)) before 14th August, 2012.

AARG on Facebook (a note from Johanna Dressler: [aarg.secretary@gmail.com](mailto:aarg.secretary@gmail.com))

Last year AARG committee decided to keep up with the times and to launch a facebook page. A lot of AARG members are already using facebook for professional or private (or something in between) matters and since 19th of July AARG is represented in this social network. Already we have 63 people following AARG at: [http://www.facebook.com/aerialarchaeologyresearchgroup](http://www.facebook.com/aerialarchaeologyresearchgroup)

Being part of this network gives the possibility to reach a broader group of archaeologists (we have already followers from Malaysia, Bolivia and USA) and to spread information among members/followers. It provides an easy way to get in contact with other members/followers, you can use the dashboard to ask questions (and to get an answer quite quickly) and maybe it will direct the attention of other archaeologists towards aerial archaeology. To avoid misuse, I am taking care of this site at the moment - depending on where the things will develop, I may need others to administer as well.

At the moment the page seems to be slightly dead. To keep a page like this alive it needs the input and support of followers and members. Therefore I ask anyone who wants to provide photographs (not necessarily scientific aerial ones but pictures from workshops, conferences, field trips etc.), any kind of information (e.g. conferences, new books, new websites, new data sets etc.) or just want to offer help to contact me.
Due to a lack of education about Aerial Archaeology at most of the European universities, young professionals are struggling with quite similar problems all over Europe. The main difficulties are:

- getting access to knowledge (i.e. photo reading, understanding why we see what we see, interpretation, using software, etc.);
- getting access to literature;
- getting access to expensive software and data;
- finding support for new ideas and methods in their home countries.

AARG’s committee fully supported the proposal to form a Young AARG (YAARG) and have provided space at its Budapest meeting for the first meeting of this group which will take place on the afternoon of 12 September 2012.

Membership of the group is restricted to young professionals who are working on their first projects (this will be in most of the cases their PhD) in countries where aerial photography and uses of aerial images are new methods of research. It will provide an informal forum to ask questions (archaeological and technical ones), to ask for hints and to exchange ideas that you may prefer not to ask in front of some of the older AARG members.

To be able to have a fruitful discussion the meeting is open to 12 to 15 participants. We ask that each prepares a brief introduction to themselves, their project and the main problems relevant to aerial images (up to five minutes). Our initial aim will be to find common threads in directions of research and in problems encountered. As a consolidated group it may be possible to overcome some of these problems in a way which is impossible for individuals working alone. Another theme is to remember that students of today will be the teachers of tomorrow and that by establishing aerial archaeology as a respectable method of research now we will be ensuring its growth in future.

It is proposed to elect a small number of Honorary Children from (normal) AARG who will be available after the session, or who (at the discretion of YAARG members) may be invited to attend. A summary of our session will be presented on the first day of normal AARG.

People who are attracted by this idea and interested to take part should contact johanna.dressler@googlemail.com and include a short summary of their current projects, position and the country they are working in – and perhaps a note of how they think YAARG may help them. Closing date for applications is 14 August 2012. Attendance will be free for AARG members but non members will be asked to pay 5€ towards the cost of room rental and refreshments.

1 johanna.dressler@googlemail.com
2 vedrana.glavas@gmail.com
Workshops, forthcoming, etc

The Cruachan Aí Centre in Tulsk, Co. Roscommon Ireland
Archaeological Conference: April 13th – 15th

The conference will highlight the important archaeological work carried out in the Rathcroghan area over the past ten years.

Rathcroghan is an ancient Royal site, located in the west of Ireland, noted via ancient text as being home to a powerful warrior people and one of the three great burial mounds of Ireland dating to the Iron Age. The royal site of Rathcroghan has never been excavated, but instead surveyed using a range of advancing non-intrusive archaeological techniques.

The conference will run for three days, the highlight of which will be a series of talks Prof. John Waddell (NUI Galway) on Rathcroghan detailing the surveys carried out by himself and his team over the past decades. Joe Fenwick (NUI Galway) and Kevin Barton (LGS) will present on the various techniques utilised in uncovering the archaeological monuments in the Rathcroghan Complex, including new LiDAR data for the region.

Jacqueline Cahill Wilson of the Discovery Programme will also present on the Late Iron Age and ‘Roman’ Ireland project currently underway. There will be a number of other speakers discussing topics from interpretation and presentation of the landscape to possible unidentified sites within the Rathcroghan Complex, an area with over 200 archaeological monuments including.

Sunday the 15th will provide current students/researchers in the field of Archaeology to present their projects in the areas of non-invasive survey and interpretation of sites. These projects can cover any period or region as the key concern is the techniques used and interpretation of archaeological monuments.

In January 2012, the Rathcroghan website included a call for papers but – apparently – no info about the conference booking:


3rd Aerial Archaeology Training School in Merida, Spain
18-23 June 2012

Organized by:
Archaeolandscape Europe, Radio Past project, Mérida Institute of Archaeology (IAM)

Aimed at students and graduates in archaeology or related fields and with a maximum number of places at 20. Acceptance will be based on a process of evaluation of the applications received during the pre-inscription period. A short statement and a CV will be required.

Inscription fee: 300 euro.

Grants:
Archaeolandscape Europe offers 5 grants of up to 500 euro to support students with no extra funding. More information here.
Merida Institute of Archaeology offers up to 9 free accommodation grants. Please apply in the preinscription form by 30 March. Download preinscription form here.

**Objectives:**
Introducing the basics of aerial imaging for archaeology, through a combination of short theoretical presentations and supervised practical seminars. The students will explore different interpretive and technical procedures, such as: photo reading and interpretation, georeferencing and rectification, data integration, GIS analysis, integration of aerial images with ground based techniques or data capture in the field with low altitude remote control devices.

**Programme: thematic blocks**
1. Introductory issues: background, history, experiences and uses of aerial imagery in archaeology.
2. Aerial Photo Reading & interpretation: theoretical introduction and interactive workshops.
5. Field practice: data capture with low altitude device. Interactive workshop: processing, mapping and interpretation of field data.

**Teaching experts from Archaeolandscapes Europe, Radio Past, Merida Institute of Archaeology:**
- Dave Cowley, Royal Commission on the Ancient and Historical Monuments of Scotland
- Włodek Raczkowski, Institute of Prehistory, Adam Mickiewicz University, Poznań
- Rog Palmer, Aerial Archaeology Research Group
- Antonio Malpica, Departament of Medieval History, University of Granada
- Luis Vázquez, Departament of Medieval History, University of Granada
- Frank Vermeulen, University of Ghent
- Cristina Corsi, University of Evora
- Geert Verhoeven, University of Ghent
- Victorino Mayoral, Mérida Institute of Archaeology, CSIC
- Enrique Cerrillo, Mérida Institute of Archaeology, CSIC

**Remote Sensing Techniques in Archaeological Research**

**International workshop at Rethymo, Crete**

21-29 September 2012

The main aim of this workshop is to introduce students, researchers and professionals to the capabilities of ground-based and satellite remote sensing techniques. Seminars will cover theoretical and practical issues of remote sensing, focusing on the use of geophysical techniques and use of satellite and aerial images in archaeological applications.

Organised by Institute for Mediterranean Studies, Foundation for Research & Technology, Hellas and supported by Archaeolandscapes Europe.

As neither their website nor downloadable pdf is copyable you can chase details yourselves:

Air Survey and Principals of Remote Sensing for Archaeology

Workshop: Sazená: 21st – 23rd June 2012

Place: Airfield of the Air Club of the Czech Republic at Sazená (central Bohemia, distr. Kladno; 30 kilometers north of Prague)

Participants: Students of archaeology interested in archaeological remote sensing for past settlement- and landscape study

Organizer: Department of Archaeology, University of West Bohemia, Pilsen, Czech Republic with financial support of ArchaeoLandscapes Europe.

Head of the organisation team: Prof. Martin Gojda

Manager and contact person: Dr. Lucie Čulíková

Objectives of the workshop:
1. Teaching about theoretical basement and principals of archaeological remote sensing (ARS) and enabling the participants to acquire basic knowledge in the practice of archaeological air survey carried out from low altitude and focused on the identification and documentation of archaeological buried sites and features displayed via cropmarks.
2. Practical training in the processing and mapping of aerial photographs and LiDAR data.

The course is divided to four sections:

Air- and field school
A. Theoretical basis of ARS, practical air survey performed in Cessna 172 (owned by the Czech Academy of Sciences, Institute of Archaeology), downloading and primary processing of photographs and GPS data
B. Verification and mapping of cropmarked features on the ground through GPS and Total Station

Ground school
C. Advanced processing of APs (rectification of oblique APs, their archaeological interpretation and mapping of recorded sites and features by means of GIS).
D. Working with data from airborne laser scanning (LiDAR).

Accommodation and meals (breakfast + lunch) will be provided at the airport. The course fee (which includes aircraft rental cost, teaching facilities, accommodation, meals) is 100 €.

The project ArchaeoLandscapes Europe (http://www.archaeolandscapes.eu/) offers a very limited number of grants (max 500 €) to support students to participate the workshop. Please confer to the ArcLand grant rules and grant application form that you can find at http://archaeolandscapes.eu/index.php/resources/documents/cat_view/94-activities-a-events/91-grant-documents.html

Workshop applicants are asked to contact Lucie Čulíková, the organisation manager, for registration, and more information at: lculikov@kar.zcu.cz or Lucinka.Cul@seznam.cz
Archaeological Prospection 2013

10th International Conference on Archaeological Prospection

Austrian Academy of Science, Vienna

May 29th – June 2nd 2013

On behalf of the International Society for Archaeological Prospection (ISAP) and the Aerial Archaeology Research Group (AARG) we would like to announce the 10th International Conference on Archaeological Prospection to be held in the Austrian Academy of Sciences in Vienna from Wednesday May 29th until Sunday June 2nd 2013.

Scope of the conference:
The conference aims to provide a forum for the presentation and discussion of latest developments and cutting-edge research in the field of archaeological prospection. It shall cover the entire spectrum of methodology and technology applied to the detection, localization and investigation of buried cultural heritage (aerial photography, remote sensing, LiDAR, near surface geophysics, data processing, visualization and archaeological interpretation). The focus shall be on integrative approaches exploiting the diversity of all data and information necessary for the visualization and interpretation of archaeological and historical monuments, structures and entire archaeological landscapes. This scientific and social venue will provide a meeting place for young researchers and experienced professionals in the field of archaeological prospection. We welcome high-level contributions from all over the globe - and beyond.

Young researchers are invited to join the conference on a reduced conference fee.

Organisation:
Ludwig Boltzmann Institute for Archaeological Prospection and Virtual Archaeology
Austrian Academy of Sciences
Vienna Institute for Archaeological Science – University of Vienna

In cooperation with
International Society for Archaeological Prospection
AARG – Aerial Archaeology Research Group
Central Institute for Meteorology and Geodynamics – Archeo Prospections®
County of Lower Austria

For further information please visit the conference website at: http://ap2013.univie.ac.at
Cropmarks
Interpreted by Rog Palmer

It’s been a busy winter for cropmarks...in no particular order. All accessed Jan/Feb 2012):

Airrecce: the story of photographic reconnaissance
A web site that is being enlarged and may be of interest to any of you delving into the history of PR. At present the site is mostly about cameras and aircraft but includes useful information on images and their stories.
http://www.airrecce.co.uk/index.html

Corona Atlas of the Middle East – Uni of Arkansas (thanks to Dave Maynard)
Some of you may remember a note a few issues ago commenting on an Article in Antiquity. This Atlas is one result of that. Martin Fowler reviews the site elsewhere in this issue.
http://corona.cast.uark.edu/index.html

Kennedy and Bewley Aerial Archaeology Project Publicity
An article published on 14 September 2011 focusing on the features known as Wheels photographed by the Aerial Archaeology Project has been picked up by international media.

Owen Jarus, a freelance writer with the science news website "Live Science", following a phone interview from Canada last weekend, published an article on Wednesday on the enigmatic prehistoric stone-structures in Jordan and its neighbours we know as Wheels, comparing them to the Nazca Lines. His article used imagery from the Aerial Photographic Archive for Archaeology in the Middle East website and linked to the archive’s public profile on Flickr. Since this article was published, our ‘view counts’ on Flickr has risen from a modest average in the low hundreds daily, to 4000 on Wednesday, almost 90,000 yesterday and already over 20,000 in the first couple of hours today. The article has been picked up by Yahoo, MSN, and CBS media outlets, and we have also received interest from the Discovery Channel, Canada. (source: Rebecca Banks, UWA, 16 September 2011)

Selected online coverage:
‘Visible Only from Above, Mystifying ‘Nazca Lines’ Discovered in MidEast’, msnbc.com, 15 September 2011: http://www.msnbc.msn.com/id/44531708/ns/technology_and_science-science/

1 rog.palmer@ntlworld.com
There was more on David Kennedy’s projects from 6 November 2011
http://www.thenational.ae/news/worldwide/middle-east/ancient-middle-eastern-stone-structures-revealed-by-
google-earth?pageCount=0

And Google Earth Sightseer for December 2011 included a links to various of his on-line sites, including a brief YouTube talk:
http://www.youtube.com/watch?v=7hakGJU9xco&feature=youtu.be

and examples of various sites on Flickr: http://www.flickr.com/photos/apaame/

All useful for anyone working in that kind of area or looking for ‘unusual’ slides for lectures.

**Fossil sites from the air**

Use of neural networks to find patterns that may indicate fossil man sites. After training results seemed good but, of course, it all needs checking on the ground.


**David Mattingly Sahara sites:**

Real-life “castles in the sand” made by an ancient culture have been revealed in the Sahara, archaeologists say. New satellite photographs show more than a hundred fortress settlements from a “lost” civilization in southwestern Libya.

The communities, which date to between about A.D. 1 and 500, belonged to an advanced but mysterious people called the Garamantes, who ruled from roughly the second century B.C. to the seventh century A.D.

Researchers uncovered the Garamantes’ walled towns, villages, and farms after poring over modern satellite images—including high-resolution pictures used by the oil industry—as well as aerial photos taken during the 1950s and 1960s.


Samarra from above mixes some of Beazeley’s material from his Geographical Journal articles of 1919-1920 with others. It’s a bit of a mish-mash but makes this early aerial material easily accessible at pretty good quality.


UAV uses, including flying ALS: http://www.igp-data.ethz.ch/berichte/Blaue_Berichte_PDF/105.pdf

Balloons you can buy for site photography:  http://www.ballonsolaires-solis-nebula.com/

Hungarian use of UAVs photographing known sites. Is this ‘aerial archaeology’, ‘aerial photography’, or ‘site photography’..? And does it matter?

http://legiregesz.blog.hu/2012/01/09/legiregeszeti_kutatas_robotokkal_uav_technologies_in_aerial_archaeology

8th International Conference on Archaeological Prospection

The abstracts from this and the 7th Colloque GEOFCAN from Paris in 2009 can be freely download at the following address. There are some that include aerial survey of various kinds:  http://archeosciences.revues.org/1179

English Landscapes and Identities project (EngLaID):

This project was noted in the last issue of AARGnews. It now has a website, at http://www.arch.ox.ac.uk/englishlandscapes.html

This will be updated regularly, alongside the existing blog at http://englaid.wordpress.com

And a visual blog at http://visualenglaid.wordpress.com/, run by the project artist Miranda Creswell.

(Source: Laura Morley, EngLaID Administrator, January 2012)

Camera GPS

Not especially new news as these were used at the Denmark school in 2011. Jobo – an old name from the wet-darkroom days – sell stand-alone GPS units that fit on a camera hotshoe and record coordinates and other information at the time of exposure. If I understand the blurb correctly, the provided software lets this information be written to the EXIF file so that individual images can be tagged with locational information.

http://www.jobo.com/web/photoGPS.447.0.html

…and a review at: http://www.ephotozine.com/article/jobo-photo-gps-10578

(thanks to Helena Kaldre)

Allen’s APs online

The Ashmolean Museum’s collection all 1702 of Major Allen’s aerial photos are now searchable online and can be searched by county and site name. Results are displayed as a thumbnail, with a larger image and the catalogue details displayed by clicking on the thumbnails. You can also order copies of individual images online.

http://www.ashmolean.org/ash/objects/?mu=422

(thanks to Julia Wise via Dave Cowley)
Posters
For those of you wanting a change from pretty aerial photographs on the wall, DigitalGlobe have opened an online store from which you can chose posters for $25 each. These are delivered as a jpeg image that can be printed at sizes up to 24x36 inches (60x90ish cm). Images on sale are at:
http://store.digitalglobe.com/storefront.aspx

The Landscape Research Centre
Those of you with an interest in presentation of digital data, archaeological survey and landscape analysis should have a look at http://thelrc.wordpress.com/, where the launch of the LRC Digital Atlas of the Archaeology of the Vale of Pickering is announced. Brilliant stuff.
(initial link from Dave Cowley)

… and isn’t this a hint for NMP and other tax-funded stuff..? (not from Dave Cowley)
A book review (A View from the Air) and some observations on publication
Dave Cowley

This contribution to AARGnews has two parts. The first is a review of a recently published volume, and the second part, directly stimulated by undertaking the review, is some observations on publication, airing some general issues about why and where we publish.

Book Review
A View from the Air: Aerial Archaeology and Remote Sensing Techniques - Results and opportunities. Edited by Marc Lodewijckx and René Pelegrin

Collected papers and conference proceedings can be very hit-and-miss, and the successful ones invariably have a clear vision of why the papers go together. A View from the Air suffers from a number of problems, not least that there is no apparent rationale for the volume as a whole. The book has its origins in the AARG annual conference held in Leuven in 2005, but for reasons that will be explained below it is not badged as a ‘Proceedings’ or otherwise associated with AARG.

Fourteen papers range widely from Iceland to Turkey and Egypt, covering the results of aerial prospection, methodological and management issues, satellite imagery, archives, and spanning a broad chronology from prehistory to 20th century conflict archaeology. Seven papers provide summaries of results from aerial reconnaissance and mapping at regional and national scales drawn from Belgium, Egypt, Iceland, Slovakia, UK and USSR. Two papers, from Ireland and Italy, have a specific focus on archives, though several other papers also touch on the applications of archival imagery. Landscape-scaled management is discussed in papers from Scotland and Belgium, the former presenting a system that has changed in many ways since the paper was written. A further two papers present a variety of computer/algorithm-based approaches to extracting archaeological information from satellite imagery. A final paper outlines an approach to providing simple virtual reality representations of sites.

Contributions range from analytical, well-written, informative contributions to those that are little more than a display of aerial photographs and descriptive text. Most papers provide at least some level of interest. However, as a collection of papers the volume shows some worrying features. For example, it is thrown together rather haphazardly, and it is slightly depressing to observe that the running order of papers is alphabetically by author/first-named author. Thus, papers that were presented together in sessions during the conference are separated from each other in the book, losing their context and part of their raison d'être. For example, Cordemans’ paper on heritage stewardship by the Flemish Land Agency makes little sense without the context of the session on Managing archaeology in agricultural landscapes, which included Moira Greig’s Scottish perspective. The introduction to the volume by Lodewijckx does not help to create a rationale or to make linkages between papers or identify themes for discussion – apparently publishing ‘as a memorial to the cordial collaborations of

1 dave.cowley@rcahms.gov.uk
the congress’ provided enough justification. Indeed, most of the introduction dwells on the delay in bringing the volume to press, and most papers include a note from the editor apologising for this.

This raises another weakness of the volume: that many of the papers have since been superseded by other publications, or are simply out of date. Thus, the paper on digital visualisations by Vergauwen et al. is almost prehistoric, while the debate on image analysis/feature extraction (De Laet et al., Lasponara & Masini) has moved on considerably. This highlights an important issue, that if collections of ‘work in progress’ are to be published then they must be brought to press quickly, recognising that all too quickly they become of historical value only. Out of date, as well as poorly structured books, can be a graveyard for good quality work. While this volume contains some useful papers, they are lost in what I consider to be an out of date and poorly structured book. Thus, from my perspective the volume as a whole has little to recommend it. Nor is it cheap (£40/€48), and while production values (for a BAR) are not bad, including adequate colour image reproduction, it does not seem good value for a jumble of papers over 182 pages. And this is unfair on some of the papers in the volume, which are well-written, useful pieces, and begs the question of whether the authors are well-served by the volume. This, and other issues, will be explored below in a broader discussion of publication issues in aerial archaeology.

However, before this a slight digression on the history of the volume is in order, which draws on my involvement in the AARG committee in the period after the conference. The 2005 annual AARG conference was hosted by Marc Lodewijckx and his colleagues at the University of Leuven, Belgium. The event, as is usual with AARG conferences, featured many presentations of ‘work in progress’, structured in sessions including Managing archaeology in agricultural landscapes, Aerial Archaeology on the edge, Aerial Archives and Wartime and Military landscapes. At the time there was some discussion between the AARG committee and the hosts of the potential for a publication. The view of the AARG committee then, and repeated in subsequent discussions, was that the conference did not merit a publication, partly because many of the papers were interim statements of survey work, but also because of a lack of overall cohesion. The point was also made that some of the papers might be more usefully published in journals where they would have the impact they deserved. However, the editor Marc Lodewijckx persevered and the AARG committee distanced itself from the project, asking specifically that any volume was not badged as an AARG conference proceedings. This was done in order to ensure that sub-standard proceedings did not reflect badly on AARG. To judge by the volume that has appeared six years later, these concerns were well-founded.

Publishing aerial archaeology – why, where, when?

The weakness of A View from the Air highlights some of the problems associated with archaeological publication, especially for a specialism like aerial archaeology. Managing a balance in perception amongst the wider archaeological community between areas of specialisms and ‘fringe’ interests is important if methodologies and results are to get the recognition they deserve. When I began to get involved in AARG in the early 2000s, coming from a background of a ground-based archaeological surveyor with a broad interest in landscape, I was immediately struck by how introverted the aerial archaeological ‘community’ was. Conferences attracted little outside interest, and had a strong emphasis on
'talking amongst ourselves', coloured by a sense of being under-valued by archaeology at large. Aspects of this are entirely appropriate, as a specialist group needs to discuss matters of direct concern to its membership, but the sense of hiding under a rock and complaining about lack of recognition was less useful. Fortunately, by then the trajectory for wider engagement was already set, and has seen AARG develop as an outward looking organisation, whose conferences and other products (publications, training schools) are of interest to many. So it is disappointing to see *A View from the Air*, as part of the ‘public face’ of aerial archaeology/aerial remote sensing, appearing in late 2011 as a poorly constructed, out of date book.

Publication is an important part of the development of any discipline – and aerial remote sensing is no exception. For academics especially, ensuring impact is important, and what is published and where it is published are material considerations. The top-flight peer-reviewed journals score highly, as do volumes from academic publishers, while other forms of publications, including newsletters, are not rated at all in the impact and rating criteria. And to some degree this is appropriate, because peer review should be a means of ensuring high standards, and it also, albeit crudely, signals to readers outside the discipline that the subject matters. However, publications of varying type serve different functions. So, while significant methodological and theoretical developments and results should be tested by peer review in rigorously edited publications, the presentation of work in progress in less formal formats has a valuable role in maintaining profile and inviting comment from within special interest groups. In addition to these examples, there is clearly a role for edited volumes (peer-reviewed or otherwise), but they need to be of a certain minimum quality if they are to reflect well on the editors, contributors and discipline as a whole. In some cases speed of publication is of the essence, and this applies to *A View from the Air*, because most (all?) publications show their age in time, but in this case the volume was considerably out of date before it was published, surely a deeply undesirable situation.

Looking back some ten years, publication of aerial archaeology was relatively low profile, with a few volumes, some published in obscure places, and a scattering of papers in peer-reviewed journals. For example in the 2000 volume of *Archaeological Prospection* the overwhelming emphasis was on geophysical survey, with a single aerial-themed paper. Tracking this balance over the last decade there is a welcome increase in the number of aerial remote sensing papers, and this reflects a healthy, increasingly extrovert, discipline and recognition that a journal like *Archaeological Prospection* should be the natural home for much of ‘our’ work. Over the same period the contents of *AARGnews* have reported project work, carried some ‘internal’ discussion (i.e. theory in aerial archaeology) and facilitated the ongoing process of communicating amongst ourselves (editorial, chair-piece, books of interest etc.). Of course these are just two general models for publication, but they represent the formal ‘quality-assured’ on the one hand, and the informal, relaxed on the other.

I have rehearsed some of these issues because they lie at the heart of what is wrong with *A View from the Air* – that it has no apparent rationale. It contains ‘works in progress’ for which rapid informal publication is probably most useful, alongside rounded ‘complete’ papers and methodological discussion, for which peer review and the profile of formal publication are important proofing processes. It is not for this reviewer to dictate where articles should be published, but papers that do little more than present images and pure description are surely the natural fodder for newsletters, and it is worth noting that at times during the long gestation of this volume *AARGnews* was routinely short of copy. On the other hand, several papers
would have benefited from peer review and could have contributed to progressing the
discussion of feature extraction, for example. For myself, random collections of papers have
little role to play in publication and, without a clear raison d’être, they serve contributors
poorly and do little to help the development of our area of interest. Finally, there are papers
that are of ‘local’ or regional interest and some of these might have been better served in
creating some impact in specialist journals.

The key point I am trying to get to is that authors, editors and publishers should have a clear
view of what they are trying to achieve in a publication, and whether the proposed approach
serves that purpose. In my view, critical reflection on the Leuven volume should have led to
its abandonment, because as a book costing £40/€48 it has little to recommend it, and that is a
great shame.

The cost of the volume does however, raise a further matter that is becoming increasingly
problematic. As an active researcher based in a Government Agency, I do not have routine
access to electronic journals and publications. These are becoming ever more expensive, with
electronic access to single papers in journals routinely costing £25/€30, and many academic
books becoming eye-wateringly expensive. Indeed, the recently published Lasaponara and
Masini edited volume *Satellite Remote Sensing: A New Tool for Archaeology* is €129.95 for
the whole book or €24.95 per chapter. This is another issue to address in considering how and
where to publish, and highlights the need to create a balance between the (expensive) formal
and the (cheap and cheerful) informal, in ensuring that high-quality publications help advance
the discipline as a whole, while others hit their target audience, including the vital area of
‘talking amongst ourselves’ (i.e. writing something for *AARGnews*!!!). This has been a
necessarily personal commentary on publication, and I make no apology that it rehearses
some very basic issues in the hope that it may stimulate some discussion. In the evolving
world of publication, it is appropriate that communities like AARG periodically explore their
changing world – as electronic publication becomes more widespread, as impact is ever more
important to research profile and funding bids, and as approaches to communication develop.
Different modes of communication (of which publication is one) offer all sorts of potential –
from instant, essentially transitory (well – that is how I see it) facilities like twitter, through
blogs and websites, rapid electronic newsletters to (slower) formal publication. However, I
will conclude with the observation that asking the basic question of ‘why am I doing it this
way or that’ is vital to creating focus, identifying a target audience and ensuring a worthwhile
end product.
Books of interest?

Rog Palmer


Although planned for 2006, this book has been worth waiting for – and some of the post-2006 material is useful and relevant to the tale. First impressions? The design is good and the book looks and feels good. Text and pictures have been crafted together so that, in almost all cases, box features begin at the end of a paragraph or section which is much better than the more usual ‘design’. But design has come at the price of readability and my opinion is that the caption font is too small and some of the illustrations have been reduced beyond comprehension and one of the stereo pairs has been ‘designed’ so that it is extremely difficult to fuse the images (try setting your stereo at maximum interoptic distance). Martyn is a skilful author and has a way with words, so it is good to see that his editors have not completely changed his style to something they thought would be more appropriate to whatever image EH tries to present to the world. The purpose of this book is to tell a story, so the text needs to flow and retain interest. And it does retain interest, with flow helped by the use of endnotes rather than Harvard-type references. The endnotes, as well as the main text and illustrations, show the scope of Martyn’s research and some of the many corners he seems to have been the first (among the aerial crowd) to investigate.

Just as there are many different but correct histories of archaeology, so there can be many varieties of how archaeological aerial photography began and developed. AARG members may be aware of Martyn’s interest in the pre-aeroplane era (eg *AARGnews* 30, 9-16) and this occupies the first quarter of the book. Rightly so (probably) as the first three chapters chart people’s awareness of the aerial view, early ballooning and the development of photography and its uses in the air. These chapters and the next – on WW1 – are international in scope after which the focus narrows to England. Those slow ponderous aircraft of 1914 entered military service as reconnaissance vehicles and the next four years saw intense development of aircraft, cameras, aerial photography and photo interpretation. The war provided a legacy that was, by and large, forgotten by the military afterwards although it was the birthplace of photo interpretation and the awareness that aerial photographs are not always straightforward to interpret. There is a quote from a 1916 manual to the effect that ground knowledge is invaluable to the interpreter – something that is not always remembered by 21st century archaeologists working on plough-levelled sites.

Although the military may have forgotten lessons learned in WW1, some archaeologists had not and the 1920s were the time when this new technique to access the past was presented to the public. This book reminds us of how much ground investigation was carried out on early discoveries and shows what may be necessary to convince ‘traditional’ archaeologists in other countries. Crawford used *Antiquity* to publish numerous aerial photographs and notes about excavations of sites ‘discovered’ and this helped to consolidate the fact that aerial survey is the most important and prolific means of detecting archaeological sites and features.

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Those topics are covered in chapters 5 and 6 and take us to the Second World War (chapter 7) when aerial photography was at its most prolific [leaving me to wonder who manufactured all the film, paper and chemicals] and photo interpretation became huge operations that employed several academic archaeologists among its numbers. This chapter includes the immediate post-war years when the survey of Britain was undertaken and provided, for the first time, stereoscopic pairs of photographs of the whole country. This same post-war period saw the rise of St Joseph and the establishment of what later became CUCAP and his personal research department [my own view].

The final chapter (8) takes us into the 21st century. This is a bit of a plug for EH, but not many others can provide the range of examples and it is their book after all… Others also are mentioned in this chapter which gives a potted history of developments in aerial survey after the war. Many of the known names come into this phase – Pickering and Riley, for example – and, as this is the time of my own beginnings in aerial work, I would have expanded this somewhat. For example, the CAA exemptions in the late 1970s and 1980s, which were critical in building up a flying work force, are covered in a short paragraph. But maybe this is too recent to have yet become ‘history’? This chapter also comments on new data from satellites (which tend to be dismissed) and lidar (much sexier) and concludes with a postscript about Lt Sharpe’s 1906 balloon flight and his photographs of Stonehenge.

I enjoyed reading this book and would unreservedly recommend it (or certainly the last four chapters) to all students of archaeology regardless of their speciality. Why? Because it tells, in a clear, interesting and at times exciting way, the story of how and why aerial photography and interpretation of aerial photographs is so important to the discipline of archaeology. Many of us who teach at a practical level fail to get this across when we get lost in explanation, method and technique. And we should perhaps be proud that we are working in a speciality that has 100+ years (or maybe back to the 16th century!) of history – and exciting history at that. The author and EH should be praised for giving us this history and the series of tales that have been woven together to make it so interesting.

One final thought is to ask why this book is only available as a hardback? If it is marketed effectively it should become an EH best seller. If, as I think it should be, this book becomes essential reading for all students of archaeology, a half-price paperback version would be ideal for that market – unless this is another book that EH are planning to give away as a free download.


This book is a mixture of aerial photographs and environmental essays.

*From the product description:* Takes readers on a journey to bear witness to the environmental destruction that is currently plaguing the planet; from a forests devastated by mountaintop removal mining, to a regions left in ruins by the phosphate mining industry, J. Henry Fair presents hard evidence that society’s unchecked consumerism is leading the way in the destruction of the planet, one natural resource at a time. Beneath the surfaces of abstracted images lurk horrific realisations of global destruction.
I haven’t seen the book, only a few arty pics at: http://www.fgi.ixlidol.com/archives/4653


*Adapted from the authors’ abstract:*

The relationship of the biophysical characteristics of plants to their spectral reflectance has facilitated the development of various non-destructive sensing methods for detecting vegetation stresses, monitoring plant growth and calculating crop yield. Aerial archaeologists flying in small aeroplanes have only partially exploited this knowledge. Instead of basing archaeological interpretation on only direct visual inspection of conventionally acquired colour photographs, this contribution briefly reviews the reflectance properties of plants and uses them to present a new low-cost imaging technique beneficial for the detection of (faint) archaeologically induced vegetation marks. The new approach consists of three simultaneously operated digital still cameras, each of them capturing information in a different spectral waveband: the visible, near-infrared and red-edge spectral region. The latter two bands are used in the calculation of a $R_{700}/R_{800}$ vegetation index. Besides a theoretical underpinning, real-world examples will assess the potential of this new approach in detection of vegetation marks and prove that this low-cost, multispectral method might be beneficial in identifying and enhancing weak crop stresses that are lost when taking only the broad visible spectrum into account. In the final discussion, some thoughts on future archaeological aerial research are given.


This paper expands on the author’s contribution to *AARGnews* 33 on the same topic. It is useful to know the acquisition time of aerial and satellite photographs because solar azimuth and elevation will affect what can be seen and the clarity of its recording. It is made clear that other factors also affect a photograph or image – atmospheric conditions, filters used, processing and, with CORONA data, the quality of reproduction of the 2nd or 3rd generation negatives held by USGS. Test cases come from the site at Masada and reflect the need to use all available photographs when interpreting archaeological features.


This is one paper that won’t be out of date in this somewhat delayed volume as it demonstrates the use of CORONA and GAMBIT photographs/images to study ABM and related sites surrounding Moscow and their development during the Cold War years.

Lis thrust this book at me in Poznań with the words, “I hope you speak Danish.” No… but on the basis of the contents and a quick flick through it seems that this is a survey of and guide to collections of aerial photographs of Denmark. After a brief history of aerial photography over Denmark the book summarises the 10+ million items held in the Royal Library and then moves on to smaller collections and those held by Communes and in other countries. Internet links are provided to a lot of the collections, allowing a reader to pursue selected photographs. The numbers of photographs of Denmark is impressive as is the range of the book – from balloon shots in 1890 through to satellite images and lidar – with example illustrations throughout the book. A useful-looking Appendix lists the main vertical surveys and identifies the copyright holder of each. Finally, a series of tiny maps (possibly available at larger size on a web site) show areas flown in different years and scales.

Some papers from past CPIA symposia, including a few aerial ones, can be freely downloaded from: [http://cipa.icomos.org/index.php?id=28](http://cipa.icomos.org/index.php?id=28). Among these are:

Aerial and remote sensing archaeology in Eastern Macedonia, Greece by D. Kaimaris, O. Georgoula, G. Karadedos and P. Patias (2009)

*Authors’ abstract:*
A systematic and extended research was conducted in the area of Aerial and Remote Sensing Archaeology, in N. Greece (E. Macedonia), for locating new archaeological sites. Its main target was the locating of the marks of the buried ancient Via Egnatia that used to pass through two major ancient cities of the area, Amphipolis and Philippi. The research data consisted of historical and contemporary aerial photographs, diachronic QuickBird-2 and WordView-1 satellite images, as well as contemporary and historical maps. A new, targeted Geographical Information System was created for the documentation, management, study and analysis of the research data and the marks of the covered constructions. The system provides new management tools of spatial and descriptive information and even scientists with limited computer knowledge can use it with ease.

Documentation of geoglyphs on Nazca Plain, Peru using remotely sensed data by Hanzalová K and Matoušková E. (2011)

*Authors’ abstract:*
Thanks to spatial resolution improvement of satellite images we now have the potential to document our cultural heritage using remote sensed data. This work deals with the possibilities of evidencing cultural heritage using GeoEye – 1 and QuickBird satellite data. The objects of interest are geoglyphs located around Palpa village in Peru. Geoglyphs are commonly known as large structures built on the Earth’s surface. GeoEye – 1 scanner is distinguished by high spatial resolution, which is lower than 0.5m in panchromatic band. The second available image originates from BGIS2000 scanner located on QuickBird satellite and its spatial resolution in panchromatic band is higher – 0.61m. Both sensors acquire data also in multispectral mode and the spatial resolution is then 1.65m resp. 2.44m. Images are geocoded and then different classification methods are applied. In this paper different supervised and unsupervised classification methods are analyzed on both given datasets. The methods in question are then compared with the previously gained vectorized satellite data of the same area. In terms of the future analysis the best classification technique for identifying geoglyphs in the area of interest is found. Influences and
demands of the normalized difference vegetation index (NDVI) for the given area are also specified. ENVI software was used for all our analyses.


I enjoyed reading this but I’m not sure if I understood all of it. Authors’ abstract:

The origins of archaeological methods are often surprising, revealing unexpected connections between science, art and entertainment. This paper explores aerial survey, a visual method commonly represented as distancing or objective. We show how aerial survey’s visualising practices embody subjective notions of vision emerging throughout the nineteenth century. Aerial survey smashes linear perspective, fragments time-space, and places radical doubt at the root of claims to truth. Its techniques involve hallucination, and its affinities are with stop-motion photography and cinema. Exposing the juvenile dementia of aerial survey’s infancy releases practitioners and critics from the impulse to defend or demolish its ‘enlightenment’ credentials.

…and something to look forward to?


*Hyped-up product description:* In the early 1940s, in a grand, Buckinghamshire country house on the banks of the River Thames, a secret intelligence unit worked day and night to change the course of the Second World War. Its unconventional staff - a remarkable collection of brilliant, eccentric and enigmatic men and women - became some of the unlikeliest, yet most significant, heroes of the War. Bletchley Park had its famous code breakers, but this sister organisation, known as RAF Medmenham, was coordinating one of the largest spying operations ever undertaken - photographing World War Two from the air. With reconnaissance squadrons operating across the globe to produce millions of images, the Allies built up a real-time picture of the War as it happened. From Germany’s Blitzkrieg advances through Europe and the breakneck search for the terrifying Nazi ‘Vengeance’ weapons, to the Allied bombing campaign and the ferocious D-Day assault, the photographic interpreters of Medmenham and the daring Spitfire reconnaissance pilots fought the enemy on every front, denying them the element of surprise and constantly uncovering their secrets. Now, the classified imagery that Churchill used to plan his strategies and offensives - drawn from a vast archive of wartime aerial photographs, including remarkable 3D imagery - is being published in a unique illustration of the conflict. Ranging throughout Europe and featuring key events including the hunt for the Bismarck, the bitter struggle for the Mediterranean, the bombing of Hamburg, and the daring paratrooper assault of ‘Operation Market Garden’, ‘Above Wartime Europe’ is a landmark volume, revealing to the public for the first time the incredible, Top Secret aerial intelligence photographs that helped win the Second World War.
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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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.