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Editorial 1

The wheel
Several years ago I asked John Hampton, one of the founder members of AARG, why he no longer came to the annual meetings. His reply was that he was fed up with hearing people reinventing the wheel. Yes, there is a certain amount of reinvention, and while this may be necessary to provide each generation, and each country, with its own starting platform, I do sometimes wonder whether sometimes we are going round in circles – or spirals if you want the current theoretical equivalent. My philosophy on publishing (which means not only my own writing but also reading output by others) has always been that, other than purely factual stuff, its purpose is to outline ideas for others – and maybe oneself – to kick around. Nothing is carved in stone, nothing is necessarily right, or certainly should not be expected to be right for more than a few years. Our study of the past is constrained or freed by the available factual data and the theoretical concepts within which those are organised and manipulated. Taking, for example, a 70-year leap, it is apparent that the ‘culture concept’ – through which such authorities as Childe organised past Europe-wide societies – is no longer a valid or acceptable way of studying groupings of and interactions between past communities…. although it does seem to cling tenuously in some counties. The data have increased and improved and, more importantly, the ways in which we think about what went on in the past has changed dramatically, perhaps incomprehensibly to archaeologists of the 1930s (as well as to some of us in the 2000s!).

While it’s acceptable to reinvent the wheel if you add another spoke to the design or make it round instead of square, to come up again with the same answer from the same beginning is not really making any progress. I was surprised to hear myself reinvented at a recent AARG meeting – perhaps more elegantly than I put it in the 1970s and maybe with a different theoretical twist, but with little change that I can remember to the original ideas. In a way it was good to have someone – especially someone whose thinking I respect – show that I’d got it right 30 years earlier but at the same time it was frustrating not to see the ideas extended. That event was one thing that led to these paragraphs. Another is the paper in this issue by Johanna Dressler that echoes some issues that have been discussed for many years in Britain. The difference in this case is that Johanna is applying them in part of Germany where there are some different factors at play to those that concerned the Brits so, to follow my wheel theme, she is changing its design to suit the local terrain. The interaction between soils, crops, seasons and archaeological sites is something that should concern aerial observers and users of aerial photographs in any country. It helps provide a graduated background against which distributions of sites can be considered and enables some understanding of the reasons why some land is devoid – or apparently so – of past evidence. I am pleased to include Johanna’s paper in AARGnews but think that an essential next step is to get the same thing, or a longer version, published in German – and she has told me that moves are being made in that direction. Johanna is obviously a bit of a mover and shaker, having recently organised the meeting at Mainz for German and Austrian aerial people (see elsewhere in this issue and the AARG web site), and I look forward to following how she may extend the uses of aerial photographs in a country that has a long history of airborne observation and photography for archaeology. However, her search for a PhD supervisor in Germany is proving difficult, with ancient professors (in mind if not in age) claiming that there is little point and that Otto Braasch has done everything already. Such attitudes were identified by Michael Doneus at AARG 2008 when he said that it was your fault – or our fault – if archaeologists see ‘aerial archaeology’ as little more than discovery. His comment was not challenged, not commented on, and maybe not

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even noticed by many in the room, but it highlights a wheel that needs taking off and throwing away so that we can design a new one. As I’ve said in different forms so many times before….

Stubble burning

Recent conversation with Chris Going ended with us puzzling about the date range during which stubble burning was common practice in the UK. We had been talking about the post-war vertical photographs of the country and neither of us could recall seeing evidence of stubble burning on those despite the fact that a high percentage had been taken during the immediate post-harvest months. We thought it was worth asking AARG members what they had seen of this and what the earliest date was on which burning, or its after effects, had been recorded on aerial photographs. Chris and I thought that, in England, it may have been a phenomenon of the 1950-60s until whenever it was banned in the 1990s. Any comments?

Hadrian’s Wall…

English Heritage have recently, and probably rightly, publicised the fact that their internal Aerial Survey people have completed the mapping of Hadrian’s Wall and its environs as part of the National Mapping Programme. For any of you who don’t know, NMP was begun in the early 1990s with the intent of mapping, at a scale of 1:10,000, all archaeological features in England that were visible on aerial photographs (see AARGnews 4, 34). For Hadrian’s Wall, in a project that ran from 2002 to 2008, their ‘experts’ examined 30,500 aerial photographs and mapped 2700 new ‘landscape features’ within an area of 1725 sq km (‘names’ and numbers have been taken from EH’s website: http://www.english-heritage.org.uk/server/show/ConWebDoc.15029).

Impressive? There is, of course, more than one way of looking at these figures and I wanted to try and break it down into work per person per day. We know that such major mapping projects begin with the compilation of a project design, locating photographs, etc and we can anticipate that such an important project will end with a hefty publication, as is expected from any research department worth its name. So let’s deduct two years from that total, leaving us with five working years within which I’ll guess that EH’s experts may work 200 days per annum – a total of 1000 days. The web site doesn’t tell us the number of experts involved in the project, but if it was only one, he or she would be looking at 30 photographs a day on which they were finding, mapping and then documenting three new landscape features. That way it doesn’t seem quite as impressive, but it does give an idea of the sheer amount of work that needs to be undertaken by those of us who work with aerial photographs. Even finding nothing still requires that all the photographs are examined (and after finding nothing for a while, we begin to worry whether we’re having a bad day) so that part of the process takes about the same length of time whether there are 2700 new sites to find or none.

The working time-scale, the range of features now mapped, and the number of photographs available have all changed considerably since NMP was conceived. And, as with the old County Inventories that all three Royal Commissions were founded to produce, it seems as if the original idea to work NMP on a county basis has changed to a number of themed smaller projects. Official NMP presentations usually tell us how much of the country has been mapped, not what remains, and regardless of how it’s done – by counties, coastline, or ‘threat’ theme – there is still a vast amount of work remaining. Based on figures that EH announce, my current estimate is that completing NMP requires at least 40 years more work by which time some of the current experts will be in, or beyond, their 90s.2

... and Norfolk
Towards the end of January I attended a meeting organised by the external NMP Norfolk people to present some preliminary results of their Norwich-Thetford-A11 corridor work to an assortment of East Anglian people. This project focused on an area that is, or will be, favoured for development and expansion and thus its aims include providing mapping and documentation that will “...facilitate management and research decisions...”. The project is based at Norfolk Landscape Archaeology and so has easy access to Historic Environment Record data that may provide ‘factual’ evidence to go with features mapped from air photos. In addition, by working in advance of development there are opportunities for feedback from the diggers – much as I am given in Cambridgeshire. So some of the examples presented to us were able to pinpoint quite precise date ranges for features and to expand these to show, or suggest, development of sites and their environs based on those dates. There was also a particularly-neat example of thinking that Sarah Massey (now Sarah Horlock) showed when she joined and projected elements of triple-ditch adjacent to the Roman town at Caistor to produce a huge but convincing enclosure representing an earlier town defence or an enclosure that pre-dates the construction of the town walls. Previously, these features have been interpreted as a military defended site that pre-dated the town.

Of course, we were presented with the cherries – the good bits that stories could be woven around – but there was an enthusiasm from the Norfolk people that sometimes seems to be missing from other NMP presentations. In conversation afterwards, it seems that NMP data have been provided to PhD and other research students and that these are also available through the Norfolk HER. We look forward to seeing results of such work and can perhaps anticipate that such use will increase once there have been opportunities to absorb the results of any analytical publications that appear in which good use has been made of aerial data.

[I’m grateful to Sarah Horlock for detailed responses to some of my emailed questions and for correcting some of my notes from the meeting, although the words above are all my own work so please EH, do not throw her out!]

More Google Earth
In February 2009 GE 5 was announced and among its new features was what they called Historical Imagery. Sadly, their interpretation of ‘historical’ is not quite the same as ours and GE 5 does not include mosaics of all the old verticals. Instead – and most usefully – they have put back all the images that had been earlier layers in GE so we have the facility in a single web resource to move to a chosen location and browse through a series of photographs taken, or added, between the late 1990s and the present. There is also an attempt to attach dates to each layer, but it is not always the date of photography. The number of layers differs with the location – in places I’ve found only two, in others there have been five but it has increased the usefulness GE and tends to emphasise the point that ‘archival photographs’ become so on the day they are shifted from camera to computer (or to the box for anyone still using film).

This issue
We have a fairly Euro-centric content in this issue – Zoltán Czajlik’s summary of work in Hungary, Jo Dressler’s work in Germany, and a contribution from Pierfrancesco Rescio that was commissioned by Dave Cowley and based on a poster presentation about study of landslip in Italy. For serious fun we unveil the quadrocopter that has been developed by Graeme Collie and his colleagues at Heriot-Watt University, Scotland, and consider some of its uses for archaeological and architectural recording.
In the shadow of crisis: Chairman’s Piece

Włodek Rączkowski

September 2008 saw the start of the world financial and economic crisis. Does this mean that AARG will likewise find itself in the shadow of crisis in the next few years? Was the first symptom already visible in Ljubljana when, for the first time, the elected head of AARG was not from the UK? Fortunately, the AARG ex-Chair becomes Vice-Chair and so it is possible to make use of his experience in further activities. This could well be a flicker of light in the darkness of crisis. The strategy and plans already sketched out (Cowley 2008) will, as far as is possible, be put into action and developed.

The workshop in Iceland originally planned for May 2009 is the first casualty of the crisis. A lack of funding is preventing this workshop from taking place. But Dr. Kristín Huld Sigurðardóttir, Sólborg Una Pálsdóttir and Oscar Aldred from the Icelandic team as well as Dave Cowley from AARG are full of hope that the workshop will go ahead – hopefully in 2010. Any suggestions regarding potential funding sources are welcome.

Good news

To provide ‘momentum’ what we need is good news. It’s probably worth starting with Germany. ‘Since forever’ Otto Braasch has been spiritus movens for all activities connected with aerial archaeology in Germany (and almost all of Europe). At a recent meeting however, things were a little different. There were 47 participants in the Luftbildarchäologie in Deutschland one-day conference on 6th December 2008 organised by the Institut für Vor- und Frühgeschichte Johannes Gutenberg Universität of Mainz (see report by Johanna Dressler in this issue). The number of participants is proof that aerial photographs are still important to German archaeologists (thanks to Otto Braasch and Klaus Leidorf and other active aerial photographers), and the method is becoming ever more widely used. There has also been a marked increase in interest from German universities and this is a very good sign for the future. Another positive aspect is the foundation of a German-language (in-?)formal exchange network. I am certain that AARG will support any initiatives emerging from Germany. Also, others will be able to benefit from German experience in this respect.

Similar networks already exist in Denmark and Holland and it is probably worth considering their formula in relation to AARG. The AARG committee is delighted to support these networks, and sees the flexibility and informality of these groups as a significant advantage. The language focus and their ability to address national issues have already been shown to be valuable. As ever, one of AARG’s strengths is its international perspective and membership, and we look forward to working in a ‘multi-scalar’ way, both within national networks and in the international network of AARG.

More good news, this time from Denmark. Lis Helles Olesen from Holstebro Museum has been awarded a grant for her Prehistory from the sky project. The project will run for four years from January 2009 to 2013. The budget is about 650,000 DK. The aim of the project is to show and analyse the unique possibilities that aerial photographs can offer to researchers, planners etc., and to build public awareness of past landscapes through exhibitions, articles, papers, radio, television and so on. A better understanding of archaeological cultural heritage is also one of the main aims of the project, which encompasses nine different activities: 1) a survey of historical vertical
photographs through archives; 2) studying vertical photographs and flying in eight different areas in Denmark; 3) small scale archaeological excavations to test for previously unknown archaeological features; 4) aerial monitoring of scheduled monuments instead of ground visits; 5) aerial survey of national monuments; 6) aerial survey of coastal areas; 7) introduction of new technology, including LIDAR; 8) developing national and international co-operation; 9) dissemination of the results of the project to the general public. Our congratulations to Lis and ‘fingers crossed’ for top results.

Some optimism is also to be found in Poland. On 31 August 2008 a specific the Aerial Archaeology Unit was set up in the Institute of Prehistory at the Adam Mickiewicz University in Poznań. Among its aims are the following:

- to formulate and realise an interdisciplinary programme on the use of remote sensing techniques (mainly aerial photographs, satellite imagery or laser scanning) in studies on the past cultural landscape;
- the construction of a theoretical basis for the application of remote sensing methods in archaeology and participation in European initiatives regarding the use of non-invasive methods in studying and managing cultural heritage;
- active participation in the development of academic teaching methodology in European universities with the aim of preparing young archaeologists (and others) to use remote sensing data in the course of research into the past;
- participation in projects preparing educational materials for schools which would make use of aerial photographs in history classes; using aerial photographs to their full potential in order to inspire further research and consolidate the knowledge we already have;
- the promotion of remote sensing methods in the protection and management of the cultural heritage in Poland and other countries.

High aims indeed and we shall see just how much can be realised!

There have already been some developments. The Polish Archaeological Record (better known as AZP) is already familiar to many archaeologists in Europe (eg Jaskanis 1992). Almost 85% of the country has already been investigated using mostly the fieldwalking method. As readers will probably know, aerial photographs have not in the past been examined and applied within this project (eg Rączkowski 2005). So the discussion – what next? – has begun. Practically all comments on the subject have concluded that archaeological prospection should continue and be enhanced, along with other non-invasive methods. Using aerial photographs is starting to be seen as an almost obligatory method in the so-called AZP-2. A meeting of the Scientific Board of the National Heritage Board of Poland took place in Poznań in January 2009. The National Board acts on behalf of the Ministry of Culture and National Heritage to apply national policy within the field of the protection and management of the cultural heritage, including archaeology. One of its goals is to introduce and popularise new methodological standards in the research, recording and conservation of monuments. I was invited to give a lecture on the potential of aerial photographs in the protection and management of the archaeological heritage. I tried to do my best using APs as examples from almost all over Poland. All of the Scientific Board members were really quite impressed. Conclusion – aerial archaeology should be a core method of AZP-2. Fingers crossed – again! It is a good starting point to promote the method at a national level (until… political changes). The pilot project will probably start this year in the Wielkopolska region and the Aerial Archaeology Unit will be involved at both conceptual and practical levels.
Education has already been discussed at AARG meetings and by the EAC/AARG Aerial Archaeology Working Party (see Cowley 2007: 4-5). It concerns all levels of education as aerial photographs can be used at various stages. And here I have some more good news (though I am sure not everything has reached my ears). Two postgraduate courses related to the protection and management of cultural heritage have been created – in Poznań for Protection and Management of Archaeological Heritage (October 2008) and in Bydgoszcz Management in Archaeology (February 2009). In both courses AA is taught – 6 lectures in Poznań whilst Bydgoszcz will have 14 hours of lectures and practicals (including interpretation on-screen, tracing and rectification using AirPhoto).

The e-learning course in Archaeological Heritage in Modern Europe funded by the EU is up and running. The project is intended to consolidate European co-operation in the protection and management of the archaeological heritage education and training sectors. For the first time in the EU it involves the elaboration of methodology in e-learning solutions in the field of protection and management of archaeological heritage. It will then put together a programme of 15 multimedia e-learning courses covering the most significant issues in this field (including the application of aerial photographs). The project is conducted by a partnership of six institutions from EU member states: Germany, Latvia, the Netherlands, Poland, Sweden, and the United Kingdom.

Oh, and one more thing. In December the Institute of History at the Adam Mickiewicz University in Poznań will host a conference on the application of photography in historical scientific research and in history teaching. One of the sessions will be dedicated to aerial photographs. On behalf of the organisers I’d like to invite those of you for whom Polish is not a foreign language. ☺

So, lots and lots happening then. ☺ And for sure there’s even more activity and other initiatives out there that I’ve not heard of.
Perhaps the crisis is just a figment of our imagination?

Rome 2008 and …

At the end of September/start of October 2008, the Remote Sensing for Archaeology and Cultural Heritage Management workshop was held in Rome. It was organised by two Italian Institutes – the Institute for Archaeological and Monumental Heritage (IBAM) and the Institute for Environmental Analysis Methods (IMAA) – as well as the European Association of Remote Sensing Laboratories (EARSeL). The workshop was a forum at which researchers working on the application of a variety of remote sensing methods (APs, satellite images, hyper- and multispectral images, geophysics, Lidar etc.), 3D visualisation and virtual reconstruction, landscape archaeology and paleo-environmental study etc. could meet, discuss and exchange experiences. Some AARG members presented papers, including, amongst others, Bill Hanson (2008), who discussed The future of aerial archaeology (or are algorithms the answer?). This should also provoke wider discussion within AARG. I am sure we should tackle the subject soon. Bill’s paper, as well as many others, showed that there is a gulf separating aerial archaeologists and specialists in other remote sensing methods. We speak different languages and there is a lack of understanding between the methods/disciplines (in truth – the people). This means that meetings/conferences/workshops etc., such as those in Rome are an absolute necessity. Another point is that specialists in other remote sensing methods interpret archaeological remains and… this also should be the subject of wider co-operation. It seems that closer co-operation between AARG and organisations such as EARSeL, Digital Earth etc. might actually benefit us all.
Continuing this train of thought – one of the sessions – Interpretation, Interpretation,
Interpretation... *in the 21st century* at the AARG Annual Conference in Siena, planned for September this year, will highlight the problem. Looking forward to seeing you there!

The *Remote Sensing Archaeology* conference, the third in the series after Beijing (2004) and Rome (2006), will be held in India in Tiruchirappalli (see: www.spacetimeplace2009.org) and will be one of the earliest opportunities to continue the discourse between people applying different remote sensing methods in archaeology.

**Archives in the shadows?**

Archives are of constant interest to AARG and its members. At all conferences examples of the usefulness of historical aerial photographs are presented. None of the modern, air- or space-borne techniques will ever overtake their value in the study of past landscapes. Other difficult topics connected with photographic archives are being sorted out slowly but surely (eg, TARA, in its new home at RCAHW in Edinburgh – Ferguson 2008). In this context the future of the collection at the Unit for Landscape Modelling in the University of Cambridge (the former CUCAP) is a cause for concern. Rose Desmond, a stalwart there for many years, has in fact recently retired. Everyone who has ever made use of this excellent collection of photographs will remember Rose as a very open person, always willing to help. On behalf of AARG I would like to thank Rose for her great contribution and wish her all the very best in her retirement. The future of the ULM collection remains an important issue, one which we in AARG will follow closely. Will the economic crisis affect ULM? We hope the outcome will be positive.

**References**


* FIRST CALL FOR PAPERS *

International aerial archaeology conference

** AARG 2009 SIENA **

25 - 27 September 2009

Organised by the University of Siena, Italy, and the Aerial Archaeology Research Group

** Proposals for sessions, papers and posters are invited **

The following sessions have been proposed for the presentations and discussions on 25 and 26 September. Offers, posters and additional session titles of papers are welcome:

Aerial Archaeology in Italy and the central Mediterranean

- New Projects
- Postgraduate Research
- Interpretation, Interpretation, Interpretation...... in the 21st century
- The Death of Cropmarks?
- Engaging with Aerial Photography
- Conflict and Military Archaeology
- Beyond-Visible Archaeological Reconnaissance

27 September Conference Day 3: Field Trip

Note: session titles are provisional and all papers and session proposals are welcome.
Oral papers should usually be 20 minutes duration. Equal value is given to poster presentations.
Closing date for abstracts is 31st May 2009.

Conference Organising Committee
Professor Dr hab. Włodek Rączkowski (AARG, University of Poznań)
Dr Stefano Campana (AARG, University of Siena), Dave Cowley (AARG, RCAHMS)
Robin Standring (AARG, Cambridge), Lidka Żuk (AARG, University of Poznań)

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STUDENT/YOUNG RESEARCHERS BURSARIES FOR AARG 2009

These are to support bona fide students and young researchers who are interested in aerial archaeology and wish to attend the conference. Applications to Dave Cowley at the above address, by letter or email. 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 who can provide a reference; an estimate of travel costs to attend.
Closing date for applications is 31st May 2009.

Aerial Archaeology Research Group website: http://aarg.univie.ac.at/
The role of efficiency in aerial archaeological research of Hungary

Zoltán Czajlik

Introduction

In the cadre of the Hungarian-French archaeological cooperation, a programme was initiated by Miklós Szabó in 1992-93 to explore the possibilities of aerial archaeology in Hungary. The leader was René Goguey and the research was supported by the Region of Burgundy (Goguey and Szabó 1995). The cooperation ended in 2000 and – according to the personal interests of the participants – it focused on topographical research of Celtic sites as well as on exploration of the Hungarian section of the Pannonian limes. During the research programme a great number of structures has been found that range in date from the Neolithic to the Early Modern Age. When we began our interpretation of the photos, our closest parallels were from Western European, mainly from Eastern France (Goguey 1995, 1997, 2000a, 2000b). As the result of the aerial photo reconnaissance carried out every year at the beginning of the summer we now have 432 new archaeological sites. René Goguey has taken more than 4000 photos, building up the initial collection of the Aerial Archaeological Archive of the Institute of Archaeological Sciences, Eötvös Loránd University (Budapest). The archive now has more than 22,500 photos.

The most important results of the research period cannot be characterized by mere numbers or by the presentation of some important sites. During the cooperation between our institute and René Goguey, a different region of Hungary has been researched every year and the base airport has been changed respectively. Since the middle of the 1990s - as a result of this method - we have veritable data showing how fruitful the survey of certain regions and geographical units can be. This confirmed the research objectives of the foreign researchers, that parts of Hungary can benefit greatly from archaeological aerial survey.

This fairly recent recognition of this is principally because aerial archaeological research was not allowed in Hungary and other Communist countries between 1945 and 1990, although there was a hopeful beginning in the interwar period (Neogrady 1948-50).

After the political changes took place, research began at many Hungarian institutes. For example, research at the Institute for Archaeological Sciences of the Eötvös Loránd University included the creation of a GIS Laboratory to support archaeological excavations undertaken in advance of the M3 motorway construction. This enabled the use of new methods which had made significant changes in Western European research. Those methods have been developed, adopted and were introduced immediately. Although Hungarian aerial archaeology was ‘sleeping’ for a very long time, there are many technological changes, such as GPS, which provide effective help and have been used at Eötvös University from the beginning of our programme. More recently we have obtained georeferenced digital maps, satellite images and digital cameras.

Aerial archaeological explorations at the Institute of Archaeological Sciences of the Eötvös Loránd University now have a 16 year history. This can be divided into two 8 year phases: the first is the phase of Hungarian-French cooperation, the second is the phase of independent topographical research which has been funded by various sources from 2000 onwards. An

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earlier report dealt with our research between 1993 and 2005 (Czajlik 2007), this present article gives an overview of the experiences of the last 3 years (fig.1).

![Fig. 1. Aerial archaeological sites in Hungary, 1993-2008 (Eötvös Loránd University, Institute for Archaeological Sciences, Budapest) (László Rupnik, 2009)](image)

**The role of preparation**

A key factor when starting aerial archaeological research in new regions is access to precise archaeological topographical data. Although topographical research was started in Hungary in the 1960’s (MRT) and has increased in the last 10 years, there are detailed data for approximately 20% of Hungary.

For this reason, part of the database (a site cadaster) at the GIS Laboratory of the Archaeological Institute of Eötvös Loránd University - which was compiled between 1998 and 2001 - had an important role in research. This database includes many entries about sites which have features visible on the surface (Nováki et al. 2006, Czajlik 2008 in press, Anders et al. 2008 under acceptance) and so can provide information about known sites where aerial photos never have been taken. There is also the chance to discover regularities when a series of sites are being intensively observed which have the same size, layout or disposition.

An example of parallel use of the topographical data and the database of prehistoric fortifications is the research at the Benta valley. With the help of the aerial photography we

![Fig. 2. Traces of Bronze Age fortifications at Hajós – Hildpuszta, identified on aerial photos](image)
were able to identify a chain of Middle Bronze Age fortifications (Vicze et al. 2004). A similar row of neighbouring fortifications could be identified at Hajós-Hildpuszta (fig. 2.).

Where research has been less intensive, old documents can help us identify locations of more recent sites as has been the case with Medieval churches. In 2008 we cooperated with András K. Németh in Tolna county who helped identify the locations of many Medieval villages. Thus became often possible to identify the remains of the very small churches (10-15 m) from low altitude, despite of the undulating features of the landscape (fig.3). The preliminary data collection enabled us to identify zones in the region where crop marks may be expected.

**Traditional documentation in the cockpit = less sites discovered!**

There is a period in every year, when the time available for observation, identification and photography is heavily influenced by the time demand of documentation within the airplane. This can become more evident when there is a drought (e.g. in the years 2000 and 2003 in Hungary). Paradoxically, there can be less time for photography as the number of sites increase and their documentation consumes the time - even when the pilot helps or there is an assistant on board. The traditional way of documentation is very time-consuming in the case of complex sites (Leidorf 2001) and it is possible to loose a site from sight when there is a group of four or five close together.

Using a film camera we could only dream of the possibility to link it directly to a GPS unit but in the digital age that facility is already provided by some manufacturers. Coordinate data are written to each image file which makes written documentation redundant and removes the problem of having a sequence of photos without geographical locations. However, it is useful to download the data track of the onboard navigation GPS as this can be helpful if there is a problem with the GPS unit of the camera. The locations of known sites (see: Cowley and Macleod 2008) can also be uploaded into the navigation GPS and it becomes easy to identify any newly discovered ones. We have to remark that the Hungarian topographical maps have a scale of 1:10,000 that enables a more accurate identification of the sites compared to the 1:25,000 or 1:50,000 scaled maps of many European countries.

**Positive feedback: the role of the field survey (fig. 4)**

Since the spring of 2006 we have put considerable emphasis on the field surveys of sites we have discovered from the air. As well as collecting archaeological finds, we make general observations on the geomorphology and are able to help identify those soils where aerial archaeology proved to be effective. Evaluation of these results helps us to find the optimal locations and dates for taking photos.
In the region of the Southern Transdanubia there are many meridional valleys and the numerous archaeological sites were difficult to understand using only aerial photographs. In these cases, a combination of surface and aerial research proved to be much more effective.

Fig. 4 (right). The locations of the intensive field surveys in Western Hungary. (László Rupnik, 2009)

Fig. 5 (below). The valley of the Leperdi streamlet between Szakcs and Felsőleperd with the sites identified during aerial survey (Zoltán Czajlik, June 19, 2005; June 13, 2006, analysed and rectified by László Rupnik, 2008)

Fig. 6 (above). Surface finds from the valley of Leperdi streamlet. 1-3: Felsőleperd – Vadfogó W; 4-6: Felsőleperd – Vadfogó 2; 7-9: Szakcs – Somkút-dülő, beyond Leperdi streamlet (László Rupnik, 2008)
An example comes from the meridional valley of the Leperdi streamlet where there was an active watercourse North of the Roman period settlement recently identified as Iovia (Bertók 2000). We repeatedly photographed the area in 2005 and 2006 and identified three sites. During field walking of the area, we observed a fourth one (figs. 5-6.). Comparison of the photographic results and the surface collection led to important conclusions. Despite the clearly-observable phenomena observed from the air at both Szakcs sites, repeated field walking produced relatively few (and atypical) finds. However, in similar conditions in the northwest part of the area, relatively-dense surface finds identified the location of a medieval settlement without the help of an aerial photo. At Felsőleperd, Vadfogó-W, the structures outlined in the aerial photo and the quantity and quality of the collected material coincided but it could not be determined if the ditches on the photographs indicated a recent field parcel or they separated parts of the much-earlier settlement. We were unable to identify the date of the semi-subterreanean buildings (Árpádian period?) or to be certain from which structure on the photographs the finds of Roman walling bricks belonged. It is obvious that the integration of the two non-destructive methods yields more information than traditional field walking alone. This is especially true at sites that produce few surface finds.

In the region of Tóköz we have found few surface finds despite there being very distinct crop marks. Sites in this area have been photographed in three years (2003, 2007, 2008) and were field walked in the spring of 2008. For example, field walking at Veszkény (fig.7) produced no finds but this was probably because it lay in a local depression. Traces of recent flooding were noted during the field survey. These, along with general observations in the region, suggest that a considerable number of the sites may now be covered.

Despite the problems mentioned above, the soil that formed over the Pleistocene gravel layer is responsible for the outstanding results of the research (fig.8). The consequence is that the number of the sites found during aerial survey is more than double the number identified from field surveys.

By timing our field surveys suitably, we could examine land where usually the subsoil water level is high. Thus we were able to explore the valley of the Sárvíz in 2008, although this had been difficult in the past. During the field surveys we became aware that there were local patterns of sandy areas. Some were beside former water courses while others were local high areas rising from the field’s surface. These differences in soil type and water level encouraged crop growth and we were able to observe and photograph sites as early as the end of April (fig. 9).

Our project has demonstrated that aerial archaeological research in Hungary is not just complementary to field survey but can itself open a new dimension in archaeological topographical research – as it has done it in Western Europe (e.g. Nouvel 2005). Our challenge is to produce photo maps in a country with large fields where control is poor so that
Fig. 8. Szárföld – Átaljáró. Details (a-c) and analyses/rectification (d) (Zoltán Czajlik, June 22, 2003; June 10, 2007, analysed and rectified by László Rupnik, 2008)
these can be accurately related to field surveys. We also are looking ahead to the completion of a series of test excavations at key sites.

Translated by Lőrinc Timár

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GIS-based analysis of aerial photography, soils and landuse

Johanna Dreßler M.A.¹

As a child, my father sparked my interest in aircraft and in flying; an interest that has remained to this day. Not surprisingly, when I started studying archaeology at the Johannes Gutenberg-University of Mainz, I was drawn to the subject of aerial archaeology, so I made this the main focus of my studies. Since 2004 I have had the opportunity to undertake aerial surveys for the Landesamt für Denkmalpflege Hessen and the DFG-Project Fürstensitz Glauberg. From January 2007 to March 2008 I wrote my master’s thesis, entitled: GIS-basierte Analyse zur Anfertigung archäologischer Luftbilder zwischen Hunsrück und Vogelsberg. In the following pages, I will present a summary of my work.

1. Introduction

It is a common fact that fewer observer-targeted aerial photographs have been taken of the Central German Uplands than the fertile plains. This phenomenon, and analysis of its causes, is the foci of my thesis. This fact raises several questions:

Do we see no features because no-one settled there?

Is the former use of this area not able to form features that will be visible on aerial photographs?

Is development of aerial archaeological features influenced by natural circumstances like vegetation cover, the quality of the soil, or the level of afforestation in this region?

Has the number of archaeological survey flights been sufficient, or have they been restricted because of a lack of interest or finances?

As a geographical frame, four sheets of the 1:25.000 map of Germany were chosen: map sheet 6012 (Stromberg) and 6014 (Ingelheim) in Rhineland-Palatinate, as well as map sheet 5618 (Friedberg) and 5620 (Ortenberg) in Hesse. These were chosen because of their positions in the landscape, their history of settlement and research, plus the rate of aerial surveys.

Figure 1 shows the four map sheets located in the Rhine-Main-Area. It shows the maps in their geographical context and relation to each other. The Rhine-Main-Area is one of the biggest urban agglomerations in Germany and very densely populated. It is surrounded by huge agricultural areas on one side and large woodlands on the other. To the north there is the Wetterau (map sheet Friedberg) and in the west lies Rhinehesses (map sheet Ingelheim), both belong to the oldest German cultural landscapes and have a long history of research. Situated at the north-east edge is the Vogelsberg, at the south-east border the Spessart, the biggest German woodland areas, and at the north-west corner is the Taunus, another heavily-forested upland.

As noted previously, more aerial photographs have been taken over the fertile plains than the Central Uplands. Hence one of the main foci is on the transition areas, where the lowlands shade into the mountainous zones (map sheet Stromberg and Ortenberg).

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The first step was to collect every aerial photograph taken within my research area. The sources were the aerial archives of the Landesamt für Denkmalpflege Hessen (the majority taken by Otto Braasch and Klaus Leidorf) and the private archive of Peter Haupt at the institute of Pre- and Protohistory of the University of Mainz. Pictures included features from every archaeological and historical period, be they plough levelled or upstanding, as well as those targeting geological phenomena. The location of each photograph was then mapped using ArcGIS 9.2.

Figure 1: Overview of the woodlands and the biggest, connected built-up areas in the Rhine-Main-Region as well as the proximate airspaces around Frankfurt Airport. The grey squares mark the position of the map sheets (from west to east): 6012 Stromberg, 6014 Ingelheim, 5618 Friedberg and 5620 Ortenberg

For the evaluation, the available field capacity up to 100 cm ground depth was used as a base map. The available field capacity is the maximum amount of water or moisture the soil is able to hold and which is available for growing crops. (In short, the available field capacity describes the quality of the soil.) It is classified in six levels: very low (1), low (2), medium (3), high (4) and very high (5). Populated and non-agricultural areas are zero.

Un fortunately it was not possible to get any meteorological data in addition to the available field capacity. This would be quite interesting as well.
2. The map sheets
The state of source (historical as well as archaeological and literary) of the separate sheets is quite different. The four map sheets show four individual situations with four divergent results.

The sheets Ingelheim and Friedberg have a high density of aerial photos – this is not surprising in view of their long history of settlement, without any hiatus from prehistoric through roman to medieval and modern times. By contrast, the sheets Stromberg and Ortenberg are characterised by few aerial photographs other than those taken of “special” features such as the Celtic burial mound and the related oppidum in the south-west corner of the sheet.

a. Ingelheim (figure 2)
Ingelheim (map sheet 6014) is situated in the northern part of fertile Rhine-Hesse. Due to climatic, hydro- and pedological conditions as well as its location at the confluence of the Rhine and Main and Nahe, the area has been constantly colonized from early neolithic times.

Figure 2: Mapping of all known aerial features on available field capacity of the map sheet Ingelheim. [Geobasisdaten (TK25) © Landesamt für Vermessung und Geobasisinformation Rheinland-Pfalz, 09.02.2009, Az.: 26 722-1.401]
Ingelheim benefitted from the presence of Charlemagne and the vicinity to Mainz. Since the later first century AD Mainz was capital of the Roman province *Germania superior*. By the 6th century, Mainz held a verifiable bishop’s see. In medieval and early modern times Mainz became more and more important as a religious, political and economic centre.

The mapping of all air photos on the available field capacity shows that most features are located on good-quality soils. 58% of the features are situated on level 5 (highest quality of soil), 19.7% lie on level 4, 9% on level 3, 4% on level 2 and 8.3% on level 0 (no quality unascertainable).

In the centre of the eastern half a significant concentration of First World War features is visible. At the beginning of the 20th century a line of fortifications was constructed to the south and west of Mainz. At the outbreak of the Great War, the line was fortified and systematically enlarged. After the Treaty of Versailles the concrete buildings were blown up and the zigzagging trenches were partly left open, partly filled up. Nowadays the bunkers and ditches can be detected as crop marks from the air. The placement of the positions is well known from contemporary charts, and can also be reconstructed from aerial photographs. In the southwest of Wackernheim, few traces are now visible although it is known from historical maps that the line continued further north to meet the Rhine.

According to the aerial archaeologist Peter Haupt’s statement, air surveys were made in this area. From the map, it is noticeable that the soil quality is poor in this area and we can see that lower soil quality goes hand in hand with a lower density of aerial photographs. This does not indicate a lack of archaeological features in the ground, but rather their limited visibility.

### b. Stromberg (figure 3)

The region of the map sheet Stromberg was neither highly populated nor of particular importance in historical times. Furthermore the non-wooded area is mainly used as meadows or for winegrowing. This minimises the opportunities of detecting soil and crop marks. For these reasons, only a few archaeological features have been photographed from the air. There are only 21 known ones, a quantity that is too small to make a useable statement. But several prehistoric burial mounds and deserted medieval villages are known and denoted on the map sheet. It can be assumed that these sites can be discovered by focusing on features other than only those that produce crop marks.

### c. Friedberg (figure 4)

Because of its location in the midst of the fertile Wetterau, Friedberg, like Ingelheim, has been populated since the early Bandkeramik Culture. The Romans identified its capability as a bread basket and in Roman times the Wetterau was elaborately integrated into the Roman Empire. The Wetterau became the object of intensive research as early as the 19th century (it was, for example, a classic area for research into the oldest neolithic period). Due to the agricultural use of this region it is particularly suitable for aerial survey which, since 1980, has led to the detection of numerous sites.
Figure 3: Mapping of all known aerial features of the map sheet Stromberg. [Geobasisdaten (TK25) © Landesamt für Vermessung und Geobasisinformation Rheinland-Pfalz, 09.02.2009, Az.: 26 722-1.401]

Figure 4: Mapping of all known aerial features on available field capacity of the map sheet Friedberg. [Datengrundlage (TK25): Hessische Verwaltung für Bodenmanagement und Geoinformation]
The distribution of features against the available field capacity is different to Ingelheim and shows most to be on level-3-soil (70%), a further 17.9% lie on level 4, with 7.6% on level 2 and 9% on level 0. Apart from the fact that there is no level 5 soil on the map sheet Friedberg, it still can be postulated, that most of the features are situated on soil of higher quality.

Despite the comparable archaeological, historical and natural circumstances, the map sheets did not give similar results. In contrast to the Ingelheim sheet, the designation and dating of the known features from the sheet Friedberg is “non-definable” (42.2%) or “Roman” (51.3%). No further chronological classification exists, because field surveys were rarely carried out after the flights.

As well as sites recorded from the air, it was possible to add archaeological features found by other means, for example during construction works or field survey. It is striking that the two layers (aerial and other) do not coincide. This shows quite plainly how different methods complement one another. Due to the proceeding destruction of archaeological features by the rapid development of housing, agricultural and commercial areas or by their loss to or masking by soil erosion, the inventory and documentation of features becomes more and more important.

d. Ortenberg (figure 5)

As a result of its location at the border to the Vogelsberg, Ortenberg was far less populated than the Friedberg area and played only a minor part in the history of Hesse. The region gained in archaeological importance during the last decades due to the discovery of the Keltenfürst of Glauberg.

The Glauberg lies in the southwest corner of the map. The earliest findings belong to the Rössener and the Michelsberger Kultur (middle neolithic times), whose traces are irregularly scattered over the plateau. An earliest fortified settlement dates to the Urnfield Culture and during the early Iron Age the Glauberg became an important Celtic oppidum with several related burial mounds. The famous Celtic burial mound with the grave of the Keltenfürst was detected during a flight in 1988. Since 2002, excavations carried out by the University of Mainz have taken place at the Glauberg and since 2003 systematic air surveys have been carried out.

A large number of marks that form circular structures cluster around the Glauberg. Besides an area of level 4 soil to the north and east of the Mount Glauberg, the plateau itself and the southwest and northeast flanks consist of level 2 soil and the nearby environment of level 3. So, in this area, most of the aerial photographs show features located on poorer-quality soil. On one hand this means that if an aerial observer has the motivation to conduct intensified aerial survey over areas of lower quality soils there are possibilities to record visible marks.

3 http://www.archaeologie.geschichte.uni-mainz.de/Forschung/Glauberg.htm (status: 31.1.2009)
4 To speak from my own experience I know that the Mount Glauberg acts like a magnet to an aerial archaeologist flying over this region. Our flights took place by order of the DFG-project of Glauberg and use the airfield of Gelnhausen, approximately 8 flying minutes south of Glauberg. Every time after prospecting we flew to and over the western adjacent Wetterau while neglecting the ‘unpromising’ zones in the north, north-east and east. There are no known aerial pictures of this land because no one ever flew there.
On the other hand it shows how the method of aerial prospection is influenced by circumstances such as the archaeologists’ flight preferences.

Figure 5: Mapping of all known aerial features of the map sheet Ortenberg. [Datengrundlage (TK25): Hessische Verwaltung für Bodenmanagement und Geoinformation]

3. Perspectives
The visibility of aerial archaeological features depends on many parameters: not only natural circumstances such as natural cover and the quality of the soil but also personal ones like the preferences of the photographer, the project management or aeronautical factors (prohibited airspaces, minimum flight altitude etc.). In his book *Archäologie aus der Luft – Arbeitsergebnisse der Flugjahre 1960 und 1961 im Rheinland* (the first compendium for aerial archaeology in German language) Irwin Scollar published a map with the subtitle 'Eignung für Bewuchsmerkmale im Rheinland in normalen Jahren'. He analysed the applicability of aerial archaeology for his study area, the Rhineland, in consideration of the soil, geology, density of tree cover, the course of the weather etc.

With this map in mind, I asked whether it is possible to create an overview of a region that indicates its potential for aerial survey before taking off? Mapping the available field capacity seems likely to provide a good base to someday create a map similar to that made by Scollar. Since I started working with aerial photographs, I thought about developing a kind of a compendium that indicates in what region, on what soil, after or during what kind of weather conditions one should fly to photograph aerial features at their best visibility. I know that the factors are probably too many and unforeseeable but maybe one can get near to it.

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Recording Landscape and Urban Areas Modification: an example from Southern Italy

Pierfrancesco Rescio¹

Introduction

More than four decades have passed since the first archaeological interpretations of aerial photographs of the Tavoliere, north Apulia by John Bradford. He was a pioneer in promoting the investigation of ancient landscapes in their totality and saw the potentials of aerial archaeology and landscape archaeology (Bradford 1949, 1950, 1957; Bradford & Williams Hunt 1946). The flexible approaches of landscape and aerial archaeology give the opportunity to remotely examine the landscape and potentially to fill the gap between the study of individual settlements and the study of territory and its transformations. For these reasons, the geology and geomorphology of the research area make an ideal test-bed to examine the potential of aerial survey as an investigative tool, on both small- and large-scale sites and on their natural environment and its changes.

In addition to their archaeological uses, modern geographical databases, cartographical data, satellite and aerial photographic images can also assist in the study of historic geographical hazard areas. The quality, completeness, resolution and reliability of the landslide inventory maps are rarely ascertained and this compromises the reliance that can be placed on the hazard or risk assessment based on these data. However, this can be improved by input from photo interpretation and field investigation.

This paper reports on research into the dynamics of prehistoric and historical settlement in relation to environmental change and the transformations of the landscape in southern Italy, especially in Basilicata, Calabria, Campania and Apulia, regions of peninsular Italy. This area has a complex of little-known settlements, across a range of geological regions (Ogniben 1969), and allows the research to move beyond the simple exploitation of landscape resources, to include the study of settlement patterns within the same territory (Rescio 1992; Coppola et al 2006).

Methods of analysis

Data on archaeological sites has been compiled to reflect two main factors. Firstly, the record of the archaeological sites themselves is based on aerial and landscape survey. Secondly, the geological-geographical record that gives the location of the sites is based on analysis of the literature on slope movements in the study area. Single landslides and landslide areas for which information was available were identified and sites where landslides were studied or where slope failures were reported were checked in the field. Landslides were identified and mapped in the field at 1:25,000 scale. Field checks concentrated mostly in the urban areas and along the main and ancient roads. Systematic interpretation of aerial photographs and landscape analysis guarantees a more detailed history of past landslides and their connection with the degradation of some historical monuments and settlements. Comparison of the two landslide maps in a GIS allows for a quantitative estimate of the differences between the two inventories. Use of a GIS also allows us to combine the modern aerial photos with numerous

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vertical and oblique historic aerial photographs for the study area. The micro-landscapes round hillforts are being mapped systematically by aerial photography and LiDAR data.

The project is still at an early stage, but the collection of data has covered an extended area, recording archaeological sites, soils and history in the best visibility. These provide the resources needed to complete the inventory maps, and study the possible effects of the differences between the landslide maps for ascertaining historic landslide hazard and for determining landslide risk in the present.

Medieval settlement and landscape

The archaeological records of the prehistoric and historic period, but especially of the Medieval period (5th – 11th century A.C.), show the beginning of the settlements that have conditioned the subsequent land use of the whole territory. Modification of the surrounding landscape is also evident, relating to the abandonment of urban areas and the population of ‘open spaces’. The invasion of Southern Italy by the Lombards (after 568 A.C.) can be seen to have a significant impact on the nature of settlement. Of particular note is the preservation, in a variety of abandoned urban areas, of features dating from medieval and earlier to the present day. These include, by way of example, some settlements of Northern Apulia and Basilicata (i.e. Aliano (Figure 1) and Campomaggiore (Rescio 1997, 1999b), the Roman city of Grumentum), in Campania (i.e. Maddaloni and Castel Cicala near Nola, and Quaglietta near Salerno) and some cities of Northern Calabria (i.e. the Norman settlement of Scribla). However, the distribution of urban areas is not uniform and, even before the Lombard invasion, some parts of the territory, like the catchments of the Agri and Basento rivers in central Basilicata, or southwestern Apulia (the cities of Craco (Figures 2 & 3) and Uggiano (Figure 4) near Ferrandina, prov. Matera), had fewer town centres or, indeed, none. It appears that the varying environmental characteristics of territories and local limitations to agricultural exploitation are the main causes of recurrent interference to the vegetation cover (Rescio 1999a), that created the pre-conditions for events that might escalate into natural disasters, such as increased soil erosion and vegetation loss.

Figure 1: Aliano, Basilicata, South Italy. The historic medieval centre on variegated clays.

Figure 2: Craco, Basilicata, South Italy. The abandoned settlement has preserved intact all architectural structures and is valuable for understanding the evolutionary dynamics of the landslides.
The archaeological sites known in the study area range in date from the Neolithic to the Middle Ages. Comparing the archaeological and geomorphological records strongly suggests that settlement dynamics over the millennia have been strongly influenced by variations in hydrographic regimes, and in particular strong differences in the rates of incision of valleys. In this respect, different territories with their varying geological characteristics have seen communities creating different subsistence strategies that are best suited to those localities. A progressive colonization of land can be seen, including the steepest slopes and hilltops, where frequent use was made of so-called ‘slash-and-burn’ techniques, where cutting of vegetation and subsequent burning are used to prepare land for cultivation. These practices and the environmental factors, such as increased riverine incision, caused significant environmental deterioration, have strongly influenced post-medieval settlement and agrarian production.

**Landscape Archaeology**

Uses of the analytical techniques of landscape archaeology to study change and modification have been well documented in the settlements of Castelnuovo di Conza, Salerno (Figures 5 & 6), Uggiano (Figure 7), Matera (Figure 8), and Campomaggiore (near Potenza, Figures 9 & 10). In this southern Italian case study the landscape approach, combining information against a geographical background, has given interesting results. Our working strategy produced a morphological classification of different types that occurred in particular positions of horizontal and vertical stratigraphy. For example, results were achieved by utilising the observation that fields had been added to an original core of settlement to extend the survey territories across larger areas.

Geomorphological studies of deep sediments on the alluvial plain and at the mouths of some rivers in the mid-Adriatic have demonstrated the presence of a Bronze and Iron Age phase of slow sedimentation of river mouths. This is attributed to anthropogenic activity that produced an increased sediment load in the rivers, almost certainly the result of vegetation clearance for agriculture and consequent soil erosion in the river catchments. Erosion was exacerbated by the extent and sophistication of systems of water capture for Roman agricultural practices. For example, walls and cisterns, such as have been discovered during archaeological surveys and excavations, especially in the central areas of Basilicata.
Figure 5: Castelnuovo di Conza, Campania, South Italy. An ancient structure (the 16th century) recovered during the survey, in areas where water is absent. The presence of particular monuments indicates climatic transformations and land use change.

Figure 6: Castelnuovo di Conza, Campania, South Italy. Recording of contemporary landslides in combination with archaeological and topographical data.

Figure 7: Uggiano. The degrade of part of vegetable mantle below the archaeological site allowed the abandonment and the actual destruction of the settlement.

Figure 8: Matera, Basilicata. The historic town, where the stones with caves are timetable elements for other known archaeological structures.
The occupation of the study area by the Lombards provides us with a period where material culture and documents enjoy a creative reflexive relationship that includes the contemporary cultural landscape. Though this approach tends to be regarded as illustrating an account based on written sources, the role of the material culture is of equal value.

**Settlement and Landscape Dynamics**

This work has shown how much the land use varied from period to period, so that, for example, some zones that were central to Roman agricultural activities became marginal in following period, acquiring new functions. Similarly, some urban areas remained in use, elsewhere there were new foundations, and others were completely destroyed or seriously damaged. Here, the evolutionary dynamics of the archaeological landscape can be examined against smaller geographical units and can be reconstructed through a diachronic analysis of the interactions springing from the presence of existing architectural structures in the physical environment.

An outline of the mechanisms triggering major hydro-geological change in these regions shows that the analysis of slope stability is one of the most complex problems to be addressed, especially in this area of the Apennines. In past centuries, landslides called “calanchi” and underground collapses threatened a great number of settlements causing their abandonment. Nonetheless, the evolutionary dynamics of the ecosystem of a minor physiographic unit may be reconstructed by a multi-temporal analysis of the interactions between historical-architectural settlements and its local environment. From a geological and archaeological point of view, the relationships between geotechnical properties and settlements are very complex, not only in respect of the mechanical aspects, but especially the physical-chemical characteristics related to the molecular structure of the fine fraction of the stone and the nature of the buildings. Therefore, a good knowledge of climatic variations as a function of the rainfall is required in order to understand the triggering mechanisms of landslide movements.
The reconstruction of the processes of modification of this environment, connected with the history of the modifications in the location of the centres of human aggregation, can favour an evaluation of the causes and the effects in the process of transformation of past landscapes. The impact on the territory of important archaeological sites and temples and ancient human activities have certainly induced modifications in the local environmental ecosystem, suffering themselves in turn the influence of the same modifications.

References
Small but Perfectly Functional – Quadrocopters and Archaeological Recording

Graeme J Collie, Mike Smith, Ian Black

Although many archaeological excavations are funded either by industry or by national bodies, an increasing number are small local initiatives often manned by volunteers. Impecunious Site Directors face the challenge of how to record their site with vertical photographs. Traditional methods have involved gaining a vantage point by mounting a nearby natural or manmade feature, or by using a step ladder. Better-funded excavations have built scaffolding towers. Other more recent developments have included the use of Cherry-Pickers, camera-on-a-stick techniques, kites, balloons or radio controlled (RC) aircraft. All of the aforementioned have their own disadvantages. This paper introduces the RC Quadrocopter as a stable, versatile, cost-effective, flying photographic platform. The paper explains the technology and outlines the advantages of the quadrocopter over rival systems. It also objectively considers the limitations of this device, and suggests future developments and improvements.

Plan photographs are an extremely important means of recording archaeological digs, they are however frustratingly difficult to obtain. A typical excavated area may be as much as 100 m² and positioning a camera above and directly over the centre of the exposed area has taxed the minds of diggers since the invention of the camera. Enterprising Site Directors have ordered junior archaeologists up trees or onto the roofs of adjacent buildings (Fig 1a). As well as being an extremely questionable practice in these days of heightened health and safety consciousness, this also relies on the availability of a suitable perch within reasonable proximity. Slightly safer and more versatile is the use of step ladders (Fig 1b). Better still is the use of a purpose-built scaffolding tower, although the latter can be expensive, and requires specialist erection and a sound footing. It should be noted that none of the methods suggested so far will produce a true plan shot.
For several years David Wooliscroft has used his camera-on-a-stick method which provides a spectacle that no-one who has seen it will ever forget (the experience is best described as exciting but unpredictable: Fig 1c). This method has recently become popular among local archaeology groups, due mainly to its low cost. However, the results are less than perfect. One variant of this technique, adopted by RCHAMS, is their Landrover-mounted Hi-spy system which is safer and more stable and can provide real-time monitoring of pictures. However, it would not provide a true vertical shot and, as with all vehicular-based solutions, site access may be limited. More recently we have seen the use of cherry pickers which provide a safe working platform from which vertical shots can be made. However, these are expensive to hire and can only be used where site access allows.

It was obvious early on that what was required was a cost-effective flying platform and, over the years, various means have been used to achieve this. These include tethered blimps (Summers 1993), kites (Knisely-Marpole 2001), and radio controlled aircraft (Schönherr 2001), with varying degrees of success. Kites are cheap, can provide a stationary platform, are non-intrusive but weather dependant. Tethered blimps provide a stable and fixed platform, require relatively little skill to operate, can be adapted to provide real-time image viewing, but require the use of Helium contained in pressurised bottles. This increases the operating cost and can present transportation challenges. Remote controlled aircraft provide a stable but non-stationary platform, require skill to fly, are expensive, and require suitable landing strips. The authors believe that the remote controlled helicopter, which is the subject of this paper, trumps the other alternatives in that it offers a stable, stationary, photographic platform that does not require a designated landing area. It is relatively unaffected by weather (within reason), and can be used over any terrain without requiring access to any previously existing infrastructure.

QUADROCOPTER PRINCIPLES

The species quadrocopter is a member of the genus micro-UAV (unmanned aerial vehicles weighing less than 2 kg). The name is self explanatory; a helicopter with four rotors. The rotors are positioned in a rhombus pattern; front, back, left, right. The front and back rotors turn clockwise, the left and right rotors turn counter-clockwise. The contra-rotation provides stable, stationary hovering for as long as the lift generated by all of the rotors remains in balance. To move the quadrocopter in any particular direction this balance is deliberately upset. To fly forward the speed of the rear rotor is increased causing the vehicle to pitch. To move left the speed of the right rotor is increased causing the craft to roll. Rotation around the vertical axis (yawing) is achieved by changing the speed of pairs of rotors; to yaw clockwise
the front and back rotors will be speeded up and the left and right rotors slowed. Pitching (forward/backwards or left/right) occurs as a result of differential lift. Yawing occurs due to a torque reaction which results from the acceleration and deceleration of the pairs of motors, the net lift remaining constant.

The quadrocopter consists of five main components (Fig 2):

- Power, including power source, motors and rotors
- Avionics, including sensors, motor control and flight control software and PCBs
- Pilot/Aircraft interface
- Airframe, including camera cradle
- Camera

Fig. 2. Wolferl 3.14 UAVP Open Source Quadrocopter. Main features
POWER

**Batteries**

The motive force to drive the electric motors is Lithium Polymer (LiPoly) batteries. LiPolys are closely related to Li-ion batteries and both types deliver high discharge rates. However, LiPoly batteries dispense with the hard metal casing of the Li-ion battery replacing it with a material which is both light and flexible (i.e. robust), two properties which are essential in the application discussed here. In recent years, lithium polymer batteries have become the prime choice for manufacturers of mobile phones and laptop computers, but have not been designed specifically for RC aircraft. Luckily aeromodellers are adept at borrowing technology from wherever it becomes available. One disadvantage of using non-targeted technology is that, at present, flight times are generally limited to below 15 minutes, so a supply of fully-charged batteries must be taken on site. An interesting aside is that the signature properties of Li-ion batteries (high discharge currents available from a compact, light battery) resulted in them being adopted to cold start full size helicopters on North Sea oil platforms.

**Electric Motors**

The electric motors used to drive the rotors of the Quadrocopter are brushless AC. These offer high efficiency and performance from a compact, light package. The fact that the motors are brushless means that there is less risk of interference. These motors are available in a variety of power outputs. The technically alert will already be thinking “AC motors being driven by batteries – this does not sound right”. This is where the motor controller comes in.

AVIONICS

**Motor Controller**

One component which had to be specifically designed for the quadrocopter was the Electronic Speed Controller (ESC). Although ESCs are used in other RC applications the quadrocopter has some particular requirements which make these ESCs unique. The key role of the ESC is to convert the DC current from the batteries into a 3-phase alternating current suitable for the motor in a controllable, predictable and repeatable manner. The ESC must be able to accept, and be sensitive to, rapid changes in throttle settings. In addition, the quadrocopter ESC must possess an I2C bus interface. Motors will typically possess 6 Field Effect Transistors (FET). At any given time 2 of the 6 FETs will be switched on, each pair being turned on and off sequentially. The timing of the current switching is achieved by comparing the voltage in the powered and unpowered phases of the motor windings, and using this as a trigger for commutation. Power requirements are continually monitored and the power reduced in a controlled manner if the ESC is approaching its maximum rated power output.

**Flight Controller and Sensors**

Although miniature multi-rotor aircraft have been theoretically possible for some time the quadrocopter would not be practical proposition without its array of sensors and sophisticated flight control system.

The main sensors used by the quadrocopter are rotor speed, accelerometer and gyro. The function of the first is self explanatory. The functions of the other two are to determine, respectively, acceleration and attitude in each of the x, y and z axes.
It is not the speed of the rotors, but their relative lift, which affects the attitude of the quadrocopter. The lift will be affected by slight differences in rotor size and shape, wind speed and direction, as well as the actual rotor speed. The flight control system uses data from the sensors to accommodate for these differences by continually making small adjustments to the speed of the individual rotors, via the motor controller, to maintain stable flight. Other sensors can be added to this basic package, these include compass, altimeter and GPS. When an altimeter is included the control system may be set up such that a specific altitude will be maintained automatically. GPS is highly desirable in order to improve ease of flight, however it is expensive and is not regarded as an essential component.

Software can be written such that level flight will automatically be regained on release of the controls. While this feature may not necessarily be useful to the model-aircraft enthusiast, this, and accurate, sensitive height (as opposed to altitude) control are prerequisites for aerial photography. All the flight control systems are brought together in the populated control board/main PCB which houses the main sensors and PIC/processor mounted & flight software.

As with all forms of technology added functionality means added cost. Based on their own experience, the authors suggest the following sensor package as a reasonable compromise between cost and complexity.

- 1 PIC with relevant firmware
- 1 altimeter
- 3 gyroscopes
- 1 triple axis accelerometer
- 1 compass module
- 1 GPS module

PILOT/AIRCRAFT INTERFACE

Considering that the quadrocopter is such a sophisticated piece of equipment, the Pilot/Aircraft Interface (Transmitter and Receiver) is remarkably conventional. The minimum requirement is four channels such as are provided by a standard RC transmitter featuring two joysticks, each with two axis of movement (forward/back and left/right). For the purposes of aerial photography at least two more channels are added; one to control altitude (using a potentiometer), and one to function the camera (using a switch).

The receiver on board the quadrocopter reads the signals from the transmitter and turns them into electrical signals which can be read by the flight controller. Typically the electrical signal produced by the receiver will be a summed signal, effectively all of the instructions from the transmitter melded into one. One of the main functions of the flight control software is to decode this summed signal, separating it into the different channels needed to control the aircraft.
AIRFRAME

Frame
The function of the airframe is to act as a rigid location for all of the other components; motors, batteries, receiver, ESC and camera. Unlike a conventional RC aircraft, aerodynamic capabilities are very low on the list of priorities; as a result most quadrocopters look functional and skeletal. The basic shape of the quadrocopter is determined by the rotor spacing, the minimum distance between rotor centres (400mm) being dictated by the diameter of the rotors. Larger distances between rotors mean a larger, heavier frame. Increasing the distance between the rotors provides stability (due to reduced sensitivity to localised changes in airflow) while at the same time, ironically, making the craft more manoeuvrable. Although the number of possible frame configurations is almost limitless, the simplest airframe takes the form of a central rectangular plate with four outriggers on which the motors are mounted. The position of heavy items, such as batteries, need to be carefully considered. The quadrocopter must be perfectly balanced in the x and y planes. In addition, the closer the heavy items are to the centre of mass, the more manoeuvrable the craft will be. Finally, minimising the weight at the end of the outriggers means that the stiffness, and hence the weight, of the outriggers can be reduced.

The first quadrocopters used aluminium frames; plate for the central frame, extruded box section for the outriggers. More recently composite materials have found favour thanks to their high strength to weight ratio.

Camera Mount
Camera mounts vary in complexity and cost. Most camera mounts use a simple double gimbal system, or a universal joint from which a pan and tilt rig hangs. The more complex mounts alter their attitude by means of digital servos which are connected to outputs on the main board. These either maintain a specified, preset, angle of attitude or the camera can be angled can be controlled by a photographer on the ground. With the rise in usage of the quadrocopter commercially there are now a variety of off the shelf solutions for the frame and, more importantly, the camera mount.

CAMERA

The choice of camera is limited only by the payload capacity of the quadrocopter; however operators must bear in mind the requirements of the end user vis-à-vis picture quality and definition. This camera should have the facility to take a series of photographs; at the beginning of the flight it can be set to record a series of still images, at a predetermined temporal separation for the duration of the sortie. Alternatively, if the camera has the ability to be triggered by infrared signals, then shots can be taken at specific times deemed appropriate by the pilot or photographer.

FIELD OPERATION

Once constructed, the machine, and all other components necessary for operation and on site maintenance, can be stored and transported easily in a standard 50 litre home storage box, the total weighing no more than 5 kg. The weight of a machine without camera depends on the system chosen. For a machine which is capable of lifting a digital compact camera you would
expect the weight to be anywhere between 1 kg to 1.5 kg. The quadrocopter pictured in this paper has a total take off weight of 1.5 kg with the camera installed. With this payload an average flight time of 12 minutes can be expected.

FLIGHT TRAINING

Using a quadrocopter with the set-up described in the sections on Avionics and Pilot/Aircraft Interface above it is possible to maintain a particular height, heading and geostationary position without input on the control sticks, assuming the flight is being conducted in reasonable weather conditions (Fig 3-4). As with any technical system it is not advisable to assume that an operator with no training or previous experience would be competent immediately. However, with the level of flight assistance currently included in the craft used by the authors, it can be said that any individual with good depth perception, reasonable dexterity in their thumbs, and good knowledge safe aeromodelling practices, could learn to fly the quadrocopter and achieve acceptable results, in terms of useable and accurate aerial data, in a relatively short period of time. However, although no regulations currently exist, it is starting to look increasingly likely that the CAA will insist on pilots displaying a suitable minimum level of competence before they are allowed to fly quadrocopters in the UK, certainly in a commercial environment. It is assumed that training will be made available by recognised centres, and that this training will include aspects such as avoiding flying in sensitive or restricted air space.

Fig. 3 (above). Quadrocopter during takeoff at Historic Scotland property Huntingtower Castle, Perth

Fig. 4 (right). Quadrocopter in flight surveying roof of Huntingtower Castle, Perth
TYPICAL SPECIFICATION; QUADROCOPTER FOR AERIAL ARCHAEOLOGY

Although specifications for quadrocopters offer infinite variation, the authors offer the following as fulfilling all of the basic requirements for recording sites:

Model: Wolferl 3.14 UAVP open source
Controls: Spektrum DX7
Weight: 1.5kg inc camera
Max T.O.W: 2kg
Motors: 4 x AXI 2217/20 Gold Line brushless AC motors
Batteries: Tanic Pack 30C discharge 3 cells producing 11.1v with 5000mAh
Camera: Pentax Optio A30 10 mega pixel camera with image stabilisation

CONCLUSION

In terms of technology, the quadrocopter’s time has come. The existence of the quadrocopter is primarily due to increases in the availability, and reduction of costs, of key components (Li-poly batteries, brushless motors and miniaturised sensors), accompanied by a wealth of applied knowledge and enthusiasm from the electronics and programming communities. Now, easy to operate, transport and maintain, partially autonomous craft are making the transition from the enthusiasts’ work room to the commercial market, and beyond to the field of archaeology. The products of this rapid development vary significantly in cost and complexity from open source projects to full blown commercial systems. The quadrocopter has arrived at a juncture when the growth in local archaeological initiatives, and general belt tightening in the economy, has increased the market for a cost-optimised, stable, photographic platform that can be manoeuvred to a pre-determined and repeatable position. Although the quadrocopter was introduced to the archaeological community only fairly recently it is already providing creditable results and has generated a huge amount of interest (Fig 5).

Future developments will hopefully include longer flight durations (dependant on battery technology), real-time telemetry and improved remote camera control. Areas worthy of further work are the accurate measurement and control of height and location over the site.
Typically quadrocopters use altimeters which rely on barometric pressure, these are neither sensitive, nor accurate enough to allow accurate height placement above the site to be photographed. It is envisaged that height gauges, and lateral positioning devices based on, for instance, laser distance measurement could be developed.

This paper has considered the use of quadrocopters for recording excavations, ground features and monuments using true vertical photographs. It is not expected that the quadrocopter would be used for archaeological prospection; the flight durations are too short to allow this, and RC aircraft are better suited for this sort of work (Schönherr 2001). There are, however, other uses to which the quadrocopter can usefully be put including the monitoring of, and recording damage to, historic buildings (Figs 6-7), and providing photographs which allow the wider landscape around particular sites to be shown. The versatility of the craft combined with its unobtrusive nature makes it suitable for urban and rural environments, and for recording modern building projects and architectural works, as well as the historic and prehistoric subjects considered here.

Fig. 6 Elevation of Huntingtower Castle, Perth taken at the level of the lowest roof line
REFERENCES


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Aerial archaeologists’ meeting at Mainz, Germany

Johanna Dressler¹

On 6 December 2008, the Institute of Pre- and Protohistory of the University of Mainz hosted a meeting: “Aerial Archaeology in Germany”, organized by Johanna Dreßler, a PhD student of the Institute. The meeting was attended by 47 archaeologists and archaeology students and the conference script, with summaries of all 12 lectures, is now available for download from the AARG homepage.

Due to Germany’s federal structure, aerial archaeology is organised and utilized by each federal state separately. The main intention of the conference was to exchange experience and information, as well as getting to know each other. During discussion at the end of the meeting the necessity for an informal forum for the exchange of information between aerial archaeologists in Germany, Austria and Switzerland became clear and ended with the founding of a “Netzwerk Luftbildarchäologie” for these purposes. An encoded, private message board will provide the forum for discussion of problems and presentation of aerial archaeology research.

Future meetings are intended on a yearly basis. One of the possible topics for further meetings could be a discussion about how aerial archaeology can be better established in academic education, for example by organising workshops.

For more information, or to be added to the mailing list of Netzwerk Luftbildarchäologie, please contact the writer.

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Information for contributors

AARGnews is published at six-monthly intervals. Copy for AARGnews 39 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 in the AARG website.

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Review article. The influence of aerial photography on the artworks of Kate Whiteford

Sarah Horlock¹


This book represents the first published appraisal of the career of the artist Kate Whiteford who has, for the last twenty years, been creating monumental artworks based in, or inspired by, the landscape. The book, which is a collection of essays by the artist herself, the archaeologist Colin Renfrew, the art critic and former Turner Prize judge Richard Cork and others, examines some of the artistic and intellectual motivations behind her work. This may initially seem like an unusual choice for an AARG book review, although hopefully both the artist’s artworks and approaches will be of interest and relevance to the *AARGnews* readership. A significant proportion of Kate Whiteford’s artworks are directly influenced by the ‘aerial view’ of the landscape and the deliberate creation of these views and aerial photographs represent an integral part of many of her installations. These are not by-products of the art – solely a way to view it or illustrate it – rather they often represent an attempt to engage with the processes and practice of aerial reconnaissance and the different levels of perception it affords. But as *Land Drawings/Installations/Excavations* reveals, Kate Whiteford’s work is not merely inspired by the ‘From the Air’ phenomenon, it is influenced by an interest in aerial archaeology.

The first major work to explore the aerial perspective was undertaken at Calton Hill, Edinburgh, in 1987. Next to the imposing architecture of the National Monument Whiteford carved a series of designs, based on Pictish symbols, into the ground and filled the trenches with Skye marble. Too large and complex to be understood on the ground, these relied on the aerial view afforded by the nearby Nelson’s Monument for the perception of the whole arrangement to be gained. The shadows of this artwork were visible for years to come, like scars on the landscape of Calton Hill, and led to Whiteford’s greater interest in archaeology and aerial photography. Their continuing influence can be traced in her later works.

Perhaps one of the most visually imposing pieces of Whiteford’s work is *Shadow of a Necklace* created on the Isle of Bute in 2001. The sculpture when ‘read’ with an aerial archaeologist’s eye invokes interpretations of a hillfort or causewayed enclosure, however outwardly the piece served to monumentalise the identity of the ‘individual’ rather than the ‘community’ into the landscape. The lines carved into the ground are presented to the viewer as the image of a necklace recovered from a nearby Bronze Age grave. However, the ambiguous nature of Whiteford’s artworks intentionally allows the viewer to interpret them on multiple levels – enclosure/grave/necklace. The processes of using aerial photographs for archaeological purposes were referenced more explicitly in her work at Jesus College, Cambridge (2005), where an artistic ‘archaeological’ project was undertaken in collaboration with Cambridge Archaeological Unit on a ‘site’ identified by Whiteford on a Luftwaffe photograph. Developing from this act of identification or creation, a fictive archaeology and site narrative was created and the work culminated in ‘excavation’.

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This page

Top – Sculpture for Calton Hill - ground and aerial views.

Bottom Left – Cassino part of the Palimpsest watercolour series.

Bottom Right – Shadow of a Necklace, Mount Stuart, at night.

Next Page

Top – Excavation (Circle and Arch), Jesus College, Cambridge.

Centre Left – Evidence – archaeological ‘site’ at Jesus College created on Luftwaffe photograph

Centre Right – Viewfinder 2007 - aerial photographs displayed as part of Airfield exhibition

Bottom – Airfield 2007, Compton Verney
Whiteford’s recent work at Compton Verney, Warwickshire (2007), draws predominantly on two particular ways of viewing and reading the landscape: formal park and garden design and aerial reconnaissance. Whiteford interweaves the site histories of Compton Verney, a designed landscape by Capability Brown that was used as a camouflage research station during World War Two, and the nearby Wellesbourne Mountford airfield that became the base for the School of Aerial Photography. Visual parallels are drawn between the sight lines and vistas of the park and those employed at the airfield. Two installations within the park, *Point Blank* and *Airfield*, manipulate space and direct the viewer’s eye in the same manner as Capability Brown’s vistas and airfield runways. The use of standard airfield ground signals within the park draws interesting parallels between the visual language employed within formal landscape design and landscape painting and those employed as part of flying and aerial reconnaissance.

The book includes a discussion of aerial photographs by Colin Renfrew who, in an essay focused on a series of beautiful watercolours inspired by the palimpsest archaeological landscape of Italy visible on RAF photographs, puts forward the idea that many aerial archaeologists have not fully engaged with the ‘wonder and fascination’ of the process, often only appreciating the photographs for their archaeological information. I would like to think that this is far from the truth, but potentially it is the impression that has been given outside of aerial archaeological circles in the past and is perhaps something that should be addressed in our writings, collaborations and projects in the future.

*Land Drawings/Installations/Excavations* is an engaging and beautifully-illustrated book detailing the career of a varied and dynamic contemporary artist, whose work crosses many genres and media – sculpture and installation, painting, textiles, dance, film and photography. This review is deliberately focused on the traces that run through her work which reflect on the practice of aerial photography as a ‘way of seeing’ and a ‘way of thinking’. Kate Whiteford’s artwork has many thought-provoking and interesting aspects that should be of relevance and significance to those involved in aerial photography and archaeology, and hopefully not just those interested in art.

[All images are taken from *Land Drawings/Installations/Excavations* and are reproduced with the permission of Kate Whiteford and Black Dog Publishing.]
Other books of interest?

Rog Palmer


When I was starting in archaeology, one of the books I enjoyed reading was Leslie Grinsell’s Folklore of prehistoric sites in Britain in which he gathered local legends that were, or seemed to be, related to archaeological sites. For our non-British readers, Grinsell was an ‘amateur archaeologist’ who undertook and published surveys of round barrows across very large areas of Britain (using air photos to help his investigations, if I remember correctly). Perhaps this was an acceptable thing for an amateur to do at the time (I’d guess its original publication date was in the 1950s) while the professionals kept to original documentary sources rather than the possibly-biased oral traditions. In the past 40 or so years, use of oral reminiscences has become a more acceptable part of archaeological survey or documentation, perhaps encouraged by TV documentaries such as that which interviewed some of the last surviving WW1 soldiers.

In Latvia, there is a much stronger discipline of folklore – which includes actively collecting old stories and songs and sometimes performing them to modern audiences. Juris Urtans, the author of this book, is the only archaeologist in Latvia who tries to combine folklore and archaeology and also he teaches a course: folklore with an introduction to archaeology (Alma Ziemele, pers comm). His book about the Lakes of Augšzemes describes results from a project that ran between 2006 and 2008 and includes a short English summary. The main theme is to examine lakes that have been recorded in folklore with tales of historical or archaeological relevance and to try to identify the corresponding archaeological sites. Tales include various items sinking in lakes – churches, castles, even a German airship – flying lakes and, of course, the things that dwell in lakes. But however fanciful, these usually indicate a significance rather than an historical truth and pursuing those significances often led Juris and his students to the identification or discovery of archaeological sites.

Just as there are moves by some of us to integrate results from aerial survey with those gathered by other investigative means, so Juris Urtans integrates folklore with archaeological investigation. Even in the short English summary it is possible to sense his passion for this kind of work which helps to bring ‘flavour and taste’ (his words) to otherwise dry archaeology. The book’s illustrations include many of Juris’s aerial photographs and, for readers of Latvian, an apparent wealth of information about individual lakes, the surveys and finds from them. The original source material – the tales held at the Institute of Literature, Folklore and Art – occupy the final one-third of the book. Wouldn’t it be nice to do this kind of thing in other countries and be able to relate bedtime stories to archaeology and embed (sorry!) an interest in the past from an early age?

*From the book’s Presentation blurb:*

... taking into account the increasing interest in the topic and the related need of knowledge, we decided firstly to organize an International Summer School on “Geophysics for landscape archaeology” (Grosseto - Italy, July 2006) and secondly to publish ... the lessons and the applications made during the school for use by both students and researchers.

The volume is divided in two sections: theory of geophysical prospection and practice in the field. In this section [practice] we report work achieved during the Summer School but also we publish data collected from 2001 when the site was discovered during the Aerial Archaeology Research School (Culture 2000 project) to the last survey we did in autumn 2007. One intention working on the Aiali test-site [which includes a large Roman villa] is to apply the highest available level and intensity of archaeological prospection methods on a large, complex and stratified site that has produced material from the Etruscan, Roman and Medieval periods.

As conclusion Stefano Campana and Salvatore Piro, an archaeologist and a geophysicist, try to combine all the information together. Through a GIS-based analysis the editors integrate different sources geophysical measurement as well satellite imagery, aerial photograph, archaeological information collected during field walking survey and archaeological knowledge. The critical impact of the work is addressed to show the improvement of available archaeological information as a consequence of the improvement of the survey methods.


A collection of 17 chapters from presentations given at the Ypres conference held in October 2006 of which the publisher’s blurb says:

Striking aerial views of war, and of the scarred landscapes of its aftermath are the focus of this unique and multidisciplinary book. For the first time, the history, significance, and technology of military aerial photography are brought together and explored by military historians, archaeologists, and anthropologists. This new approach opens the door to a modern reassessment of military aerial imagery, reveals the concepts and philosophies that guided their production and interpretation, and illustrates the complex interaction between humans and technology in creating and understanding the landscapes of conflict.

Which the publisher’s blurb tells us:

- Examines Iron Age and Roman human activity in a 30x20km landscape block containing the catchment of the River Foulness, East Yorkshire which extends from the Yorkshire Wolds to the River Humber.

- The region contains one of the largest iron production centres of Iron Age Britain, the Hasholme logboat, the Arras Iron Age cemetery with its square barrows and chariot burials, a Roman pottery industry, the Roman town of Petuaria, several Roman roadside settlements and a number of villas.

- Using data drawn from a combination of techniques including aerial archaeology, large scale field walking, excavation and information drawn from Sites and Monuments Records, this book considers the development of settlement and economy, against a changing landscape, reconstructed from a range of environmental factors including topography, soils and drainage.

Martin J F Fowler. *The application of declassified KH-7 GAMBIT satellite photographs to studies of Cold War material culture: a case study from the former Soviet Union*. *Antiquity* **82** (2008), 714-731.


…and coming soon (31 March 2009):


A book for future review and which includes link to a website with further resources and colour images showing, perhaps, the way we need to go with any book designed for teaching.
Cropmarks
Interpreted by Rog Palmer

Coordinate systems
The following link was sent to me by Irwin Scollar who said:

   It’s the clearest explanation of such matters that I’ve ever seen, and should be read by everyone who uses AirPhoto or GPS.


…and later added:

A hundred or more years from now when things have shifted out from underfoot by meters or more, maps have changed and GPS or whatever it will be called whose accuracy will be in the centimeter or better range, people will have trouble finding discoveries in the field if the precise physical methods now readily available are ignored. When one reads about the problems of finds recorded in the past on old maps in many countries, one begins to appreciate having accurate physical methods to find things on the ground in the future. Although continents drift, "archaeology is forever".

Mini Synthetic-Aperture Radar
Also thanks to Irwin Scollar was a pointer to an article in the IEEE Spectrum for January 2009 about a miniature SAR unit that will fit in the baggage compartment of a Cessna 172. The unit has been developed by ImSAR (http://www.imsar.com/), a private company in the USA, but its export may be restricted by the US government as it has been described as ‘munitions’. However, Irwin also passed the information to Otto Braasch who is making enquiries so there may be more information to come in futures issues.

Vexcel UltraCam-L
I just write the stuff – Irwin and Otto Braasch have done most of the chasing for this one. Microsoft has bought Vexcel Imaging GmbH and one of their products the UltraCam-L which at about 55kg is suitable to fit into your Cessna if you can afford the €250,000 price tag. The specs are at http://www.microsoft.com/ultracam/ultracaml/default.mspx and it’s a nice-looking item taking 64 megapixel pictures that, says the blurb, are analogous to an aerial film image at a format of 23 cm x 16 cm, scanned at 20 μm. The camera simultaneously collects Pan, RGB and NIR and has JPEG and TIFF image data formats with options for 8 and 16 bits. This seems an idea toy that heritage organisations and other airborne observers can leave switched on so as later to discover what they’ve missed while they’re flying around looking out of the windows.

And a final quote to remind you that there’s more to life than aerial photographs
“We are archaeologists because we love that people can live again.” Bloo: 30 January 2009
The Aerial Archaeology Research Group

The Aerial Archaeology Research Group (AARG) provides a forum for the exchange of ideas and information for all those actively involved in aerial photography, photo interpretation, field archaeology and landscape history. This also includes the use of aerial photography in defining preservation policies for archaeological sites and landscapes.

Since its foundation in 1980, AARG has actively encouraged such exchange through its annual conference, specialist meetings and, more recently, through the biannual publication of its newsletter, AARGnews.

Membership of AARG is open to those interested in aerial archaeology as well as its active participants. All applications for membership, subscriptions and changes of address should be sent to the Secretary:

Lidka Żuk, Institute of Prehistory, Adam Mickiewicz University, ul. Sw. Marcin 78, PL61-809 Poznań, Poland. lidkazuk@amu.edu.pl

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

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

Subscription reminders may be sent out on January 1

Methods of payment:

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- Sterling or Euro bank notes

Bank details are available on request for direct payment from overseas. Please contact the Secretary.

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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 Dave Cowley, RCAHMS, 16 Bernard Terrace, Edinburgh, EH8 9NX, Scotland (Dave.Cowley@rcahms.gov.uk) 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.