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A rather lengthy editorial

**AARGnews contents**

A small plea was made at the end of the last Editorial for contributions. This is obviously not the way to solicit gifts of any kind and there has been a resounding none received since then. So my thanks go to all members for shortening the time I spend editing *AARGnews*. In future we will be sending periodic email reminders to all members that their contributions are needed if *AARGnews* is to be more than a dozen pages in size. I am most grateful to Bob Bewley, Martin Fowler and others (see flying roundup) who responded to this first call.

**Iceland …**

At the end of March this year, participants from 22 European countries gathered in Reykjavik for an EAC symposium titled *Remote Sensing for Archaeological Heritage Management in the 21st century*. On page 7, our Chairman shares some of his thoughts arising from this meeting which leaves me to reminisce about the extra-mural activities. Of these there were plenty because the organisers had asked us to use cheap airlines – which we did – but the only flights we could take were on Mondays. So we were forced to stay there a week. This gave us plenty of time for tourism in and around Reykjavik with café and bar stops to get warm. A day was spent on a wide-ranging field trip organised by Kristín Huld Sigurðardóttir from the Archaeological Heritage Agency of Iceland that included the coach driver taking us across streams and battling with 4x4s to get us close to the newly-erupting Eyjafjallajökull (pronounced *that volcano*) – which at that date was not upsetting airlines but was a popular tourist attraction for Icelanders and others.

Several of the Brits had been talking about doing some flying when we were there and Kristín helped us contact pilots. The eruption proved a bit of a problem as all the light aircraft were working full time flying tourists to see the thing. Eventually we were able to get two slots but only to go to the volcano and back rather than to do a bit of archaeological tourism as we had hoped (see cover photo – cropped and grained). However, we made the best of it – a wrapped in most of the clothes we’d taken in case anyone was daft enough to open the window – and took lots of tourist photos plus a few of archaeological sites, or earthworks of unknown dates.

Most of us were going home on March 29 – my 65th birthday – and at about midnight on 28th (our flying day, we’d been sitting around admiring photos) this was welcomed in by a cake and choir of slightly inebriated AARG members. I was presented with a copy of *Above Scotland* (Dave Cowley’s book which Chris Musson reviewed in one word, possibly ‘lovely’) and responded as expected. Chris then sternly told me to go home and ‘read’ the pictures, something I attempted one evening after tea in Cambridge. Maybe I should not admit this in public, but Dave (and Chris) might like to know that by page 112 I had fallen asleep – the marker is still in place.

**…and OAP**

The great thing about being an Old Age Pensioner (I don’t know, or care, if there is an approved PC term) is that I now have a regular income for the first time since 1990. I can understand why people stay in jobs in which they have no interest, as the prospect of monthly payment (in my case, supposedly for doing nothing) still seems quite magical to me. It

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couldn’t have happened at a better time as commercial archaeological work is extremely quiet and has been for the past 12 months. Friends in digging units have had to lay people off and the developers don’t seem to have got back to developing after the usual Christmas hush or after the elections. I am currently (August) working on my 6th AP assessment of 2010. In other years my annual total has been 25-30, with the busiest year (2004) being 35. And for those who haven’t guessed, as I have nothing from which to retire I’ll carry on as usual.

More volcanoes
At the time of the eruption of Eyjafjallajökull and the banning of jet-powered flights in Europe I wondered if any of our aerial photographers had taken advantage of this lull in activity and surveyed controlled areas around airfields which are usually closed to us? Elsewhere in this issue, Damian Grady notes that some such activity took place in England but, of course, the volcano went off at the wrong time of year for archaeological photography. I haven’t learned if people in other countries took advantage of the lull in civil flying, but as the ash problem seemed to be mainly at high altitudes (source: Met Office Ash Concentration Charts), it seems likely that others of you used this unexpected gap in activity to look where we are not usually allowed. If this was the case, we must hope that the next disruptive eruption is during a dry summer.

Summer 2010
I timed two weeks in Bucharest to coincide with the crop ripening in the hope of doing some flying with Carmen and Irina. What happened? It rained a lot of the time I was there. Ioana Oltean reported the same wet weather a bit further east and told me that she managed fewer flights than she hoped.

In Britain, or certainly in the E and SE parts, it was dry and the reports that Damian collects and circulates were getting a bit excited. The few flights I made in Cambridgeshire and Hertfordshire showed a lot of sites in cereals on clay soils and a fair amount of parching in grass. When conditions are like that I feel the inadequacy of airborne observers because they need to look everywhere and that just isn’t possible. However, I expect summer 2010 to be written up by observers as one of the good dry summers and it is one that can be added to the list (or my list) of dates where information may be especially good on block cover photographs.

Thinking of dates, I read somewhere recently (can’t remember where) that the verticals taken of Bedfordshire in 1996 were a good example of the ‘chance’ occurrence of archaeological features on such pictures. This is not true as Stephen Coleman planned that series of photographs to be taken at that time of year (see his chapter in Populating Clay Landscapes). What he did not plan was the dry summer, and it was that which provided the ‘chance’ to record loads of information. But, in that case, isn’t the whole aerial photography game down to chance? Isn’t it chance that an observer happened to look in a particular field at a time of year when crops were responding to sub-surface features, and chance that the light was right if those marks were directional, and chance that the observer understood the significance of the crop differences, more chance that the camera worked and chance that the aircraft didn’t crash on the way home or that the observer didn’t lose her camera? “Ah”, you may respond, “but a lot of these are planned chances.” So, I think, are the dates of vertical flights, but they remove the additional chances caused by an observer.
GPS and AirPhoto
I’ve been using a camera GPS for a few years but 2010 was time for a new one along with some new cameras (more benefits of becoming an OAP are the lump sums you can take). My old di-GPS was bulky, had been erratic during my 2009 flights and didn’t respond at all in Iceland (maybe satellites don’t go that far north?). The Nikon GP1 is small, clips on the flash shoe and is powered by the camera battery. Once I’d learned to keep the camera switched on and had set a function that kept the camera from automatically shutting down when the GPS was attached it proved very reliable. Even under a Cessna wing it wrote coordinates to 90% or more of the photographs taken. I don’t really need this when flying locally although it helps to pinpoint any site taken ‘on the way past’, otherwise the normal continuous GPS track shows orbits and indicates where we’d stopped to take photos.

Where camera GPS does become more useful is in foreign parts where one is not familiar with the landscape or its sites or does not have useful maps on which targets can be marked during a flight. In the last month or so, Irwin Scollar has added a new search facility to AirPhoto, ‘Find with GPS’ that reads the coordinates in an EXIF file and zooms Google Earth to that location, allowing sufficient height for this (which is the camera position) to include a target area unless the photograph is highly oblique. By saving that view, it is then possible to read the target’s coordinates in a chosen local grid.

For those of you with non-GPSable cameras, there are programs such as the freeware GeoSetter (http://www.geosetter.de/en - see screenshot on p46). Thanks to Lidka, and to her source Wojtek Mania, for telling me about this program that will read a track on to which the camera positions can be added if the clocks of GPS and camera have been synchronised. Google Earth backgrounds can be used along with previews of your aerial photographs and so their locations can be determined visually. For those who want to use technology, GeoSetter can be programmed to write coordinates to each EXIF file if this is required and with those you can use the AirPhoto/Google Earth facility as necessary.

There are many different ways of locating photographs and I tend to begin by copying my tracks to Google Earth. In England my flights are local and I can follow a GE track on a 1:50,000 map and write NGRs in an Excel file. The coordinates in an EXIF file tend to be used only when all else fails. In Romania I again use Google Earth to display a track and in previous years have used RoboGeo to read EXIF file coordinates as camera positions are a useful aid to locate photos in Romania – or certainly faster than following a track. The free version includes a built-in error in position, although this is close enough to see where I ought to be. From there I push pins in at the location of each photograph and these can be saved as a kmz file from which, I’m told, the coordinates and photo numbers can be read directly into the Cimec AP database thus avoiding the possibility of making errors when copying numbers. I used the same pin method for my Iceland photos which should allow Kristín to see where they are. But these are amateur methods: maybe the professionals in AARG can enlighten us about methods of locating photographs in their countries.

Flying and the wheel
Which leads into a note that in recent months one or two people have asked me questions about flying. And if they ask me, I guess means that ‘professional’ fliers may have been asked even more. While there have been complaints in the past about the wheel being reinvented at AARG meetings there are times when it needs to be rolled out again so that a
new generation can be shown how it works. The flying questions need not necessarily be about how to take photos but perhaps more about flight preparation and ‘maps’, taking control of your pilot, in-flight documentation (it is necessary or is it just something to keep students occupied?), post flight essentials, use of GPS, use of Google Earth, photo storage and indexing methods. For example, after a few email exchanges with Geert Verhoeven earlier this year I completely revised my way of working with photos using software that I already had, or was about to update (thanks Geert). From my travels and contacts I know there are as many systems as there are operators but there remain some common aspects that could usefully be passed on to beginners and others. I’m not sure if this is a potential session topic for a future AARG conference, nor can a lot of it be effectively published, but it may make a useful topic for one of our occasional day or weekend schools. And some of the technological aspects are likely to change every few years. There may also be other topics that have changed in the past decade or more and that may be worth a special meeting. However, none of this is going to happen unless people tell the Committee that there is some interest, so it’s up to you.

Help?
We may have noted a site like this before, but this essaytown.com will write anything from a one page summary to a PhD, or they’ll correct and improve something you’ve already written (tempting to try that one). They stop short (at present) of writing books for you – a service that I’m sure would be welcomed by those academics who have to produce a new book every few years – but seem confident in offering anything else. Following a search on aerial photography it seems they haven’t yet written an essay on this topic so those of us who teach can look forward to the usual delights of comprehension from our students.

Perhaps they’d like to contribute to AARGnews if we can think of an appropriate title? http://www.essaytown.com/topics/aerial_photography_air_photos_essays_papers.html

Picture of the day
A month or two ago, via a picture of Easter Island statues and a solar eclipse, I found a link to Astronomy Picture of the Day (http://antwrp.gsfc.nasa.gov/apod/astropix.html). This is just what it says, with each picture explained in a long caption written by people who know a thing or two. My first thought – as from others to whom I sent the link – was what about an aerial picture of the day, you know, a nice map or something else that would catch people’s imagination and interest. But then I think of finding 356 a year and immediately forget the idea as it would be a part time job for several people. But regardless of that, if you want to see some very pretty pictures and learn a bit at the same time, it’s a very good link to follow at coffee breaks, etc.

CUCAP/ULM
On the last day of August I called in to ULM and found an open space where previously there had been people, the book library (or their coffee room), plan chests, etc. On the way out I glanced into the photo store where I had been allowed to go and help myself and found that a lot of the upstairs stuff had been squeezed into that small room. Also there was Alun Martin – ex librarian – so I stopped for a chat to find out the news. For those of you who don’t know, CUCAP (which holds the photographs taken by St Joseph and Wilson) was absorbed into the Unit for Landscape Modelling about 10 years ago. Bernard Devereaux, the new boss, never had any interest in the old photos and did nothing to promote their use. When Rose Desmond
retired after decades(?) of being librarian, Alun took over and soon developed an interest in
APs and especially their ability to document social change. Now he seems largely
responsible for ensuring that the room (which is now stuffed full of photos, maps and all the
old paper catalogues) did not end up in a skip. Alun will be working part time on the
collection (which now looks like most houses on the day you first move in) and intends to
ensure that the index is updated in digital form. We reckoned that the last 10 years, probably
more, of vertical photography and ALS, is documented only by paper flight traces.

ULM has vanished. Only two people (plus a part-time Alun) retain jobs. The rest, plus the
aircraft and its kit, have been made redundant. In my opinion, CUCAP had always been St
J’s personal research department and although it ticked over under David Wilson’s
curatorship (or whatever he was called) it no longer had the drive that St J gave to it. After
David’s retirement it would have needed a very committed person for it to maintain much of a
presence and it really needed the input of someone who would make the collection better
known and more broadly used both inside and outside the university. It is probably too
practical for Cambridge’s Archaeology Department (I think that John Collis and myself were
the main users from there – John in the 60s, me in the 70s) and too old tech for geographers.

After a year or so of rumours and uncertainty, it’s good to see that the collection has survived
in some future-useable form. It may have been offered to various bodies for curation but we
know of no takers yet. At present all we can do is shrug and say that the photos are not
available – there’s no point in making a fuss about it – and for me it means one collection that
does not need to be searched and examined. Yes, there is some unique material in it but I
know from work in Wessex, Cambridgeshire and other places that a lot of archaeological sites
have been photographed by others and, from those sources, the photos usually have better
control information. So wherever it ends up, let’s hope that access again becomes available
and that it does not remain a closed library for too many years.

Sun point
At the Iceland meeting I introduced a Sun Point that was added to vertical photographs to
indicate the direction of sunlight. To make the point that the sun needs to be at the top, my
points looked grumpy when the sun was at the bottom of the picture, and it was smiling when
it was at the top. Recent thoughts, and reading Simon Crutchley’s ALS guide (see Books of
interest?), lead me to suggest that a Sun Point would be a useful addition to published ALS
pictures. On these it is usually easy to see where the sun has been placed, but not always so.
Nina Heiska reminded me that any such point should also show azimuth as this also can be
manipulated – but at the moment a 3D Sun Point is beyond my design facilities. Are there
any comments or ideas from ALS users about whether this is useful or necessary?
Chairman’s Piece: Changing perspectives

Włodek Rączkowski1

In the shadow of volcanic eruption – the EAC/AARG symposium

It began almost like a Hitchcock film – a volcano in Iceland erupted just before the symposium. Fortunately, no one was killed and there was no having to wait in suspense till the last day. Well, perhaps not quite – people were rather excited about the chance to see a volcanic eruption from close up. We were actually not far away at all (a few kilometres), but for some, that was not close enough. A few managed to observe the eruption from a distance of a few hundred metres (from the air – of course – just as aerial archaeologists should). Although the volcanic eruption appeared in many of our conversations it was not the main subject of the symposium. The Symposium on Remote Sensing for Archaeological Heritage Management in the 21st century was organised by Kristín Huld Sigurðardóttir and Dave Cowley, having been initiated by the EAC/AARG Working Party.

AARG has, for many years, been searching for a way to go out beyond its own ghetto, to reach a much wider archaeological audience and show the value of aerial photographs in the study of the past, for past landscapes or the protection and management of archaeological heritage. This led to the organisation of sessions or round tables at various conferences, in the presentation of papers and the initiation of joint projects (e.g. European Landscapes: Past, Present and Future). However, what was missing was institutional cooperation which would lead to more long-term and consistent representation of the aerial archaeological perspective within the forum bringing the people responsible for conservation politics in Europe together. For the last few years AARG has been working closely with the EAC (Europae Archaeologiae Consilium – http://www.e-a-c.org/) and it seems this cooperation will be very important and promising for the future.

The EAC was set up in 1999 as an organisation to bring together the representatives of national institutions responsible for shaping of policies on the protection and management of archaeological heritage. It is thus the organisation best placed to promote high standards and best practices related to heritage management. It builds relations between the archaeological heritage institutions in Europe and provides a forum for discussion and the exchange of information. For this reason the participation of AARG in the work of the EAC is particularly valuable and the joint working party on Aerial Archaeology so important (http://www.e-a-c.org/12-0-Aerial-Archaeology.html). My thanks to Dave (and his predecessors) for representing AARG on the EAC forum so consistently and effectively.

During the symposium the representatives of national institutions working within the EAC received, through carefully selected and prepared papers, a synthesis of information on the current methods for site registration and the creation of reliable inventories (from the analysis of historic aerial photographs to LiDAR, geophysics and multi-/hyper-spectral sensors) as well as discussions of the interpretation of collected data and its impact on understanding the past. I got the impression, however, that something was not quite right – there was a lack of discussion on applications of remote sensing methods and their integration into protection and management of archaeological heritage practice. A rift appeared between researchers applying these methods and the representatives of national archaeological heritage management agencies. Clear proof of this was in Adrian Olivier’s comment summing up developments which highlighted that during the symposium no reference was made to either

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the Malta Convention or the European Landscape Convention, both of which are key reference points for the construction of European and national protection and heritage management strategies. Therefore, the symposium witnessed a tension between researchers exploring the latest technologies and conceptual and structural thinking about heritage management. For many, such a tension must have been rather shocking. Let's not forget that in many countries the basic method for the “protection” of archaeological heritage is still excavation. Not everywhere is it possible to carry out field-walking on a large scale. Aerial or geophysical surveys are even less common, nor are they part of the heritage management system. Perhaps, for this reason, the statement presented during the symposium on the potential of modern methods first has to be “digested” and assimilated. It will take some time before we become accustomed to it.

If my diagnosis of a lack of debate is right then this means that it is absolutely necessary to continue such meetings at both European and national level. At the same time, we should anticipate the needs of the listener – not only overwhelm them with fantastic results but also indicate practical ways of applying the potential of the new methods and how to integrate them into the protection and management of archaeological heritage.

Retreat?

Looking at further presentations from a certain distance I started to ask myself which methods are the focus of main interest from the perspective of their application in the study of past landscapes and their protection? It was with some surprise that I realised that we have moved on from aerial photographs. LiDAR clearly dominates today and multi-/hyper-spectral sensors are on the way up. What is more, the visual persuasiveness of aerial photographs is no longer such a great attraction in itself. The possibilities that LiDAR offers stimulate the imagination far more. Perhaps this is only due to the fact that it is a “new toy”? Or perhaps there are now so many new remote sensing methods that aerial archaeology needs to reconsider its own identity?

At one time this issue seemed very straightforward and rather obvious. When the framework of aerial archaeology was being built at the start of the 20th century, apart from excavations and field-walking, it had no competition from other prospecting methods. What is more, it was unusually persuasive and provided an image of the past which other methods could not achieve. Furthermore, it was a particularly effective research tool (Crawford 1923). Aerial archaeology's accepted strategy of action slotted really well into the cultural-historical archaeology at the time – it provided empirical data and indicated attractive sites to be excavated (e.g. Cunnington 1927). Discovery in order to find out about the past was the essence of aerial archaeology for decades (even though Crawford did much to guarantee aerial photographs a more serious place in scientific discourse).

The 1960s were a time when the position of aerial photographs became stronger – discovery was meant to serve not only finding out more about the past but also the effective protection of archaeological heritage. *A Matter of Time* (RCHME 1960), published 50 years ago, revealed great new challenges for aerial photographs. It was probably *A Matter of Time* that marked the start of a brilliant career for aerial photographs in archaeology though their role was later dominated by the conservation perspective. I have no doubt that the immense amount of information on archaeological sites gained thanks to aerial photographs played a part in the development of non-invasive research methods in archaeology. This was later reflected in the Malta Convention. Aerial archaeology as practised from the perspective of conservation began to conquer Europe, which was expressed in the Amiens conference in 1992 (Bréart, Nowicki, Léva 1999) and Kleinmachnow in 1994 (Kunow 1995).
The start of the 1960s was not only a period of consolidation for aerial archaeology but it also marked the start of the processes which, when viewed today, can be seen as those which weakened it. I am thinking here of two phenomena – the development of remote sensing methods and the birth of processual archaeology. The tendency of processual archaeologists to formalise and objectify research processes also incorporated reorganising the methodology, including the position of certain processes researching the past. Such an approach, connected to the development of the concept of remote sensing in 1960 (Curran 1985), led to aerial archaeology being considered a remote sensing method. From the unique position it had held as a prospecting method it suddenly became one of many remote sensing methods “competing” on the same research field. In the 1990s this was not yet so obvious but today, together with the development of technology (high-resolution satellite images, multi-/hyper-spectral sensors, LiDAR), we are handling newer technologies increasingly more often than aerial photographs. Is it so that we need new visual stimuli, and we now find visible light boring? Has the potential of aerial photographs in our understanding burnt out?

Let's take a look at the problem from yet another perspective – that of a group of researchers concerned with the application of remote sensing methods to study the past. The development of remote sensing methods leads to new descriptions of the world, even past ones. New groups of researchers who specialise either in one method or another are being created. As a result we have AARG, ISAP, EARSeL, ISDE etc. Conferences on how to use remote sensing methods (and their integration) in studies of the past are organised regularly (Archaeological Prospection, AARG Annual Meeting, International Symposia on Digital Earth, EARSeL International Workshops on Remote Sensing for Archaeology and Cultural Heritage, International Conference on Remote Sensing Archaeology etc.). The subject matters of these meetings is converging and it is becoming increasingly difficult to identify the specific character of each one. Aerial archaeologists rarely attend the majority of these conferences. Are we handing over the field? Or is it that because we deal mainly with aerial photographs that we are no longer in a position to “compete” with the specialists in satellite imaging, LiDAR or multi-/hyper-spectral sensors? Have we become old-fashioned, technologically backward? Do we have nothing to offer?

The power of self reflection

Experience so far has shown that the long development of aerial archaeology gives us quite an advantage over specialists of other remote sensing methods. The development of critical reflection on the interpretation of aerial photographs “prevents” us from reading too much into what we see. I have no doubt that the knowledge and skills developed in aerial archaeology regarding the interpretation of aerial photographs (and the past) is of enormous potential and this we have at our disposal. By keeping a certain distance between us and the object of our research we can attain more and move up to a meta-level (e.g. Rączkowski 2002; Brophy, Cowley 2005) and take a look at aerial archaeology from a wider perspective. It also allows us to take a critical look at other remote sensing methods (when the initial magic has worn off). This is why it is well worthwhile developing these aspects of the thinking process (self-reflection) and I am looking forward to a lively discussion during the Bucharest conference.

ArchaeoLandscapes Europe – a challenge

Over the last year, thanks to an AARG initiative, the concept for another European project was created which would lead to the development of cooperation in the field of the
application of remote sensing methods in the study of past landscapes. The success of the 
European Landscapes: Past, Present & Future project has shown how much can be achieved 
in this way. The Römisch-Germanische Kommission has taken on the responsibility of 
coordinating the project and Friedrich Luth is the person in charge. The project, which is to 
run for five years, has received funding and will officially commence in September 2010. 
ArcheoLandscapes Europe (No. 2010-1486/001-001) is a further fantastic opportunity to 
spread the word on remote sensing methods in Europe. I wish all the participants every 
success, great results and a lot of work ☺.

I hope that there will be enough room for aerial archaeology, for the careful 
consideration of the problems encountered in the interpretation of images attained through 
various methods and that the result will be polyphony in the study of the past landscapes of 
Europe.

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LBI for Archaeological Prospection and Virtual Archaeology

Michael Doneus\textsuperscript{1} and Wolfgang Neubauer

The Ludwig Boltzmann Institute (LBI) for Archaeological Prospection and Virtual Archaeology (http://archpro.lbg.ac.at) is a novel and innovative research institution for the development and application of advanced non-destructive prospection methods and their integration within the theoretical and methodological framework of landscape archaeology. As such, it integrates a multi-disciplinary team of European scientists combining remote sensing, high resolution near surface geophysics, sophisticated computer science, and geomatics within a non-destructive conceptual framework for spatial archaeology.

The realization that the protection of archaeological sites requires their economically efficient identification, documentation and interpretation was, and still is, a major stimulus to the development of non-destructive archaeological prospection methods. In future, its demands will be the ability to survey large areas quickly with very high spatial resolution and accuracy supporting a holistic archaeological prospection approach.

An integrated prospection approach is mutually based on both technological and methodological development. Therefore, the LBI will include and integrate two important aspects of archaeological prospection, which are too often handled separately: (1) data acquisition, i.e. the development of new efficient techniques of non-destructive data capturing, processing, and visualization. (2) Interpretation, i.e. new technological and methodological concepts to handle this data and to derive archaeologically relevant content by the means of integrated archaeological interpretation approaches. In this way, both interrelated aspects can be systematically developed further. Both aspects are reflected in three interdisciplinary program lines (PL) with a high degree of interaction: “PL1: Archaeological Remote Sensing”, “PL2: Archaeological Geophysical Prospection” and “PL3: Archaeological Interpretation, Spatial Analysis & Virtual Archaeology”.

The LBI is based in Vienna, but integrates a Europe-wide partner consortium, representing academic and research institutions, archaeological service providers, and governmental authorities from Austria, Germany, Great Britain, Norway, and Sweden. Within the research program, various geographical areas have been selected by the partners to provide different archaeological landscapes for distinct case studies. The selected areas are investigated by the LBI in close cooperation with the partner organizations using non-destructive, advanced methods and techniques to be developed by the LBI.

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A 35 years old exhibition catalogue rediscovered: The Catalogue of the “Aerial Archaeology” Exhibition in Bucharest, with a foreword by Dr Irwin Scollar

Irina Oberländer-Tânoveanu

Last summer I discovered an exhibition catalogue in my home library. To my surprise, the title was *Arheologie aeriană* (Aerial Archaeology). It wasn’t dated and I couldn’t remember when and where such an exhibition was opened in Romania.

The first clue: the introduction to this exhibition catalogue was written by the German Federal Republic’s ambassador in Romania by that time, Dr Erwin Wickert. Searching on the Internet, I found some information about Dr Wickert, a very interesting person and a witness of many important events of the 20th century (he died in 2008). I learnt that from 1971 to 1976 he served as ambassador to Bucharest and that gave me an indication of the time range of the exhibition. I was a student at that time… More about the diplomat and writer Dr Erwin Wickert (1915 - 2008) can be read in the obituaries published by *The Independent* (19 June 2008) and *Times Online* (28 April 2008), where there is also a photo of him.

The second clue was the name of the author of the text: Dr Irwin Scollar. I met Dr Scollar at a Computer Applications in Archaeology Conference some 14 years ago and we had a long conversation, the more that his grandmother was born in Botosani (in northern Romania) and his mother in Bucharest. After the death of his Austrian grandfather, the family left Romania in 1906 to go to the USA to join his two eldest uncles who had emigrated many years earlier. From the webpage of Dr Scollar ([http://www.uni-koeln.de/~al001/scollar.html](http://www.uni-koeln.de/~al001/scollar.html)) I found out his e-mail address and exchanged some messages with my old acquaintance, obtaining his permission to publish the booklet in digital format on our website. You can see it at: [http://www.cimec.ro/Arheologie/Scollar/index.html](http://www.cimec.ro/Arheologie/Scollar/index.html)

After all these investigations I managed to piece together this information:

The exhibition, about aerial archaeological investigations on the Rhine Valley, was opened in Bucharest in 1975 or 1976 and was probably held at Dalles Exhibition Hall. It enjoyed a tremendous success with the public, being one of the few western showings at that time. Dr Irwin Scollar remembered how he prepared this photo exhibition about the first four years of aerial photography in the Rhine Valley in 1965 which was financed by Internationes, a cultural branch of the West Germany’s Foreign Ministry. At that time, an exhibition brochure was written in English and later translated into Swedish for its first showing in 1966 in Stockholm. Many years later, Internationes sent this exhibition to other countries and translated the brochure into the local languages. Dr Scollar wasn’t kept informed about all of these showings but, at my request, he searched in his own archive and found a copy of the Romanian brochure he received at that time. Dr Scollar held a series of conferences on the subject in Romania in 1973, but couldn’t remember if the exhibit was open at that time. That’s why the time frame for the exhibition is between the years 1973 and 1976, most probably in 1975 or 1976.

The exhibition had an important role in introducing the Romanian audience to the use of aerial photography in archaeological research, that’s why Dr Scollar’s contribution won’t be forgotten and we are pleased to offer it to the public once again in digitized form on the web.

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Aerial Archaeology in Jordan 2010: a brief up-date

Bob Bewley¹, David Kennedy, Francesca Radcliffe, Karen Henderson and Stafford Smith

As many readers will know there has been an active programme of aerial reconnaissance for archaeology in Jordan since 1997, an initiative taken by David Kennedy, after many years of field work in the region (see Kennedy and Bewley (2004) and cf. 1998). Bob Bewley joined the project in 1998 and Francesca Radcliffe in 2001, with students, staff and friends from the University of Western Australia joining the project at various points – Mike Neville, Karen Henderson, Stafford Smith and Don Boyer. We have been conducting a season of aerial reconnaissance there every year, and in some years – twice a year (2002, 2005 and 2010).

The authors would like to dedicate this article to one of our team, Mike Neville, whose help with the digital side of the project was invaluable; sadly Mike died suddenly in Australia having just spent the 2009 season in Jordan with us.

We are now engaged in a five-year strategy (2008-2012) for which the objectives are:

- Further recording of sites from the air throughout Jordan, trebling flying hours to c. 30+ per annum
- Increased ground investigation
- Development of research projects arising from our work
- Development of a web site on which all our images can be displayed and viewed
- Regular Aerial Archaeology training workshops
- Monitoring a fragile and desperately vulnerable archaeological heritage
- Engagement with plans to survey the landscape south of Amman in advance of a major roadwork and development scheme
- Direct and active efforts to engage with other fieldworkers and integrate aerial reconnaissance and aerial photographs into their fieldwork

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The purpose of this short note is to share some of the work that has been completed. Much has been published on prehistoric, Roman, Near Eastern and matters of aerial archaeological importance, not least in the book *Ancient Jordan from the Air* (Kennedy and Bewley 2004). It is also an opportunity to share some of the impressions gained over the past dozen or so years of working in a rapidly changing country, with a well preserved, relatively unknown, but rich archaeological heritage.

Even in the most far flung part of Jordan, reconnoitring for those wonderful “Kite landscapes” in the north-eastern part of country – there was the evidence of the bulldozer. Yet for a few minutes one can fly over what appear to be completely “untouched” landscapes. By untouched we mean that there are no easily visible signs of human occupation since the Kites, Wheels Pendants, Cairns and Camps were abandoned and the system which gave them life, collapsed. The date for this change, is as yet unknown; most are certainly pre-Islamic and many go back several thousand years to the Pre-Pottery Neolithic. We know, of course, through ground survey that they are not untouched – the Bedouin still pass through and live there – but the intrusions of the modern world have escaped some parts; this is perhaps the last chance to record – and even preserve these important sites.

Fig 2. Wisad Kite 23. APAAME_20091004_DLK-0017.dng. Photo by David Kennedy.
In preparing the chapter for a forthcoming volume (Kennedy and Bewley 2010) we focussed on the damage to sites in the greater Amman area; the pace of change in the city of Amman has been the most dramatic since we began working in 1997. Now the authorities have planned and begun to build a huge southern ring road – the M25 of Amman (for the non-UK reader the M25 is the orbital motorway around London) but there has been no archaeological research or reconnaissance, survey or excavation in advance of this road building – and yet this is an area rich in prehistoric, Roman and later remains.

The population of Jordan is rising rapidly – in part as a result of migrations – initially from Palestine but more recently Iraq, but also as a result of its success as a stable economy and the high birth rate of much of the Middle East. As a consequence the towns and villages are expanding, with new buildings (not adapting old ones), and as a symbol of wealth, having detached houses in good locations, which often means next to – or even inside - important archaeological sites. This is nowhere better exemplified than at
the Roman city of Jarash (Kennedy and Baker 2009; Kennedy 2007).

There are other areas where the landscape has been recently altered and many of the field walls and field systems re-arranged (eg Fig 5). We also have photographed new or modified villages and even “villas” – (more villa rustica than residences for the wealthy) on the Shar’a plateau, south of Shaubak (one of the large Crusader castles) and east of Petra (the well-known Nabatean and then Roman city).

Fig 5. Farmstead in a landscape of dispersed settlements and field systems on the Shar’a plateau, in southern Jordan. APAAME_20090930_RHB-0322.dng. Photo by Bob Bewley.

The project has also had its highs and lows in terms of access to aircraft and funds but since 2008 there has seen a steep increase in terms of the potential research output (with Karen Henderson, from the University of Western Australia undertaking a PhD on the Kites and other stone-built structures in the Basalt Desert – see Figs. 2 & 3), aerial archaeology training workshops and most importantly access to the imagery which is all now digital, and the database contains some 20,000 images, which are available via Flickr: http://www.flickr.com/photos/APAAPE/collections/ (thanks to the efforts of the late Mike Neville and Stafford Smith, also of the University of Western Australia).
Flights
As a result of the grant from the Packard Humanities Institute many additional flying hours were again possible in 2009 and 2010.

The first graph illustrates the significant increase in flying hours (for 2010 a second season is planned for September and October so the final total will be on a par with 2008 and 2009) but there has also been a concomitant increase in the number of targets photographed each hour, as shown in the second graph. This is (in part) as a result of working in a digital environment with improved pre-flight planning (using Google Earth and uploading each route to the GPS) and having digital cameras (Nikon D3) which record (using the Geopic II GPS) the Lat/Long as part of the metadata for each image.
2009

Seven flights were carried out. Five flights focussed in the northeast of Jordan on photographing prehistoric remains of the so-called Kite sites, Wheels, Pendants (both probably funerary), Cairns and possible settlements (“Camps”) in the Basalt Desert. Two other flights were over the region between Amman and Petra.

In total, our flying time was 39.65 hours. The weather and thus the lighting conditions were very good and we were remarkably successful again this year in locating almost every site swiftly and accurately.

5806 photographs were taken, overwhelmingly the images are digital, there are also 10 colour slide films, taken on a Nikon F90 camera.

2010

In the May season of 2010 four flights were carried out. Two were in the northeast area and largely concerned with photographing prehistoric remains in the Basalt Desert. Two others were over the region between Jarash and Kerak (Figs 6-7). In total flying time was 18.9 hours; we plan to fly a further 20 hours in Sept/Oct 2010.

Publications in 2010 and future plans

We have provided several images for use as the frontispiece of several issues of *Antiquity*, including one that was awarded their photographic prize for 2008 and the front cover for an article on the Great Arab Revolt Project (GARP) (see *Antiquity* Vol. 84, number 324 June 2010 and Saunders and Faulkner 2010). On the more popular front this year we published an article in *Minerva* (Bewley and Kennedy 2010). There is also a chapter in press: Kennedy and Bewley (2010). We are also planning a further research report will be for publication in the Council for British Research in the Levant’s (CBRL) Bulletin for 2010 or 2011.

For a comprehensive list of publications arising from the project’s research since 1997 see Appendix.
This rapid overview has highlighted the current progress of the project, with an expansion in
the range and number of flights each year. Even the total number of hours flown since 1997
(at c 225 hours) is still less than one year’s reconnaissance in England. Equally, it is a small
contribution to a large region, where, as a result of this and earlier projects, we know aerial
archaeology has a large contribution to make.

There is one key, crucial objective which – in time – we have to achieve if there is to be a
legacy for this project but so far have failed to achieve; that is to train Jordanian
archaeologists in aerial survey for archaeology. We have reported elsewhere on the first of
the two workshops (see Bewley, Kennedy and Radcliffe 2007) - one in 2006 and one in 2008
– which were a great success, but we have not yet been able to arrange a third. There has
been a very recent change in personnel at the Department of Antiquities in Amman (a new
Director-General was appointed in May 2010, so we need to establish a new working
relationship, and hope he will be open to supporting more workshops).

As we have found in Europe, the biggest barriers to increasing the use of aerial survey for
archaeology are intellectual as well as political, but they are inextricably interlinked.
Intellectual in that it is perfectly acceptable to train archaeologists in survey, excavation and
even “remote sensing” (especially if it is ground-based) and what might be generically termed
“heritage management” but much harder to obtain funding and permissions to train students
in air photo interpretation and aerial survey (despite our two successful workshops). It is even
harder to arrange for them to go flying – though we did achieve this on one day of the
second workshop (which had students from 13 different Middle Eastern and North African
countries). Using military helicopters to fly a cohort of students was a real success but one
we have yet to repeat.

Yet, the nature of the technique lends itself to providing a much better understanding of the
nature of a region’s archaeology – and thus should be a central strand of heritage
management, if not archaeological survey. One of the challenges for Jordan is that most
archaeological research is undertaken by foreign teams, which are mainly either excavations
(see Fig 9 – Hesban) or field surveys (for example some follow up work we have done since
Miller’s survey of the Kerak plateau (Miller 1991)) (see Fig 8), or the GARP project already
mentioned. So, we have tried to make links with such teams, but we too are not based in
Jordan – but spread from Australia to the UK.

So, why do we continue and for how much longer? The objectives we have set ourselves (to
2012) are achievable, and with an expanding team there are those who can build on what we
have begun. The time is rapidly approaching where we need to be able to train a handful of
Jordanian archaeologists to carry on the landscape survey approach, using all forms of survey
- airborne and terrestrial. A number of young archaeological students from Jordan have been
trained in Britain and Europe, on the condition that they work as lecturers (having obtained a
PhD) in Jordanian Universities for minimum of 8 years. Perhaps we should be exploring
ways of training these students both here and in Jordan.
Fig 8. Er-Rabba (Miller No. 108). APAAME_20100516_RHB-0548.dng. Photo by Bob Bewley.

Fig 9. Hesban, mentioned in the Bible as the capital of an Amorite king, Sihon, who increased its importance by acquiring the lands of Moab. APAAME_20100516_SES-0155.dng. Photo by Stafford Smith.
If AARG members have suggestions, or offers of help about expanding the training of non-UK students for everyone’s benefit, we would be only too pleased to discuss this further.

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References


APPENDIX: PUBLICATIONS DEVOTED TO, INSPIRED BY OR INCORPORATING MATERIAL FROM THE FLYING PROGRAMME: 1997 - 2010

Books

Chapters in Books

In progress

Refereed Journal articles

Unrefereed Journal articles

Magazine articles: professional editorial control

Conference Proceedings; professional editorial control
Newsletters: professional editorial control


Newspaper and newspaper magazine contributions

The first space photographs and the origins of satellite archaeology

Martin J F Fowler

The past decade has seen a significant increase in the application of satellite imagery to archaeological studies to the point that satellite remote sensed products are now an integral component of the aerial archaeologist’s toolkit. Whilst the recent history of satellite archaeology is well documented (Fowler 2010), this article looks back to the early days of space-based remote sensing to try and identify when the potential for using the orbital perspective for archaeological purposes was first considered.

V-2s and Vikings over New Mexico

The first photographs of the Earth’s surface from beyond the atmosphere were acquired over 60 years ago when captured German V-2 rockets were fitted with cameras and launched from the White Sands Proving Ground in New Mexico to attitudes of over 100 km (Reichhardt 2006). Flown on suborbital trajectories that eventually resulted in the missiles impacting the ground at high velocity, more than 1,000 photographs were returned between 1946 and 1951 (Lowman 1964). Initially taken using 35 mm motion picture cameras (see http://www.airspacemag.com/multimedia/videos/Newsreel-Rocket-Camera.html and http://www.airspacemag.com/multimedia/videos/Early-V-2-Photos-of-Earth.html for example footage), later flights carried Fairchild K-25 aircraft cameras and returned higher quality black and white photographs that, when combined in mosaics, covered typically over 2 million km² of New Mexico, Arizona and Southern California (e.g. Figure 1). Clearly showing the curvature of the earth, the photographs that were captured by the V-2 flights demonstrated the potential of space photography to map inaccessible regions both for civilian and military purposes (Holliday 1950).

Figure 1. Mosaic of photographs acquired by a V-2 rocket launched on 26 Jul 1948 from the White Sands Proving Ground, New Mexico. Image: John Hopkins Applied Physics Laboratory.

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When the supply of V-2 rockets was exhausted, Viking sounding rockets, together with smaller Aerobee rockets, continued to carry cameras for earth photography. The rockets usually attained altitudes of between 100 and 150 km, although the later Vikings exceeded 200 km, and carried cameras that used black-and-white, infrared, and colour films (Bird and Morrison 1964, 468-472). Of the various flights, the final Viking tests were the most valuable from an earth photography perspective since they were designed primarily for high altitude photography and produced the highest quality space photographs from this era. Viking 11 was launched on 24 May 1954 and exposed 39 frames on infrared film at altitudes up to 255 km. Whilst the features visible on the photographs were in general the same as those on other tests, the greater altitude provided a more comprehensive view of the broad features of the landscape below. Nine months later, Viking 12 was launched on 4 February 1955 and carried a smaller camera and film but, because of refinements in the camera setting and a clearer winter atmosphere, produced photographs that were sharper and comparable with conventional aerial photographs. Some 53 photographs were acquired at altitudes up to 230 km and showed both the general and detailed characteristics of the landscape to the west of the launch point.

Subsequent interpretation of the photographs acquired by the Viking 11 and 12 flights (together with those of a V-2 mission and a series of nearly 400 photographs from NASA Aerobee flights in 1963) demonstrated their value in photogeological mapping (Merifield and Rammelkamp 1964). However, since the study was conducted to investigate the role of hyperaltitude photography in determining the physical characteristics of planetary surfaces, it paid little attention to man-made features and concentrated on natural features such as drainage patterns, geomorphic landforms, relief and texture, and geologic structure.

Whilst the photographs taken by the V-2, Viking and Aerobee sounding rockets demonstrated the potential of space photography, in most cases the pictures were more or less an accessory experiment, although occasionally a strikingly successful one (Lowman 1964). Furthermore, the area covered was very limited because of the ballistic nature of the flights and it would require an orbital satellite to acquire photographs cover larger areas.

**Into orbit**

An attempt to photograph of the Earth from a satellite in orbit was made on 14 August 1959 by a spot scanner television system carried on the NASA Explorer VI satellite (NASA 1965b, 1). Secondary in importance to other experiments carried on the satellite, the scanning device was intended to photograph the Earth's cloud cover and, as such, was the forerunner of the TV cameras carried in later satellites. However, the image that was acquired when the satellite was crossing Mexico at about 27,000 km above the surface of the Earth and looking out over a sun-lit area of the Central Pacific ocean (Figure 2) was of a very poor quality.
Figure 2. The first photograph of the earth from orbit obtained by Explorer VI on 14 August 1959. *NASA photograph.*

Less than eight months later, TIROS-1, the Television Infrared Observation Satellite, acquired the first image of the Earth’s surface from orbit in April 1960 (Figure 3). Operating in a near circular orbit more than 650 km above the Earth, the satellite carried two TV cameras to photograph cloud cover and transmitted 22,592 pictures before its power supply failed on 29 June 1960 after 1,302 orbits of the Earth (NASA 1965c). One of the cameras had a 104° lens giving wide angle view, whereas the other camera had a 12.7° lens giving a narrow angle view. Between 1960 and 1965, a further 9 TIROS spacecraft were successfully launched and provided meteorologists with unprecedented opportunities to study the earth’s cloud patterns and relate them to the weather.

The spatial resolution of the TIROS system was limited by the width of the television scan line; when the sensor was pointing directly downwards, this was equivalent to approximately 330 m at the Earth’s surface for the narrow angle camera and 3 km for the wide angle camera (Bird and Morrison 1964, 477). Whilst this quality of the images was sufficient for meteorological applications, the low spatial resolution limited their applicability to other scientific disciplines.
Nimbus-1, the follow-on to TIROS, was launched on 28 August 1964 and carried three sensors: the Advanced Vidicon Camera System (AVCS) designed to meet the needs of the national meteorological services for global weather data, especially cloud cover; the Automatic Picture Transmission System (APTS) that provided similar cloud mapping photographs of somewhat lesser resolution to local weather users; and the High Resolution Infrared Radiometer (HRIR) system provided a continuous scan of the earth at night time to detect emitted thermal radiation (NASA 1965a). With 800 lines on the TV raster, the ground resolution of the AVCS at the sub satellite point was of the order of 0.8 km and was capable of discerning terrain features. The HRIR sensor was also capable of detecting terrain features, but in this case it was because of temperature differences rather than differences in reflected solar radiation.

HRIR pictures over the deserts of North Africa and the Near East exhibited fine structure in the emitted infrared radiation with inferred temperature variations of 10° to 15° K across the swath of the sensor. These temperature gradients were considered to be due to variations in the thermal properties of the ground surface as a result of differences in moisture content. This phenomenon was used to investigate surface geomorphological features in the Nile Delta.
and northern Sahara Desert based on Nimbus I data collected in September 1964 after the long months of hot and dry weather of the summer resulted in temperature contrasts being sharper than at other seasons (Pouquet 1968). The study demonstrated the potential for the HRIR sensor to identify different soils of varying ages within the Nile Delta for which the relative enrichment or lack of enrichment of organic content was directly related to moisture capture and retention. Maps based on these observations indicated soils of various ages in an area densely occupied in prehistoric times and showed the potential for infrared scanning imagery to inform aspects of palaeoclimatic conditions and the palaeoenvironment, and the probable locations of ancient human occupations (Gumerman and Lyons 1971).

**Astronaut photography**

The first colour photographs of the earth’s surface from orbit were acquired during the Mercury programme between 1960 and 1963 (Bird and Morrison 1964, 472-476; Lowman 1964, 11-13). Of the 9 Mercury fights, the first unmanned orbital mission (MA-4) launched in September 1961 provided the first generally available pictures of the earth on film that were recovered from a satellite. The camera automatically took 70 mm colour photographs every 6 seconds from lift-off until the film was exhausted during which time the spacecraft passed from Cape Canaveral across the Atlantic Ocean, North and Central Africa, and part of the Indian Ocean. Several hundred photographs were taken, however only those between the Moroccan coast and Lake Chad (frames 182 to 270) showed continuous areas of land visible; the other frames either covered the ocean, were taken when the earth was in darkness, or had much of the earth’s surface obscured by clouds. Interpretation of photographs covering the Western Sahara desert showed that the larger geological and landform patterns of the area, as well as vegetation boundaries on the south edge of the Sahara, could be mapped from the photographs (Morrison and Chown 1964). Man-made features were lacking in most of the regions photographed and those that did exist were small, such as houses, desert tracks, or tiny cultivated plots at oases, and could not be distinguished on the MA-4 photographs. Nevertheless, the potential for space photography to have “undoubted possibilities” to investigate small-scale land use was recognised (Morrison and Chown 1964, 112).

The second orbital mission (MA-5) launched in November 1961 and carrying the chimpanzee Enos also included an automatic camera, but on this flight the interval between frames was increased to 33 seconds and consequently the film was not exhausted until the end of the second orbital pass. Unfortunately, many of the photographs were taken over ocean areas, during hours of darkness, or over land areas obscured by cloud or dense haze (Bird and Morrison 1964, 476). During the next three manned flights, MA-6 to MA-8, photographs of the earth were taken by astronauts using hand-held cameras, but only a few covered cloud-free land areas. The last Mercury mission (MA-9) was more fortunate with astronaut Gordon Cooper taking approximately 25 photographs of land areas including the deserts of Arabia, Iran, north-western India, the Himalayas, Tibet (Figure 4) and the Ganges delta. As with the earlier flights, the poor spatial resolution of these photographs precluded the detection of man-made features, although on all four orbital missions the astronauts reported that they could see small objects such as cultivated fields, roads and railroads (NASA 1963).
Between 1965 and 1966, some 1,464 photographs were taken of the earth by the manned Gemini flights III through XII (NASA 1967; NASA 1968; Giddings 1977). Gemini IV, launched on 5 June 1965 and carrying astronauts James McDivitt and Ed White, conducted the first formal photographic experiment from space taking about 100 colour pictures of land areas using a 70mm Hasselblad 500C hand-held camera for geologic and geographic study as part of the Synoptic Terrain Photography Experiment (Lowman et al. 1966). Building on the experiences of the MA-8 and MA-9 missions, the experiment was targeted to acquire photographs of the southwestern United States, northeastern Africa and the Arabian peninsula (Figure 5), and northern Mexico. The experiment was considered to be highly successful and demonstrated the geological and geographic value of the photographs, but, like previous missions, their low spatial resolution precluded the capture of man-made features. A follow-on experiment flown on Gemini V produced similar results, as did photography from the remaining 7 missions. Although the inherent low resolution of the photographs still hampered their detailed interpretation, a few relatively high resolution photographs were acquired from
these missions, such as a photograph of Mombasa Airfield, Kenya, acquired on the Gemini 5 mission 35 mm Zeiss camera (Figure 6). This remarkable photograph is one of 138 frames that were taken using a telephoto lens with a focal length of the order of 1250 mm (Oberg 2000). With a theoretical resolution in the region of 30m, the photographs taken by this camera were some 4 to 5 times higher resolution than those taken by the 70mm Hasselblad cameras and appear to have been part of a ‘classified’ experiment to investigate the potential of the camera for photoreconnaissance purposes.

Figure 5. Gemini IV photograph of the Nile Delta taken using a 70mm Hasselblad 500C hand-held camera. NASA photograph.
Multispectral photographs from space

In March 1969, the first multispectral photographs from space were acquired by Apollo 9 using four Hasselblad cameras that captured 127 frames in four different bands of the visible and near-infrared portions of the spectrum (Kaltenbach 1970; Nicks 1970, 100-102). Photographs were taken of various earth resource ‘test sites’ in the United States and were complemented by almost simultaneous aerial photography and ground-based measurements. The experiment was designed with a view to developing improved capabilities for quantifying various kinds of earth resources, including timber, forage, agricultural crops, soils, water and minerals. The success achieved by the Apollo 9 astronauts demonstrated the value of high quality multiband space photography (Figure 7) and provided an indication of the opportunities that would be presented when the first operational multiband satellite, the Earth Resources Technology Satellite (ERTS), that employed essentially the same wavelength bands became available three years later.
Not surprisingly, subsequent Apollo missions tended to concentrate on photographing the lunar surface, although some photographs of the earth continued to be taken. Of note, a survey of early Apollo photography published in 1970 was the first to include a chapter dedicated to “The hand of Man” and as such was the first major publication to recognise the potential for space photographs to describe man’s influence on the earth’s surface (Nicks 1970, 95-116). Similarly, in anticipation of the forthcoming close-up reconnaissance of Mars by the Viking Orbiter spacecraft, Gemini and Apollo photographs of the earth were used to investigate the potential of 100m resolution imagery to reveal signs of life (Sagan and Wallace 1970). The study concluded that the Mars Orbiter and Lander experiments held significant promise of detecting life on Mars of contemporary terrestrial extent and advancement, should such life exist.

Whilst the Apollo missions were being conducted, and no doubt in recognition that the low spatial resolution of the photographs and imagery that were being obtained from space would
eventually be improved, NASA was also funding research to investigate the potential uses of airborne scanned imagery and false colour infra-red film for archaeology with encouraging results (Schaber and Gumerman 1969; Gumerman 1971; Gumerman and Lyons 1971).

**Project EROS and ERTS**

In a note published in *Antiquity* in 1967, Dr Henry O Thompson of Syracuse University observed that the imagery that would soon be available from the forthcoming Earth Resources Observation Satellite (Project EROS), as ERTS was then known, had the potential to be an effective resource for archaeology (Thompson 1967). He noted that, in contrast to conventional aerial photography, Project EROS would be able to provide almost continuous coverage of almost any point of the globe at any time of the year delivering a vast quantity of information that could be used by archaeologists. In a comment on the note, St Joseph suggested that the low spatial resolution of the imagery would be a limiting factor, a point that was recognised by Thompson. Once ERTS imagery finally became available some five years later, attempts to use its Multispectral Scanner (MSS) to detect archaeological features were limited by the 80 m resolution of the product. Nevertheless, some massive features such as the pyramids at Giza could be detected on MSS imagery (Quann 1977), albeit with some imagination, as could ancient water management structures in Mesopotamia (Adams 1981) and northern Egypt (Richards 1989).

**Meanwhile, in a parallel universe...**

At the same time that the US Government was funding the above civilian activities it was also funding highly classified work to develop satellite remote sensing for intelligence purposes. In what could be considered to be a ‘parallel universe’, millions of dollars were being spent on what became the highly successful CORONA programme, as well as other less successful programmes such as SAMOS and LANYARD (Peebles 1997). Operational between 1960 and 1972, CORONA returned over 800,000 photographs of the earth’s surface with an initial spatial resolution comparable to the Gemini IV photograph shown in Figure 6, but rapidly improving to 2 m for the final variant of the system that was operational from 1967 onwards (Figure 8). Complementing the area search capabilities of CORONA were the satellite flown in the GAMBIT programme which returned even higher quality photographs of specific targets of intelligence value with spatial resolutions of the order of 1.2 m (Richelson 2003).

The photointerpreters analysing CORONA and GAMBIT photographs in the 1960s would have been well aware that many of the unknown features that they were viewing were not of intelligence value and would have included features of cultural and archaeological interest; they were known as the “unidentiftieds” (Brugioni 1969). However, it would not be until 1977 that the archaeological potential of photoreconnaissance satellite imagery would be described in print. Writing in the pages of the CIA’s classified house journal *Studies in Intelligence*, Robert Poirier described the use of satellite photographs to describe a number of Roman sites in Jordan including the legionary fortress at El Lejjun (Poirier 1977). In his paper, Poirier argued that photo-reconnaissance satellite photographs had great potential for use in archaeological discovery and that since the US intelligence community did not have the analysis resources available to evaluate the mass of photographs collected, they should be made available to academia for research use. A year later, Poirier published a paper describing a satellite photograph of the First World War battlefield at Verdun, further illustrating the archaeological potential of the photography (Poirier 1978).
Poirier’s proposal caught the eye of Admiral Stansfield Turner, the Director of Central Intelligence, who asked for the feasibility of the release of satellite photographs to academia to be investigated (CIA 1977). However, despite highly classified reconnaissance images having been released for use by government agencies outside the intelligence community for a variety of reasons including updating domestic mapping by the US Geological Survey, assessing the damage caused hurricanes and tornados, even counting whales off the Mexican coast (CIA 1973), it would take another 18 years before the photographs acquired by CORONA would be declassified and subsequently used in archaeological studies (see Fowler 2004 for a review).
Summary

Although by no means exhaustive, this survey indicates that whilst a growing number of photographs of the earth’s surface had been obtained from space from the late 1940s onwards, it was only by the late 1960s that the archaeological potential of photographs and imagery acquired from the orbital perspective was being realised. The 1967 paper in Antiquity by Thompson appears to be the first formal articulation of the archaeological potential of satellite imagery, although it is likely that the intelligence analysts working on CORONA and GAMBIT photographs at that time would have been well aware of the actual capabilities of satellite products to reveal archaeological features, but were unable to report their observations in the open literature. NASA’s interest at this time in the use of airborne scanned imagery and false colour infra-red film for archaeological purposes would appear to reinforce this view that the period was beginning of the realisation that the orbital perspective could have some archaeological potential.

The imagery acquired by ERTS in 1972 represents the start of the exploitation of civilian satellite imagery for archaeological purposes. This would ultimately lead through the later versions of the Landsat satellites, as ERTS was subsequently known, to the very high resolution images that are now available from commercial satellites such as IKONOS, QuickBird and GeoEye-1. Facilitated by the Internet, forty years after the archaeological potential of the orbital perspective was first realised, high resolution commercial satellite images covering a significant proportion of the Earth’s surface are now readily available through Google Earth and the photographs acquired by the US CORONA and GAMBIT programmes, previously available for a very modest cost, are now becoming available for download free of charge. The era of satellite archaeology has now truly arrived.

Acknowledgement

Thanks to Mr Jeffrey Hartley of the National Archives and Records Administration, College Park MD, for searching the CREST database and providing copies of the CIA documents cited in this article.

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Note: copies of the NASA reports cited below are readily available for download from the NASA Technical Reports Server (http://ntrs.nasa.gov/search.jsp).


approved for release on 9 January 2002, College Park MD: National Archives and Records Administration.


Flying review 2010

A request for information about results from flying in 2010 brought the following notes and photographs plus a more general appraisal about problems of flying in the north of Scotland. To avoid argument these are placed these in alphabetical order of country.

Flying in Denmark summer 2010
Lis Helles Olesen¹

During the previous two summers in our research project “An aerial view of the past” we were rather spoilt with good conditions for cropmarks. In 2008 we had about 60 flying hours and in 2009 about 70 flying hours. In each year we found about 280 archaeological sites of which 80 % were earlier unknown sites.

In 2010 we have had a very long and cold winter and spring together with some rain in spring. The flying season stated at the end of June and ended about twelve days later because of too much rain. The rain wiped out the crop marks which had appeared at that time almost only in the western part of Denmark. This happened probably because the crops were in an earlier stage of the growing season compared to 2009 when cropmarks did not disappear because of rain at nearly the same time of the year.

Anyway, we had about 40 flying hours in 2010 and found very good new sites but only in the western part of the country. I guess there are about 70 new sites including a new causewayed camp just beside an old known one. In addition, houses and settlements from the Iron Age and Viking Age and the bailey (farm buildings) to a medieval castle mound just to mention some.

www.aerial-archaeology.dk Still it is only in Danish, but you can look at the photos under “BILLERDSERIER”.

Lots of Iron Age houses from the time around the birth of Christ.

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Summer 2010 England

Damian Grady, Dave Macleod, Pete Horne\textsuperscript{1}: English Heritage

An exceptionally dry spring and early summer led to 2010 being a very productive year for cropmarks in England. Some flyers with long memories have even compared it to 1976. The flying season started in unusual circumstances (volcanic ash) with easier access to busy airspace around Luton, Stansted, Gatwick and Bristol in April, but unfortunately just before cropmarks started to develop in any great number. From late May to the end of June cropmarks were visible in most parts of England and on a variety of soils. The English Heritage (EH) reconnaissance teams concentrated on areas with unusually high SMDs early in the year, mainly in the south west and north west; areas with usually low response and/or areas that had received little reconnaissance due to previous wet summers or busy air space. While there were relatively few high profile discoveries (eg a Roman Camp in Dorset) there were lots of field systems, enclosures (c.60 in one day in Holderness, a normally sparse area for cropmarks), barrows/ring ditches, at least four long barrows and a range of more unusual sites (see attached). Reports from EH funded local flyers suggest a similar pattern in Herefordshire, Shropshire and Cornwall up to late June when the weather started to deteriorate from the west.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{unusual_funerary_group.jpg}
\caption{An unusual funerary group (?) near Hull. NMR28081/31 Dave Macleod © English Heritage. NMR}
\end{figure}

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Reconnaissance in Muntenia/Oltenia/SE Transylvania, Romania, 2010
Bill Hanson and Ioana Oltean

A short programme of reconnaissance (2nd-8th July 2010) focused primarily on recording Roman military structures was undertaken under the auspices of the STRATEG programme, co-ordinated by the National Museum of Romanian History, Bucharest. This followed an excellent first season in July 2008 which focused on the region of Galati and N Dobrogea in eastern Romania. This year reconnaissance was based at grass strip airfields, first in Pitesti-Geamana and then in Brasov-Ghimbav. Weather conditions for both flying and cropmark formation were not ideal, restricting both flight time and results. Flooding was apparent in parts of SE Transylvania and along the Danube, though a few cropmarked sites were recorded in Muntenia (e.g. Roman fortlet south of Rosiori de Verde). Nonetheless, the opportunity to fly in areas with no history of reconnaissance was still worthwhile to record extant sites, both known and apparently unknown, including a possible early church enclosure with a cemetery at Icafalau (below).

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Two for the price of one: parching in grass reveals two previously unrecorded later prehistoric settlement enclosures beside Prestwick airport in western Scotland. The northerly of the two (A) is probably late 1st millennium BC in date and comprises the bedding trench of a large timber round house (c. 18m diameter) set within a broad enclosing ditch. The second enclosure (B) is set against the edge of a steep-sided gully and may date to the first half of the 1st millennium BC. These were recorded on 21 June 2010 during a period of sustained drought in Scotland, which produced very good returns in the west where soil moisture deficits were higher than in many traditionally drier areas in the east (e.g. at 110mm for grass in the area around Prestwick during the week this survey was undertaken). This is important because the predominately damp climate of western Scotland has limited the returns from aerial reconnaissance for plough-levelled sites. Aerial survey of the west and south-west of Scotland has benefited from several unusually dry recent summers, including 2008 (Cowley 2008) and 2010, building on a few past dry seasons at very irregular intervals (e.g. 1992: Cowley & Brophy 2001). These returns, generated by unusual weather conditions and reactive aerial survey, are populating landscapes that are otherwise poorly understood.


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Frustrations of Flying in NE Scotland

Moira Greig
Aberdeenshire Archaeology Service

This winter proved a challenge to undertaking any winter flying in NE Scotland, with the worst snow falls and lowest temperatures for many years. It was a challenge to actually find a window to fly in, with either no sun or too much snow. Finally getting the right conditions in late February resulted in a flight, with a combination of sun & snow just almost perfect - except for a low temperature of -8°C on the ground near Aberdeen. Having booked the flight for a Bell 206l Longranger, with an opening and closing door, I arrived to find there was only a Robinson R44 available, which I usually use for summer flights. They had kindly removed the door for me, which they usually did for my summer flying anyway. Being well wrapped up against the cold I thought nothing of it. However 30 minutes into the flight I reached an interesting area and made a start at recording sites. After waiting so long to get up and finding a good site I then had the frustration of having the batteries in the cameras packing in due to the low temperatures over the hills of below -18°C as well as the wind chill factor with no door. In spite of trying a variety of methods of trying to keep the spares warm we had to finally terminate the flight.

The snow finally cleared away and thoughts turned to summer flying. I took to the skies again in late June to check developments in Aberdeenshire after a relatively decent dry spell. There was a promise in the crops although SMD figures were not as high as I would have liked. However, similar figures had produced crop marks in previous years so I was hopeful. I checked all the usual indicator sites but not a single mark was recorded over a wide area where marks generally show. Again frustration but lots of upstanding buildings photographed!

Having received an update of rising SMD figures from Dave Cowley things started to look up. I took to the skies again in mid July. Winter barely was looking good so I therefore decided to cover the coastal plain of Moray, which is a good crop mark area. I knew I would be flying into a military zone but we had phoned ahead and had clearance as long as we arrived before a certain time. Nothing was visible as I flew north but on reaching the coastal plan west of Banff I finally saw the first marks with a barrow cemetery starting to show. Things were looking promising but of course too good to be true! We were now in a change of frequency area where RAF Lossie took control. Having had a delay at the start of our flight we missed the window and as a result there was a large NATO exercise on. My pilot was not keen to fly in an area where there were a number of foreign pilots flying in unfamiliar territory, and RAF Lossie were not very willing to accommodate us. I only made it to the river terraces of the lower River Spey near its estuary, where fortunately I did manage to record a number of crop marks and even found three new sites. Now the weather has changed again and the harvest has started!

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Information for contributors

*AARGnews* is published at six-monthly intervals. Copy for *AARGnews* 42 needs to be with me by **February 14**. Editorial policy (for want of a better word) tends to be that if I am sent interesting contributions they go in up to an issue limit of about 50 pages. Vague instructions for contributors are on the AARG website.

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

Remote Sensing and Archaeology - RSPSoc ArchSIG

The Archaeology Special Interest Group of the Remote Sensing and Photogrammetry Society aims to encourage the exchange of research and methodology between remote sensing and photogrammetry scientists and archaeologists, especially those concerned with methods of site prospection and novel applications.

Meetings and communications concentrate on a mixture of exploring case studies and developing methodology and include ground-based methods, photogrammetry, LIDAR, laser scanning, and geophysical prospection, as well as aerial photography, UAV's and spectral / thermal imaging.

The aims of the group are to promote the development and use of remote sensing and photogrammetry in archaeological surveying; to encourage research in all aspects of remote site location, recording, analysis and interpretation and to provide a forum for the exchange of information and ideas. Additionally the group provide an opportunity for collaboration between archaeologists and heritage professionals and the wider environmental remote sensing community via events supported by RSPSoc.

RSPSoc ArchSIG welcomes new members from the wider heritage community and is particularly seeking contributions for our re-launched quarterly newsletter available via the ArchSIG website - [www.rspsoc.org/information-zones/sigs/archaeology/](http://www.rspsoc.org/information-zones/sigs/archaeology/)

For more information please contact Dr Chris Brooke archsig@rspsoc.org or speak with Rebecca Bennett at AARG Bucharest.
Cropmarks
Interpreted by Rog Palmer

Jordan/Israel
Some of the kite and ‘funnel’ sites that we know from Jordan have been identified elsewhere

ALS and the Maya in Belize
Why bother with a single wooded hilltop if you can use ALS to examine a jungle? The background was that professors Arlen and Diane Chase (University of Central Florida) have directed archaeological excavations at Caracol for more than 25 years. People on the ground had mapped some 23 square kilometers of ancient settlement. Moving from the ground to the air and using NASA technology aboard the Cessna allowed them to survey a much larger area that seems to show that the city spread over 177 square kilometres.

There are many web links (some near-identical) that include the following:
http://www.photonisonline.com/article.mvc/Laser-Beams-Unearth-Secrets-Of-The-Maya-0001?atc~c=771+s=773+r=001+l=a&VNETCOOKIE=NO
http://www.sciencedaily.com/releases/2010/05/100511111935.htm

UCF Biology Professor John Weishampel designed the unique LiDAR approach. He has been using lasers to study forests and other vegetation for years, but this was the first time this specific technology fully recorded an archaeological ruin under a tropical rainforest.

The images taken at the end of the dry season in Belize last April took about 24 hours of flight time to capture and then three weeks to analyze by remote sensing experts from the University of Florida. Now Caracol's entire landscape can be viewed in 3-D, and that already offers new clues that promise to expand current understanding of how the Maya were able to build such a huge empire and what may have caused its destruction.

Main source: University of Central Florida

For more information, visit http://news.ucf.edu.
Exhibition at Harvard: Spying on the past: Declassified Satellite Images and Archaeology
All we know about this is from the website which notes there to be “Four case studies in Syria, Iraq, Iran and Peru reveal complex early cities, extensive trackways, intricate irrigation canals and even traces of nomadic journeys.”
http://www.peabody.harvard.edu/node/560

One of the organisers is Jason Ur who has published extensively on Mesopotamian sites and landscapes based on CORONA and other satellite information. His projects and other stuff are at:
http://www.fas.harvard.edu/~anthro/ur/index.html

Google Earth – prisons and looting
Thanks to Ioana Oltean for pointing out this link to sciencemagazine.com and a two-page note about archaeology students using Google Earth. Two examples are detailed: a study of the development of the prison at Guantánamo Bay [this is change – just what a sequence of APs is good at recording] and the severity of looting in the Near East and Peru. David Thomas’s work in Afghanistan (see AARGnews 37) is also mentioned. References are given to the original publications of the examples and it is good to see that so much archaeological use is being made of GE. As long as the users realise that this is one tiny part of the complete photographic record.

GeoSetter (see Editorial)
Books of interest?


This is the first book in Romanian on aerial archaeology and came as a result of our participation in the European Culture 2000 project and the training, collaboration and work we enjoyed during the past five years. This work aims to bring to the attention of archaeologists and those interested in this area the benefits and values of using aerial photographs and satellite images in archaeology and their role in protecting the vestiges of the past. The volume includes a foreword explaining how the book was born; an introduction to aerial photography, interpretation and mapping methods and techniques in archaeology, written by Rog and illustrated with aerial photos taken in Romania; a report on the Romanian aerial investigation project in Southern Romania (Mostistea Valley) written by Irina and Carmen; and the final report of the Culture 2000 project, _European Landscapes - Past, Present and Future_, which presents, in texts and images, the aerial investigation projects in 11 partner countries (2004 – 2008). At the end of the book we added a selective bibliography and a web reference list for those who wish to read more, while the more technical terms (sometimes hard to translate into Romanian) are explained in a glossary. More on this book in the English version of my foreword, at [http://www.cimec.ro/DespreCIMEC/Arheologia-Aeriana-Foreword.pdf](http://www.cimec.ro/DespreCIMEC/Arheologia-Aeriana-Foreword.pdf)

Irina Oberländer-Târnoveanu

Kevin Jones wrote from New Zealand with the following information:

_Ngā Tohuwhenua Mai Te Rangi: A New Zealand Archaeology in Aerial Photographs_ (1994) by Kevin L. Jones is now online at the NZ Electronic Text Centre.

[http://www.nzetc.org/tm/scholarly/tei-JonTohu.html](http://www.nzetc.org/tm/scholarly/tei-JonTohu.html)

The text is in the original and also as scannable text (with many literals).

Because of the detailed nature of the images in this work, when you click through to the actual jpg of each image (e.g. [http://www.nzetc.org/etexts/JonTohu/JonTohu012a.jpg](http://www.nzetc.org/etexts/JonTohu/JonTohu012a.jpg)), you will notice that it is presented larger than with most other works on the ETC site. This will let people appreciate the range of features these photographs cover.

Kevin says that he has a few mint copies of the original work for sale at a steep price, which has just dropped. Contact kljarchaeologist@paradise.net.nz

[This site/book is worth visiting – or buying – for a view of the other side of the world. Nice photos and informative text. Rog]


It is good to see how rapidly Geert Verhoeven has been publishing parts of his PhD as these include items of interest to any of us who make serious use of a camera. If I remember correctly, he has spoken at AARG meetings about benefits of RAW and, more recently, about using a digital camera for infrared photography. Near-UV uses wavelengths at or beyond the other end of the visible spectrum.

The *Power of RAW* paper is informative – some may say over-informative but such is the nature of most PhDs – and makes useful comparisons between RAW, jpeg and tiff files. Use of the word *Power* in the title says it all as a RAW file ‘… can be seen as the digital negative…’ (p2010) and I think that those of us who used film still treasure our negatives. And as with negatives and a good darkroom technician, RAW files can be manipulated to reveal detail, especially in highlight and shadow, which may not be recorded in jpegs (I don’t think anyone uses tiff as a camera-recording file type). As with darkroom chemistry that gave us a choice of films, papers and developers, so the variety of RAW file types can be processed using any of a dozen or more purpose-written software packages. There can be no argument that RAW is not best for the ultimate digital capture and, as in the days of film when we each had a preferred film-developer combination, each of will end up using favoured software, and methods within those software, to process it.

To investigate the Near-UV part of the spectrum involves the following (my summary):

- a camera from which the UV/IR filter has been removed from the sensor. (With appropriate lens and filter, this can also be used for IR photography);
- a UV-dedicated lens plus a filter that cuts out the near-IR and visible spectrum;
- the setting of a low-value white balance;
- very long exposures which require a stable platform;
- image processing (but so do most other digital pics).

The examples of aerial photos seem to show increased contrast between tones over those that have been recorded using the visible wavelength – so there may be some use for this end of the spectrum. However, the need for long exposures means that photography using the near-UV will need to remain a tethered operation and thus targeted mainly on sites that are already known and/or excavations. Perhaps companies who offer ‘aerial photographs’ using extending poles may usefully add such a camera to their kit and so record an excavation in UV, IR and visible during one visit.

Both papers are quite technical but among that will be found the pertinent paragraphs that may help us to understand, improve and expand some of the things we do. I would guess that the over-abundant references are a remnant of the original thesis and while they may prove useful to someone could, for the sake of easier flow of words and reading, be cut significantly in any future post-PhD papers (written by anyone – especially theoretical archaeologists).

Rog Palmer

You have to get to page 44 before authorship is credited to Simon Crutchley who has been the main person evaluating uses of ALS in EH’s aerial survey. Peter Crow (Forestry Commission) has written a contribution on using ALS in woodland. For some reason (thorough editing?), that same page 44 gives the guide a different title and a different publication date.

However, the rest of this guide seems to have escaped editing errors and is full of useful information about using and commissioning ALS. Simon uses the guide to teach the reader not only about ALS but also about problems and sources of confusion in its interpretation. I doubt if there is a need for a further introduction to ALS (although I’m sure we’ll be inundated with them, just as people will preface their talks at AARG with 5 minutes about how it works) as this is clear and informative. If you want to know about ALS, get this guide.

Rog Palmer


I know of this only from receiving a pdf copy of the paper I wrote with Dave Cowley but I imagine the contents are similar in type to those in the 2006 *From Space to Place*. Whatever, it seems expensive and there surely are ways of publishing conferences that make them more immediately available and either free or cheaper. Or are paper books necessary for academic prowess?

Rog Palmer

*Helvetia Archaeologica* volume 125/126: *Luftbildarchäologie*. CHF 24.-/Euro 16.-

Bestellung via E-Mail oder Briefpost an die Redaktion.

Mit freundlichen Grüßen

3 Anhänge

Reading the contents with my non-existent German suggests this issue of the Swiss journal is about results of aerial survey in different areas and results of subsequent work. But I may be wrong!

[based on information sent by Rudolf Degen]

*From the publisher’s blurb:*

This volume presents the rich, but under-utilised and in parts inaccessible, archival historic aerial imagery, traditional photographs and those captured from satellites, for the exploration and management of cultural heritage. An unparalled resource, for archaeologists and all with an interest in landscapes, images spanning the second half of the 20th century provide an unrivalled means of documenting and understanding change and informing the study of the past. Case studies, written by experts in their fields, illustrate the applications of this imagery across a wide range of heritage issues, from prehistoric cultivation and settlement patterns, to the impact of recent landscape change. Contemporary environmental and land use issues are also dealt with, in a volume that will be of interest to archaeologists, historians, geographers and those in related disciplines. 293pp, b/w and col illus.

Étang de Montady, Languedoc-Roussillon in southern France. A remarkable pattern of field boundaries created in the 13th century on a reclaimed lake photographed on 6 August 1944. Drains converge on the circle which lies at the centre of the former lake, with water then transported out of the shallow basin through a tunnel 1.3km long under the Hill of Malpas. TARA_MAPRW_106G_1960_4175, © Crown Copyright, RCAHMS

This book followed from the AARG session at Copenhagen in 2007 about archive photographs and their uses. It is the second volume in the series *Occasional Publication of the Aerial Archaeology Research Group*.

And for any of you who didn’t get a flier, copies can be ordered from:

Oxbow Books
10 Hythe Bridge Street
Oxford
OX1 2EW  UK
orders@oxbowbooks.com
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 photographs 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

AARG is a registered charity: number SC 023162.

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

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Subscription reminders may be sent out on January 1

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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.