AARGnews 15

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Ref: Harold Wingam: pioneer aerial photographer by Geoff Hall in this issue.
AARG Working Groups

Michael Doneus had the idea of forming AARG Working Groups and, with the demise of the CBA Aerial Archaeology Committee and no equivalent body in Europe, it seems an obvious way to examine aerial problems in detail, reach conclusions, publish, and apply pressure as necessary. Michael’s interest is in following up GIS uses and technical photogrammetric mapping so as to produce guidelines to mapping scales, methods, accuracy, etc and to try to identify a suitable range of tagged data that should accompany GIS mapped data. His GIS at Vienna is soundly developed as is that in Britain at Northamptonshire County Council. It seems sensible, before it is too late, to agree on a basic compendium of linked data rather than all going our separate ways.

Creation of a second working group is a logical development from my AARG 97 session, Aerial survey for archaeology? I will remind you that AARG’s unnamed forebear was convened to tackle post-reconnaissance problems. Acquiring the most appropriate photographs to work with is a critical post-reconnaissance problem yet it has never been discussed at AARG and interpreters’ few requests to photographers (eg for prints and for stereo pairs) have been little heeded. If there is to be serious use of aerial photographs beyond illustration, it will be necessary (however unpopular) to harness the photographers to work to specifications set by photo interpreters.

I hope that future issues of AARGnews will be able to keep all members in touch with the problems and progress of Working Groups.

Aerial photography for the millennium?

Along with quite a chunk of the population, I am somewhat disgusted by the amount of money, regardless of its source, that is being poured into ‘millennium commemorations’. Unfortunately, I can’t credit these feelings with the birth of this idea (it arrived during breakfast) but seriously wonder why we (by ‘we’ I mean England, Britain, Europe, the World...) don’t go for a genuine and useful commemoration by acquiring 1:10000 vertical cover of the whole country (etc) in, say, June or July 1999. What a way to go – and what a way to keep PIs busy for the next millennium! Surely if the RAF could do it in 1946 they can do it sixty years later with their few remaining aircraft?

Obviously another National Survey isn’t just for archaeological use, and this may be where we can integrate with other disciplines to gain the ability and influence to try to pull it off. Maybe a combined team of Secretaries from the three Commissions, plus the CBA, plus a few friendly profs (Bradley and Cunliffe for instance?) will know enough ‘important people’ in other disciplines to be able to form a powerful pressure group to get this done. Isn’t it worth a try?

Medieval fields

Now that medieval fields, especially areas of ridge and furrow, are recognised as being of archaeological interest might it be possible to point a few cameras in those directions instead of deliberately ignoring the stuff? Last year English Heritage funded a project, conceived by Brian Roberts and managed by Glenn Foard, to identify areas of surviving ridge and furrow in eight midlands counties. The end product of the project was to nominate large areas of surviving earthwork fields for scheduling, or otherwise put under controlled management, but when EH inspectors became fully aware of the acreages involved they rapidly lost interest. I would have thought that management was a simple problem: earthworks survive because the fields are pasture, often on clay, and too lumpy to plough; therefore EH restricts use of said fields to pasture which is what the farmers want them for anyway! QED? Problems aside, it does mean that medieval fields have at last been recognised by ‘authority’. Our aerial photographic record of open fields is not especially good: there are obliques of spectacular and well lit pieces by St Joseph and other artists, and there are
chance recordings of crop-marked strips (such as on some of Allen’s photographs and in the Maxey area) when they form an upper layer to earlier levelled sites. Official policy seems to be to ignore it (I seem to remember Bob Bewley telling me that, ‘We don’t photograph rig and furrow.’) but policies can change and I suggest it is worthwhile to make such records when good surviving extents are noticed (and to train yourself to look at, rather than through, medieval fields) as changing landuse may eventually lead to its disappearance.

**Dating crop marks?**

In early May I was asked to take some aerial photos of excavations along the route of the Market Deeping bypass (Lincolnshire-Cambridgeshire). By that date there was a fair amount of what the aerial photographers seem to call ‘green-on-green’ crop variation (mostly height-differences) in cereals on the limestone and river gravels. This area is one that I know well from mapping, and where work on the ground has shown it to be dense in occupation from the neolithic onwards. Apart from natural cracks, which often showed extremely clearly, I became aware that the crop-marked archaeological evidence on the gravels appeared to be solely above features of the bronze age (well, ring ditches) and medieval (strip cultivation) – the iron age and RB features were not there at all. It would have been interesting to see if these ‘missing’ features pop up at a later date, but it rained and I haven’t been that way since.

Have any of you noticed this crop-marks-by-period phenomena?

**A use-by date for aerial photographs?**

During recent teaching at Sheffield a task was set which included use of maps published by Derrick Riley in 1980 (*Early Landscape from the Air*). A week later one of the students asked a question that floored me for a while, ‘Why are you asking us to use material which is more than ten years old?’

What a wonderful concept! At last we can chuck out all those old photographs that Crawford collected, just about all the obliques that St J and David Wilson took for CUCAP, those curly old verticals from the 1940s, and most of your faded slides. Great news for the Commissions or any other libraries which seem to be getting a little crowded.

**Historical note**

I had a delivery by courier recently, who pointed at the *Air Photo Services* address and mused, ‘Ah, air photos, I used to work with them in the RAF.’ When I later mentioned archaeology he brightened up and said that he remembered someone years ago, ‘Completely mad [his words], who used to drive the pilots frantic, refused to be strapped in and hung out of the side taking photos. He was a professor at Cambridge....’

Unfortunately for me, my courier lives in Bristol but seemed happy with the idea of chatting for an hour or so about his past service life which included involvement in survey in Britain and Africa (eg work on the pre-dam Aswan survey) and a spell of PI at Benson. So if there is anyone vaguely local (and an ex-railway workshop at Swindon springs to mind) interested in post-war air survey, prepared to do some chatting, feed in the occasional camera name, and write up what’s interesting for your favourite newsletter, I’ll pass on his address.

**and finally...**

I am delighted that RCHME have (almost) published Cathy Stoertz’s *Yorkshire Wolds* (see ad on p7). This book provides an unsurpassed demonstration of the information that can be interpreted from aerial photographs and the range and scope of archaeological thoughts that may be applied to begin to understand those mapped data. If RCHME market the book properly, we may finally be able to convince ground archaeologists (and maybe a few of the flying archaeologists?) of what aerial survey is capable of achieving. Some consideration is also given to directions for subsequent field investigation. You all need a copy.
Chairman’s piece

Cathy Stoertz

It seems to have been traditional for past chairmen to use part of this space to report the season’s flying results but, as a non-flying aerial archaeologist, I will have to let that custom lapse. In any case, the Great English Summer has reasserted itself with a vengeance this year, after tantalisingly promising beginnings – far from having to beg for extra funds in August, as in the last two years, most reconnaissance teams in these parts may be hard pressed to spend this year’s budget at all.

The wash-out of the cropmark season may of course have knock-on benefits for other areas of research – winter flying, earthwork survey and architectural survey tend to suffer if the money runs out with the harvest. As a photo-interpreter, I can’t resist pointing to this season as a useful reminder that aerial photography concerns more than cropmarks, and aerial archaeology concerns more than photography. No matter how avidly we all follow reports of ‘new discoveries’ each year, interpretation, mapping and research are not simply alternatives to reconnaissance: they are the necessary outcome, and are not weather dependent. (This pompous sentiment is expressed with decreasing conviction from a sweltering office in mid-August – I’m sure anybody with any sense would rather be flying!)

Of course even habitually airborne AARG members don’t really have any trouble filling hours/days/weeks on the ground. Many lines of communication opened via the AARG forum have been active of late. The EU’s Raphael Project will present an exhibition and conference in Prague in October followed, it is hoped, by a series of research projects based on central European themes. Włodek Raczkowski is working on an aerial archaeology exhibition to be shown at the Institute of Prehistory in Poznan, and plans are taking shape for a training course in Poland in the summer of 1998.

News of an exciting new beginning has been received from Latvia, where the State Inspection for Heritage Projection has embarked on the initial stages of project design for a national aerial survey programme. Dr Juris Urtans, the Head of the Centre of Archaeology, will be visiting Britain in September to look at the work of the Royal Commissions and others. His visit will include the AARG conference which, I trust, will establish another strand in the communications network.

Finally, Rog Palmer and Michael Doneus have been working on an AARG homepage for the Internet, which offers seemingly endless opportunities to extend the range of contacts. Who knows what net-surfers we might reach on future wet afternoons?
AARG aerial photograph competition

1998 is *The Year of the Photograph*, and to join in the celebrations your Committee thought it might be appropriate to have a competition.

We ask for prints – black and white, colour, FCIR, hand-coloured or digitally manipulated – to be submitted. Size no larger than 250 x 250 mm (10 x 10 inches). Please note that prints does not mean slides, although prints may be made from original transparencies. Entries can be the work of any photographer (not necessarily yourself, although permission may be required) taken at any time from the air but not previously published.

Each entrant may submit a total of four prints, each of which must be categorised as either:

1. Archaeological: site (control points are not compulsory!)
2. Archaeological: landscape
3. Architectural: site
4. Architectural: landscape
5. Landscape (including waterscape)
6. Abstract – or just plain pretty

Entry is open to any AARG member not currently on the committee and closing date for receipt of photographs is 30 January 1998. Prints should be sent to:

Cathy Stoertz, RCHME, NMRC, Kemble Drive, Swindon SN2 2GZ, UK.

Judging will be by the current AARG Committee (or most of it) and results will be announced in the March *AARGnews*. We offer no prizes other than fame among AARG members. We hope to be able to exhibit some, or all, photographs at AARG 1998.

Return of prints. Photographs can be collected by entrants (or their agents) at the end of AARG 1998 or will be returned by post if a stamped addressed envelope (or label) is included with the submission. Any remaining will probably be donated to NLAP!

AARG reserves the right to publish (in black and white), in future issues of *AARGnews*, any of the photographs submitted.

**The following information must be firmly attached to each print:**

<table>
<thead>
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<th>AARG aerial photograph competition 1997</th>
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<tr>
<td>Name and address of entrant</td>
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<td>Name of photographer (if different)</td>
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<td>Category entered</td>
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<td>Date of photography</td>
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<td>Other information? (optional)</td>
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For sale...

ANCIENT LANDSCAPES OF THE YORKSHIRE WOLDS

by Catherine Stoertz

This volume introduces a visual representation of the rich archaeological landscapes of the chalk uplands of eastern Yorkshire.

It provides a landscape reconstruction and analysis of vanished sites which are, for the most part, only visible from the air in the form of cropmarks. The maps reveal for the first time a density of occupation and land-use which transforms our understanding of the intensity and distribution of prehistoric and Romano-British settlement in the region. The text leads the reader through the analytical methods required to understand the changes which took place, from the Neolithic through to the Romano-British periods.

The RCHME, through the historic collection of aerial photographs in the National Monuments Record and the Commission’s own reconnaissance programmes, is uniquely able to prepare these maps, which will serve as a research base for the development of future understanding, investigation and management of the archaeological sites within this arable upland countryside.

104 pages; 45 figures; 4 landscape maps.

ISBN 1 873592 31 0

Published by the Royal Commission on the Historical Monuments of England.

Price £45 (Special offer £40 until 31 December 1997); postage and packing £6.

Available from RCHME Publications Section, NMRC, Kemble Drive, Swindon SN2 2GZ. Phone 01793 414618; Fax 01793 414769; email pubs@rcme.gov.uk

All aerial photographers and most archaeologists need this book.

Buy it!

[Rog]
Forthcoming event

Luftbildarchäologie in Zentraleuropa
9-10 October 1997
Kinosaal des Nationalmuseums, Prag

Those of you who don't get enough aerial photographs at AARG may fancy a trip to what was described to me as the beer capital of Europe [but I thought England was now part of Europe..].

This meeting, supported by the EU Raphael Programme, aims 'to raise public and professional awareness of the uses of aerial archaeology' and is a showcase for some of the recent photographic work undertaken in the Czech Republic, Germany, England, Austria, Hungary, Poland and Slovakia as well as including a handful of people talking about using aerial photographs. The meeting sees the opening of an exhibition of aerial photographs on October 9, and a field trip is planned for the 11th.

Cathy Stoertz is attending on behalf of AARG (one of the project consultants) and may tell us about things in the next AARGnews.

Any late-bookers should contact the organisers: Landesamt für Archäologie, Japanisches Palais, D-01097 Dresden. Fax: +49 351 814 4555. E-mail: lfa@archsax.de

Information on the Raphael Programme can be found on the following sources:

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British Archaeological Reports

A recent circular from BAR included the following:

'We have the most modern technology at our disposal and are now able to offer colour reproduction on a scale not hitherto seen in this type of publication'.

Any of you planning a book may like to contact BAR (who also do an International Series) through:

David Davison, Archaeopress, POB 920, Oxford OX2 7YH, UK
e-mail: bar@archaeopress.demon.co.uk
In the days of OGS Crawford, and Air Photography was called Aerial Photography there was a likeable fellow named Harold Wingham. Before some of the readers of AARGnews were thinking of their apertures this chap was up there taking some of the most magnificent AP’s.

As the Librarian of the Royal Commission’s Specialist Collection I’m happy to say that Harold’s photography forms a valuable part of the Collection, but in the days of the ‘gifted amateur’ we had not placed much value in formally logging acquisitions; copyright agreements, provenance, that sort of thing. This is probably due to the fact that the ‘gifted amateur’ is a more generous creature than the ‘not-so-gifted professional’!

Nowadays the accent is on recording such things, and so an opportunity arose via my colleague Jane Waite to meet Harold and gain a little background knowledge to the Wingham Collection. This follows an initiative to produce a catalogue for the various historical collections here at the National Monuments Record Centre.

Harold Wingham started photographing archaeology and architecture in 1946/47. He was trained during the war as a wireless operator/navigator with the RAF, although he admits to not completing the navigators course. After the war, the flights were self-funded and budget restrictions meant applying to the Government for surplus cameras and film. Armed then with a couple of Williamson F24’s and a stock of Ilford HP Aerial film, Gloucestershire, Wiltshire, Hereford and Worcester were covered. Later (1950’s and 60’s) survey projects included Cornwall and Devon, and the quality of this photography is stunning.

Harold’s love-affair with airships started in the early sixties. In 1963 he flew in the ‘Schwab’ airship over Germany; a 16mm film of his flights is deposited at the RAF museum in Hendon. It was on the ‘Schwab’ that he realised that slower shutter speeds could be utilized. We will return to this theme a little later in the article.

When you consider the so-called advances in this field there is still an awful lot riding on skill, and a point and press medium format camera seems a long way off! However, the F24 weighed around 24lbs with its heavy aluminium casting, and the purchase of a Fairchild K20 reduced this by half – it being made from pressed steel as a sort of throw-away camera. Present day, you hear of Air Photographers extolling the virtue of a 35mm over the 70mm medium format camera because the latter is too cumbersome! In the light of Harold Wingham’s experience I would have to say that if pounds were somehow translated into quality of resolution then the heavier the better; no doubt this would prove problematic for a 6 or 7 hour sortie, but surely muscle development would follow a good flying season.

On talking to Harold I was surprised to hear that he knew OGS Crawford. I don’t know many people in this field that do and so I must admit to gasping at the news. We all utter the Crawford name with a sort of reverence given to a patron saint, and so to hear Harold tell of a man that could cut you to the quick was unexpected. He also told of the time that he wanted OGSC to give him one of his books, but the great old pioneer was reticent to give it away. Having asked Harold to pay a little toward the ‘gift’ of the book his greatness appears to have got the better of him, and he felt compelled to write a dedication to the young flyer. But what do you put when you have failed to be generous and your conscience won’t allow you to claim magnanimity. Simple, the dedication reads, ‘This book used to be mine, and now it is Harold Wingham’s’ – signed OGSC. Not that that story is meant to represent the ‘true’ OGSC, indeed Harold recalls the great encouragement he received from Crawford.
The great pioneer inspired the young Harold Wingham to continue with his flying despite the lack of outside interest from those who could provide funding.

I’ve included a couple of APs (Frontispiece and Figure 1) to show you what I mean about the quality of the material, and hopefully the published version will show it! The Harold Wingham Collection is my favourite AP collection at the NMRC, and that is not only to do with the quality, but the balance in it between archaeology and architecture. This broadens the appeal of the photography, especially in the days of marketing and targeting your customers.

Figure 1. Trencom Hill Fort, Cornwall. Photograph © Crown Copyright: Harold Wingham Collection, 23 September 1960 (HAW 9406/47).
Not content with oblique aerial photography from an Auster or other light aircraft, in the 60’s his attention was given to the use of airships for archaeological survey (Figure 2). Although the project never got off the ground (another story is told of lost investments and the unscrupulous amateur), it is interesting to note the technical advantages that were expected (see Shell Aviation News, 392 (1971), 8-10).

Higher resolution of course affords greater archaeological detail. By comparison, a photographer in a light aircraft using the aforementioned film and camera would set the exposure to say 1/250 second to record a site. Using an airship Harold could set the exposure time to 1/25 second – and no problem with camera shake. Hovering above the site it could be recorded more thoroughly, and it was suggested at the time that the airship could land, pick up a Site Archaeologist and allow them to gain a rather unexpected perspective of the site! Look out Time Team!

So what does the future hold? Having seen the results of the Air Photograph Unit’s airship jolly around Biggleswade a few years ago I could have been put off showing any enthusiasm – some great shots of the motors I recall!! But can we still learn something of value from this? Will the Royal Commission’s Aerial Survey ever use an airship in its reconnaissance programme?

On a more personal note I would ask the AARG Committee to consider Harold Wingham for honorary membership to the Aerial Archaeology Research Group.

As for the Royal Commission, we are hoping to put on an exhibition of Harold’s photography. Having met him, I believe Harold to be one of the unsung heroes of Aerial Photography, willing to sacrifice a lot for this rather strange discipline.

© National Library of Air Photographs

Figure 2. Harold Wingham, cupola and power unit, presumably rigged for static testing in the 1960s (Photograph © Crown Copyright: Harold Wingham Collection: MISC/280).
New films from Kodak

Rog Palmer

Those of you who think there is value in using FCIR film will be delighted to learn that from this summer Kodak will be marketing a 35mm E6 processable version (Ektachrome Infrared Film 2236) to replace the old E4 film. I imagine this will be flown by some AARG members and it may be valuable for us to be informed of results. I have yet to be shown that it is possible to predict when FCIR will give better results on arable crops or soils, and I still believe the results in John Hampton’s (1974) experiment which I interpret as showing that panchromatic plus yellow filter gives good, or better, results most of the time .... but films, especially colour films, have changed considerably in the last 25 years.

Another new film is a C41 process version of their T-Max 400 black and white film – available in 35mm and 120 sizes. This may be useful to those of you who fly in the winter, or late in the evenings. I’ve used their conventional T-Max 400 for dance and theatre pics for several years now, although this is always pushed to 1600 or 3200iso. At those ratings it has produced very good detail in shadows and, on close ups, the pic (left) shows that film grain is fine enough to see stitching and hairs – so it ought to record a crop mark at its specified speed. Chris Musson included pictures taken on T-Max 400 in Wales from the Air – try and find them! I get the impression that many air photographers think that any film rated above 100iso will produce nasty grainy pictures. This is not so, but all I can do is encourage you to try faster films when conditions need them and see for yourself. Contrast is good, and improves with uprating, and so may be of benefit when photographing almost indistinguishable marks such as occur on clay. One day I’ll get round to flying with some 1600-rated film just to see if it will be as good as I think.

A few years ago I tried Ilford’s XP2 (presumably a similar product to Kodak’s C41 T-Max) in the air and on the ground and was not wholly taken by it, possibly because I did not have control of the processing. Its grain is good for aerial work but I found the negatives very dense and not easy to print. Those of you without darkrooms may find the rapid turn-round times for C41 chemistry an advantage as any of the high street processors can handle the film – if you are happy with the quality of high street printing of aerial photos.

Reference
Background

In early 1993 the holdings of the Scottish Office Air Photographs Unit were transferred to the National Monuments Record of Scotland (NMRS). The Collection comprised nearly one million aerial photographs and negatives covering the whole of Scotland, ranging in date from 1941 to 1990. The main reasons for the transfer were twofold: firstly the holdings would compliment the RCAHMS aerial material and Ordnance Survey large scale aerial photographs already held in the Record; secondly the Unit could be better accommodated and made more widely available to users.

The vast majority of the Collection is made up of black and white vertical photographs taken by the Royal Air Force following World War II although there are also several hundred strategic wartime photographs. Other large parts of the collection include the air photographs taken by the Ordnance Survey for mapmaking purposes (from the mid 1950s to the present) and the All Scotland Survey, commissioned by the Scottish Office in the late 1980s from which the land cover of Scotland was compiled by the Macaulay Institute. The Collection also maintains a select central register of photography by private companies.

Since arriving in the NMRS, the Collection has continued to grow with the addition of collections such as the photographs and negatives taken by Meridian Airmaps Ltd.

The Collection has also undergone some radical changes: from a core staff team of seven in the Scottish Office, three were allocated to the Commission of which only one now remains. However, the number of visitors to the collection and orders for material has increased threefold. This has been largely achieved by means of implementing a computerised retrieval system which was agreed before transference of all the material. It was decided to make the laborious manual procedure for retrieving the photographs accessible through the Commission’s own GIS although no additional funds were provided for the project.

Digitising the Collection

Preliminary preparation work for the digitisation had been carried out whilst the Unit was in the Scottish Office: division of the sorties into small, medium and large scales by the allocation of a library number; development of the Central Register and plotting on colour-coded 1 maps. The possibilities of using PHOTONET (a system developed using GIMMS software by Edinburgh University for RCHME) had been provisionally explored but rejected halfway through the pilot digitisation of Shetland leaving the existing manual system. The basic file details for all the sorties were computerised onto an Atari which ceased functioning leaving a frustrating set of disks which no-one could read (although I must, at this point, thank Roger Harris and the staff at RCHME for attempting to help resolve this problem).

Thus whilst the library numbers facilitated an easy approach to this vast archive, there was a hiatus with regard to the best way to proceed with computerisation. The decision was taken to create a new indexing and enquiry system to be operated in a UNIX environment on Genamap, the GIS used in RCAHMS’ pilot scheme (for further information, see Murray and Dixon 1995, 32). Consultants from Genasys Ltd. were approached to develop a Graphic User Interface (GUI) whilst the possible methods for digitisation of the flight plots were considered by the Commission. After a couple of ‘in-house’ trials it was decided that the fastest way to proceed with the digitisation to the high standard required would be to employ an external specialist data company and a contract was awarded to Gardline Infotech. The data was captured in two primary layers: principal points (the centre of each photograph), and lines digitised in the direction of flight. The buffer zone (area covered by each photograph) could be calculated later by the GIS. A considerable amount of time was required to prepare the flight plots and solve some of the
problems of incorrect plotting. To date, the flight plots from the All Scotland Survey, virtually all the Ordnance Survey air photographs, about 80% of the Royal Air Force photographs and some of the collections from private companies have been digitised. The remaining RAF plots are virtually impossible for all bar the specialised user to read and need to be simplified, probably replotted, before they can be sent out for digitisation, but work is proceeding with this at present.

The Development of ICARUS

The basic system was set up in March 1995 and the name ICARUS coined, initially as a temporary witticism, but was subsequently adopted as an acronym for 'Interactive Computerised Air Reconnaissance User System'. (The preferred reason for selecting this name being because ICARUS, according to Greek legend, was the first man to fly rather than any notions of disobedience and melting wax!)

The conversion of the Atari disks and a way of inputting over five and a half thousand records of sorties and their attached photograph numbers was a continual problem and eventually the records were re-keyed and verified by a data service company in Edinburgh and provided in an ASCII format. Provisional work has been required to simplify the files into a suitable form to be imported into the newly created Oracle table which is interactively linked to the GIS. This information, once in the Oracle attribute table, can be called up on the GIS and selections can either take place through the GIS, or through the Oracle database on networked PCs where additional information relating to the searches can be added. The GIS can also produce plots of given areas displaying single or multi-layered coverage.

The geographical information in ICARUS is stored in a series of ‘layers’ which can be switched on and off together or individually. The ICARUS GUI has been designed to be very simple to use with a series of pull-down menus and a palette enabling the user to zoom around the maps (by gazetteer as well as user-defined box and National Grid Reference) and perform queries and selections. The layers have been created using a series of database selections from the two index maps constructed from the sortie line and photograph / point data. These layers are not exclusive and are designed to aid the user depending on the size of the area for which coverage was required (e.g. all the layers in the RAF large-scale layer would be in the overall RAF layer). Layers can be queried for their various attributes (stored in the oracle table) and then selected in a variety of ways to produce a set which may later be combined with other selection sets to produce complete coverage of any given area. For example, coverage of an area flown in the 1940s could be displayed against the 1980s coverage, this could be anything from an individual site to the line of a proposed road. The ultimate result of the enquiry is to produce an active save which could be turned into a ‘cover search’ report. This was designed to be suitable to send out to potential users and customers of the collection as well as for internal RCAHMS enquirers.

Other GIS applications

Once the ICARUS application was produced, further GUIs were created for the NMRS data, building on the existing pilot scheme. The primary map-browsing application, ARTEMIS, incorporates some of the ICARUS layers enabling the user to display and analyse aerial coverage against other data sets such as the NMRS database of sites (which includes the indexed oblique aerial photograph collections), aerial transcription plots, EDM survey data and digitised Ordnance Survey first edition settlement remains. This facilitates a fully integrated and comprehensive system. One addition that might be considered for the near future is the incorporation of the recently acquired Luftwaffe material for Scotland.

The other GUIs went ‘live’ in April 1996 and the suite of applications has proved invaluable in accessing the wealth of material held in the National Monuments Record of Scotland.

Bibliography

Luftwaffe material in the National Monuments Record of Scotland

Kevin McLaren

The Luftwaffe Collection, of 126 photographs and 28 maps, held in the National Monuments Record of Scotland (NMRS), represents a selection of the target reconnaissance documents of Scotland taken by the German Luftwaffe during the Second World War (1939-1945), and is a copy of the entire holding of Luftwaffe material relating to Scotland in the National Archives and Records Administration in the United States of America.

The material was obtained by the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS) in 1995 to compliment the collection of national survey aerial photographs, transferred to NMRS from the Scottish Office in 1993, many of which were taken at the end of the Second World War and show industrial sites and airfields, for example, at the peak of production and activity. The NMRS does not, however, hold photographs of all of the areas depicted on the maps, and it may be that more material is held in Germany or in private hands.

Photographs

The photographs are particularly pertinent to the NMRS, as its forebear, the Scottish National Buildings Record, was set up in 1941 to make a record of Scotland’s historic buildings in anticipation of possible destruction through enemy action. The RCAHMS also carried out an Emergency Survey in 1942-3 to record all ancient monuments in danger because of their location in military training areas.

Many of the Luftwaffe photographs are annotated with information relating to the size and purpose of each target and its constituent parts. These details have been accurately translated, by Justyna Wisniewska, and have been compiled into a working catalogue to accompany the collection. Smaller targets noted on the photographs are also listed in this catalogue, as are other features of interest, such as archaeological sites and unnoted military installations.

Maps

The sortie plots are a collection of Military Series 1:250,000 scale maps of parts of Scotland, showing areas of Luftwaffe photographic coverage, annotated by the United States Air Force between 1956 and 1960.

From these maps, it can be seen that the Luftwaffe obtained good coverage of several key areas of Scotland and the north of England. The Angus and Northumberland coastlines, where many airfields, radar installations and potential invasion beaches (and their defences) were situated, were photographed stereoscopically. The western seaboard and north-west highlands of Scotland were investigated, as these were areas where convoys gathered and vessels of the Royal Navy’s Home Fleet were occasionally anchored. Likewise, the central belt, and the Firths of Clyde and Forth were extensively photographed as these were areas of concentrated industrial manufacturing, shipbuilding and naval activity. Other areas were less extensively but more selectively covered, with one notable sortie taking in the royal residence of Balmoral Castle.

Luftwaffe activity over Scotland

German Luftwaffe aerial photography of Scotland was obtained mainly by aircraft of Luflflotte V, operating extensively from Norway and Denmark in 1940, usually flying at medium to high altitudes but occasionally arriving at low level to obtain oblique images.

Many sites were photographed for general intelligence purposes, but from the collection held in the NMRS, it can be seen that some of the photographs are directly related to bombing raids. Edinburgh and the Forth Bridge were photographed before the 2nd October 1939, for example, and then attacked very shortly
afterwards, on the 16th October 1939. Edinburgh was then photographed again on the 21st October 1939, possibly with the intention of locating further targets.

Glasgow was heavily bombed in early March 1941, photographed in late March 1941, probably to assess the damage inflicted and to select new targets, then bombed again in May 1941.

Similarly, parts of Orkney were photographed from the 9th to the 12th October 1939, before being raided on 17th October and 22nd November 1939. Again, attacks were made between the 2nd and 8th of April 1940, and follow-up photographs taken on 10th April 1940, probably to select further targets in the run up to the German invasion of Norway.

Defences noted on the photographs taken by the Luftwaffe include anti-aircraft gun batteries, coastal defence batteries, barrage balloons, searchlights, blockships, and radar stations, but defences also included sound locator units, anti-tank obstacles and pill-boxes. Occasionally the Luftwaffe photographic interpreters made errors, and one photograph of Deepdale, Orkney, shows an ‘airfield’ that never was.

Work is currently proceeding on a catalogue of wartime photographs of Scotland, which will present the Luftwaffe material along with a wealth of second world war Royal Air Force aerial photographs held in the NMRS.

Enquiries regarding specific sites and orders for copies of the photographs should be addressed to: The Secretary, RCAHMS, John Sinclair House, 16 Bernard Terrace, Edinburgh, EH8 9NX.
Norton: The first interrupted ditch enclosure in Wales?

Toby Driver

In 1996 the cropmark of a previously unrecorded interrupted ditch enclosure at Norton (NPRN 90000, SS 87467578), east of Ogmore-by-Sea, Glamorgan, was recognised on Ordnance Survey vertical air photographs (30th May 1984). Subsequent oblique flying by RCAHMW in July 1996 confirmed the existence of the enclosure, still under arable cultivation. The site occupies a rounded hill at 76m OD, towards the northern edge of a high coastal promontory overlooking the broad mouth of the Ogmore River, with the extensive dunes of Merthyr Mawr Warren further to the north. The underlying geology is predominantly limestone, with patches of less responsive clay.

A number of features make this discovery of immediate interest (Fig 1). The subcircular enclosure is bivallate, c191m x 176m internally, but the ditches are narrow (c2-4m wide) and close set (3.8m-7.2m apart). In addition the ditches are clearly interrupted and, particularly along the eastern side, often displaced from the line of neighbouring sections. The 12.5m-wide entrance facing due east is asymmetric in plan, defined to the south by the outward-curving ditches of the enclosure and to the north by butt-ended ditches flanked externally by a narrow-ditched D-shaped ‘antenna’. A large pit lies within this antenna, with another, even

Figure 1. Site plan reduced from original mapping at 1:2500. The location map shows Wales, a land somewhere to the west of Europe and England.
larger, outside the southern side of the entrance. Other large pits lie within the enclosure and the apparent relationship with the entrance (or even the enclosure) may be coincidental.

Oblique sources (Fig 2) show traces of a similar entrance on the north side of the enclosure. Opposing the main entrance to the west the enclosure ditches appear to fragment or diverge, although cropmark clarity here is poor. A ring ditch occurs in the extreme NE of the enclosure.

This enclosure is the first of its type to be recognised in Wales and, while the observed characteristics superficially place it in the Early Neolithic period, it must be treated with caution. In the context of lowland Glamorgan, known Neolithic monuments comprise a small number of chambered tombs, with a single possible henge monument near Newton, Gower (Houlder 1976). This said, the dunes of Merthyr Mawr Warren, 1.5km NW of Norton, have produced many stray prehistoric finds over the last 200 years. Of particular note are polished stone axe fragments of Graiglwyd rock, felsite, greenstone and chert (NAR SS87NE 42, 43, 47, 63) consistent with earlier Neolithic activity in the area. Looking to examples in England, both Norton’s size and the close-set ditches have similarities to known enclosures at Great Wilbraham, Cambs (2 circuits), Mavesyn Ridware and Alrewas, Staffs (3 circuits) and
Eastleach, Glos (2 circuits), although the overall size of the latter is not known (Palmer 1976). The elaborate eastern entrance at Norton however, appears to be unique.

Although a number of cropmarks are known from oblique photography over lowland Glamorgan, it is only in the last two years that studies of vertical air photographs have begun to contribute to our archaeological knowledge of this area, not least with the discovery at Norton. In 1995, eight previously unknown defended enclosures and related sites were identified at Aberthaw, Glamorgan, from a single vertical sortie flown in July 1975 (Driver 1995). These lie in an area of restricted air space, sandwiched between RAF St Athan and Cardiff-Wales airport, making follow-up oblique photography difficult. Further analysis of summer vertical photographs for lowland Glamorgan by Lampeter University MSc. students revealed a number of enclosures of likely prehistoric date which warrant systematic mapping in the future. In an area like Glamorgan, where often heavy clay subsoils and flying restrictions can make annual cropmark reconnaissance difficult, vertical air photographs offer many potentials for future study.

On a technical note, the plan of the enclosure was rectified against a 1:2500 map, using the Bradford AERIAL system, from three sources (one vertical, two oblique) before being drawn up in FastCAD. Due to the site's location on a rounded hill, and poor control from wide hedge boundaries with indistinct angles, the finished plan is only accurate to within 5m.

Acknowledgements

I am grateful to Dr Alex Gibson for his useful comments on the Norton enclosure and to Chris Musson for his comments on earlier drafts of this paper.

References


Austrian holiday

Michael Doneus was kind enough to persuade his Institute for Prehistory to fund much of my trip to Vienna in June. Many AARG members will be familiar with Michael’s work from presentations and from his publications (eg Doneus 1995; 1996; and see this issue) so I won’t go into details. Seeing things for real (like his lovely desktop stereoscope) and having the time to think and discuss was extremely useful. Michael also raised the idea of forming AARG working groups to pursue specific ideas, reach decisions, publish and then disband. Within AARG, or on its fringes, we have sufficient experience to tackle most problems with the help of those few members who are prepared to experiment, change and develop as new methods and technology become available. This is vital if our flying is not to stay forever in the 1930s and our mapping in the 70s. We should aim to establish guidelines that will be appropriate to, and acceptable within, most countries where aerial photographs are used. There will be more on this during the September meeting when the AARG Committee hopes to establish two of these groups.

There appear to be two main problems relating to aerial work in Austria (well, three if you include mountains, problems of transit and shortage of airfields!): one for the airborne side and one concerning post-reconnaissance. We made two flights during my visit – the first to the south-east of Vienna, the second along the Danube valley (which really is pretty, Anthony, when it isn’t raining!) to the west. The airborne problem was immediately apparent and is directly related to land allotment or farming methods which result in most of the fields being managed in narrow strips (sometimes retaining superb examples of medieval patterns). A wider range of crop types are grown than in Britain, resulting in the occasional strip of responsive field. This, plus the pitty nature of many local sites, made observation a skilled task and on several of my photographs I cannot now see what we were then photographing. This stripy summer cropscape may be one reason why Michael has interpreted some of his more complex and complete sites from winter vertical photographs.

This brings us to the post-reconnaissance problem: maps. Apparently the largest scale maps of Austria are 1:50000 [sic], so when an archaeological site is to be mapped the first job is to go out and survey in control points. Once these are recorded in three dimensions the information can be used on an analytical plotter to create a terrain model to which the archaeological features can be added – from obliques or verticals – to an accuracy of ±10cm! (This was the first time I’ve heard our British use of OS data and AERIAL described as ‘crude’ – but I suppose ±2.0m is crude by those standards.) I wonder if working to such close tolerances is realistic, and pause to ask which of our phenomena (earthworks, crop marks and soil marks) are likely to show themselves repeatedly, and be interpreted, at that level of accuracy. However, for the occasional site, mapped at large scale, where the aerial information is to be linked with geophysical survey or other precisely located data there may be advantages to such extravagant work.

Michael’s background of photogrammetry plus his grasp of computer technology have allowed him to develop an extremely efficient system of recording for his aerial work. Information is stored as GIS layers and can be overlain on topographic maps or, interestingly, on a suitably geo-corrected satellite image of Austria. This use of GIS was what prompted the idea of AARG working groups as it would seem necessary to ensure that similar, or compatible, information is held on all such systems that include layers of data derived from, or relevant to, aerial photographs. So, he will ask, what ought this information to include?

Update on the Hungary training week

After what I considered to be ‘work’ in Vienna, I had planned a period of non-work in Hungary with friends from the 1996 training week. I visited lots of archaeological
(and other) sites, gave a lecture (I’d been set up as a famous professor from Cambridge...), tried to learn to count to ten, washed up, watched the birds, made paper aeroplanes, drank beer, and generally did the usual things that photo interpreters do when they are not interpreting photos. My longest stay was with Csilla Aradi (big Csilla) and her family near Kaposvár, in the south-west of the country. On the way home I stayed in a modern semi-cave dwelling owned by Csilla Zatykó (little Csilla) and George. Their house was half way up a mountain near Budapest and included three rooms cut into the rock. The view from their garden (a further terrace upwards) was similar to that from a Cessna at 2000ft.

Big Csilla and I travelled to Pécs to see Zsolt Visy at Janus Pannonius University. The journey was interesting, crossing a range of hills on which were many pasture fields with lynchets. From the bus, the lynchets did not appear to form large field systems but many seemed to fit in with the current, or recent, boundaries. It is possible that they had only recently gone out of use, but there seems to be no knowledge of their date of origin. The area has not been flown for oblique reconnaissance (no crop marks, therefore not interesting???) but interpretation of any existing vertical photographs (or satellite images?) may provide information to help understand early fields in that area.

A meeting of the Raphael project in Dresden meant that neither Zsolt Visy nor Gabor Bertók (who had been doing most of the work) were at Pécs, but we found a helpful secretary and assistant who attempted to show us what had been achieved so far¹. You will remember (AARGnews 13, 5) that the training week generated 8288 colour slides – although this total reflects the overkill of photographs per target resulting from flying four-camera aircraft. That number of slides is itself a headache, but these were left as 224 uncut films, each of which was identified by date, flight and photographer and thus could be linked to GPS output. It seems that ‘the best’ of these have been mounted and will be held at Pécs along with other Otto-generated pictures. It was hinted that there were plans to give, or loan, the remainder to local archaeologists, who would be able to use the information in response to development, management and research. In most cases, as in Britain, responsibility for action and monitoring threats to archaeology rest with the county, so it would seem imperative that the county records are maintained, up to date, and have access to the relevant air photos. Until mapping begins in Hungary, copies of the photographs themselves (rather than mapped interpretations) will have to provide this level of information. The only listing we saw at Pécs was by photo number in a huge Crawford-style book, but we were told that there is a computer index which will be necessary to identify photos by location or date. Presumably such an index could also be used to generate a distribution map – although this has been done adequately on a country-wide scale using GPS data by Otto Braasch (1995, Abb 2).

Gabor Bertók recently completed Bill Hanson’s course at Glasgow (information in AARGnews 6, 20) and should be suitably versed in methods with which to begin post-reconnaissance archaeological (as opposed to library) work. Maps at 1:10000 scale exist for Hungary although, as we remember only too well from 1996, they show mainly the ‘concrete’ structure of the country. Many field divisions are not mapped and thus any archaeological use of aerial photos will either have to be as poorly fixed sketches or, more accurately, after generating control from verticals or field survey. The other problem will be to devise ways of interpreting from slides as most, if not all, of the collection is in that form.

It was good to see that the material from the Hungarian training week has been successfully geo-located and that a selection has been added to the Pécs collection. Hopefully, some of the slides can be made available for local use and, with planning currently underway for a 1998 training school in Poland, it would be useful to have a range

¹I have since asked Visy if my impressions are correct, received no reply, so assume they are...
of the 1996 material on loan to AARG to provide examples for teaching.

Other Hungarian aerial work
At the western end of the country, Zsuzsa Miklós undertakes most of the aerial photography and interpretation from the Archaeological Institute of the Hungarian Academy of Sciences in Budapest. Much of her work is in connection with pre-development rescue evaluation for which, as in Britain, aerial photos often provide the first indication of the presence of past activity. Unfortunately, rates for hire of aircraft are similar to the UK – in round numbers, about £100 per hour – which seriously reduces flying time and means that virtually every flight has to be planned to achieve specific aims with none of this wandering about looking for the odd crop mark. (As a guide to prices, an ice cream at local prices was about 11p with the rip-off-tourist rate at 25p; beer ranged upwards from about 60p a pint. Aircraft hire, therefore, would be equivalent to a UK rate of £300-500 per hour!). Consequently oblique photographic work is limited and not easily able to build up a picture of a region.

The Archaeological Institute of the Hungarian Academy of Sciences is currently trying to acquire the necessary hardware and software to run AERIAL but, as we seem to find everywhere, digitisers are a rare species and some European ones have their own quaint differences. (It took quite a while to discover that one recently bought in Poland by Włodek Raczkowski had its origin in the NW corner.) Regardless of such problems, it is clear that, with several years of photographs already gathered, someone somewhere should begin to have a serious look at the things and feed requests back to the photograph(ers).

Csilla Zatykó is also at Budapest studying medieval settlements and is aware of the contribution that air survey can make to such work (Zatykó 1997, 42-3). As in Britain, this is one area of study for which old verticals, if they exist for Hungary, may offer more information than currently can be recorded. Perhaps, the Keele collection holds useful photographs, and a search for any pre-collective-farming cover (?US and Soviet military) would also seem worthwhile. Study of medieval settlements (by which I do not mean just medieval villages) tends to be the province of the historical geographer rather than the archaeologist as well as being something that is not – maybe cannot be – recorded effectively by oblique photography, although this can produce good illustrations of parts of those settlements. There is, though, a lot to be gained by integrating photo interpretation within such studies and I look forward to learning how such work in Budapest progresses.

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On the Archaeological Use of Vertical Photographs

Michael Doneus

Introduction

In aerial archaeological research, vertical photographs seem to live more or less in the shadow. From the relevant literature, I often get the impression that they are only second choice. Therefore, I want to show some glimpses of our thirty year’s experience of using vertical photographs in archaeology.

Vertical photographs in Austrian archaeology

When the aerial archaeological section within the Austrian Society for Prehistory was founded in the early sixties, contacts were made with the Austrian military air base at Langenlebarn (Friesinger 1969). Consequently, some years later, a cooperation arrangement was signed. From then on, we have been using their 23 by 23 cm² vertical photographs, which we are allowed to copy and to use for our scientific purposes. We have even the possibility to order flights for refund of expenses (which is still affordable). Today, our budget for oblique photography is low (a bit more than 20 flying hours a year). However, this lack can be compensated by the results from the vertical photographs, which turned out to be very valuable for detecting new sites. Therefore, they are our most important source for aerial survey.

Today, our archive contains copies of more than 30,000 vertical photographs, which cover all of our main working area in the north-eastern part of Austria. Using them, we can investigate all of our working area stereoscopically. Most parts are even photographed several times at different seasons and scales (Doneus 1994).

In our daily working routine, vertical photographs give us basic survey information. They help us to set up flying programmes and to evaluate success or failure of our own flights. Additionally, they provide us with the basic data (using analytical stereophotogrammetry) for the analysis of any other photographs (Doneus 1996).

In the following, I want to show two examples from vertical photographs.

Basic survey

The “time-windows”, when cropmarks or soilmarks are at their best in a certain region, are very often limited to a short period - mostly too short to let you weed out the entire landscape taking oblique photographs. However, if a vertical coverage can be arranged within that time, the whole area with all visible sites will be depicted on stereopairs providing a 3D replica of the landscape at that certain point of time.

Anybody, who afterwards interprets the photographs will see the whole landscape in the same suitable condition, regardless, if he looks at it the day when the film was developed or thirty years later. The landscape can be interpreted time and again and, as experience and knowledge increases, more and more sites will be probably found.
In April 1981, conditions for soil-marks seemed to be very good in the north-eastern part of Austria (the so called “Weinviertel”). Consequently, three vertical films were flown by the military at a scale of 1 : 10,000. In the following, I will concentrate on one of them, numbered “01810305” and containing 280 photographs covering an area of 780 km$^2$ (Figure 1). The photographs have an overlap of 65% providing good stereoscopic views. The whole film was examined thoroughly using a stereoscope. From the 280 photographs, 80 pictures were unsuitable for interpretation (because of woodland or large villages). Altogether we could record 172 archaeological sites, which means almost one site per photograph (Figure 2). The types range from a few pits to huge fortified settlements. On Figure 3 two typical examples are shown.

Figure 1: Map of Austria; the hatched area is covered by the vertical film “01810305”, mentioned below.

Figure 2: Mapping of the 172 identified sites. The line shows the limits of the vertical film “01810305” (see also Fig. 1); the hatched area represents woodland.

The left part of Figure 3 shows a huge fortified settlement with at least three ditches covering an area of 50 hectares. However, more typical is the right picture of Figure 3 showing an open settlement, which consists of several pits.
High level of detail

Another feature of vertical photographs is the high level of detail they can provide. Our providers use the panchromatic black-and-white film (KODAK DOUBLE-X AEROGRAPHIC Film 2405) with extended red sensitivity. It has high sensitivity and good contrast. Its resolving power lies at 100 lines/mm at a test-object contrast of 1000:1 (KODAK 1971).
The example on Figures 4-6 is taken from a flight on July 1st, 1992. Figure 4 shows the cropmarked late-antique settlement of Hanfthal, which is situated close to the border between Austria and Tschechia. The photograph was taken from a height of 1.500 meter or approximately 5.000 feet and has a contact scale of 1 : 9.000. The settlement consists of more than 100 rectangular shaped huts. The dashed line marks the boundary of the settlement (as can be seen in this photograph) and the rectangle shows the limits of Figure 5.

**Figure 5:** Hanfthal, zoomed part corresponding to the white rectangle of Figure 4. Several huts can be identified. The rectangle shows the limits of Figure 6.

**Figure 6:** Hanfthal, zoomed part corresponding to the rectangle of Figure 5. At least four larger post-pits can be identified in the hut at the lower right corner.
In Figure 5, several of these huts can be clearly seen. They were most probably roofed working places with extents of 4x6 meter, which were cut into the soil. Again, the rectangle shows the limits of Figure 6.

After zooming in again, Figure 6 shows even more details. In the left upper part, at least three huts are intersecting each other. In the central part and in the lower right corner of Figure 6, the dark spots at the edges of two huts mark the location of postholes.

All of these features were identified during routine stereoscopic examination using a Wild APT1 stereoscope with an integrated magnifying lens (15,5x). There has been no digital enhancement of the image (except that the image had to be scanned for this publication).

**Conclusion**

During the last 30 years of aerial archaeological research in Austria, vertical photographs turned out to be of great use. They are suitable for the basic survey of our working area and, when flown at times of suitable conditions, reveal plenty of archaeological sites. The level of detail can be very high as shown in the example of the late-antique settlement of Hanfthal. I hope, the discussion on vertical photographs in aerial archaeology, which started in the last issue of AARG-News, will go on. Maybe it will encourage other aerial archaeologists to involve more vertical photographs in their daily work.

**References**


Remote Sensing Applications in Archaeology: conference review

May 29-31, 1997, St. Cloud State University, Minnesota, USA.

Anthony Crawshaw

‘Useful and informative’ would be my immediate response to this conference, jointly organized by St. Cloud State University, the Oriental Institute of the University of Chicago and NASA. There were about forty participants, from the USA and Europe. One of my lasting impressions from the meeting was the different approaches adopted to survey from above, by those from, broadly, the New World and Europe. One might loosely class these approaches as habitat detection and site detection, respectively.

In habitat detection the emphasis is on detecting the likely environment where earlier peoples would have lived, and then searching the most likely spots for ground truth. The promising environments were first defined in terms such as elevation and proximity to resources, by reference to previously known sites. There is a commendable integration of aerial and ground studies, but one of the limitations of the approach is that some sites, at least, must be known first, in order to define the site characteristics to be sought.

A good example of habitat detection was provided by Juris Zarins (Southwest Missouri SU) in his study of the palaeolithic/Neolithic in Dhofar, southern Arabia. Here, a combination of recent geological maps, satellite imagery and ground investigation was used to identify concentrations of stone tools. Richard Stallings (Cultural Horizons, Inc.) applied Landsat TM imagery to a region of the northwest Mississippi basin, where the river had changed its course many times. The speaker was able to show that there was a significant difference in the geographical characteristics of settlement locations, between the Late Archaic and Early Woodland periods, which he tentatively ascribed to the need for clay by the later, ceramic, culture.

By contrast to habitat detection, site detection works by first recognizing the sites and then, hopefully, assembling them into a landscape. Like the detection of habitats, the method has an Achilles heel of initial recognition, but this time by the observer in the air, who has to record the site. In both approaches unrecognized sites may go unrecorded.

In the site detection category, Martin Gojda (Institute of Archaeology, Prague) gave a brief introduction to the European scene and then an outline of past work by, and future plans for, his integrated programme in the Czech Republic.

A plea for site detection, by any available technique, was made by Keri Brown (UMIST); she was continuing the work of Bradford on the Tavoliere area of Italy, the archaeology of which is being extensively damaged by deep ploughing. The result was that excavations of the area had largely been discontinued, as being not worthwhile. Were there any remote sensing techniques that might pin-point undisturbed sites? The delegates seemed generally unable to come up with any suggestions, with the exception of airborne/satellite radar, which the speaker is now looking into.
As to the reasons why these two different approaches of detection arose in the two areas, one may speculate that the nature of the sites is responsible. In general, it seemed that the North American sites were less substantial and more scattered than the ones in Europe. As a result, site detection would be less fruitful, so other methods evolved.

Both approaches have something to offer each other and I wonder if a fusion of techniques would be beneficial. For instance, European Aerial Archaeology is largely silent on non-ritual sites from the Bronze Age, and earlier sites of any description. Habitat detection techniques could well extend the number of these sites known to us.

As an example of possible benefits in the other direction, Robert Vincent and Amy Ollendorf (Bowling Green State University) might have been able to use European techniques of low-light photography of earthworks to advantage in their work. Their project included the use of a digital terrain model, derived from rectified and digitized vertical photography, to pick up hut-platforms that existed as ground relief, followed by ground survey.

One contribution that did integrate SPOT satellite images, aerial photographs, old maps and ground truth (coring) was that from Eric Fouache (Universite de Paris, Sorbonne), who studied the ancient Greek port of Oeniades. The port was demonstrated to have had direct access to the sea, via a bay that subsequently became the present marsh, and not via a river, as previously thought.

Todd Brenningmeyer (University of Minnesota) also worked in Greece, using Landsat imagery to help detect eight Medieval Frankish settlements. These towns were founded by returning Crusaders; some of those settlements later abandoned were in very difficult terrain, as shown by the ground studies. Another paper on Greece had to use spy satellite imagery, because of security restrictions on aerial photography, due to the strategically important Corinth Canal. Richard Rothaus (St. Cloud S U) used the resolution available, sometimes 1m., to demonstrate the futility of the photography restriction, in his study of the two ancient harbours.

Even more ‘hostile natives’ were one reason why several contributors used satellite images, rather than aerial photographs. Tony Mathys (IMA Consulting) reported his study of the Jezira region, Syria, where he integrated the declassified images from intelligence satellites into a GIS. Under the ‘seriously hostile’ category we heard from Benjamin Richason (St. Cloud S U) and Tony Wilkinson (Oriental Institute), who showed various permutations of data processing applied to radar images of Nippur in Iraq. The point was well made that there is a trade-off in qualities involved in image processing; you don’t get something from nothing. Kris Verhoeven (University of Ghent) had a similar potential problem with ground truth in his contribution on mapping the Mesopotamian alluvial plain.

Thomas Sever (NASA) showed us an excellent combination of remote sensing and ground work, in his study of the Peten region of Guatemala. This area, presently rainforest, had been home to an advanced Maya civilization. There is little known about both the economic base for their society, and the reason for its sudden collapse. Remote sensing was being used to locate the remains, such as canals and pyramids, before ground expeditions into the very inhospitable jungle. The archaeology is under threat from both looters and deforestation.
A third category of contribution were those describing advances in the physical methods underlying detection of sites. In this category I would include an interesting talk by Ronald Blom (Jet Propulsion laboratory, NASA) on Space Shuttle Imaging Radar results in Sudan. In this work the radar achieved sufficient ground penetration to detect former river channels, which were invisible on conventional visual images. Radar was also applied with benefit to the detection of an abandoned desert trading settlement in the Arabian Peninsula.

Advanced computing techniques were discussed by Ben Drake (Independent Consultant), who used a Sun workstation to good effect. He stressed the importance of compatibility between the various available suites of software.

Defying categorization was a contribution from Bradley Matson (SUNY Oswego), who had a down-to-earth view of Remote Sensing when he described applications of ground penetrating radar and acoustic sensing to a Tell site in Jordan.

One aspect promised in the initial publicity, that was not fully covered in practice, was ‘the necessary introductory material (and) discussion of the development of technology . . . for each session’ (AARGnews 14). I would have welcomed this sort of review, before the contributors got onto their own specific case studies. The nearest that any contribution came to the introductory brief was that by Colin Shell (Cambridge, UK) who described thermal imagery, both by CUCAP and the RAF, together with some of the factors important to the technique.

I have little doubt that ideas from the New and Old Worlds could usefully be combined in the study of archaeological problems, as was demonstrated in some of the contributions. It is unlikely that any one new method will be the universal answer, but the more possible techniques that are available, the better the chances of meaningful results. To me, this conference was an introduction to new techniques and ideas, which is what conferences ought to be about. Besides, if I had not travelled via Minneapolis, would I ever have visited the Museum of Questionable Medical Devices?!

Rather to my surprise, this was apparently the first conference of its type in the USA. The delegates were sufficiently inspired by this one to arrange, provisionally, future conferences on a biennial basis. The conference in 1999 will be held in the USA; that in 2001, not on the backside of the moon as one might expect, but in Cambridge, UK, the next best thing. See you there!

[Editorial note: I was told that papers from this conference would be published on the WWW. A search on 15 August 1997 showed no obvious change from the pre-conference page which includes abstracts from some of the papers as well as information about RSAA. This page can be found at: http://eleftheria.stcloud.msus.edu/RSAA.]
1.000.000 km² KVR-1000 Russian satellite imagery for 49.95 DM?

Peter Haupt

‘Do you want to have a look into your neighbour’s garden?’ is an advertising sentence of the German Topware CD-Service AG, which has been selling imagery of the Russian satellite Cosmos/KVR-1000 (more than 60 GB on two CD-ROMs) since winter 1996-97. In view of the much higher costs that Martin J. F. Fowler gave for KVR-1000 imagery (AARGnews 11, 29), it seems to be useful to reflect on the D-SAT Satellitenatlas für Deutschland.

The imagery is available in seven scales: 1:3.000.000, 1:1.500.000, 1:600.000, 1:300.000, 1:100.000, 1:20.000 and 1:10.000. The scales 1:3.000.000 to 1:300.000 are copies of one colour photograph. 1:100.000 is from a second colour photograph, and 1:10.000 is an enlargement of the 1:20.000 black and white photograph. As scales are subject to the size of the used screen, these figures represent estimates rather than exact measurements. Exact measurement is possible using the scale bar below the imagery. The date of photography is not specified, but appears to be spring 1989 or 1990. Perhaps a few regions have been photographed at another time (1992 to 1995 according to Geoware), because the atlas is composed of a lot of single photographs.

The scenes of 1:3.000.000 to 1:300.000 cover a territory ~4° to ~16° east and ~45° to ~55° north. 1:100.000 images may extend up to 100 km beyond the German borders, while the larger scales cover all of Germany but only a few km of the adjoining countries.

Clouds disturb the view sometimes in the smaller scales images where, for example, parts of Eastern Austria and the Czech Republic are covered by a bank of clouds. On the largest scale images, clouds may cover occasional buildings: for example, the Römisch-Germanisches Museum in Köln is hidden under a little cloud....

The potential of D-SAT for archaeological work is seriously limited by several problems. Because of their low resolution, images of scales 1:3.000.000 to 1:300.000 are serviceable only for mapping. 1:100.000 scale is too small for showing archaeological details, although the images are clearer than those at the smaller scales. 1:20.000 images might be the most useful scale, but their clarity is marred by the software’s addition of grey-toned regional boundaries (a tone similar to that of the image), added at a late stage of the image building. Finally, the largest scale is a bit less clear than the 1:20.000 before the boundary drawing, but allows recognition of large soilmarks or linear objects.

The problem caused by the addition of regional boundaries has been corrected in the updated D-SAT 1.0a, which is offered for free downloading on the internet (Geoware: address below). The 1:20.000 scale material becomes fit for use after starting the updated version. At that scale a few (known) archaeological sites can be recognized. Because of the low resolution, the identification of new sites is restricted to those such as old roads, limes, and other large or linear objects.
The chance of discovering new archaeological sites with D-SAT is slim unless intact 1:20.000 images are used as only these take advantage of the high resolution of KVR-1000. According to the producer of D-SAT, resolution is at 3m/pixel – but on my screen it seems to be ~10m/pixel.

As well as the imagery-data, D-SAT offers further options:
Tools and documentation. The latter is rather poor, particularly due to its software; support by telephone is rather expensive. The quite exact and comparatively detailed information about satellite, camera and film are probably a result of Geoware’s goal to expand its consultancy services.

The most important tools are: ‘Marker’, that can be added to the image (for mapping etc.) and measuring-tools (distances and areas). In the first version of D-SAT, the result of measurement is visible for only two seconds before the complete image is rebuilt. Rebuilding the image takes between 10 and 30 seconds (Pentium 75/16 MB of RAM), so a lot of measuring will require much time. This mistake is corrected with the update; results are shown (m, m² or ha) until the user wants to rebuild the image.

The screensaver should be deactivated, because the computer will not be able to rebuild the image on the first try after screen-save-modus.

All in all, the purchase of D-SAT for 50 DM is good value, even if its use is limited. The free update-version, D-SAT 1.0a, corrects the biggest mistakes and is a necessary addition. For professional use of satellite images it will be necessary to bypass D-SAT and purchase professional products (at professional prices!). In Germany, for example, Scout-Systems offer uncompressed KVR-1000 imagery for 5-1 DM/km² (the price is subject to a few deductions, depending on the size of the area).

Distribution: Topware CD-Service AG, Markircher Str. 25, D-68229 Mannheim, Germany
http://topware.compuserve.de, http://geoware.de and e-mail: webmaster@geoware.de
Geoware also offers also digital maps for Austria and Switzerland.
System Requirements: 486DX-33 or higher, 8 MB of RAM, Windows 3.1x or Windows 95.

[Editorial note. The September issue of the UK magazine Practical Photography features an article advertised as ‘NASA can photograph your back garden’ and may be of interest to some members. The August issue included a piece on aerial photography which the old hands among you may find amusing.]
Commenting on a declassified US photo-reconnaissance satellite image that recently appeared in AARGnews (Fowler, 1996a), Anthony Crawshaw (1997) quotes Dr Johnson that: "it is not done well; but you are surprised to find it done at all". He suggests that any airborne photographer who turned in a photograph with a resolution of 1.8m would not be invited to repeat the exercise.

Although it is well recognised that the quality of current civilian satellite imagery is inferior to conventional aerial photography, Crawshaw's suggestion appears to represent a somewhat parochial view from a practitioner working in a country where, with the exception of a few areas of restricted airspace, he is permitted fly and photograph to his heart's content. Archaeologists wishing to exploit the potential of aerial photography in many other countries are not so fortunate; alternative platforms to the conventional light aircraft may represent the only sources of aerial images that are readily available. Currently, the highest resolution satellite images in the public domain are products derived primarily from US and Russian photo-reconnaissance satellites (Table 1). The Russian KVR-1000 and KFA-3000 products, with ground resolutions of approximately 2m, are comparable to orthodox medium scale vertical air photography. The archaeological potential of the KVR-1000 product has been demonstrated through the detection of both standing and crop- and soil marked archaeological features on an image of the environs of Stonehenge (Fowler, 1996b). Although the performance of recently declassified US CORONA imagery has yet to be investigated fully, at a cost of $18 for a negative covering some 14 by 188 km, it represents a cost effective source for the production of a systematic vertical coverage on a regional scale. Dating from 1960 to 1972, it also represents an important historical record that covers areas of archaeological potential that by now may have been lost to development.

The "Open Skies" nature of satellite imagery means that virtually any area of the globe can be imaged within orbital constraints. As an example, a KVR-1000 image of the Pyramids at Giza shown in Figure 1. This was acquired by a Russian satellite without any need for permission from the Egyptian authorities. The acquisition of a comparable image by a foreign national flying a light aircraft would most likely be prohibited or stall under the weight of the bureaucracy that would be involved.

CORONA and KVR-1000 represent products from first generation photo-reconnaissance systems involving conventional film products. In 1994, Presidential Directive 23 paved the way for the transfer of current generation American military remote sensing technology into the commercial domain. This directive permits US companies to develop high resolution satellites for commercial use and over the next couple of years, a number of sensors providing digital panchromatic images with ground pixel sizes of the order of 1-3m will become available (Table 2). Of these systems, the highest resolution product is expected in late 1998 from the
EarthWatch QuickBird satellite with a ground pixel size of < lm. These very high resolution satellites will also carry multi-spectral (XS) sensors but with a lower resolution than their Panchromatic sensors. However, when compared with the current XS sensors carried on the LANDSAT and SPOT satellites, they represent up to an 8 fold improvement in spatial resolution. Such an increase in resolution results in approximately a 60 fold increase in the number of pixels covering a 30m square on the ground. Since 30m resolution LANDSAT Thematic Mapper imagery covering the near infra-red part of the spectrum (0.76-0.9μm) appears to have some potential for the detection of archaeological features (Fowler, 1995), the significantly improved resolution of the new XS sensors suggests they may have a future role in archaeological prospection.

Despite these advances, the highest resolution satellite images that are currently acquired are still firmly in the domain of the military. It is speculated that current American satellites have a ground resolution of the order of 5-10cm (Dutton et al., 1990, 101). Some indication of the quality

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<table>
<thead>
<tr>
<th>System</th>
<th>Launch date</th>
<th>Sensor mode</th>
<th>Resolution (metres)</th>
<th>Spectral bandwidth (µm)</th>
<th>WWW address</th>
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</thead>
<tbody>
<tr>
<td>KVR-1000</td>
<td>1983-1993</td>
<td>Panchromatic</td>
<td>2</td>
<td>0.51-0.76</td>
<td><a href="http://www.spin-2.com">http://www.spin-2.com</a></td>
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</table>
| KFA-3000| 1978-1993   | Panchromatic| 2                   | 0.51-0.75               | http://www.augusta.co.uk/tentoten| worldmap

Table 1. Existing very high resolution satellite systems.

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<th>Sensor mode</th>
<th>Resolution (metres)</th>
<th>Spectral bandwidth (µm)</th>
<th>WWW address</th>
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<tbody>
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<td>1997</td>
<td>Panchromatic</td>
<td>3</td>
<td>0.42-0.70</td>
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<td></td>
<td></td>
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<td>15</td>
<td>0.49-0.60</td>
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<td>0.61-0.67</td>
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<td></td>
<td></td>
<td>0.79-0.87</td>
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<tr>
<td>QuickBird</td>
<td>1998</td>
<td>Panchromatic</td>
<td>&lt;1</td>
<td>0.45-0.90</td>
<td><a href="http://www.digitalglobe.com">http://www.digitalglobe.com</a></td>
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<tr>
<td></td>
<td></td>
<td>Multispectral</td>
<td>3.28</td>
<td>0.45-0.52</td>
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<td></td>
<td>0.76-0.90</td>
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<tr>
<td>Carterra-1</td>
<td>1997</td>
<td>Panchromatic</td>
<td>1</td>
<td>0.45-0.90</td>
<td><a href="http://www.spaceimage.com">http://www.spaceimage.com</a></td>
</tr>
<tr>
<td></td>
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<td>Multispectral</td>
<td>4</td>
<td>0.45-0.52</td>
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<td></td>
<td></td>
<td>0.76-0.90</td>
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</tr>
<tr>
<td>Orbview-3</td>
<td>1998</td>
<td>Panchromatic</td>
<td>1 &amp; 2</td>
<td>0.45-0.90</td>
<td><a href="http://www.orbimage.com">http://www.orbimage.com</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Multispectral</td>
<td>4</td>
<td>0.45-0.52</td>
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Table 2. Future US commercial very high resolution satellite systems.
of these products can be seen from Figure 2 which is one of the few recent photo-reconnaissance images that is in the public domain having been leaked to the press by a US intelligence analyst in 1984 (Peebles, 1987, 138-41). The KH-11 image had been acquired in July 1984 and shows the Russian aircraft carrier Leonid Breznev (now the Admiral Kusnetsov) under construction at the Nikolayev shipyard on the Black Sea. The resolution of this oblique image is probably of the order of 0.5-1m since, compared with the nadir view, the sensor must view the target through a greater thickness of the atmosphere.

Ten years ago, the prospect that US photo-reconnaissance satellite images could be purchased by the general public was inconceivable. Although originally highly classified, the fact that first generation images have now been released into the public domain suggests that at some time in the future, imagery from current classified photoreconnaissance systems could be made available for civilian use.

Remote sensing satellites will continue to image those parts of the Earth’s surface that other platforms cannot reach. Despite being inferior to conventional aerial photography, it can be said with a reasonable degree of certainty that whilst "it may not be done well" at present, it will be done better in the future and the new high resolution sensors that are on the horizon will bring new possibilities.

References


Books of interest?


Small Format Aerial Photography (SFAP), as this book is called, is a misnomer, as far as the general AARG membership goes. Once one appreciates that ‘small’ means anything up to 70 mm., and that ‘Aerial Photography’ means vertical, and usually metric, photography, then one has a much better grasp of what the book is about. Before immediately thinking that such is not for you, reflect that this is the direction in which our editor would have us go, as evidenced by the session scheduled for AARG 1997.

Despite the subject restrictions, this book is a mine of useful information for anybody contemplating vertical photography. The authors have clearly done what they are advocating and this experience shows throughout the book. If you are considering a vertical photography operation, the price of £50 is good value, bearing in mind the other costs that you will face. If, however, you are seeking background information about the vertical photographs that you are using, then there are probably better value books around, particularly if you are prepared to scour the second-hand bookshops. One very useful lesson the book taught me is that vertical photography is a good deal more complicated than I had first thought.

The book is in three parts, ‘mapping and measuring’, ‘aerial photography operations’ and ‘applications’, followed by eight appendices. ‘Mapping and measuring’ comprises 88 pages on the geometry of photographs and deriving measurements from them, and then discussion of how these apply in SFAP. The second part of the book, ‘aerial photography operations’, is very practical, dealing with cameras, films, mountings and aircraft, plus other means of getting your camera aloft. The matters of mission planning, procedures and navigation are also dealt with in the 144 pages of this section. ‘Applications’, totalling 40 pages, include SFAP case studies in the areas of natural resources, the environment, urban survey and multispectral work. Examples are also given of complete surveys, from planning to prints.

The appendices contain some useful information, including listings of ten QBasic programs relating to mission planning, a method of measuring the actual shutter speed of your focal-plane shutter and a comprehensive bibliography. This bibliography has 340 references, classified by various applications and techniques. Alas, only 16 of these references are in the classification ‘Cultural Resources (Archaeology)’, whilst 35 referred to ‘Oblique and Hand-Held’.

Most of the references to oblique photography are in passing, when discussing deviations from true vertical imagery. No doubt some would say that this reflects the correct state of affairs, but oblique photography does not really fall within the book’s remit. One interesting section devotes four pages to mapping from single oblique photographs. This section doesn’t describe the ‘Aerial’ program, or similar techniques, but a method akin to the Mobius Network. The interpreter, given the focal length of the camera and the flying height, ends up with a 100 m. grid, incorporating perspective, overlaying the photograph. It seems to me that you then only need two control points, to tie in the photograph, and perspective gridded overlay, with a 100 m. scale grid, which could be aligned over the map. If so, this represents an improvement on the Mobius Network, which requires five control points, or the Paper Strip method, which needs four such. I have not tried this idea, which seems graphically complex, but it might be an answer if one is faced with the only photograph of a site, with just two control points. The original reference is:-

The present volume is clearly related to an earlier book by two of the authors (Manual of Aerial Photography, R.Graham and R.E.Read, Focal Press, 1986), even to the point of sharing some of the illustrations. I suspect that the various chapters were produced more or less autonomously, as there seem to be differences in style. More importantly, the different chapters seemed to me to assume different levels of starting knowledge, on the part of the reader. This could, however, reflect the varying approach of a reader from a different background, so may be more perceived than real, rather than editorial carelessness.

Inevitably, some information is going to be dated, despite the 1996 publication date, as the equipment develops. Two sections, in particular, that are already being overtaken by events are Digital cameras and Satellite navigation systems. Despite that caveat, these sections still provide a useful introduction to those areas. There are a number of typographical errors, probably due to poor proof-reading, but these do not detract from the overall worth of the book. Another editorial irritation is not so much the grouping together of the colour illustrations, but the lack of order within that section. The grouping was presumably for printing reasons, but why not have the illustrations in numerical order?

Overall, I was impressed by this volume and, if I had not read the review copy, I would definitely have bought the book.

Anthony Crawshaw

[Whittles Publishing hope to have copies of SFAP for inspection and purchase at AARG 1997.]

Martin Gojda. Aerial Archaeology in Bohemia. 61pp + catalogue + plates. Institute of Archaeology, Prague. 1997. £18.50 or 45DM (both incl postage from Prague). ISBN 80 901934 8 X

In the words of the author, ‘This volume is the first complete overview of aerial archaeological activities in Bohemia...’ (vi) and as such we should expect to learn what is going on and, by omission, what is not going on. Because the author has been so prolific in both written and spoken words, there are parts which will be familiar to AARG members but are put into the larger context in this book. Usefully (at least for English-speaking members) all chapters are repeated in Czech and English.

The book begins, logically, with a history of past aerial activity and tells of the increase in flying, and the presence of several regional fliers (and collections), that has been possible since security has been relaxed. There is a footnote announcing the award of the grant that has enabled Gojda to greatly expand his aerial work (as detailed in AARGnews 14, 11-12) and a section on ‘future developments’ which adds to that AARGnews note.

One of the aspects that, to me, has been pleasing about recent work in the Czech Republic is that aerial survey is seen as one component of landscape studies. In Chapter 3 the aims and methods of this project are outlined together with examples from recent work. This important chapter also introduces the concept of direct and indirect evidence (soil marks and crop marks respectively) which is something that the rest of us would do well to remember. Discussion moves on to methods of reconnaissance and appears to suggest that, after the phase of extensive survey, smaller regions of 100-500 sq km [note that the ‘k’ has been lost in the English translation: see Czech text, p29] should be observed over a period of 2 to 4 years. What is not clear is whether this period is seen as adequate to cover a region or has been proposed as an initial working period. Interestingly something similar was suggested by the young St Joseph in 1944: ‘Such a scheme [of aerial reconnaissance] might be prepared for a three to five year period, to cover risks of successive wet seasons, and to take advantage of all possible crop-rotations.’ (St Joseph 1945, 59).
However, as elsewhere in Europe, the new ‘aerial archaeology’ has been led – perhaps necessarily – by the aerial photographer and once on the ground there seems to be little logical continuity to extract the archaeological information from the pictures. Gojda notes the need to establish an archive which can link all known archaeological material: a Czech SMR. As part of this, he has adapted MORPH to suit Czech sites (p50) but we find that all data for this is extracted directly from the pictures. Tut! The illustrations show there to be ditched sites (see for example, the interpretative oblique tracings, Figures 20a-c) and some even have control points – so, why no photo interpretation and mapping? Possibly the Czech way of attempting to tackle this is revealed in the aim to develop ‘... transcription of oblique photographs to vertical plans [sic] by means of software which rectifies images and the application of GIS ...’ (p 11). But this still leaves the photo interpretation to be made at some point. Fortunately work in the Czech Republic has been running for only a short time (Gojda is dealing with only a few hundred crop-marked sites) and so any rethinking or developing of methods will not be the gigantic problem that it was in Britain.

The text ends with a description of the current archive databases. This is followed, curiously, by their complete contents, which occupy about one-third the book. How many, I wonder, will find a complete list of Gojda’s photographed sites (in the Czech republic and anywhere else) of any use or interest? Why do we need a complete log of all flights between 1992 and 1996? Ok, we can say that we have been presented with a total record of work to date, but printed publication of these lists seems unnecessary although I doubt whether their omission would have reduced the price significantly.

The book is well illustrated: linework is clear and most of the photographs (monochrome and colour) show the features adequately. All illustrations in the text are placed in the Czech chapters, so the English reader has a bit of page flipping to do. The final twenty or so pages are just plates, identified by placename but not apparently referred to in the text. These show the range of sites so far recognised in the country as well as a few bonus pictures from, to Gojda, foreign parts.

Bohemia shows the rapidity of publication we have come to expect from Martin Gojda and, despite my personal moans (and I forgot to complain that he had taken more slides than prints!), it presents a good and clear picture of past work and future plans for the roles of aerial photography in landscape studies. As far as I am aware this book is the first ‘strategy’ document to come from Europe [or from anywhere unless we count bits of Whimster’s (1989) Emerging Past?] and as such should be read, thought about and discussed by anyone taking or using aerial photographs.

References


Rog Palmer

[ Copies are available from Martin Gojda, Institute of Archaeology, Letenská 4, 118 01 Praha 1, Czech Republic. Fax 00420 2 539361.]

D R Wilson. The Care and Storage of Photographs: recommendations for good practice. 42pp plus plates. NAPLIB. 1997. £4.50 including postage. ISBN 0 9530436 0 6

The size, A5, and extent, 42 pages, of the book suggest a vade mecum for those responsible for the management of photographic collections. Indeed the introduction points out that general, as well as aerial photographic collections are served, and that there is a lack of such a summarising work reflecting current knowledge. Good points, well founded. So does it fit in the pocket, and is it easily consulted? Yes obviously, and yes but less obviously comes the reply.
The division of the book into a discussion of the dangers faced by photographic images, followed by chapters specifically relating those dangers to four image types leads to a deal of repetition. Each main chapter, for example, has its own temperature and humidity section, often differing in degree rather than kind. Handling negatives (page 14) is quite short: later (page 21) comes a more comprehensive section on print handling which could have served as a paradigm for the general topic.

Somewhat confusing, too, has been the choice of what technical details to abstract from the references, for inclusion in the text. The chemistry of acceptable plastics, the precise composition of conservation quality paper, or of fire proof safes are, I suspect, above the head of the average collection manager, and could well be left to the appendices. Conversely there are places where I would have preferred some expansion. Where is the rationale for ‘prints should not...... be put on display’? Is the concept of the print as an artefact not valid at all?

This is nit-picking. David Wilson has put all necessary information into the book, either in text or reference. Unlike Eric Morecambe he does play all the notes and in an acceptable order. No one should complain about having to read 42 pages to pick up the wrinkles of good practice, or having to use the technical literature in the references for fine detail of basic premises.

I do have one general criticism to offer. The title is carefully worded, and the sub-title is Recommendations for good Practice. There is here no suggestion that absolute values will lead to perfect success. Yet, dotted throughout the text, the ‘a’ word appears. The not yet specialist curator may well ask what is archival storage; what is an archive? Is good storage practice always archival; is a collection, by default, an archive? David Wilson, as Director of the Cambridge University Collection of Aerial Photographs, is ideally positioned to advise us on such matters. What a pity that he has not used his own collection to add examples of when best practice can be downgraded to good practice, or by how much his fifty year old photographs are degraded, or not perhaps, for not having had modern standards of process and care from the outset. A description of how his clients use photographs would illuminate the practical differences between a working collection and a closed archive. We all can acquire technical information on how to manage a collection: much more hardly gained is the knowledge of how individual experts operate.

The Care and Storage of Photographs is a good book. When can we have the sequel?

Gwil Owen: August 1997
(Faculty Photographer, Archaeology and Anthropology, University of Cambridge.)

[ Copies available from The Hon Treasure [sic], NAPLIB, NMRC, Kemble Drive, Swindon SN2 2GZ, UK. Cheques made payable to NAPLIB. ]


This book is the latest in Chris Musson’s series of collaborations with archaeologists on either side of the Welsh border. As always, the result is well illustrated and clearly written, offering a fascinating glimpse of the variety of landscapes within the region.

Snowdonia is now chiefly known as a centre for leisure activities, where many Britons have spent at least one holiday. At first glance, the visitor might take the region to be a natural wilderness; however, these photographs and the brief but informative text provide a concise guide through the 6000 years of human impact which have shaped this landscape. Along with the more usual prehistoric, Roman and medieval remains, this book places full emphasis on the relatively recent development and, in many cases, disappearance of the industries of northwest Wales. Some of the most interesting photographs are those which show that, for at least the last couple of centuries, those ‘wild’ hills were positively...
crawling, inside and out, with people and machinery.

Following the pattern established by the other books in this series, the archaeology is presented succinctly and accessibly. It seems to be aimed primarily at the interested amateur, but there is plenty here for the archaeologist, aerial or otherwise. And, as always, the book is well designed and the photographs are wonderful. Many are accompanied by key diagrams to assist identification and interpretation (helpful to the aerial archaeologist as well) and there are also a few proper transcriptions – I wouldn’t have minded a few more.

As someone only slightly familiar with the region, I also would have welcomed a general location map with key place names, to put the images into context. The text points out that many of the illustrated sites are on private land, so perhaps specific location information was thought to be too tempting for potential explorers, but it would have been interesting to see the relationship between sites.

The most arresting photographs are those in colour - about one-third of the total. One or two of the monochrome frames seem rather flat, due in part to the use of non-glossy paper but mainly, I assume, because of the region’s prevailing light and weather conditions. Indeed, I was initially suspicious of the number of shadows and scraps of blue sky portrayed in this work: my own experience of Snowdonia on the ground is that it is almost always raining. Last time I was there (May 1997) it snowed! Could the authors possibly be guilty of artistic licence, or even infringement of the Trades Descriptions Act? On the other hand, the RCAHMW photographs were taken over a period of about seven years. I suspect that this actually represents the few days during that time when there wasn’t wet stuff falling from the sky, in which case these photographs are a monument to the photographers’ skill, perseverance and optimism.

This excellent combination of images and clearly focused archaeological description has increased my interest in this intriguing region and its landscapes. On my next visit to Snowdonia, I will be better informed and all the more eager to explore – but I think I’ll take this book with me, to be certain of seeing a few sites in sunlight.

Cathy Stoertz: August 1997


The book deals with the analysis of satellite data for geological and environmental purposes and gives a good introduction to remote sensing as far as it concerns these subjects. Consequently, all the topics covered are explained and illustrated using examples from geology or environmental studies. Attention is therefore also focused on the spectra of earth materials, which are described in a larger chapter.

For the aerial archaeologist, at least for those who try to involve satellite data into their studies, the most relevant chapters are those explaining scanners and image processing techniques. The latter are divided into multispectral and spatial image processing methods.

Within the multispectral image processing methods, attention is focused on the elimination of atmospheric disturbances and on the possibilities to display multispectral data as colour images without loss of information. The spatial image processing methods deal with automatic linear feature mapping, geophysical imaging, digital photogrammetry and the integration of remote sensing data and geographic information systems.

Digital photogrammetry is, in the first instance, seen as a tool for automatically extracting digital elevation models and orthophotographs from vertical stereopairs. These are consequently used within geographic information systems. The importance of this integration is clearly worked out.
The last four chapters show remote sensing applications to different fields of geology and environmental studies. These examples illustrate the methodical discussions from the previous chapters and give a good overview of the broad range of applications. The examples dealing with topographic mapping of landfills and open pit mines (industrial archaeology?) and the mapping of chemical indicators around them are certainly interesting for the aerial archaeologist. Another topic, relevant to our work is the trial to determine the soil loss by erosion in the past to predict the likely future erosion.

Although this book is not designed for archaeologists, it is certainly valuable for those of us, who try to work with multispectral remote sensing data. It gives a good introduction to remote sensing and provides us with many ideas as to how remote sensing could also be realised within our subject.

Michael Doneus: August 1997


Only rapidly scanned to date. A multi-authored book which begins by defining the Newcastle version of ‘landscape archaeology’. This is followed by a chapter on the geoarchaeology of the Tyne basin which sets the background for a series of historical and archaeological papers which study different aspects of smaller and different locations within the basin. I got the impression that use of air photographs was limited to easily-obtained obliques. These landscape archaeologists seemed to have no knowledge of vertical cover such as the National Survey or more recent stuff which, I imagine, would have helped construct the medieval landscape around the DMV at Welton (Chapter 5). Another chapter which ‘deconstructs’ a medieval landscape to study the earlier periods is likely to be of interest to anyone working with aerial photographs. This looks to be an interesting book, reasonably priced, to which I want to return (on another train journey?). One of the thoughts it has so far provoked was for me to question how we study landscapes and to wonder whether it may be more useful (by which I mean place us closer to past reality) to study small areas on the assumption that parish-sized areas were ‘the world’ before these days of easy and rapid movement? Are we right to examining large areas – such as my Danebury and Cathy’s Wolds – as units and what should we expect to learn by studying such vast chunks of land? Will local studies provide more of an insight into questions arising from aerial survey? Presumably we will develop (are developing) a range of questions to throw at these different-sized areas of past landscape and must take care to ensure that these are appropriate to the extents of landuse studied.


This truly huge book was sent out for review in April and shows, if nothing else, that a hardback book on good quality paper can be published for £15 in 1997. I have to assume that its bulk has defeated the reviewer who may eventually submit something. Survey for Humberhead included some use of aerial photographs and, as such, may be of interest. It is the second volume of results for that part of England.

[Copies available from Humber Wetlands Project, School of Geography, University of Hull, Hull, HU6 7RX, UK. Cheques made payable to University of Hull.]

This really has been a best-seller and has been reprinted to make a total of 7500 copies sold (Edwards, pers com). In the first edition (1987) the black and white photographs were excellently reproduced and accompanied by text that was brief but informative. Derek is one of the few photographers who combines a good eye for the land with the ability to talk the aircraft to where he wants it to be. This is certainly among the best of the *somewhere from the air* books, and cheap, and we should be pleased to hear that a second volume is planned to include some of the more recent photographs.

[Copies are available from Norfolk Museums Service: contact Mary Whattam: 01603 223628.]

**Heard of but not seen...**


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