

Making aerial photos work

JAMES CADOUX-HUDSON, Mitcham

1. INTRODUCTION

Much time, effort and money has been spent on seeking uses for remotely sensed images, they appear in such diverse ways as CD Rom, as background to maps and as glamorous posters in education packs but what of aerial photographs?

Aerial photography has to a great extent been a poor relation, perhaps because aerial photos are viewed purely as a means of procuring a map and because the survey and mapping companies involved in the photography have been slow to find alternative markets.

Traditionally aerial photography is used in photogrammetry to produce digital maps - in England much of the work is mapping for the National Rivers Authority (for modelling river basins) or for the Department of Transport (producing large scale maps of roads). The work in both cases is extremely competitive and the margins allow for little investment for the future. The problem is compounded in England as elsewhere in Europe, by the availability of large scale national mapping. This view of aerial photography neglects some interesting facts of which we, in Geonex (UK) Ltd., are very aware. Our sales of aerial photography are considerable, well over £ 1 million/year which may well be, in part, due to the abilities of the sales network but underlines a general interest in the photos as a source of data. We also discovered that much of the photography purchased was being archived in a fairly inaccessible way - stored in filing cabinets!

The aerial photograph is, of interest to all those who purchase it because it is a primary source of data. In the UK there are only 3 other primary sources of data:-

- a. Ordnance Survey who levie copyright charges due to high government financial recovery targets.
- b. Remote sensing SPOT, LANDSAT or Russian Imagery.
- c. Old maps outside copyright (50 years).

OS mapping is not a true primary source as it has been derived from aerial photography to cartographic rules.

Importantly the photos provide a snapshot or audit point in time - not provided by digital map data. This latter is almost certainly differential in nature with pockets of high change being relatively current with large areas of slow change neglected and consequently older.

2. GEONEX PHOTOGRAPHY

Having underlined the importance of having photographic coverage Geonex are undertaking a 4/5 year cycle of photography of UK. The photography will all be in colour (AGFA) and will cover the UK at 1 : 25,000 scale. This will underpin a series of products and services. With this feel for the market and a clear look at the advantages of the photos over other products Geonex started to investigate "value added products" ones that fit around the central acquisition of photography - to date we have virtual total coverage of UK. The areas we have concentrated on as a company are:-

- Education
- CD Rom

- Derived products
- Production of digital images
- Photo interpretation
- Road centrelines

2.1 Education

In UK it is a requirement of the national curriculum that mention was made of aerial photography. To this end we were able to produce school packs of photos together with a booklet for the teacher. These packs have been so successful that a range is now available including an overseas version based on Kano, a further education one, resource packs centred on different topics and even one in Welsh!

2.2 CD Rom

With the introduction of CD Roms into schools (with Government funding) the path was obvious and a CD Rom has been developed, based on our experience with education packs. This CD Rom integrates scanned photos (rectified, edgematched and mosaiced) with scanned maps and ancillary data such as that available at a tourist office. Integrated in this package are tools for drawing and lessons which the children are guided through, ranging from:-

Identifying a bridge on the map and photo,
to producing your own tourist map.

The students are guided through the disc by a Viking since the CD Rom is based on York!

2.3 Derived Products

We have also been active in using the aerial photos as a base upon which to produce cartographically enhanced products. Examples of these include golf maps and city centre plans. The photo image is scanned into the computer and the relevant features are traced off and enhanced. The photograph can then be used as the background. This produces a rapid product one which is up to date and immediately relevant.

2.4 Digital Images

With the need to provide a more readily accessible photo a software package "GeoDas" was developed which allows the user to view aerial photos (the photos are rectified, edgematched and mosaiced). The user is then able to zoom, and make the use of simple drawing tools to produce overlays.

The object of this is to allow the photos to be interpreted directly onto the image (24 bit colour on a Mac). This data can then be input into a GIS for further analysis. This tool was developed 2 years ago in partnership with the University of Kingston. To date 4 counties in UK (Oxfordshire, Mid Glamorgan, Fife and West Sussex) have been converted and the data is used for a variety of purposes ranging from the habitat surveys to schools.

The second area in this category is the use of digital maps in GIS's most of which are starting to be able to cope with handling raster data and the required file sizes. This area is set to be a growth area with huge requirements in many systems for a meaningful backdrop. To date this has often

consisted of raster maps but alternatives are being considered because of high copyright charges and the lack of currency and the search for further information - photos are ideal if rectified.

2.5 Photo Interpretation

Much emphasis has been placed by vendors of remote sensing software in classifying images. Photographs of course although fairly uniform over a film do vary with the strengths of the chemicals used etc. so although classification can be undertaken it needs to be normalised often. An alternate way is to interpret the images in 3D using stereoscopes and to pull out the classes of interest. This has successfully been undertaken for a very demanding job in which cities had to be categorised by height band. The resultant polygon traces were then scanned and vectorised and delivered to the client.

2.6 Road Centrelines

Perhaps this is a UK phenomena but there is now a lot of interest in obtaining road centrelines out of coyright. This is in main due to the high level of Ordnance Survey Charges (Ordnance Survey are due to have full cost recovery by 1997), charges which are unlikely to decrease.

The only feasible method is using photography, either the Russian or normal vertical photography. Road centrelines are obtained by us from the aerial photos. The method we employ is to use GPS control coupled with air triangulation. This allows the individual photos to be controlled, so that plotting of features can be produced either by way of monoscopic digitising or by use of the more conventional methods. Much depends on the end accuracy of the product as to which method is employed. The costly part of this technique is the ground verification which also incorporates the addition of attributes such as road names, etc.

3. WHERE TO NOW?

Digital photogrammetric tools are likely to allow the rapid processing of data but at present the process is restricted through the relative slowness of the popular air triangulation systems and the slowness of scanning. This is partly due to the requirements of high resolution photography often not applicable for the mass market who want a useable image which may contain some distortion. But where are the cheap software packages to allow the manipulation of these images?

By-products of the orthophoto process are DTMs which are eminently sellable in their own right and orthophotos which although used widely in Europe are seldom used in UK. The orthophotos coupled with a DTM of a city area then allow the city scape to be developed and the production of much wanted fly/walk throughs.

What we need to get this market moving are: -

- Cheap scanners capable of 600-1000DPI from film.
- Orthophoto software tailored for batch processing.
- Cheap software to utilise the digital orthophoto data.
- Supply of cheap ground control through GPS or other means.
- Rapid means of providing Air Triangulation for large areas.

4. CONCLUSION

Aerial photographs are an indispensable source material which can provide a wealth of information much of which is under utilised. The reason that the aerial photos have not been exploited is that

most present solutions tend to revolve around expensive high accuracy solutions. I am proposing low cost solutions aimed at a much wider and expanding market. I urge manufacturers to look to provide these facilities to allow the market to expand into providers of popular Geo-Information.