

Conference Report

ASPRS ANNUAL CONFERENCE 2004 MOUNTAINS OF DATA – PEAK DECISIONS

YOUR REPORTER CONFESSES TO BEING A DEVOTEE of the conferences of the American Society for Photogrammetry and Remote Sensing (ASPRS), and one who has participated in five of the past seven Annual Conferences as well as the last two Pecora meetings in this capacity. Both of these Pecora meetings have in fact been held in Denver, the venue for the latest Annual Conference, arrestingly subtitled “Mountains of data – peak decisions”, that also marked the 70th anniversary of the Society and was held between Sunday 23rd and Friday 27th May 2004. The reasons for continued participation in all these ASPRS meetings are the high standard of their organisation; the huge range of presentations; the excellent technical exhibitions; and the opportunity to meet practitioners from all over the world on a regular basis. That so many of the ASPRS conferences are held in Denver is simply because – as a prominent photogrammetrist remarked – “Denver is the Silicon Valley of the geospatial industry”. The city and its neighbouring towns are full of system and software suppliers; aerial imaging and mapping service providers; satellite constructors; space image providers (DigitalGlobe and Space Imaging); a major USGS mapping facility; cartographic houses; universities and colleges with surveying and remote sensing programmes; and so on. If one wants to keep abreast of the latest innovations and developments in photogrammetry and remote sensing, then an ASPRS conference being held in Denver is the place to be. And indeed the 2004 Annual Conference turned out to be an excellent event.

CONFERENCE PROGRAMME

The scale of this Annual Conference is really remarkable. On this occasion, there were 1900 participants, which is much as usual except for last year when the Conference was held in Alaska and numbers were unaccountably lower. The format too is well established. There were 11 so-called educational (lecture) sessions running simultaneously in parallel throughout three days (Tuesday, Wednesday and Thursday) of the Conference. These resulted in 430 technical papers being presented in 132 separate sessions. Prior to these, on the first two days (Sunday and Monday) there were 14 full-day or half-day workshops, together with seven user group meetings – held by Leica, Z/I Imaging, PCI, Inpho, DigitalGlobe, RSI and ESRI – again with each lasting either a full day or half a day. Add to all of this, the large exhibition held only over two days (Tuesday and Wednesday), plus a choice of three technical tours and an extensive social programme. Given this enormous programme,

it will be obvious that some drastic choices had to be made as to what to attend and a strict timetable had to be implemented if one was to participate in even a fraction of the Conference activities.

EDUCATIONAL SESSIONS

With regard to the educational part of the programme, there were sessions on almost every conceivable subject within photogrammetry and remote sensing. However there was a really notable series of no less than 15 sessions devoted to “Lidar sensors and their applications” that had been organised by the Lidar Committee of the ASPRS Photogrammetry Division. This is an accurate reflection of the current interest in the technology and its applications. It proved possible to attend a couple of these sessions, including hearing a first-class overview of the present situation and future trends given by Charles Toth of Ohio State University. His and most other presentations are available on the Conference CD-ROM.

Another continuing series of nine sessions was devoted to the “Art and science of photogrammetry”. Again it was only possible to fit in two or three of these on various different aspects of photogrammetry. Almost inevitably, three of these nine sessions were devoted to the use of rational polynomial coefficients (RPCs), a matter largely provoked by Space Imaging’s refusal to supply the calibration data for its Ikonos scanner imager. However, all the other suppliers of space imagery do supply the relevant calibration data, so there is really no need for users to miss using a rigorous geometric model with their data. Still, the advent of RPCs has certainly provoked plenty of theoretical and applied research and has resulted in the generation of numerous papers by various university professors.

Another interesting series of three sessions was devoted to “Radar and microwave sensors and applications”, including another excellent invited presentation on “Trends in IfSAR” given by Brian Mercer of Intermap. Inevitably he concentrated on the results achieved with his company’s *NEXTMap Britain* project, but he also gave some insight into the enormous task of covering the whole of the USA in its *NEXTMap USA* project that is currently under way. However active the airborne SAR scene is at the moment, by contrast, the use of high-resolution SAR imagery from space will remain largely in limbo until the new series of European SAR satellites (TerraSAR, COSMO-SkyMed and SAR-Lupe) is launched over the next two to three years. After this there will be a real explosion of interest in this subject area.

Besides sampling a small part of each of these series, your reporter also attended various other lectures concerned with the sensors and applications of optical airborne digital imagery. There were interesting presentations on operational aspects of airborne digital frame cameras by Gorin (BAE Systems), Thurgood (Vexcel), Neumann (Z/I Imaging) and Mostafa (Applanix) and on the ADS40 airborne pushbroom scanner by Pacey (Leica) and Hoffman (EarthData). The current emphasis in airborne imaging is very much on the development of numerous digital frame cameras having widely different format sizes. However the ADS40 imager, while following a very different path with its pushbroom scanner configuration, has gathered a substantial list of well-known commercial users, including EarthData, Horizon and Delorme in the USA, North West Group in Canada and Pasco in Japan. In addition, two more examples of the ADS40 have been delivered to Russia.

TECHNICAL EXHIBITION

As usual, the exhibition was first-class, with over 80 exhibitors and plenty of interesting items for the Conference participants to see, touch and discuss. In terms of innovation, most attention was focused on the introduction of still more airborne sensors, especially digital frame cameras and laser scanners, a development that had been reflected in the educational sessions.

Large-format Digital Frame Cameras

At the top end in terms of format size and price were the Z/I Imaging DMC and the Vexcel UltraCam D. Both of these feature a pair of multiple camera systems fitted into a single box. In both cases, the first of these paired systems comprises four individual cameras that are used for the creation of each panchromatic image. The second system, also comprising a further four cameras, is used for the simultaneous acquisition of multi-spectral images of much lower resolution. These two major suppliers have now been joined by DiMAC Systems from Luxembourg which showed its DiMAC (Digital Modular Aerial Camera) system. It is modular in its construction, like the original concept of the Z/I Imaging DMC. It is available with either one, two, three or four camera units that can be placed in a cylindrical gyro-controlled mount. Each camera is equipped with a Kodak True Colour back producing an image of 5440×4080 pixels (= 22 Megapixel) and can be operated either in a vertical position or in a tilted configuration. Potentially, with suitable marketing and technical support, this DiMAC system could become a serious contender in the large-format end of the digital frame camera market.

Medium-format Digital Frame Cameras

However, it is evident that the sheer scale of investment needed for the present generation of large-format digital cameras is either too great or too risky for many mapping companies and organisations. So a number of medium-format cameras, mostly producing $4\text{ k} \times 4\text{ k}$ (16 Megapixels) images have been developed and were shown in the exhibition. One or two of these were modifications of film cameras with digital backs replacing the film magazines; others were purpose-built units. Prominent among the first group was the Applanix DSS (Digital Sensor System) based on the Contax 645 film camera and featuring a MegaVision back. Rollei also showed a version of their Rolleimetric 6008 camera with a digital back. However Rollei has also introduced a purpose-built Aerial Industrial Camera (AIC) that generates either a 16 Megapixel ($4\text{ k} \times 4\text{ k}$) or 22 Megapixel ($4\text{ k} \times 5.4\text{ k}$) image. Striking too were the several medium-format cameras that had been constructed "in-house". Two of these came from mapping service providers located in Denver: Spectrum (with its NexVue camera) and Merrick (with its DACS = Digital Aerial Camera System). Also noteworthy was that both of these cameras had been built specifically to operate in conjunction with airborne scanning lasers (lidars).

Small-format Digital Frame Cameras

At the small-format end of the market are the systems utilising multiple cameras with parallel optical axes producing multi-spectral images that are so common in the

USA Typical of those previously seen were those from STI Services (which has now been bought by BAE Systems), Airborne Data Systems and the Kestrel Corporation. However there were other examples not previously encountered at ASPRS conferences. One was the four-band camera system from GeoVantage. Each camera is equipped with a 1280×960 pixel CCD array and the appropriate filter (RGB + NIR) resulting in both true-colour and false-colour images being generated. GeoVantage operate no fewer than 22 of these cameras from light aircraft at the present time. Another newcomer on show was the Titan MDIS X-1 (Multi-spectral Digital Imaging System X-1). This has an altogether different camera configuration. It employs twin cameras built by Illunis in Minnesota, each with a $2\text{ k} \times 2\text{ k}$ array producing false-colour images. These two cameras are tilted 18.5° off-vertical, pointing to the left and right of the flight line – as in the RAF's "split-vertical" photography – to provide increased cross-track coverage. These twin cameras are supplemented by third CCD camera, also from Illunis, that produces vertical true-colour $4\text{ k} \times 4\text{ k}$ images simultaneously. All three cameras share a common mount. The system, as shown in the Exhibition, also included a Trimble GPS and a C-Migits IMU from Systron Donner. It has been used extensively to acquire imagery for the US Forest Service and for the location and identification of areas of illegal crops (marijuana, coca, poppies) used for drug production.

Airborne Pushbroom Line Scanners

The main system falling into this category is the ADS40 from Leica Geosystems, which, as noted above, now has a substantial group of users. However, innovation in pushbroom line scanners at this particular meeting came from ITRES Research from Canada, which is well known in the UK for its CASI hyperspectral imager that acquires images in the VNIR wavelength region. The company has now introduced improved versions of the CASI with up to 1500 pixels swath width and 288 spectral channels. However ITRES is also offering two new pushbroom scanners, the SASI hyperspectral instrument with a 640 pixel swath width and 160 channels operating in the SWIR region and the TABI instrument with a 320 pixel swath width operating over a single channel covering the thermal (LWIR) region.

Airborne Laser Scanners

This is of course another area of great activity with the two market leaders – Optech and Leica Geosystems – receiving plenty of attention and apparently doing well in terms of commercial sales. However, the investment involved in purchasing one of these leading systems is again very large, so it was intriguing to see that, as with digital frame cameras, a number of service providers have built their own laser scanners "in-house" using off-the-shelf components. Presumably these systems cost considerably less than those from the main system suppliers. Examples on show or described in presentations included those from Spectrum and TerraPoint (from the USA) and TopoSys (from Germany). Also IGI from Germany, best known for its CCNS flight management and navigation systems, gave a presentation on its new LiteMapper airborne laser scanner, developed in collaboration with the GeoLas consultancy based in Munich. Airborne laser scanning really is another area where the technology is developing rapidly, which should result in the cost of ownership falling and hence even more systems being sold.

Photogrammetric System Suppliers

Needless to say, the photogrammetric system suppliers were present in force at the Exhibition. Nowadays the developments in DPWs lie solely in their software. The hardware is essentially a standard PC or graphics workstation. Furthermore most changes to the software are incremental improvements rather than fundamental changes. The largest suppliers – Z/I Imaging (Image Station), BAE Systems (SOCET SET), Leica Geosystems (Photogrammetry Suite) and Boeing Autometric (SoftPlotter and KDSP) – were all present, as were the second tier of DPW suppliers – DVP-GS, KLT (Atlas) and DAT/EM (Summit) – from North America. Inpho from Germany presented its new inBLOCK multi-sensor block adjustment tool and its inJECT software for semi-automatic feature extraction. Now that BAE Systems has terminated its agreement with Leica regarding the distribution of SOCET SET and is selling the software direct, it has entered into a partnership with Cardinal Systems from Florida to offer its VrOne and VrTwo software as an alternative to the Leica PRO600 product previously used for stereo-compilation in conjunction with SOCET SET. A surprise move, announced at the Conference, was the sale to Vexcel of the Canadian ISM company that produces the well known DiAP DPW. What with its previous purchase of the Canadian Atlantis company that produces radar image processing software and its re-incorporation of Vexcel Austria with its popular UltraScan film scanner and its new UltraCam digital frame camera, obviously Vexcel is becoming a major player in the photogrammetric field, besides its well known activities in radar processing and the supply of satellite ground receiving stations.

ASPRS AWARDS

Numerous awards were presented to various individuals who had either served the ASPRS well or had achieved eminence through their contributions to photogrammetry and remote sensing. Picking out only two or three of these that might be of interest to readers of *The Photogrammetric Record*, Professor Clive Fraser of the University of Melbourne was awarded the Fellowship of the Society for his outstanding academic, scientific and professional work. Professor John Jensen of the University of South Carolina was the recipient of the SAIC/Estes award for his contributions to education and teaching in remote sensing, including his part in building up the major programme in remote sensing offered in his University. Dr Chris McGlone of Carnegie Mellon University received the Fairchild Photogrammetric Award both for his research work in photogrammetry and computer vision and for acting as the chief editor of the new (fifth) edition of the American Manual of Photogrammetry that was due to be published in time for the ISPRS Congress being held in Istanbul.

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