

## From Our Members



### Report on 48<sup>th</sup> Photogrammetric Week Stuttgart, Germany, 24-28 September 2001

By John Trinder, ISPRS President

The 48th Photogrammetric Week was organised by Professor Dieter Fritsch, Rector of the University of Stuttgart and Director of the Institute of Photogrammetry (IfP), and Mr Rudolf Stiller, Executive Vice President, Z/I Imaging, Germany. As on previous occasions for this biannual conference, it comprised oral presentations by invited speakers in a single session in the mornings, and demonstrations and displays by Z/I Imaging and IfP in the afternoons. The language of presentation was either German or English, and simultaneous translations were provided. The proceedings of the meeting were produced in both hardcopy and CD. Separate tutorials were provided in German and English. Despite the events of September 11 in USA, total attendance of approximately 500 was similar to previous Photogrammetric Weeks.

Dr Claus Brenner was announced as the winner of the Pulfrich Award, during the Opening session. During the conference, Dr Brenner gave a presentation on his research on City Building Models. Following four presentations by the organisers on the first morning, the oral presentations for the remainder of the week covered three topics: Sensor Integration for Image Data Collection; Data Fusion and Automation; and Web Photogrammetry and eBusiness.

The sessions on Sensor Integration for Image Data Collection included papers on the characteristics and performance of GPS/INS systems for direct sensor orientation, DMC digital camera of Z/I Imaging, the ADS40 digital camera of LH Systems, and the HRSC-AX digital system developed by DLR in Germany. The papers on sensor orientation demonstrated that direct orientation achieves

accuracies of position from 0.05m to 0.3m, while roll and pitch can be determined with accuracies of the order of 0.003° to 0.005°, and heading of the order of 0.008°. Direct sensor orientation systems have been installed in many aerial photography and laser scan systems. The manufacturers claim that the results of direct sensor orienta-



Dieter Fritsch addressing the meeting.

tion can be used without aerial triangulation especially for small scale photography, or in combination with automatic aerial triangulation for large scale photography.

The DMC camera of Z/I Imaging is based on four area arrays 4kx7k in size with 12 µm pixels. The images are combined to produce a central projection with a resolution of 13,500x8000 pixels, that can be processed by existing digital photogrammetry software. There can be up to 8 lenses in the camera, 4 for acquiring panchromatic images and 4 for multi-spectral images. Forward motion compensation is carried out electronically. Tests showed that sub-pixel accuracy can be achieved. The ADS40 camera of LH Systems is based on a linear array which uses 'staggered CCD' lines to achieve very high resolutions. It features wide angle optics, high data throughput and the acquisition of 10 simultaneous images, panchromatic and multi-spectral, and GPS/INS sensor orientation. A number of tests have been carried out in various parts of the world, indicating that sub-pixel accuracies in position have been obtained. The time taken to carry out the processing and matching of the data is considerable, and optimization of the data acquisition as well as the processing and hardware, will be required to reduce the computing time. The HRSC-AX camera is based on a linear array of 12,000 pixels. Various focal lengths and angles of field of





the lenses are possible. DLR has had 4 years experience with line-scan cameras, 1 year with the HRSC-AX.

An interesting presentation was then given on a comparison of the CCDs and CMOS as appropriate technologies for aerial and satellite imaging systems. CCD sensors require high supply voltage and suffer from blooming, while CMOS do not suffer from blooming, and are best for high speed imaging. The conclusions of the presentation were that while CCD technology has been developed as far as is conceivably possible, CMOS will be able to replace CCDs for standard applications, but not for high technology applications, such as those applied in digital photogrammetry. Papers on satellite systems covered the proposed RapidEye satellite system from Germany, and the plans of Spot Image, France for the Pléiades system of satellites, and Spot5. Radar was featured in papers on the X-band SRTM processing by DLR, airborne InSAR system of Aerosensing, Germany.

The papers on the topic of Data Fusion and Automation covered the automatic aerial triangulation software of Z/I Imaging, new developments in the LH Systems digital photogrammetry software, MATCH-AT software of Inpho and results of phase 1 of the OEEPE test on integrated sensor orientation. A comment was made that with the new digital systems coming on-line, users are 'drowning in data'. The OEEPE tests were carried out on large scale aerial photography with GPS/INS, and revealed that using only the results from direct orientation, errors of 20-40µm can occur in the images, which cause parallaxes that are too large for stereoscopic vision. The conclusion was that direct orientation systems can achieve high accuracies, but they are not as good as the results that can be achieved by aerial triangulation. A limiting factor is also the lack of redundancy in the data provided by direct orientation.

Further papers on the topic of Data Fusion and Automation covered the acquisition of laser scan data over Baden-Württemberg for an area of 35,000 sq km with points every 5m with an accuracy of 0.5m; a comparison

of InSAR and LIDAR for elevation determination - there are considerably more systems available for LIDAR than for InSAR systems, but they are complementary in terms achievable accuracies; practical experience with sensor integration, showing similar accuracies of sensor orientation and accuracy of object point coordinate accuracies as revealed in earlier papers; a new proposal for a fully automatic simultaneous global matching and orthophoto production software (COBRA), involving massive amounts of unknowns; image orientation for a location aware environment; and data mining for GIS data collection.

Under the topic of Web Photogrammetry and eBusiness, papers were presented on: Web based photogrammetry and the tools available on the Web for teaching photogrammetry; TerraShare, the software developed for Z/I Imaging for distributed image data management, which can include all types of data files, images, DEMs, metafiles, and generic files, required for data management in a mapping or GIS environment; examples of the application of TerraShare software in a production environment in Greece; eBusiness, basics and challenges, covering the levels of communication that aid in the operation of a business, features of the 'new' economy, modes of e-business and its potentials, and implementing e-business; and final-



ly, a visions paper was presented by Professor Dieter Fritsch on the electronic business and mobile photogrammetry. The presentation discussed aspects of the integration of digital images into tourists maps, and location aware technologies. E-Business will have a strong influence on photogrammetric data dissemination, bringing photogrammetric data into daily life. Location based systems involving photogrammetry will be a major market opportunity in future. As a support to this presentation, one of the tutorials displayed the equipment available for e-business and mobile photogrammetry.

Very enjoyable social functions were planned for each evening, culminating on the final evening in a fascinating visit to the Weinstadt-Stümpfelbach where the local wine was enjoyed and the musical skills of the local community were on display.