

2nd and 3rd Plenary Sessions

- 1. Commission Summaries
Plenary Session**
- 2. Closing Plenary Session and
Closing Ceremony**

COMMISSION SUMMARIES PLENARY SESSION

Friday, July 19, 1996, 13:00 – 14:30

PROGRAMME

- Opening
Kennert Torlegard, 1st Vice – President
- Summary of Commission Activities 1992 – 1996
The seven Commission Presidents
- Resolutions of the Congress
Armin Grün, 2nd Vice – President
- Summary of the Exhibitions
Armin Grün, 2nd Vice – President
- Summary of Other Technical Events
John Trinder, Secretary General Elect
- Appreciation to Commission Presidents
Shunji Murai, President
- Honourable Mention Awards
Kennert Torlegard, 1st Vice – President
- Closing
Kennert Torlegard, 1st Vice – President

***Kennert Torlegard** welcomed the participants and announced the Agenda for this 2nd Plenary Session of ISPRS 1996. The Summaries of the Commission Activities have been presented by the seven outgoing Commission Presidents who well deserved the appreciation by the President and the applause by the Plenary Session participants.*

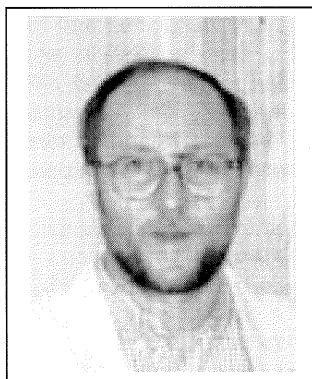
*The Resolutions, presented by the 2nd Vice – President **Armin Grün**, have been agreed on by everybody and became the valid guidelines for the next 4 year period. Armin Grün reported also about the Exhibitions and **John Trinder** about other important events of this Congress.*

*The report about the Honourable Mention Awards, presented by President **Shunji Murai** and Vice-President **Kennert Torlegard**, can be found in the Awards section of this book.*

***Kennert Torlegard**, who served ISPRS as Commission President, President and Council Member for so many years, said good bye to the ISPRS Family and the auditorium thanked him with long lasting standing ovations.*

SUMMARY OF THE SCIENTIFIC PROGRAM RÉSUMÉ DU PROGRAMME SCIENTIFIQUE ZUSAMMENFASSUNG DES WISSENSCHAFTLICHEN PROGRAMMS

REPORTS BY PRESIDENTS ON TECHNICAL COMMISSION ACTIVITIES 1992 - 1996



TECHNICAL COMMISSION I: SENSORS, PLATFORMS AND IMAGERY

by **Luigi Mussio**, President 1992–1996
and **Gianfranco Forlani**, Secretary 1992–1996,
Milan - Italy.

1. WORKING GROUPS AND STAFF

- **WG I/1 - Image Data Quality Control Assessment and Standardisation.**
Chairperson: Hartmut Ziemann, Germany,
Co-Chairperson: Wolf-Dieter Schuh, Austria,
Secretary: Anders Boberg, Sweden.
- **WG I/2 - System Aspects of Platform Guidance, Navigation and Sensor Positioning.**
Chairperson: Petros Patias, Greece,
Co-Chairperson: Roman Arbiol I Bertran, Spain,
(former Co-Chairperson: Jesus Otero, Spain).
- **WG I/3 - Optical Digital Imaging Sensors.**
Chairperson: Hans-Gerd Maas, Switzerland,
Co-Chairperson: Battista Benciolini, Italy.
- **WG I/4 - Microwave Imaging Sensors And Preprocessing.**
Chairperson: Claudio Prati, Italy,
(former Chairperson: John Curlander, U.S.A.),
Co-Chairperson: Gunter Scheier, Germany.
- **WG I/5 - Hardcopy Scanning and Pre-processing Systems.**
Chairperson: Ralf Bill, Germany,
Co-Chairperson: Alessandro Carosio, Switzerland.
- **WG I/6 - Pre-processing and Archiving Of Satellite Data for Remote Sensing.**
Chairperson: Dan Rosenholm, Sweden,
(former Chairperson: Leon Bronstein, Canada),
Co-Chairperson: Philippe Munier, France,
Secretary: Dan Klang, Sweden.

2. COOPERATING WORKING GROUPS AND STAFF

- **WG II/1 - Real-Time Mapping Technologies.**
Chairperson: Kurt Novak, U.S.A.,
Co-Chairperson: Michael Hahn, Germany,
Secretary: Holger Schade, Germany.
- **WG III/1 - Integrated Sensor Orientation.**
Chairperson: Ismael Colomina, Spain,
Co-Chairperson: James Lucas, U.S.A.,
Secretary: Jose A. Navarro, Spain.
- **WG III/4 - Tutorials on Theory And Algorithms.**
Chairperson: Fabio Crosilla, Italy,
Co-Chairperson: Gabor Melykuti, Hungary.
- **WG V/2 - Close-Range Imaging Systems and Their Performance.**
Co-Chairperson: Horst A. Beyer, Switzerland,
Co-Chairperson: Volker Uffenkamp, Germany.
- **WG IV/2 - International Mapping from Space**
Chairperson: Gottfried Konecny, Germany,
Co-Chairperson: Donald Light, Rochester, U.S.A.
- **IC-WG V/III - Image Sequence Analysis**
Chairperson: Emmanuel Baltsavias, Switzerland,
Co-Chairperson: H.H. Baker, U.S.A.
- **OEEPE WORKING GROUP On the Analysis of Photo-Scanners.**
Chairperson: Otto Koelbl, Switzerland.
- **OEEPE COMMISSION C On Large Scale Restitution.**
President: Sergio Dequal, Italy

3. ACCOMPLISHMENTS OF COMMISSION I

The conferences during the four years of the Commission demonstrated the tendency towards system integration to support high performance in aerial triangulation. Also the use of SAR data (and especially interferometric SAR data) for DTM generation and change detection showed impressive performances and potential, and its integration with photogrammetry for mapping purposes should be promoted. Many operational issues still arise when systems are placed into the production environment, while, from the mathematical point of view, combined adjustment techniques are already intensively used.

Geometric and radiometric performances of off-the-shelf scanners and printers were investigated for use in low cost photogrammetric systems. While results for laser printers looked rather poor, it was shown that scanners could be efficiently calibrated to subpixel accuracy and that their radiometric quality was generally good and sufficiently stable, though it was necessary to verify it.

Automatic extraction of information from scanned maps showed efficient techniques, incorporating knowledge-

based algorithms for classification; automatic map revision and data capture for GIS were also demonstrated. Algorithms seem to be relatively robust in feature identification, due to the limited set of objects represented.

Digital data storage and archiving is still an open problem in a variety of applications, from high speed solid state cameras to remote sensing data from satellites. Data compression algorithms were illustrated with respect to their effect on accuracy degradation. While originating from different environments and with specific characteristics, problems in handling digital data in photogrammetry and remote sensing in an efficient way are far from being solved.

In GIS data quality control the application of non parametric statistics in order to evaluate the degree of currency of the information stored in GIS was suggested, while the concepts of fuzzy data classification were introduced.

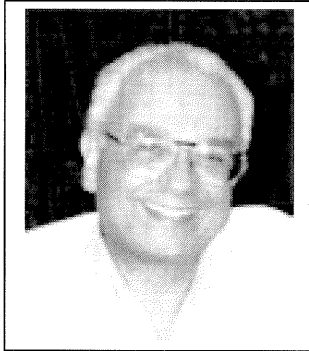
At the Vienna Congress, the key-note address, given by Prof. H. Ziemann on Standards Related to Commission I activities, covered both the longstanding experiences and the results coming from the application of new techniques and methodologies in the Commission. It was a great pleasure to note that all technical sessions hosted officially, or unofficially, one or more Co-operating Working Groups, so that the Commission was not isolated from other activities of the Congress, thus emphasising co-operation in the topics of primary data acquisition and evaluation. Furthermore, every WG paid special attention to industrial equipment for data acquisition, thus providing content to the Commission sessions. In this way the working groups did not neglect or dismiss contributions from industries, engineering firms, etc.

The most important aspects emerging from the Congress were the following:

- In the last decade the nature of the primary data changed significantly. Platforms on board satellites and new sensors, the different roles of geodesy and cartography opened new horizons and showed new directions to scientists and engineers.

- Fusion and integration of GPS, INS and laser profile data with the imagery from SPOT, SAR (with special regard to its interferometric use) laser scanning, three line cameras, CCD sensors and photo-scanners, demonstrate that the role of GIS has changed not only the nature of the primary data, but also the methodologies to acquire and evaluate them.
- Further developments of techniques and methodologies, involving primary data acquisition and evaluation, definition of standards, data archival and distribution, become very important for advancements in photogrammetry, remote sensing and related sciences, as much for the research as for their applications.
- Modern technologies allow the combination of primary data acquisition with data evaluation. On the other hand, theoretical studies on mathematics, statistics and computer science may grow in many different directions. Practical applications must focus on the most promising developments.
- The activities suitably combined the longstanding experiences and the results derived from the application of new techniques and methodologies to acquire and evaluate primary data. The aim of bringing together experts from various disciplines proved to be successful.
- Therefore scientists, engineers and users in the fields of photogrammetry, remote sensing, geodesy, electronics and computer science from universities, research institutes, governmental organisations, industries and engineering firms were invited to participate and their contributions were highly appreciated.

All Working Groups were heavily engaged in the Congress, which provided the last occasion to meet and to verify their activities, therefore ensuring that positive results would be formulated. An additional comment could be made at the end of the 1992-96 period, that participation in Commission I has increased, offering many occasions to exchange important experiences by means of the co-operating Working Groups.



**TECHNICAL COMMISSION II:
SYSTEMS FOR DATA PROCESSING, ANALYSIS AND
REPRESENTATION**

by **Mosaad Allam**, President 1992-1996
and **Gordon Plunkett**, Secretary 1992-1996
and **Jeff Labonte**, Secretaries 1992-1996,
Ottawa - Canada.

During the period between the XXXVII Congress in Washington, D.C. in 1992, and the XXXVIII Congress in Vienna in 1996, the mandate of Commission II was defined by the terms of reference (TOR) of the Commission, and the resolutions adopted in Washington, as well as the specific Terms of Reference of its Working Groups adopted by the ISPRS Council.

**THE FOLLOWING WORKING GROUPS WERE
ESTABLISHED:**

- **WG II/1 - Real Time Mapping Technologies.**
Chairperson: Dr. Kurt Novak, USA, and
Co-Chairperson: Michael Hahn, Germany, concentrating on the design and development of operational integrated real-time mapping systems, and investigating system aspects related to sensor information processing (e.g. stereo-vision, kinematic GPS technologies).
- **WG II/2 - Hardware and Software Aspects of GIS.**
Chairperson: Dr. Manfred Ehlers, Germany, and
Co-Chairperson: Nicholas Faust, USA, dealt with the integration of GIS with image analysis systems; design and performance issues for 3-D GIS; hardware and software aspects of GIS; and studies related to GIS standardisation as applied to user interface and networking.
- **WG II/3 - Technologies for Large Volumes of Spatial Data.**
Chairperson: Dr. Ekow Otoo, Canada, and
Co-Chairperson: Terry Fisher, Canada, undertook research in topics related to spatial data models, GIS open systems, and the development of spatial data browsers and database management systems for spatial data access and interoperability in a heterogeneous environment.

- **WG II/4 - Systems for the Processing of RADAR Data**
Chairperson: Dr. R.O Neil, Canada, and
Co-Chairperson: Nobuhiko Kodaira, Japan, undertook research in the development of methodologies to process, analyse and interpret SAR imagery acquired by space-borne instruments.
- **WG II/5 - Integrated Production Systems.**
Chairperson: Dr. Atef Elassal, USA, and
Co-Chairperson: Dr. Mostafa Radwan, Netherlands, studied the role of GIS, image analysis systems (IAS), remote sensing and photogrammetric technologies in the design of Integrated Production Systems (IPS).
- **IWG II/III - Digital Photogrammetric Systems.**
Chairperson: Dr. Ian Dowman, UK, and
Co-Chairperson: David McKeown, USA, studied development in digital photogrammetric workstations, visualisation and multimedia techniques, algorithms and system interfaces for automated cartographic compilation systems, and the integration of photogrammetric techniques and models into computer vision systems for the analysis of remotely sensed imagery.
- **Commission II - Special Project Upgrading Photogrammetric Instruments.**
Chairperson: Dr. Klaus Szangolies, Germany, studied the impact of upgrading photogrammetric systems with digital devices and computer technologies, particularly related to the instruments productivity, life-span and users.
- **Commission II - Achievements and Trends.**
During the period 1992-1996, progress in the developments of digital systems has been primarily driven by advances in technology. These advances come from the fields of computer science, photogrammetry, remote sensing and geographic information systems (GIS). Acceptance of GIS as a unifying technology continues to challenge the "separation of disciplines". Consequently, the shift toward integrated systems for processing of geospatial information is driven by advances in hardware, software and networking.

Trends toward developing integrated systems capable of performing multiple tasks continue to be strong. Although these systems can operate as a stand alone workstation, the networking of many of them in a heterogeneous environment is becoming a reality. Future advances in systems for data processing, analysis, representation and communication will be measured by the degree of integration. Since the power of the new workstations can be realised only if they can communicate with multiple databases, the development of a spatial information infrastructure for interoperability becomes of paramount importance.

Technological advances in integrated systems may be

measured in terms of advances in the related technologies of GIS, satellite remote sensing, photogrammetry, GPS, and information technology (multimedia, visualisation, DBMS and networking), with continued emphasis on digital photogrammetry, image processing, integrated systems, and real-time mapping systems. In the transition from analytical to digital photogrammetry, traditional photogrammetric instruments are becoming obsolete. Over the past several years, photogrammetric knowledge has gone into software instead of hardware. There is a growing need for end-to-end systems, and these are increasingly being assembled with standard off-the-shelf components in order to facilitate software portability across different hardware platforms.

The development of integrated photogrammetric/RS workstations with GIS capabilities have opened the door for their integration with other GISs. Since these systems were developed by multiple vendors on different platforms, the communication between systems in a heterogeneous network environment has posed many questions. For example: where are the major repositories of information? How are diverse data formats integrated with different GIS databases, and how can the user access, display, select and retrieve the information they need from other geographic information databases? The search for answers to these questions prompted the development of spatial data browsers, and the development of federated multi-database management systems for GIS interoperability. Research and development in this area is leading system developers toward a universal solution for an open GIS structure.

- **WG II/1 - Real Time Mapping Technologies.**
Activities in real-time (mobile) mapping systems gained tremendous interest over the past four years. Real-time mapping technologies developed at major research institutions, such as the University of Calgary and the Ohio State University, were licensed to private companies for commercial use. They integrate GPS/INS with laser scanners and video cameras for mapping of utility corridors. A notable achievement is the improvement of the accuracy of the positioning sensors. Presentations at the XVIII Congress demonstrated the reality of obtaining 3D GIS data using mobile mapping systems. Further, WG II/1 members actively participated and/or organised several conferences and workshops over the past four years; for example, the 3rd International Workshop on High Precision Navigation, Stuttgart, Germany, the Mobile Mapping Symposium, Columbus, Ohio, USA, and Integrated Sensor Orientation Workshop, Barcelona, Spain. Also, WG II/1 organised a one day tutorial on the Integration and Orientation of Sensor Systems at the XVIII ISPRS Vienna Congress.
- **WG II/2 - Hardware and Software Aspects of GIS**
Achievements in the area of hardware and software aspects of GIS are evident in hardware developments, with increases in processing power, the introduction of

32-bit operating systems, and the challenge of PCs to workstations in performance. The integration of raster and vector data in GIS, the development of easy-to-use low cost desktop GISs, and the use of client server GIS technology on the WWW for visualisation dominated the majority of WG II/2 activities. Further, WG II/2 participated in several international meetings; for example, the Chair of WG II/2 organised an international workshop on Requirements for Integrated Geographic Information Systems in New Orleans, Louisiana, participated in the 9th International Symposium on Computer Science for Environmental Protection in Berlin, Germany and participated in the International Workshop on New Developments in Geographic Information Systems, held in Milan, Italy from March 6-8, 1996.

- **WG II/3 - Technologies for Large Volumes of Spatial Data.**
Activities in the area of technologies for very large volume spatial data are now perceived as one of the major initiatives of most national governments. A number of countries have initiated programs to establish National Spatial Data Infrastructure with the purpose of providing some degree of standardisation in spatial data formats; defining the base information content of the metadata for spatial databases; and defining the core content of information for spatial database repositories and clearinghouses. WG II/3 recognised these initiatives and its activities have concentrated on several studies, research and programs that support the general principles of the set-up and use of spatial database repositories, most notably: data models that promote interoperability between heterogeneous technologies of Geographic Information Systems; large capacity storage systems; limitations of current database technology and models of transaction processing systems to support large spatial databases; and the development of federated multi-database management systems for GIS data interoperability; and techniques for modelling time, events and incorporating event processing in spatial databases. Furthermore, WG II/2 organised a tutorial on Technologies for handling large volumes of spatial data at the ISPRS Vienna Congress, and represented ISPRS at several ISO meetings.
- **WG II/4 - Systems for the Processing of RADAR Data.**
Activities in the area of processing of SAR data resulted in several presentations, for the EPOS speckle filter, and automatic tie-pointing in overlapping images. These presentations have demonstrated that a number of SAR processing systems are available commercially at lower cost than ever before. Such systems make SAR processing directly accessible to new portions of the user community and lead the way to more applications. Also, SAR interferometry has become a very exciting and promising research topic with numerous potential applications being investigated. Most common are applications related to the precise measurement of elevation differences over land, as

well as velocity measurements and ocean features. These potential applications have stimulated a great deal of research into better characterisation of SAR data, the response of SAR to various target classes, and novel processing techniques for manipulating, correcting and visualising interferometric data sets.

- **WG II/5 - Integrated Production System**

Research activities were confined to photogrammetric based Integrated Production Systems (IPS) with data acquisition functionalities, namely: spatial data collection, editing and storage, building topology for GIS applications, data transfer, integration of data sets (vector/raster from different sensors) and user interfaces to GIS. IPS integrates various processes of spatial data acquisition, such as triangulation, compilation, and transformations. Data analysis functions are relegated to GIS. The linkage between an IPS and GIS is considered essential in the development of IPS. A notable activity was the dedication of a WG II/5 session at the Vienna Congress in memory of Uki Helava. Presentations in this session addressed developments in photogrammetric systems.

- **IC WG II/III Digital Photogrammetric Systems**

This WG focused on developments in digital photogrammetric workstations, their theoretical foundation and associated algorithms. Presentations at the XVIII Congress demonstrated that digital photogrammetric systems continue to develop at a rapid rate. Several new systems have been announced, and the Zeiss PHODIS is installed and operating in a number of centres. A major development in the software addresses digital aerial triangulation. Photogrammetric software is also becoming more widespread within image processing systems. Further, there is a strong interest in the integration of photogrammetric systems with semi-automated and automated computer vision systems, particularly for cartographic feature extraction. Of interest is the trend toward the incorporation of rigorous photogrammetric modelling within computer vision algorithms.

During the past four years, IC WG II/III has actively participated or organised several meetings, for example, a seminar on Integrating Remote Sensing and GIS data, in co-operation with the University Technology Malaysia, the SPIE Conference on

Integrating Photogrammetric Techniques with Scene Analysis and Machine Vision II, Orlando, Florida, USA, and a Joint Workshop with ISPRS WGs III/2 and III/3 on The Role of Models in Scene Analysis, in Stockholm, Sweden. Also, regular newsletters were produced and circulated to the members of the IC WG.

- **Commission II - Special Project**

Since several thousand conventional analogue and analytical plotters are currently in use, this study was initiated to define the future role of these systems. The findings of the study demonstrated that vendors are of the opinion that upgrading conventional instruments is obsolete and will be of academic significance only. On the other hand, practitioners expect the transition to digital photogrammetry will continue over the next ten years until it is completed. Until then, there is a need for functioning optical-mechanical and analytical instruments. The study team held meetings in Dresden, Cologne and Dortmund, Germany.

Resolutions for Commission II covered the following topics:

- (1) Real-time mapping technologies, including implementation issues, accuracy evaluation and testing of commercially available systems;
- (2) Software and modelling aspects for integrated GIS, monitoring developments in standardisation and interoperability, and spatial decision support systems;
- (3) Technologies for large volumes of spatial data, including data exchange, metadata, and cataloguing standards, the development of spatial data browsers, distributed information systems for data interoperability; and technologies for spatial data warehouses, particularly developments making use of WWW;
- (4) Systems for the processing of radar data with increased focus on the development of algorithms for integration of SAR data with other data, and the promotion of user friendly SAR systems and software;
- (5) Integrated geoinformation production systems including the design and testing of processing systems to integrate satellite and airborne data; and
- (6) Digital photogrammetric systems with increasing emphasis on automation and efficiency, integrating photogrammetry and machine vision.



TECHNICAL COMMISSION III: THEORY AND ALGORITHMS

by **Heinrich Ebner**, President 1992-1996
and **Christian Heipke**, Secretary 1992-1996
and **Konrad Eder**, Secretary 1992-1996,
Munich - Germany.

1. STRUCTURE OF ISPRS COMMISSION III

In the period 1992 - 1996 ISPRS Commission III was structured into the following working groups:

- **WG III/1 - Integrated Sensor Orientation.**
Chairperson: Ismael Colomina, Spain,
Co-Chairperson: James Lucas, USA,
Secretary: Jose Navarro.
- **WG III/2 - Geometric-Radiometric Models and Object Reconstruction.**
Chairperson: Kennert Torlegard, Sweden,
Co-Chairperson: Wolfgang Förstner, Germany,
Secretary: Eberhard Gülch, Germany.
- **WG III/3 - Semantic Models and Object Recognition.**
Chairperson: Toni Schenk, USA,
Co-Chairperson: Dieter Fritsch, Germany,
Secretary: Monika Sester, Germany.
- **WG III/4 - Tutorials on Theory and Algorithms.**
Chairperson: Fabio Crosilla, Italy,
Co-Chairperson: Gabor Melykuti, Hungary,
Secretary: Roberta Raber.
- **IC WG II-III - Digital Photogrammetric Systems.**
Chairperson: Ian Dorman, UK,
Co-Chairperson: Dave McKeown,
Secretary: Zubbi Nwosu, Switzerland.
- **IC WG III-IV - Conceptual Aspects of GIS.**
Chairperson: Martien Molenaar, The Netherlands,
Co-Chairperson: Ryosuke Shibasaki, Japan.
- **IC WG V-III - Image Sequence Analysis.**
Chairperson: Manos Baltasvias, Switzerland,
Co-Chairperson: Harlyn Baker.

All working groups were very active during the last four years. This fact is exemplified by the large number of successful international meetings which were organised by the working groups. A major event was also the Commission Symposium on 'Spatial information from digital photogrammetry and computer vision' held in Munich in September 1994. The

contents and results of these meetings are well covered in the Reports section of the ISPRS Journal of Photogrammetry and Remote Sensing and other related journals. Last but not least, Commission III had 24 highly successful technical and poster sessions at the Vienna Congress.

2. THEORY AND ALGORITHMS IN PHOTOGRAMMETRY AND REMOTE SENSING AT THE XVIII ISPRS CONGRESS IN VIENNA 1996

2.1 Integrated sensor calibration and orientation

In the last four years the theory of sensor orientation has further expanded beyond classical collinearity equations under central perspective projection, and beyond the exclusive use of points. The intelligent combination of multiple sensor information from frame and line images, black and white images, colour and multispectral images, GPS, INS, and laser scanner has been identified as a new and important challenge. Besides the selection of the most effective sensor combination, single-sensor and sensor-to-sensor calibration, as well as error modelling for information fusion are key issues for obtaining highly accurate and reliable results.

On the operational side GPS-photogrammetry has made tremendous progress. Much work has been devoted to solving the problem of on-the-fly ambiguity resolution. Today, the use of GPS for measuring the projection centres of an aerial camera during the aerial triangulation is operational and has found considerable acceptance in practice. The complete direct measurement of all 6 exterior orientation parameters by means of a combination of GPS and INS, which will finally eliminate aerial triangulation, is underway, is already a reality for range sensors.

2.2 Feature extraction and object recognition

There is a growing demand for fast, reliable, and automated extraction and updating of GIS and CAD data from images. In order to successfully meet this demand, work has focused on early vision problems (image segmentation, grouping, texture analysis, image matching etc.) as well as on issues in late vision (hypothesis generation and verification, object and scene modelling, knowledge representation etc).

Substantial progress has been achieved in the last four years. Geometric questions including the treatment of vanishing points and inverse perspective, the use of images from uncalibrated cameras, and invariants have been topics of research and conferences. A number of projects on automatic road and building extraction are being carried out. Modelling is increasingly being done in 3D using multiple images. Special attention is devoted to information fusion, e.g. the combination of image and DTM data or the use of map or GIS data as prior information. As a result, it is now possible to consistently extract features in 2D and in 3D using semi-automatic procedures.

Some areas needing future research are the modelling and representation of complex objects and scenes,

especially with regard to context, functionality, and model grain size; model acquisition by automated learning; strategies for image understanding systems; and algorithms exhibiting self diagnosis modules for all levels of image analysis.

2.3 Digital photogrammetric systems

There is a large number of commercially available digital photogrammetric systems on the market. From the point of view of Commission III, the main interest lies in the growing use of automation. Automatic interior and relative orientation are already in everyday use. Automatic aerial triangulation is on the verge of being widely applied in practice as a tool which essentially operates as a black box, but needs some operator interaction for set-up, verification, and the identification and measurement of control information. Digital terrain models (DTM) and orthoimages generation have operated automatically for some time, however, interactive DTM verification and editing is essential, especially in more complex terrain.

The acquisition of vector data for GIS remains the most important interactive step in the whole photogrammetric processing chain. Some results on semi-automatic feature extraction indicate that future systems will be equipped with more powerful tools for this time-consuming task. Besides the implemented algorithms themselves, which combine computer vision approaches with rigorous photogrammetric modelling, the quality of the human-computer interface is increasingly seen as an important factor.

Several new trends include an increasing number of photogrammetric software modules in remote sensing systems and in GIS. Also, visualisation of GIS database objects, most notably of urban environments has become a major research and development topic. Such visualisations are of considerable value in applications such as flight simulation, video games, regional and town planning, architecture etc.

2.4 Conceptual aspects of GIS

Work in this area has concentrated on object-space modelling for GIS, the integration of data from multi-sources including uncertainty handling, the linking of different aggregation levels, and the investigation of query spaces. Concepts of object oriented approaches in GIS are being established, but very few geo-information systems can really handle such an approach. In this area a gap between research and implementation is observed. 3D modelling has seen vivid activity in urban environments, mainly for 3D city models. Vector data, DTM information and texture are combined for visualisation and computer animation.

There has been little activity in the integration of data from multiple sources. Nevertheless, this topic is important, especially for continuous and efficient updates of GIS databases, as more remote sensors are emerging. Since integration or fusion of data is also recognised as an indispensable concept for automated object-recognition, both approaches should be integrated. As for uncertainty issues, several papers dealt with specific problems such as fuzzy viewshed

due to DEM uncertainties and merging several fuzzy lines into one. Directions towards more general theoretical frameworks have been developed. The formulation of fuzzy spatial relationships is at present a topic of research for several scientists.

Relevant developments concerning multi-scale approaches for object aggregation are in the field of map-generalisation. However, this work is mainly directed at handling maps at different scales and thus oriented towards the production of graphical output. Although several papers addressed issues of linking thematic aspects and keeping consistency between different levels, this direction should be studied in more detail.

3. CONCLUSIONS

Rather than concluding this report with some general views about the state-of-the-art of theory and algorithms in photogrammetry and remote sensing, the resolutions accepted during the Vienna Congress are summarised here, since they reflect appropriately the future directions of Commission III in the next intercongress period.

The Congress recommends:

- That activities in integrated sensor calibration and orientation be continued in co-operation with Commission I and the sister IUSM organisations, with emphasis on multi-sensor system calibration, integration of GPS, INS and image processing techniques, and automatic integrated orientation concepts,
- Intensified investigations in object recognition and image understanding, particularly in the areas of modelling and knowledge engineering, in close co-operation with researchers in computer vision, artificial intelligence, and cognitive science,
- That activities in developing and applying new algorithms and software tools in digital photogrammetry be continued and intensified during the period 1996-2000, with an emphasis on performance characterisation of algorithms, quality control, test procedures, and suitable documentation in close co-operation with the computer vision community,
- That work on Digital Photogrammetric Systems (DPS) be continued, preferably in co-operation with Commission II, with a focus on evaluation, implementation, and testing of available concepts and algorithms for use in DPS,
- The further development of concepts and methods for spatial data modelling and spatial data handling,
- The establishment of a working group within Commission III to study theory and algorithms for SAR, particularly in the area of interferometry and feature extraction.



TECHNICAL COMMISSION IV: MAPPING AND GEOGRAPHIC INFORMATION SYSTEMS

by **Roy Welch**, President 1992-1996,
and **Marguerite Remillard**, Secretary 1992-1996,
Athens GA - USA

1. COMMISSION IV WORKING GROUPS FOR THE PERIOD 1992-1996

The following working groups were active in Commission IV for the period 1992-1996.

- **WG IV/1 - Geographic Information System Data and Applications.**
Chairperson: Dr. E. Lynn Usery, USA,
Co-Chairperson: Dr. Kirsi Artimo, Finland.
- **WG IV/2 - International Mapping from Space.**
Chairperson: Prof. Dr. Gottfried Konecny, Germany
Co-Chairpersonman: Mr. Donald Light, USA.
- **WG IV/3 - Map and Database Revision.**
Chairperson: Mr. Paul R.T. Newby, UK.
- **WG IV/4 - Digital Elevation Models (DEMs) and Digital Orthoimages for Mapping/GIS Applications.**
Chairperson: Dr. Luiz Alberto Vieira Dias, Brazil.
- **WG IV/5 - Extraterrestrial Mapping.**
Chairperson: Dr. Sherman S.C. Wu, USA.
- **WG IV/6 - GIS and Expert Systems for Global Environmental Databases.**
Chairperson: Dr. Ryutaro Tateishi, Japan
Co-Chairperson: Dr. Hiroshi Murakami, Japan.
- **ICWG III/IV Conceptual Aspects of GIS.**
Chairperson: Dr. Martien Molenaar, The Netherlands
Co-Chairpersonman: Dr. Ryoosuke Shibasaki, Japan.

2. ACCOMPLISHMENTS OF COMMISSION IV DURING 1996

The activities of Commission IV in 1996 were centred on preparing for the XVIII ISPRS Congress, held July 9-19 in Vienna, Austria. As noted at the January meeting of the ISPRS Joint Council and Technical Commission Presidents in Bali, Indonesia, Commission IV received the greatest number of abstracts (246) and after some negotiation with Professor Karl Kraus, Congress Director, and Professor Peter Waldhaeusl, Technical Program Director, was

allocated a total of 26 Technical Sessions at the Congress, including 16 oral sessions and 10 poster sessions. A total of 211 papers were selected for oral or poster presentation.

At the Congress, the Commission IV sessions were well-attended. Most oral presentations attracted 150 or more participants and there was standing room only in several of the Commission IV Working Group sessions. The format for poster presentations was favourably received by the authors and by the session chairpersons.

3. STATE OF SCIENCE AND TECHNOLOGY OF COMMISSION TOPICS

The State of Science and Technology for topics related to mapping and geographic information systems (GIS) as presented in Commission IV Technical Sessions at the Vienna Congress can be summarised within three major areas:

1. High-resolution satellite image data;
2. Softcopy photogrammetry for mapping applications, DEM generation and orthophoto production; and
3. GIS techniques as related to mapping applications and the integration of photogrammetry and GIS.

For example, a session, "High Resolution Satellite Imagery for Mapping Applications," that featured ISPRS Honorary Members Dr. Frederick Doyle (USA) and Professor Gottfried Konecny (Germany), and Mr. Lawrence Fritz (USA), the incoming President of ISPRS (1996 - 2000), proved to be extremely popular.

The Highlight Paper by Dr. Doyle entitled, "Thirty Years of Mapping from Space", emphasised the political sensitivities of the United States and the former Soviet Union that impacted the availability of satellite image data for civilian mapping applications. He provided an excellent overview of events since 1957, and discussed the current international space programs and plans for the future.

Professor Konecny, in his presentation, "International Mapping from Space," stated that only one-third of the Earth has been mapped at scales of 1:25,000 or larger and most of the world's maps are more than 20 years old. Although satellite images provide a fast and economical means for producing much needed maps, problems to-date have included vertical accuracy considerations, as well as the detectability of objects. It is anticipated that this situation will change over the next few years as commercial satellites provide stereo image data at 1 m resolution. With adequate B/H ratios and geometric integrity, these data are expected to be adequate for mapping at scales of 1:25,000 and larger.

Details concerning the proposed high resolution satellite image programs were covered by Mr. Lawrence Fritz in his presentation, "Commercial Earth Observation Satellites". He focused on satellites being developed by companies such as Space Imaging, EarthWatch and ORBIMAGE, that will be launched within the next two to three years and provide image data of 4 to 1 m spatial resolution. Mr. Fritz discussed orbital parameters, spatial/spectral resolution and stereo coverage as proposed by the commercial

vendors. He noted that although all of these programs propose rapid delivery of image data to clients, few are disclosing any information on the cost of the data at this time.

The possibilities for using high resolution satellite image data for a variety of mapping/GIS tasks has been enhanced by rapid advancements in softcopy photogrammetry, a topic highlighted in numerous Commission IV technical sessions. Keypoints include increased availability of scanning devices and companies that offer scanning services, and improved capabilities of computers and reductions in cost that have enabled high-performance computing to be carried out in desktop environments. A major topic was the development and utilisation of high-resolution digital orthophotos. Mr. John Thorpe and Mr. Wolfgang Schickler from Analytical Surveys, USA, for example, noted the increasing demand for high-resolution orthoimages of urban areas and a corresponding demand for faster and less expensive orthophoto production methods. To meet these needs, new procedures are being introduced in the softcopy photogrammetric environment that include the use of airborne GPS and techniques for automatic film scanning, orientation, aerotriangulation and DTM capture as a prelude to digital orthophoto generation. Once produced, the orthophotos can be mosaicked into large seamless databases. Powerful computers and extensive mass storage devices are required to handle the computational load and large data volume for producing the high-resolution digital orthophotos (< 25 µm pixel resolution) in large numbers. Commercial companies are realising an increase in the production that justifies the conversion to automated procedures for digital orthophoto generation.

Geographic information systems (GIS) related to mapping applications were the focus of the second Commission IV Highlight Paper presented by Dr. David Maguire, Environmental Systems Research Institute (ESRI), Inc., UK, entitled, "GIS Trends and the Utilisation of Raster Images". In this paper, Dr. Maguire stated that images not only provide useful input to a GIS database, but that a GIS also provides information for interpretation of images. "The traffic is not one way. GIS provides contextual information for images and helps to identify features in space." He described general trends in GIS as:

1. Decreasing costs in hardware;
2. A move from stand-alone to networked databases;
3. A shift from database building to database use;
4. The trend from difficult-to-use systems to easy-to-use GIS.

The net result of these trends has been a tremendous increase in the number of GIS users.

4. COMMISSION NEWS

Many of the ideas discussed in the preceding sections also were highlighted in the August issue (Volume 51) of the ISPRS Journal of Photogrammetry and Remote Sensing which featured invited papers focusing on Commission IV activities. A total of five papers were reviewed, edited and submitted to the Editor of the Journal for inclusion in this special issue of the Journal. The authors and titles of these papers are listed below.

Gottfried Konecny and **Jochen Schiewe**, Institute for Photogrammetry and Engineering Surveys, University of Hannover, Germany, "Mapping from Digital Satellite Image Data with Special Reference to MOMS-02".

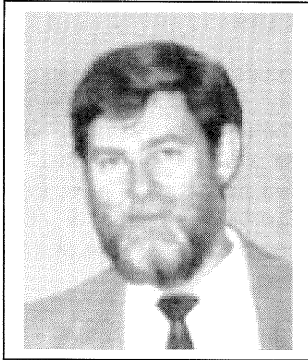
L. Harold Spradley, Survey Resources International, Inc., Houston, Texas, USA, "Costs of Softcopy Orthophoto Bases for GIS Projects".

Paul R. T. Newby, GEO-UK, Ltd., Romsey, United Kingdom, "Digital Images in the Map Revision Process".

Martina Sinning-Meister, Armin Gruen and H. Dan, Institute of Geodesy and Photogrammetry, Swiss Federal Institute of Technology, Zurich, Switzerland, "3-D City Models for CAAD-Supported Analysis and Design of Urban Areas".

Ryutaro Tateishi and **C. H. Ahn**, of the Centre for Environmental Remote Sensing, Chiba University, Japan, and Systems Engineering Research Institute, Korea Institute of Science and Technology, Korea, respectively, "Mapping Evapotranspiration and Water Balance for Global Land Surfaces".

In summary, the closing year of the 1992-1996 term of Commission IV has witnessed a surge of interest in topics such as high resolution satellite images, softcopy photogrammetry and integrated GIS systems for mapping applications. Advancements in computer hardware and software continue to drive the State of Science and Technology toward practical uses of digital image data for monitoring the world's resources and planning sustained global development into the 21st century.



**TECHNICAL COMMISSION V:
CLOSE RANGE TECHNIQUES AND MACHINE VISION**

by **John Fryer**, President 1992-1996,
Newcastle, Australia.

Vienna has long been known as the city at the cross-roads of Europe: the old trade routes went through Vienna and East met West and the cultures of the North and South interchanged. Photogrammetry was at a analogous cross-roads in July 1996 when the emphasis which had persisted for over 150 years of film-based imagery moved strongly towards the new video- or digital-based culture of the 1990s. This trend was evident in all aspects of Commission V's activities, especially so in the areas of real-time, robotics and industrial applications and aspects of medical imaging.

The topic areas covered by Working Groups and other research activities in Commission V include:

- Close-range and micro range measurements,
- Recording and monitoring objects in motion and under deformation,
- Optical and integrated close-range sensor systems,
- Digital systems and time constrained solutions in close-range applications,
- Image analysis and image synthesis algorithms in close-range applications,
- Object related processing techniques in automatic, semiautomatic and manual mode in close-range applications.

A total of six Working Groups undertook research into these topics. The specific titles for the Working Groups and their Chairpersons were:

- **Working Group V/1 - Knowledge Based Vision Metrology.**
Chairpersons : Professor K. W. Wong, USA
and Dr. Sabry El-Hakim, Canada.
- **Working Group V/2 - Close-Range Imaging Systems and Their Performance.**
Chairpersons: Dr. H. A. Beyer, Switzerland
and Mr. V. Uffenkamp, Germany.

- **Working Group V/3 - Structural and Industrial Measurements with Consideration of CAD/CAM Aspects.**
Chairpersons: A. Prof. C. S. Fraser, Australia
and Prof. H. Ruther, South Africa.
- **Working Group V/4 - Photogrammetry in Architecture and Archaeology.**
Chairpersons: Mr. C. L. , Australia
and Dr. A. Georgopoulos, Greece.
- **Working Group V/5 - Biostereometric and Medical Imaging.**
Chairpersons: Dr. T. Leemann, Switzerland
and Dr. H. L. Mitchell, Australia.
- **Inter-Commission Working Group V/III.**
Chairpersons: Dr. E. Baltsavias, Switzerland
and Dr. H. H. Baker, USA.

Before describing some of the significant results and developments which emerged from the Congress in Vienna, an observation on the use of still video (sometimes called digital) cameras is warranted. Users from disciplines and fields of scientific endeavour previously remote from photogrammetry are discovering the efficiency of these devices, but in so doing are often "re-inventing" photogrammetric principles and may not fully understand the strict mathematical error analyses which professional photogrammetrists routinely undertake. The need for photogrammetrists, especially those with an understanding of modern electronic equipment, to publish widely across disciplines has never been more pressing.

In Working Group V/1, some papers discussed the applications of digital photogrammetry to the emerging field of Virtual Reality. Environmental modelling is one such topic of interest in this field and the speakers stressed the need for total equipment calibration if accurate representations of objects are to be made. The integration of several types and sources of sensors to undertake this challenging and worthwhile endeavour is a task which should see photogrammetrists fruitfully employed well into the next century.

In Working Group V/2, new, and old, techniques for camera and system calibration were explored and the accuracies obtainable with digital camera systems applied to industry, in particular the car-manufacturing industry, were assessed. Again the emphasis was on the realisation of results in a short period of time. Algorithms for multi-sensors and the correlation of multi-images were presented along with new techniques for eliminating that most time consuming aspect of using targeted points, namely the manual numbering of those points. "Intelligent" target points which carry their own numbering system with them were mentioned as being developed. The age of automated photogrammetric measurement in industry is dawning!

Working Group V/3 continued this theme of applications for digital imagery with examples from a wide range of industries. The ship-building industry has now accepted the benefits of photogrammetric measurement and other "high-technology" industries gave examples of the

metrology possibilities which photogrammetry presents. The interactions of digital techniques with CAD modelling and reverse engineering were explored for both large scale industrial plants and small scale component parts. Over 30 papers were available for presentation in this Working Group, so the extent, world-wide, of the acceptance of digital photogrammetric methods into industrial metrology processes was demonstrated.

The largest number of papers for any Working Group concerned those in Architectural and Archaeological Representations (Working Group V/4). Over 45 authors had interesting examples to report. These ranged from the reconstruction of old monuments and buildings using conventional silver-halide photographs to the use of CAD modelling, video, surface matching, digital-still cameras and digital orthoimages to methodologies for the maintenance of inventories of historic cultural items. A Special Session devoted to CIPA covered international aspects of the preservation of historic sites and monuments and aimed to arouse greater interest and international co-operation in such activities. Again the involvement of more than one sensor was a feature of some of the more outstanding papers and the integration of multiple sensors into a system was a recurring theme. The extremely high standard of the presentation of the poster sessions in this topic area deserves special mention as it represented an outstanding effort on behalf of the authors.

Working Group V/5 involves the application of close range photogrammetry to Biostereometrics. This Working Group was most active during the period 1992-96 and conducted a large survey into whom in the medical world uses photogrammetry as a diagnostic tool in the day-to-day work-place. Partially because of this activity and the raised awareness of the existence of an ISPRS Working Group which focused attention onto medical applications, the range of papers was quite wide and covered topics such as human motion, facial soft-tissue, orthodontics, eye studies, microscopic studies of cancer cells, spinal deformities and computerised tomography. The emergence of real-time processing and the need to keep the output of the results in a form which will allow a medical practitioner to rapidly assess them were stressed.

Image sequence analysis is one of the main topics researched by members of Inter-Commission Working Group V/III. The number of papers submitted directly to this Working Group were slightly disappointing, but it must be appreciated that several papers which could have logically fallen within this Group's sphere of interests were accepted and presented in other sessions of the Congress. Examples include the autonomous navigation of vehicles on natural terrain, autonomous driving on highways and the development of several mobile mapping systems. Autonomous vehicles and mobile mapping systems usually employ several sensors such as multiple CCD cameras, GPS, INS, odometers, and in some cases barometers, laser scanners etc. Thus, a major issue is the synchronisation and integration of these sensors, and the integration of the data processing.

Studies were presented dealing with techniques which allow the tracking of particles in turbulent and other flow patterns, and applications using moving sensors and stationary objects were discussed. The scale of objects examined ranged from tiny particles to deformations in a spinning centrifuge to faults in hundreds of kilometres of railway lines. These applications clearly demonstrated the efficiency of video capture, fast digital processing and the analysis of "real-world" objects without the placement of artificial targets.

Resolutions Summary

Seven resolutions were presented from members of Commission V to the General Assembly. They should set the pattern for future development work in this Commission and are summarised below:

- **Resolution V.1** - Calibration and Performance of Close-range 3D Image Metrology Systems, recommends that Commission V continue to be focussed on the development of algorithms and methodologies for the monitoring of the calibration and performance of close-range systems which employ digital imaging as the principal component.
- **Resolution V.2** - Image Sequence Analysis, recommends increased investigations on image sequence topics in close co-operation with ISPRS Commissions III, II and I; and that those investigations concentrate on sensors and their integration and calibration, fusion of local 3-D feature and surface representations, integrated processing of multi-sensor data, systems and applications with particular emphasis on time-constrained solutions.
- **Resolution V.3** - Development and Application of Photogrammetric Techniques in Medicine, recommends that Commission V continue to be concerned with techniques and systems for medical applications; and that the appropriate Working Group of ISPRS gives priority to strengthening communication links between photogrammetrists and the community of medical specialists, biomedical scientists and biomedical engineers, by participating in joint projects, publishing in medical journals, and publicising, encouraging attendance at and reporting on appropriate conferences and meetings.
- **Resolution V.4** - Modelling for Visualisation and Virtual Reality, recommends the formation of a Working Group to develop automatic close-range photogrammetric systems to extract models of objects and sites for applications in visualisation and virtual reality.
- **Resolution V.5** - The Contribution of Photogrammetry to the Documentation of World Cultural Heritage, recommends that Commission V actively promote the

use of appropriate photogrammetric recording procedures to governments, organisations, corporations and individuals, in all nations, to expedite the documentation process; and that Commission V continue to represent and promote the activities of the ISPRS to affiliated organisations like ICOMOS, CIPA, IFRAO and others.

- **Resolution V.6** - Integration of Photogrammetric Systems with CAD/CAM, recommends that Commission V be more concerned with the development of methodologies and systems for the further integration of photogrammetric systems with CAD/CAM; and that CAD/CAM modelling concepts be further developed for use in model driven photogrammetric measurement.
- **Resolution V.7** - Encouragement of Users and Potential Users, recommends that Commission V actively seeks greater involvement of existing users, and the identification and encouragement of potential users of close-range photogrammetric techniques.

Conclusions

The Congress in Vienna portrayed the increased emphasis on still- and moving-video technology in the close range environment. Many papers detailed new applications which have been discovered for video-photogrammetry. They are very exciting and represent the leading edge of this developing technology. One question which arose was whether the existing range of photogrammetric journals adequately covered these new developments? The timely launch by ISPRS of a new information service may satisfy this need.

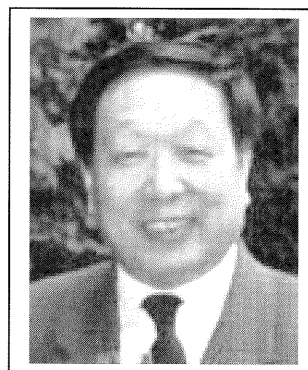
Another area where considerable new development has taken place concerns the use of e-mail and the World Wide Web (WWW) Internet service. A WWW Home Page was established for Commission V during this term of office, and another for the Australian Rock Art Research Association has recently been established. Rock art, and its recognition as a major cultural heritage, is an important emerging trend for CIPA and this Working Group. The Rock Art Home Page may be inspected at:

<http://sunspot.sli.unimelb.edu.au/aura/Welcome.html>

The CIPA Home Page is also worthy of inspection and can be found at:

<http://cipa.uibk.ac.at>

At the General Assembly meeting in Vienna, the future custodianship of Commission V was presented to the Japanese Society for Photogrammetry and Remote Sensing for the next four years until the next Congress in Amsterdam in 2000. I wish them well.



TECHNICAL COMMISSION VI: ECONOMICS, PROFESSIONAL MATTERS AND EDUCATION

by **Deren Li**, President 1992-1996,
Wuhan – China.

The possession and level of qualified professional personnel is of vital importance to the development of disciplines using high technology, such as Photogrammetry, Remote Sensing and GIS. Therefore, Technical Commission VI of ISPRS is legitimately a commission of special significance.

However, it is also a commission of considerable difficulty in terms of organisation of activities and management. This is because education requires professional insight and substantial investment, and there exhibits a great difference with respect to economics and professional matters in different countries.

It is in this context that Commission VI, during the 1992-1996 period, has covered the following topic areas:

1. Collection, analysis and comparison of educational and training programs and changes in photogrammetry, remote sensing and GIS/LIS.
2. Investigation of cost and efficiency models in photogrammetric and remote sensing operations.
3. Investigation of operational management aspects for remote sensing and GIS technology.
4. Collection and synthesis of reports on national and regional activities.
5. Promotion and dissemination of information.
6. Promotion of computer assisted teaching.
7. Identification of the proper channels for international technical co-operation.
8. Completion of the history of photogrammetry.
9. Promotion of the inclusion of other languages in the ISPRS Multilingual Dictionary.
10. Development of recommendations for standards of competence in photogrammetric and remote sensing practice.

All the activities in the above fields have been conducted and organised by our working groups under their respective chair or co-chairs, though the achievements vary according to different circumstances, namely,

- **WG VI/1 - Education, Training and Educational Standards for Photogrammetry, Remote Sensing and GIS/LIS**
Chairperson: Jozef J. Jachimski, Poland.
- **WG VI/2 - Computer Assisted Teaching**
Chairperson: Kohei Cho, Japan.
- **WG VI/3 - Terminology and ISPRS Multilingual Dictionary**
Chairperson: Gerhard Lindig, Germany.
- **WG VI/4 - International Co-operation and technology Transfer**
Chairperson: Stanley A. Morain, USA.
- **WG VI/5 - Tutorials**
Chairperson: Th. Bouloucos, The Netherlands.
- **WG VI/6 - Economics and Business Management**
Chairperson: Gerard Begni, France.
- **Special Project - History**
Chairperson: Deren Li, China.

For the ISPRS 18th Congress in Vienna, Commission VI received 52 technical papers and twenty five Member (National) Reports, which have partly reflected the development of the economics, professional matters and education in photogrammetry, remote sensing and GIS in different countries. The presentations and discussions around these topics at the Congress will surely promote further advancement in the subject.

Faced with rapid changes and unprecedented challenges, our discipline needs reorganisation, reorientation and even renaming, which called for more and deeper thinking and reviews of the functions of Commission VI and ISPRS at large during the Vienna Congress.

During the Vienna Congress, Commission VI WG VI/2 held four Oral Sessions and one Poster Session. Each of the presentations (with discussion) was interesting and important. Particularly worth mentioning was the first time to hold "Computer Assisted Teaching (CAT) Software CONtest-CATCON". The Competition activity began at 8:45 am and ended at 5:00 pm on July 12th. There were 11 CAT Softwares joining the contest. More than 100 persons took part in the activity. The chairman of WG VI/2 Prof. Kohei Cho organised the CATCON. Shunji Murai gave the opening address. The jury came from the ISPRS Council and from Commission VI. 6000 Swiss Fr. from PASCO International and four embroidery CAT gifts from China were awarded to winners. The contest results: Golden Award (2500 Swiss Fr.) to Dr. Joachim Hoehle (Denmark) for LDIP/ORTO Software, Silver Award (2000 Swiss Fr.) to Dr. Nguyen Dinh Duong (Vietnam) for Win ASEAN, Bronze Award (1500 Swiss Fr.) to Dr. Gong Jianya (China) for GeoStar Education Version, Bronze Award (without money) also to RADARSAT International (Canada).

During the Congress three Board Meetings of Commission VI were held mainly to discuss the future of Commission VI. In the discussion Council proposed a resolution to form a new Task Force on "Education Opportunities" on the development perspective. They proposed to rename Commission VI to "Education and Communications". Commission VI proposed to General Assembly four related resolutions which at last were adopted:

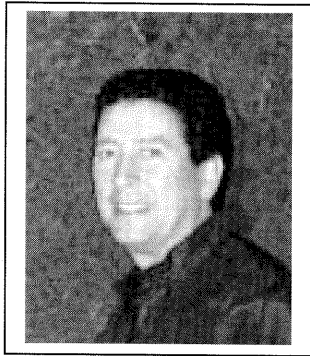
VI.1 Member Reports

VI.2 Computer Assisted Teaching

VI.3 Spatial Data Sharing

VI.4 Internet Opportunities

These resolutions reflect that ISPRS is moving forward with the development of Digital Photogrammetry, Remote Sensing and GIS education, training, profession and international co-operation.



**COMMISSION VII:
RESOURCE AND ENVIRONMENTAL MONITORING**

by **Roberto Pereira da Cunha**, President 1992-1996
and **Monica Oliveira**, Secretary 1992-1996,
Sao José dos Campos, Brazil.

**Commission VII worked with 10 Working Groups,
named:**

- Physical Measurements and Signatures in Remote Sensing,
- Resource and Environmental Monitoring Using Radar Data,
- Renewable Resources,
- Non-Renewable Resources,
- Terrestrial Ecosystem Monitoring,
- Land Degradation and Desertification,
- Hazardous Waste and Environmental Pollution,
- Snow,
- Ice Ocean and Coastal Zone Monitoring,
- Human Settlement and Global Monitoring.

The Working Group VII/1, chaired by Dr. Gerard Guyot (INRA, France), prepared two very successful symposia. The 6th International Symposium on Physical Measurements and Signatures in Remote Sensing and International Colloquium on Photosynthesis and Remote Sensing. The 7th International Symposium on Physical Measurements and Signatures in Remote Sensing has been jointly organised by Working Group VII/1 and Working Group VII/5 and will be held in April 97.

The most significant results and developments described at the Commission sessions during the XVIII ISPRS Congress can be better described as follows:

1. NEURAL NETWORK/ FUZZY CLASSIFICATIONS

This technical session was important from the point-of-view of neural networks for integrated land use/land cover studies. Different descriptors (spectral, textural and contextual information) were used to train the networks. The classification algorithms were formed by forward and back propagation methods and non-supervised processes called "adaptive resonance theory". In order to process TM-Landsat and HRV-SPOT images or digital orthophotos, these neural network-fuzzy classification procedures have

shown good performance for the identification of several land use classes, such as, forest, urban areas, crops, pasture, among others. The other integration of neural networks with GIS techniques can give support for the study of land use dynamics and spatio-temporal landscape modelling.

2. RENEWABLE RESOURCES

Emphasis was placed on the use of GIS for cadastral mapping, the importance of decentralising GIS, remotely sensed data collection and applications, and the results of tests being carried out on the delineation accuracy of photo interpreters in forestry.

**3. RESOURCE AND ENVIRONMENTAL MONITORING
USING RADAR DATA**

A paper was presented on the experimental study on the monitoring land cover conditions in the paddy fields in Thailand using multi-temporal JERS-1 SAR Data. The paper: wetland monitoring using SAR imagery and interferometry, presented the results of initial tests in the use of ERS-1 C-band SAR imagery, and phase coherence for monitoring flooded extents of the inner delta of the river Niger in Mali.

4. THE APPLICABILITY OF ALMAZ DATA

For imaging the urban areas, makes this type of radar sensor a useful tool for the area planning, of which precision tests could, through statistical techniques, be estimated with less than 5% error in comparison to information obtained from aerial photos.

**5. SPECTRAL AND RADIOMETRIC STUDIES AND
MEASUREMENTS**

The papers represented a range of topics from correction of topographic effect to radar image decomposition. However, a number of new approaches were introduced. These included the use of reference surfaces to correct for topographic effects, an approach to thermal imaging of soil that accounted for solar direction on the recorded field measurements, decomposition of radar backscatter into different mechanisms for the analysis of urban areas, and a new HIS transformation. Other papers used well known approaches for new application, such as the estimation of impervious surfaces in urban areas using NDVI.

The study of urban areas with radar data shows the advance in the analyses of "backscatter" in distinct polarisation's (HH, HV, VV), in a way to stratify (delineate) the construction areas (infrastructure), water and forest zones.

6. HAZARDOUS WASTE AND ENVIRONMENTAL POLLUTION

Several international papers dealt with different techniques for characterising and monitoring hazardous waste-sites. Satellite images were used for small scale monitoring and airborne and ground spectrometric techniques were used to assess local sites at scales of 1:5000 - 1:20,000.

7. TERRESTRIAL ECOSYSTEM

The papers focused on development of an automated techniques for identification and mapping of agricultural vegetation, estimation of agricultural productivity, use of NOAA/NDVI and climatic data.

8. COMPARISON OF RADAR SYSTEMS

A very interesting paper presented two important aspects. One was the multi-anniversary radar imagery composite. The other aspect was a comparison between ERS-1 data versus JERS-1. The author concluded that the Japanese satellite data is more appropriate for forest classification than the ERS-1.

9. DESERTIFICATION AND LAND DEGRADATION

Fusion of sensor data and integration of climatic information and the human activities have been the approach for modelling these processes of desertification and degradation, including the discrimination in different levels of environment problems.

10. REMOTE SENSING OF HUMAN SETTLEMENTS

The papers were of an excellent standard covering the problems of disaggregating mixed urban pixels for change detection over the city of Vienna, the important study of deriving socio-economic information from remotely sensed data combined with auxiliary data, and finally the new area of study relating to using radar data for settlement detection. A wide range of papers were related to the impact of human development on the landscape or physical disasters caused by human development.

CONCLUSIONS

The Congress recommended:

- That radar, other remote sensing aspects and Lidar technology receive increased emphasis in the study of physical measurements and signatures.
- The establishment of an information network for SAR characteristics and methodology for data analysis (e.g. update version of WWW home page).
- The selection of case studies of applications of data from the current microwave remote sensing satellites.
- The establishment of remote sensing studies for agricultural statistics and crop forecast.
- That a modelling of terrestrial ecosystems be established to evaluate the integration of remote sensing, object database technology, generic networking systems, visualisation and computational systems.
- That ISPRS seeks affiliation with an organisation which specialises in global change research.

RESOLUTIONS OF THE XVIIIITH CONGRESS OF ISPRS IN VIENNA 1996

The Resolutions Committee had the following members:

Kennert Torlegård, Sweden, 1st Vice President, chairman

Isabelle Veillet, France

Hans-Peter Bähr, Germany

Keith Atkinson, UK

The Resolutions Committee received 51 draft resolutions from Council, Technical Commissions and Delegates. Some of the proposed resolutions have been merged together, and some have not been submitted to the General Assembly as their recommendations are already contained in the Statutes and/or Bylaws, which is even stronger than a resolution to express directives.

Resolution G.1 Appreciation

THE CONGRESS

noting

- the importance of the Congress for professionals in photogrammetry, remote sensing and spatial information technology from academe, industry and government

recognising

- the careful preparation and successful realisation of the Congress

commends

- the Austrian Society for Surveying and Geoinformation, its president Mr. August Hochwartner, and Congress Director Karl Kraus, Technical Programme Director Peter Waldhäusl and the Congress Committee for excellent work which has resulted in a very successful Congress.

Resolution G.2 Information and Communication

THE CONGRESS

noting

- the rapid development in electronic communication and digital data transfer
- the appreciation of the ISPRS Annual Report by Members and international organisations

recognising

- the great importance of information exchange and communication between Members, Council and Commissions of the Society, and between our Society and other international bodies

recommends

- Council to develop and establish task forces or staff functions to support Council in relations with other international organisations, and in publishing a Society newsletter in both printed and electronic form.

Resolution G.3 Educational Opportunities

THE CONGRESS

noting

- that emerging technologies in photogrammetry, remote sensing and spatial information systems offer opportunities for development of new methods, services and products

recognising

- the need for continued education and training

recommends

- that a task force is set up for facilitation and promotion of grants, fellowships, scholarships, tutorials, workshops and similar educational opportunities.

Resolution G.4 Congress Schedules

THE CONGRESS

noting

- that the applications-oriented Commissions such as Commission IV draw on the work of Technical Commissions I, II and III;

recognising

- that this results in overlaps in technical interests and administrative difficulties in scheduling Congress sessions;

recommends

- that the Council addresses these problems once again and takes such steps as may be necessary to alleviate future difficulties. It is also recommended that Council and Technical Commission Presidents intensify their efforts to promote co-operation between Commissions and attempt to minimise conflicts in Congress schedules.

Resolution I.1 Science and Technology

THE CONGRESS

noting

- that science and technology should grow together, merging theoretical arguments and practical aspects

recognising

- that the linkage between primary data acquisition and data evaluation has positively emphasised important topics in mathematics, statistics and computer science;

recommends

- that industrial products and agency or engineering experiences should be taken into account, with particular care, so as to transfer mature technologies from research studies to application fields.

Resolution I.2 Image Quality Assessment

THE CONGRESS

noting

- that although digital imaging increases in importance, aerial images are still acquired via photographic technology;
- that aerial photographic lenses, cameras and films are still being developed to higher quality standards;

- that procedures for calibrating photogrammetric cameras and for optical tests are still incomplete and difficult to compare;
- that specifications for aerial photography differ internationally in spite of an increasing internationality in performing aerial photography;
- that developments in aerial photographic technology put new demands on specifications;

recognising

- that from 1992 to 1996 research activities have been concentrated upon investigations in and reviews of image quality measures and image quality influences of image scanning;
- that a test field for aerial image quality has been established in Finland;
- that automated systems for measurement and calculation of MTF of photographic images have been established, thus reducing the need for subjective judgement;

recommends

- that research work on methods for assessment of imaging as well as image quality continues, for photographic as well as for digital or digitised images;
- that efforts continue to revise or establish recommended procedures for routine calibration and testing of photographic lenses, cameras, films and detectors, based upon existing international standards;
- that efforts continue to establish internationally accepted specifications for aerial photography, based upon international quality management standards.

Resolution I.3 Standards

THE CONGRESS

noting

- that the development of the Recommended Procedures for Calibrating Aerial Cameras and for Related Optical Tests was a major activity of Commission I prior to the establishment of international optical standardisation;
- that these procedures have been referred to by several national standardisation bodies;
- that the international aerial film speed standard is under review;

recognising

- that participation in international standardisation is possible only after establishment of formal ties;

recommends

- that ISPRS becomes more actively involved in ISO activities of interest;
- that ISPRS determines the value of international quality management and quality control for the photogrammetric and remote sensing community;
- that ISPRS seeks affiliate status in CEOS and actively participates in subgroups of interest;
- that ISPRS explores the possibility of affiliation to CIE in regard to colour standardisation.

Resolution I.4 Navigation and Sensor Integration

THE CONGRESS

noting

- that spaceborne, aerial and terrestrial imaging sensor systems are developing into necessary tools for the mapping of the environment;
- that new sensor types have entered the mapping arena;
- that guidance, navigation and positioning techniques should be further developed;

recognising

- that the use of such systems not only facilitates survey planning and execution but is also an integral part of the subsequent data processing;

recommends

- that work is continued on the topic of platform guidance, navigation and sensor integration;
- that subjects on hardware properties and integration of hardware are emphasised;
- that close relations with sensor manufacturers, as well as with appropriate international organisations and related WGs are established.

Resolution I.5 Digital Imaging Sensors

THE CONGRESS

noting

- that 3-line CCD cameras achieve stereoscopic capabilities by the combination of a nadir sensor with forward and backward looking sensors and thus avoid long re-visiting times, that they can be considered state-of-the-art in the development of new satellite imaging systems and that they have also been installed in aircraft for verification test purposes;
- that area solid state sensors for aerial and space applications are still rare, but that they are of increasing interest to practitioners and researchers;

recognising

- that imagery directly acquired by solid state sensors shows certain advantages over scanned aerial images;
- that CCD sensors and cameras with resolutions of up to 3000 x 2000 pixels are already available, and - that sensors with resolutions of 5120 x 5120 pixels and 9000 x 7000 pixels are under development by major firms and have been tested in laboratories;

recommends

- that further development of 3-line CCD scanners for stereoscopic in-strip imagery for airborne and space-borne applications is encouraged;
- that the development of very large format solid state sensors should be closely observed and encouraged;
- that large format solid state sensors already available today should be thoroughly tested with a respect to their applicability for aerial applications and their accuracy potential.

Resolution I.6 Microwave Sensors

THE CONGRESS

noting

- that active microwave and SAR interferometry technologies are now mature and ready for transfer to extensive applications;

recognising

- the complementarity of optical and active microwave remote sensing technologies;

recommends

- that optical and microwave communities work together to take advantage of the combination of the two technologies;
- that the accuracy of SAR interferometry is studied further;
- that the combination of SAR interferometry data with other elevation data should be investigated.

Resolution I.7 Hardcopy Scanning

THE CONGRESS

noting

- that photogrammetric scanners are used increasingly to enable digital photogrammetry;
- that quality standards for photoscanners are still absent;
- that new types of multimedia are becoming part of GIS technology;
- that further sensor types are under development;

recognising

- that the data quality produced by photogrammetric scanners need to be investigated in both a geometric and a radiometric sense;
- that ISPRS WG I/5 1992-96 together with OEEPE designed and distributed test material, a questionnaire and test procedures;
- that the joint ISPRS-OEEPE photoscanner test is still in progress;
- that further sensor types need to be investigated;

recommends

- that the photoscanner quality test, with an OEEPE working group, is completed;
- that the test material prepared in the working group is made available widely;
- that evaluation of photoscanners continues and that a standard test procedure is designed which addresses the needs of photogrammetry;
- that further investigations be carried out which concern integrated data acquisition for multimedia GIS.
- that this research effort should include a new ISPRS working group with similar interests.

Resolution I.8 Pre-processing, Archiving and Distribution of Image Data

THE CONGRESS

noting

- that the quantity and quality of remote sensing satellite data received and archived is increasing greatly;

- that these data form one of the potentially most important sources for production and revision of geographic information;
- that archiving, processing and distribution systems are not yet adapted to all user needs;

recognising

- the need of the user community to have satellite data products adapted to their needs to produce and revise geographic information;
- the need of the user community to locate, order and obtain the data more easily;

recommends

- continuation of the work on user requirements for processing and distribution of satellite data for remote sensing and mapping applications.

Resolution II.1 Real Time Mapping Technologies

THE CONGRESS

noting

- the recent developments in real time mobile mapping technology and their future impact on photogrammetric 3D GIS data acquisition; and

recognising

- the importance of the design and development of integrated real time mapping systems, system aspects related to sensor information processing and analysis in autonomous vehicle navigation systems;
- the need to investigate the role of stereovision and cinematic GPS technologies in integrated real time mapping systems;
- the need for continued exchange of information between specialists involved in the research and implementation within this field;

recommends

- that activities be continued with increased focus on the evaluation of recent developments in real-time mapping technologies, implementation issues, developing standards for the operation and accuracy evaluation of these systems;
- that a test be conducted of commercially available systems and prototype mobile mapping technologies under development.

Resolution II.2 Hardware and Software Aspects of GIS

THE CONGRESS

noting

- that advances in computer hardware and software are leading to the development of integrated geo-information systems;
- that the developments of interoperability and open GIS standards and the advances in network technologies (e.g. Internet) are leading to distributed GIS applications;
- that a new suite of high resolution remote imaging sensors is being developed and will require new techniques for the efficient integration with GIS;
- that research activities in environmental monitoring and management are stressing the importance for the combination of remote sensing image analysis with numerical modelling, 3D and time aspects in integrated GIS;

recognising

- the need for research in the area of integrated GIS with special reference to accuracy assessments procedures, exchange, data models and data structures, analytical operators, comprehensive test procedures, benchmarks, and standards;

recommends

- that the activities on this topic be continued with the revised scope of software and modelling aspects for integrated GIS to adequately address changes in technology and research;
- that efforts be made to monitor developments in standardisation and interoperability to determine appropriate procedures for data modelling and exchange, spatial database management, quality assessments, spatial operator taxonomy, and intelligent interface design in integrated GIS;
- that advances in GIS software, remote sensor development and spatial decision support systems be monitored and analysed;
- that new benchmark procedures for the whole range of integrated GIS functionality be developed;
- that close co-operation with earth, computer and social scientists be encouraged to address topics such as integration of 3D and time aspects and modelling in GIS.

Resolution II.3 Technologies for Large Volumes of Spatial Data

THE CONGRESS

noting

- the continuing increase in the number and diversity of satellite remote sensing missions; and the widespread use of data from these missions in the science and applications;
- that many organisations have created large volumes of spatial data through automation of the mapping process, and conversion of analogue data into digital form, and the importance of digital data exchange and data distribution;

realising

- that the diversity of databases, DBMSs, GISs, national or industry standard formats currently being used for the transmission, transfer, and archiving of these data;
- that many organisations are actively implementing policies for digital data distribution;

recognising

- that the lack of standardisation of data formats and format description methods has impeded the use of these databases;
- that many national organisations and countries are developing National Spatial Data Infrastructures (NSDI) and Data Clearing-houses /Warehouses for data distribution;

recommends

- that activities should continue to maintain close liaison with, and encourage the activities of, other national and international standards organisations, the co-ordination of the development of data exchange standards, metadata, and

cataloguing standards, as well as collaboration between national space agencies;

- that research activities emphasise the development of spatial data browsers, distributed information systems for data interoperability; and technologies for spatial data warehouses, particularly developments making use of WWW.

Resolution II.4 Systems for the Processing of Radar Data

THE CONGRESS

noting

- the continued increase of technical, methodological and application activities in the field of radar data processing and analysis;

recognising

- that many photogrammetrists and mapping practitioners have limited knowledge of SAR data processing and there is a need for continual exchange of information between specialists working in this field;

recommends

- an increased focus on the development of algorithms for integration of SAR data with other data, providing information on SAR to make it more accessible to users, and promotion of user friendly SAR systems and software.

Resolution II.5 Integrated Geo-information Production Systems

THE CONGRESS

noting

- the increasing use of data from a wide range of sensors to solve particular applications and the design of special purpose systems to handle such applications;

recognising

- the need to facilitate the design of such systems through the use of common hardware, software and data exchange and distribution mechanisms;
- the need for continued exchange of information between specialists and between practitioners and manufacturers in this field;

recommends

- that the current activities on integrated geo-information production systems extend its range of activities to include the design and testing of processing systems to integrate satellite and airborne data for solving application problems in the area of environmental monitoring and management.

Resolution II.6 Digital Photogrammetric Systems

THE CONGRESS

noting

- an increased activity in the development of concepts and algorithms for automation in digital photogrammetry;
- the availability of software to automatically and semi-automatically derive photogrammetric products using digital photogrammetric systems (DPS), as successfully documented by IC WG II/III 1992-96;

- the increasing importance of including machine vision technologies in photogrammetric systems;
- recognising*
- that digital photogrammetric systems (DPS) are replacing analogue and analytical systems at an unprecedented rate;
 - that in order to ensure maximum efficiency in implementation, good collaboration between user and manufacturer is necessary in areas such as functionality and data transfer;
 - that there is need to further investigate visualisation and multimedia techniques and the human-machine interface in DPS design;
 - the need for further development of concepts and algorithms, and for an implementation of the resulting software in DPS in order to increase the rate of automation, especially in aerial triangulation and in object extraction;
 - the need for research and development in the integration of photogrammetry and computer vision with spatial databases;

recommends

- that activities relating to digital photogrammetric systems continue with increasing emphasis on automation and efficiency, including evaluation, implementation, and testing of available concepts and algorithms for use in DPS;
- that a forum be established to encourage discussion between users and manufacturers on user problems and implementation issues;
- that efforts continue to integrate photogrammetry and machine vision;
- that collaboration takes place whenever possible between other commissions and with other regional and international organisations.

Resolution III.1 Integrated Sensor Calibration and Orientation

THE CONGRESS

noting

- the current use of and trend toward multisensor platform systems such as laser, multi-spectral/panchromatic frame and pushbroom sensors, and SAR;
- the availability of powerful and complementary technologies for sensor orientation (GPS, INS and image processing)

recognising

- the need of single and total sensor system calibration to take full advantage of the potential of multi-sensor systems;
- the need for further development of global concepts for automatic sensor orientation with GPS, INS and image processing techniques

recommends

- that related activities continue during the period 1996-2000, in co-operation with Commission I and the sister IUSM organisations, with emphasis on multi-sensor system calibration, integration of GPS, INS and image processing techniques, and automatic integrated orientation concepts

Resolution III.2 Theory and Concepts of Object Recognition and Image Understanding

THE CONGRESS

noting

- the importance of theoretical/conceptual investigations in object recognition and image understanding; and

recognising

- that despite major efforts and good progress achieved from 1992 to 1996 there remain considerable gaps in the theory of automation of feature extraction and recognition;

recommends

- intensified investigations in object recognition and image understanding, particularly in the areas of modelling and knowledge engineering, in close co-operation with researchers in computer vision, artificial intelligence, linguistics and cognitive science.

Resolution III.3 Algorithms and Tools

THE CONGRESS

noting

- increased activity in the development and application of new algorithms and software tools in digital photogrammetry and remote sensing

recognising

- the importance of co-ordinating the development of algorithms with theoretical/conceptual investigations, and the need for developing suitable test procedures, quality control and performance specifications;

recommends

- that these activities be continued and intensified during the period 1996-2000, with an emphasis on performance characterisation of algorithms, quality control, test procedures, and suitable documentation in close co-operation with the computer vision community.

Resolution III.4 Conceptual Aspects of GIS

THE CONGRESS

noting

- progress in the use of geo-information for spatial inventories and spatial analysis

recognising

- the increasing complexity of these applications,

recommends

- further development of concepts and theory for spatial data modelling and spatial data handling.

Resolution III.5 Theory and Algorithms for SAR

THE CONGRESS

noting

- the increasing importance of synthetic aperture radar for mapping and surface generation;
- the number of new sensor systems becoming available;

recognising

- the need for a rigorous theoretical basis for using SAR for 3D information extraction; and
- the need for developing and improving algorithms for processing SAR data;

recommends

- theory and algorithms for SAR to be studied and developed, particularly in the area of interferometry and feature extraction.

Resolution IV.1 GIS Data and Applications

THE CONGRESS

noting

- the tremendous growth in GIS applications; and

recognising

- the need to provide focal points for diverse GIS applications;

recommends

- that working groups be formed to address topographic, thematic and urban applications of GIS.

Resolution IV.2 International Mapping from Space

THE CONGRESS

noting

- the escalation in international remote sensing satellite programmes; and

recognising

- the need to stay abreast of these activities;

recommends

- that increased attention be given to new satellite programmes and sensors being developed to address global issues;
- that the suitability of high resolution, hyper-spectral and radar data for topographic and thematic mapping, and GIS applications, should be investigated.

Resolution IV.3 Map and Database Revision

THE CONGRESS

noting

- that geographic databases in digital format are being compiled world-wide by national mapping and resource agencies;

recognising

- that these databases must be kept current;

recommends

- that both the management and technical challenges related to the maintenance and revision of these databases should be addressed.

Resolution IV.4 Digital Terrain Models and Digital Oath-images

THE CONGRESS

notes

- that accurate digital terrain models (DTMs) are required for a range of GIS applications and mapping tasks;

recognising

- that digital photogrammetric methods are being developed to produce DTMs from scanned aerial photographs, electro-optical satellite images and, more recently, synthetic aperture radar (SAR) images;

recommends

- that continued attention be given to data structures and DTM formats and to the

utilisation of DTMs for ortho image production, terrain visualisation, mapping and GIS applications at local, regional and global scales.

Resolution IV.5 Extraterrestrial Mapping

THE CONGRESS

noting

- the on-going efforts to map the topography of Mars, Venus, the Moon and other planetary bodies;

recognising

- the need to update existing maps, to construct new maps and to define techniques for mapping the planets from optical, electro-optical and electronic data records;

recommends

- a continued effort to stimulate revision of existing maps and to assist in the establishment of datums, ground control nets and the development of improved mapping techniques, with particular emphasis on the use of stereoscopic radar images.

Resolution IV.6 GIS and Expert Systems for Global Environmental Databases

THE CONGRESS

noting

- the interest in/and desire for global databases of improved quality to support mapping, monitoring and modelling of natural resources;

recognising

- that satellite remote sensing and GIS modelling will be a necessary and integral part of such activities;

recommends

- that attention be given to (1) compiling reference information on the availability and quality of global databases; (2) establishing metadata; (3) developing mapping and modelling techniques appropriate for environmental applications; and (4) stimulating co-operation between international and national organisations with vested interests in resource management and inventory.

Resolution V.1 Development and Calibration of Close-range 3D Image Metrology Systems

THE CONGRESS

noting

- that innovative technologies for digital imaging systems are being developed at a rapid rate;
- that such systems are increasingly being employed for a wide variety of measurement tasks for research and industry;

recognising

- that new technologies will inevitably produce improved levels of accuracy and performance;

recommends

- that emphasis be maintained on the development and calibration of close-range systems which employ digital imaging as the principal component.

Resolution V.2 Image Sequence Analysis

THE CONGRESS

noting

- the increasing importance of temporal analysis, and of time-constrained solutions and dynamic scene analysis, especially in close-range photogrammetry and machine vision;
- the rapid technological developments, especially in imaging and navigation sensors;
- the variety of systems and applications in robotics, industrial inspection, medicine, autonomous navigation, mobile mapping systems and visualisation of time-varying data;

recognising

- the necessity to bring various scientific activities under a common framework within the ISPRS, which would otherwise be fragmented;
- the need for in depth investigations of this topic by ISPRS as well as the necessity to combine the photogrammetric expertise with techniques from other disciplines, especially computer vision;

recommends

- increased investigations of these topics;
- that the investigations concentrate on sensors and their integration, on fusion of local 3-D feature and surface representations, on integrated processing of multi-sensor data, and on systems and applications with particular emphasis on time-constrained solutions.

Resolution V.3 Development and Application of Photogrammetric Techniques in Medicine

THE CONGRESS

noting

- the successful implementation of digital image based measurement for a range of medical purposes;

recognising

- the growing involvement of photogrammetrists in these developments;

recommends

- that interest in techniques and systems for medical applications should be continued;
- that the appropriate Working Group of ISPRS should give priority to strengthening communication links between photogrammetrists and the community of medical specialists, bio-medical scientists and engineers, by participating in joint projects, publishing in medical journals, and publicising, encouraging attendance at and reporting on appropriate conferences and meetings.

Resolution V.4 Modelling for Visualisation and Virtual Reality

THE CONGRESS

noting

- the growing demand for real-world object and site modelling for visualisation and virtual reality

recognising

- the potential of close-range photogrammetry to provide such models

recommends

- development of activities of automatic close-range photogrammetric systems to extract models of objects and sites for applications in visualisation and virtual reality.

Resolution V.5 The Contribution of Photogrammetry to the Documentation of World Cultural Heritage

THE CONGRESS *noting*

- that advances in imaging technology, photogrammetric procedures and information technology made over the last decade facilitate the use of these systems by researchers in a variety of sciences and humanities;
- that world cultural heritage is under threat of damage or destruction from environmental causes and human activities

recognising

- that the increased use of low-cost, digital photogrammetric recording procedures and other spatial information technology will accelerate the documentation of cultural monuments and sites

recommends

- the use of digital photogrammetric recording procedures to governments, organisations, corporations and individuals, in all nations, to expedite the documentation process;
- that Commission V continues to represent and vigorously promote the activities of ISPRS to organisations like ICOMOS, CIPA, IFRAO and others.

Resolution V.6 Integration of Photogrammetric Systems with CAD/CAM

THE CONGRESS

noting

- that numerous computer aided design and manufacturing (CAD/CAM) systems with a high degree of sophistication are in use in various disciplines

recognising

- that such CAD/CAM systems can contribute to the enhancement of existing photogrammetric systems;
- that photogrammetric processing is increasingly being carried out in a CAD/CAM environment

recommends

- that there should be more concern with the development of methodologies and systems for the further integration of photogrammetric systems with CAD/CAM;
- that CAD/CAM modelling concepts be further developed for use in model driven photogrammetric measurement.

Resolution V.7 Encouragement of Users and Potential Users

THE CONGRESS

noting

- that insufficient use is being made of photogrammetric techniques in a wide range of industrial and scientific applications

recognising

- the great potential of applying close range photogrammetric techniques in many situations
- *recommends*
- that greater involvement by existing users should be stimulated, and potential users of close-range photogrammetric techniques should be identified and encouraged.

VI.1 Member Reports

THE CONGRESS

noting

- that production of a significant, up to date world-wide valid image of the profession is difficult to base on the Member Reports in their present descriptive form, because the content is freely composed by the authors;
- that this record and image could be better provided by the ISPRS Member Reports in such a way that information is ready for computerised thematic synthesis and analysis that should enable world-wide comparison of the scope of applications and methods used, of the vigour, level and scope of education and training, as well as of research and development, and of the fields of co-operation;

recognising

- that not all information in the present Member Reports is of the same significance and quality and that therefore it would be important to select a set of the most important data which could form the minimum contents of a Member Report;
- that the future Member Report could be based on a questionnaire, well prepared for automatic data processing, together with a descriptive part for complementary information;

recommends

- continued research towards optimisation of the form and content of Member Reports;
- that some information is included in the ISPRS Home Page, while the full content should be shown in the Member's Home Page;
- that Member Reports could form the basic source for a report about the world-wide state of our profession.

VI.2 Computer Assisted Teaching

THE CONGRESS

noting

- the technological advancement of computers and the importance of good PC software and datasets for education,

recognising

- that good and low cost/free software and datasets are not sufficiently developed or disseminated to teachers and students

recommends

- that efforts to collect, develop and disseminate software and datasets for education should continue. The CATCON software contest should be used in order to continue to encourage development and dissemination of good software.

VI.3 Spatial Data Sharing

THE CONGRESS

noting

- that large volumes of spatial data from space-borne, air-borne and terrestrial sources are stored, accessed and manipulated in different forms on a variety of hardware and software; that these datasets should be distributed over multiple sites to different countries and organisations around the world;

recognising

- the need for spatial data sharing policy

recommends

- that increased emphasis should be placed on spatial data sharing through contacts with other relevant bodies such as ISO Geomatics and Geo-Information section.

VI.4 Internet Opportunities

THE CONGRESS

noting

- that world wide access to electronic communication is increasing at a rapid pace and that technology is being transferred by colleagues working in a virtual office;
- that education of the next generation of spectral and spatial analysts can also be improved through information sharing via electronic communication;

recognising

- that line charges can prohibit users from surfing the net for very long periods to retrieve desired information;

recommends

- efforts to investigate internet resources in photogrammetry, remote sensing, and spatial information systems.

VII.1 Physical Measurements and Signatures Using Remote Sensing

THE CONGRESS

noting

- the growing interest of users in microwave remote sensing
- considering
- the importance of physical aspects in remote sensing

recommends

- that radar and other remote sensing aspects and lidar technology receive increased emphasis.

VII.2 Resource and Environmental Monitoring Using SAR Data.

THE CONGRESS

noting

- the need to clarify the potential use of SAR data for users in various application fields

recommends

- the establishment of an information network for SAR characteristics, methodology for data analysis, and so on (e.g. update version of WWW home page);

- the selection of case studies of applications of data from the current microwave remote sensing satellites.

VII.3 Renewable Resources

THE CONGRESS

noting

- an increased need for information on crop production,

recognising

- the widespread importance of remote sensing for agriculture,

recommends

- the establishment of remote sensing studies for agricultural statistics and crop forecast.

VII.4 Terrestrial Ecosystem Monitoring

The Congress

noting

- that advanced ecosystem models are moving toward self adaptive complex systems involving both object and relational databases,

recognising

- which specialises in global change research.

- that high resolution spectral data from aerial and satellite sensors must be integrated with data from biological genetic and landscape ecological experiments,

recommends

- that a modelling of terrestrial ecosystems be established to evaluate the integration of remote sensing, object database technology, generic networking systems, visualisation and computational systems..

VII.5 Global Change

THE CONGRESS

noting

- that specific organisations like the IGBP (International Geosphere-Biosphere Program) are co-ordinating global change research,

recognising

- the importance of the continuation of global change research,

recommends

- that ISPRS seeks affiliation with an organisation

RESOLUTIONEN DES XVIII. KONGRESSES DER INTERNATIONALEN GESELLSCHAFT FÜR PHOTOGRAMMETRIE UND FERNERKUNDUNG (IGPF) IN WIEN 1996

Das Resolutionskomitee bestand aus den Mitgliedern:

Kennert Torlegard, Schweden, 1. Vizepräsident der IGPF, Vorsitzender

Isabelle Veillet, Frankreich

Hans-Peter Bähr, Deutschland

Keith Atkinson, Großbritannien

Das Resolutionskomitee erhielt 51 Resolutionen in Rohform vom Council, von den Technischen Kommissionen und den Delegierten. Einige der vorgeschlagenen Resolutionen sind zusammengefaßt worden; einige sind der Generalversammlung nicht unterbreitet worden, da ihre Empfehlungen bereits in den Statuten und/oder Ausführungsbestimmungen enthalten sind, was für ihre Durchführung noch stärkeres Gewicht hat als eine Resolution.

Resolution G.1: Würdigung

DER KONGRESS

stellt fest

- die Bedeutung des Kongresses für Fachleute von Photogrammetrie, Fernerkundung und räumlicher Informationstechnologie aus Bereichen von Wissenschaft, Industrie und Verwaltung;

er anerkennt

- die sorgfältige Vorbereitung und die erfolgreiche Durchführung des Kongresses;

er dankt

- der Österreichischen Gesellschaft für Vermessung und Geoinformation, ihrem Präsidenten, Herrn August Hochwartner, und Kongreßdirektor Karl Kraus, dem Technischen Programmleiter Peter Waldhäusl und dem Kongreßkomitee für die ausgezeichnete Arbeit, welche zu einem sehr erfolgreichen Kongreß geführt hat.

Resolution G.2: Information und Kommunikation

DER KONGRESS

stellt fest

- die schnelle Entwicklung in der elektronischen Kommunikation und im digitalen Datentransfer
- die Würdigung des Jahresberichtes der IGPF durch Mitglieder und internationale Organisationen;

er erkennt

- die große Bedeutung von Informationsaustausch und Kommunikation zwischen Mitgliedern, dem Council und den Kommissionen sowie zwischen unserer Gesellschaft und anderen internationalen Gremien;

er empfiehlt

- *task forces* oder Hilfseinrichtungen zu schaffen, um das Council bei seinen Beziehungen zu anderen internationalen Organisationen zu unterstützen und um einen Newsletter der Gesellschaft sowohl in gedruckter wie in elektronischer Form zu publizieren.

Resolution G.3: Förderung der Ausbildung

DER KONGRESS

stellt fest,

- daß die modernen Technologien in Photogrammetrie, Fernerkundung und räumlichen Informationssystemen Möglichkeiten zur Entwicklung neuer Methoden, Verfahren und Produkte eröffnen;

er erkennt

- die Notwendigkeit fortgesetzter Ausbildung;

er empfiehlt,

- daß eine *task force* eingerichtet wird zur Förderung und Verleihung von Unterstützung, Zuschüssen und Stipendien, von Tutorials, Workshops und ähnlichen Einrichtungen für die Ausbildung.

Resolution G.4: Kongreßablauf

DER KONGRESS

stellt fest,

- daß die Themen der anwendungsorientierten Kommissionen, wie etwa Kommission IV, auch für die Technischen Kommissionen I, II und III attraktiv sind;

er erkennt,

- daß dies fachliche Überlappungen und Schwierigkeiten beim Aufstellen des Programms für die Kongreßsitzungen zur Folge hat;

er empfiehlt,

- daß das Council diese Probleme noch einmal angeht und Schritte unternimmt, zukünftige Schwierigkeiten auszuräumen. Es wird auch empfohlen, daß das Council und die Präsidenten der Technischen Kommissionen ihre Anstrengungen verstärken, Kooperationen zwischen den Kommissionen anzuregen, und versuchen, Konflikte dieser Art beim Kongreßablauf zu minimieren.

Resolution I.1: Wissenschaft und Technologie

DER KONGRESS

stellt fest,

- daß Wissenschaft und Technologie durch angemessene Verschmelzung theoretischer und praktischer Aspekte zusammenwachsen sollten;

er erkennt,

- daß die Verbindung von Datenerfassung und Datenanalyse wichtige Bereiche aus Mathematik, Statistik und Computer - Science verbessert hat;

er empfiehlt,

- daß Industrieprodukte und Erfahrungen im Firmen- oder Ingenieurbereich zum Anlaß genommen werden, um ausgereifte Technologien aus dem Forschungsstadium in den Anwendungsbereich zu transferieren.

Resolution I.2: Bildqualitätskontrolle

DER KONGRESS

stellt fest,

- daß trotz wachsender Bedeutung digitaler Bildgewinnung Luftbilder immer noch mit konventioneller photographischer Technologie erfaßt werden,
- daß Luftbild-Objektive, -Kameras und -Filme noch immer zu höheren Qualitätsstandards weiterentwickelt

- werden,
 - daß Verfahren zur Kalibrierung photogrammetrischer Kameras und für optische Tests noch unvollständig und schwer miteinander vergleichbar sind,
 - daß Spezifikationen für Luftbilder trotz steigender Internationalisierung der Bildflüge weltweit voneinander abweichen, daß Entwicklungen photographischer Luftbildtechnologie neue Anforderungen an die Spezifikationen stellen;
- er erkennt,*
- daß sich die Forschung im Zeitraum 1992 - 1996 auf Untersuchungen von Maßen für Bildqualität und deren Überarbeitung sowie auf den Einfluß der Bildabtastung auf die Bildqualität konzentriert hat,
 - daß in Finnland ein Testfeld für die Qualität von Luftbildern eingerichtet wurde,
 - daß automatische Systeme zur Messung und Berechnung der Modulationsübertragungsfunktion (MTF) für photographische Bilder eingeführt wurden, verbunden mit einer Reduzierung der Notwendigkeit subjektiver Beurteilung;
- er empfiehlt,*
- daß Forschungen über Methoden zur Validierung der Bildaufnahme wie auch der Bildqualität fortgeführt werden, sowohl für photographische als auch für digitale oder digitalisierte Bilder
 - daß die Bemühungen zur Überarbeitung oder Neuformulierung der Empfehlungen und Anweisungen für routinemäßige Kalibrierung und Tests photographischer Objektive, Kameras, Filme und Detektoren auf der Grundlage vorhandener internationaler Standards fortgesetzt werden,
 - daß Anstrengungen fortgeführt werden, international anerkannte und auf internationalen Qualitätsmanagement-Standards beruhende Anweisungen für Luftbildaufnahmen einzurichten.

Resolution I.3: Standards

DER KONGRESS

stellt fest,

- daß die Entwicklung der "Empfehlungen für Kamera-kalibrierung und für verwandte optische Tests" ("recommended procedures for calibrating photogrammetric cameras and for related optical tests") eine bedeutende Aktivität in der Kommission I als Vorlauf zur Einrichtung internationaler optischer Standards war,
- daß sich eine Reihe nationaler Normungsinstitutionen auf diese Empfehlungen bezogen haben,
- daß die internationalen Normen für die Empfindlichkeit von Luftbildfilmen in Überarbeitung sind;

er erkennt,

- daß die Mitarbeit bei internationaler Normung nur nach Aufnahme formeller Verbindungen möglich ist;

er empfiehlt,

- daß die IGPF stärker als bisher in die sie interessierenden ISO-Aktivitäten eingebunden wird,
- daß die IGPF den Wert des internationalen Qualitätsmanagements und der Qualitätsüberwachung für die photogrammetrische und fernerkundliche Fachwelt erfaßt,
- daß die IGPF um einen beigeordneten Status in CEOS nachsucht und aktiv in den sie interessierenden

Untergruppen mitarbeitet,

- daß die IGPF die Möglichkeit einer Beordnung zur CIE im Hinblick auf Farbnormung erkundet.

Resolution I.4: Navigation und Sensorintegration

DER KONGRESS

stellt fest,

- daß sich Weltraum-, Luft- und terrestrische Bildsensorensysteme zu notwendigen Werkzeugen für die Umweltkartierung entwickeln,
- daß neue Sensortypen in die Kartierung Einzug gehalten haben
- daß Leitungs-, Navigations- und Positionierungstechniken weiterentwickelt werden sollten;

er erkennt,

- daß die Benutzung solcher Systeme nicht nur die Planung und Ausführung von Vermessung erleichtert, sondern auch einen integralen Bestandteil der sich anschließenden Datenverarbeitung darstellt;

er empfiehlt,

- daß die Arbeit auf dem Gebiet von Plattformleitung, Navigation und Sensorintegration fortgesetzt werden möge,
- daß Arbeiten über Hardwareeigenschaften und Hardwareintegration verstärkt werden,
- daß enge Verbindungen zu Sensorherstellern wie auch zu geeigneten internationalen Organisationen und entsprechenden Arbeitsgruppen aufgebaut werden.

Resolution I.5: Digitale Bildsensoren

DER KONGRESS

stellt fest,

- daß 3-Zeilen-CCD-Kameras durch die Kombination von Senkrecht-, Vorwärts- und Rückwärtssicht Stereoskopie ermöglichen, und auf diese Weise lange Wiederholzeiten bei der Aufnahme vermieden werden;
- daß sie als *state-of-the-art* der Entwicklung neuer satellitengetragener Bildaufnahmesysteme betrachtet werden können und auch in Flugzeugen zu Testzwecken installiert wurden,
- daß digitale Flächensensoren für Luft- und Weltraumanwendungen noch selten sind, aber auf wachsendes Interesse von Praktikern und Forschern stoßen;

er erkennt,

- daß Bilder, die direkt von digitalen Flächensensoren erfaßt werden, gewisse Vorteile gegenüber abgetasteten Luftbildern zeigen,
- daß CCD-Sensoren und Kameras mit Auflösungen bis zu 3000 x 2000 Pixeln bereits verfügbar sind und daß Sensoren mit Auflösungen von 5120 x 5120 Pixeln und 9000 x 7000 Pixeln bei größeren Firmen in Entwicklung sind und in Labors getestet wurden;

er empfiehlt,

- daß die weitere Entwicklung von 3-Zeilen-CCD-Abtastern für stereoskopische Streifenbilder für Luft- und Weltraumanwendungen angeregt wird,
- daß die Entwicklung von sehr großen Flächensensoren aufmerksam verfolgt und vorangetrieben wird,
- daß großformatige digitale Flächensensoren, die bereits heute verfügbar sind, auf Luftbildanwendungen

und ihr Genauigkeitspotential hin gründlich getestet werden.

Resolution I.6: Mikrowellensensoren

DER KONGRESS

stellt fest,

- daß aktive Mikrowellen und SAR-Interferometrietechnologie jetzt ausgereift sind und zur Umsetzung für umfangreiche Anwendungen bereitstehen;

erkennt,

- daß optische sowie aktive Mikrowellen-Fernerkundungstechnologien komplementär sind;

er empfiehlt,

- daß Gruppen aus beiden Bereichen zusammenarbeiten, um Vorteile aus der Kombination beider Technologien zu ziehen
- daß die Genauigkeit von SAR-Interferometrie weiter untersucht wird
- daß die Kombination von SAR-Interferometrie mit anderen Höhendaten untersucht werden sollte.

Resolution I.7: Hardcopy-Scanning

DER KONGRESS

stellt fest,

- daß photogrammetrische Scanner vermehrt benutzt werden, um digitale Photogrammetrie zu ermöglichen,
- daß Qualitätsnormen für Photoscanner bislang fehlen,
- daß neue Arten von Multimedia Teil der GIS-Technologie werden,
- daß weitere Sensorarten in Entwicklung sind;

erkennt,

- daß die Datenqualität photogrammetrischer Scanner für Geometrie wie für Radiometrie untersucht werden muß,
- daß die IGPF Arbeitsgruppe I/5 1992-96, zusammen mit der OEEPE, Testmaterial, einen Fragebogen und Testverfahren entwarf und verteilte,
- daß der gemeinsame Photoscannertest der IGPF-OEEPE noch läuft,
- daß weitere Sensorarten untersucht werden müssen;

er empfiehlt,

- daß der Qualitätstest für Photoscanner mit der OEEPE-Arbeitsgruppe abgeschlossen wird,
- daß das Testmaterial, welches in der Arbeitsgruppe aufbereitet wurde, weit gestreut zur Verfügung gestellt wird,
- daß die Bewertung von Photoscannern fortgeführt wird und
- daß ein Standardtestverfahren entsprechend den Anforderungen der Photogrammetrie entwickelt wird,
- daß weitere Untersuchungen im Hinblick auf integrierte Datenerfassung für Multimedia-GIS ausgeführt werden,
- daß dieser Forschungsansatz eine neue IGPF-Arbeitsgruppe mit ähnlichen Interessen einschließen sollte.

Resolution I.8: Vorverarbeitung, Archivierung und Verteilung von Bilddaten

DER KONGRESS

stellt fest,

- daß Quantität und Qualität von empfangenen und

archivierten fernerkundlichen Satellitendaten stark anwachsen,

- daß diese Daten möglicherweise eine der wichtigsten Quellen für Produktion und Fortführung von Geoinformation darstellen, daß Verarbeitung, Archivierung und Verteilungssysteme noch nicht an die Bedürfnisse aller Nutzer angepaßt sind;

er erkennt,

- den Bedarf der Nutzergemeinschaft, Satellitendatenprodukte auf ihre jeweiligen Bedürfnisse zugeschnitten zu erhalten, um Geoinformation zu erfassen und fortzuführen,
- den Bedarf der Nutzergemeinschaft, Information über diese Daten, deren Bestellung und deren Erhalt zu erleichtern;

er empfiehlt

- die Fortsetzung der Arbeit über Nutzerbedarf für Verarbeitung und Verteilung von Satellitendaten für fernerkundliche und kartographische Anwendungen.

Resolution II.1: Echtzeitkartierung

DER KONGRESS

stellt fest

- neuere Entwicklungen auf dem Gebiet mobiler Echtzeitkartierung und ihren zukünftigen Einfluß auf photogrammetrische 3D- Datenerfassung für GIS;

er erkennt

- die Bedeutung von Konzeption und Entwicklung integrierter Kartierungssysteme in Echtzeit, Systemaspekte in Bezug auf die Verarbeitung von Sensorinformation und ihre Analyse in autonomen Fahrzeugnavigationssystemen,
- die Notwendigkeit, die Rolle von Stereobetrachtung und kinematischer GPS-Technologie in integrierten Echtzeitkartierungssystemen zu untersuchen,
- die Notwendigkeit weiteren Informationsaustausches zwischen Spezialisten aus Forschung und Entwicklung innerhalb dieses Gebietes;

er empfiehlt,

- daß die Aktivitäten fortgesetzt werden mit verstärkter Konzentration auf Berücksichtigung neuerer Entwicklungen bei Echtzeitkartierung, Implementation, Entwicklung von Standards für den Betrieb und für Genauigkeitsuntersuchungen dieser Systeme,
- daß ein Test durchgeführt wird von kommerziell verfügbaren und in Entwicklung befindlichen Systemen und Prototypen für mobile Kartierungstechnologie.

Resolution II.2: Hardware- und Software-Aspekte von GIS

DER KONGRESS

stellt fest,

- daß Fortschritte bei Rechner-Hardware und -Software zur Entwicklung integrierter Geoinformationssysteme führen,
- daß die Entwicklungen von Interoperabilität und offener GIS-Standards sowie die Fortschritte bei Netzwerktechnologien (z.B. Internet) zu verteilten GIS-Anwendungen führen,
- daß eine neue Serie hochauflösender Fernerkundungssensoren in Entwicklung ist und diese neuen Technologien eine effiziente Integration in GIS

- erfordern,
- daß Forschungsaktivitäten bei Umweltüberwachung und -management die Bedeutung der Kombination von Fernerkundungs-Bildanalyse mit numerischer Modellierung, 3D und zeitlichen Aspekten in integriertem GIS unterstreichen;

er erkennt

- die Notwendigkeit, auf dem Gebiet integrierter GIS zu forschen, besonders im Hinblick auf Genauigkeitskontrolle, Austausch, Datenmodelle und Datenstrukturen, analytische Operatoren, umfassende Testverfahren, Leistungsbeschreibungen und Standards;

er empfiehlt,

- daß die Aktivitäten auf diesem Gebiet fortgesetzt werden, und zwar mit revidierter Zielrichtung auf Software und Modellierungsaspekte für GIS, um die obengenannten Veränderungen in Technologie und Forschung adäquat zu berücksichtigen,
- daß Anstrengungen unternommen werden, um die Entwicklungen im Bereich von Standardisierung und Interoperabilität zu übertragen und um geeignete Verfahren zu entwickeln für Datenmodellierung und Datenaustausch, für räumliches Datenbankmanagement, für Qualitätskontrolle, für die Einordnung räumlicher Operatoren und für den Entwurf intelligenter Schnittstellen in integrierten GIS,
- daß Fortschritte in GIS-Software sowie die Entwicklung von Fernerkundungssystemen zur Unterstützung räumlicher Entscheidungen beobachtet und analysiert werden,
- daß neue Leistungsbeschreibungen für das gesamte Gebiet integrierter GIS-Funktionalität entwickelt werden,
- daß eine enge Kooperation zwischen Geowissenschaft, Sozialwissenschaft und Informatik angestoßen wird, um Themen, wie Integration von 3D, zeitlichen Aspekten sowie Modellierung in GIS aufzugreifen.

Resolution II.3: Technologie für große Mengen räumlicher Daten

DER KONGRESS

stellt fest,

- daß weiterhin eine Zunahme von Zahl und Vielseitigkeit fernerkundlicher Satellitenmissionen und eine weitgespannte Nutzung der Daten dieser Missionen in Wissenschaft und Praxis erfolgt,
- daß viele Organisationen umfangreiche räumliche Datensammlungen geschaffen haben
 - durch Automation des Kartierungsprozesses,
 - durch Umwandlung analoger Daten in digitale,
 - durch Austausch und Verteilung dieser Daten,

er erkennt,

- daß es eine große Vielfalt an Datenbanken, Datenbankmanagementsystemen, an GIS, an nationalen oder Industriestandard – Formaten gibt, die derzeit zur Übertragung und Archivierung dieser Daten verwendet werden,
- daß viele Organisationen aktiv sind, Vorschriften für die Verteilung digitaler Daten zu erlassen;

er erkennt,

- daß das Fehlen einer Standardisierung bei

Datenformaten und Formatbeschreibungen die Benutzung von Datenbanken verzögert hat,

- daß viele nationale Organisationen und Länder dabei sind, nationale räumliche Daten - Infrastrukturen (National Spatial Data Infrastructure (NSDI)) sowie Datenkontroll- und Verteilungsstellen zu entwickeln;

er empfiehlt,

- daß Aktivitäten fortgesetzt werden sollten, um eine enge Verbindung mit anderen nationalen und internationalen Standardisierungsorganisationen aufrechtzuerhalten und sie zu Aktivitäten zu ermuntern, die Entwicklung von Datenaustauschstandards, von Megadaten- und Katalogisierungsstandards zu koordinieren und auch die Zusammenarbeit zwischen nationalen Weltraumagenturen zu fördern,
- daß Forschungsarbeiten auf folgende Gebiete konzentriert werden: auf die Entwicklung von Systemen für das Durchsuchen räumlicher Daten, von verteilten Informationssystemen für die Dateninteroperabilität sowie auf Technologien für das Anbieten räumlicher Daten, besonders auf solche, die sich des WWW bedienen.

Resolution II.4: Systeme für die Verarbeitung von Radar-Daten

DER KONGRESS

stellt fest

- ein weiteres Wachstum von technischen, methodischen und anwendungsbezogenen Arbeiten auf dem Gebiet der Verarbeitung und Analyse von Radardaten,

er erkennt,

- daß viele Photogrammeter und praktische Kartographen nur beschränkte Kenntnis von SAR-Datenverarbeitung haben und daß ein Bedarf an kontinuierlichem Austausch von Information zwischen Experten besteht, die auf diesem Gebiet arbeiten;

er empfiehlt

- verstärkte Konzentration auf die Entwicklung von Algorithmen für die Integration von SAR-Daten mit anderen Daten, Bereitstellung von Information über SAR, um es für Endbenutzer besser zugänglich zu machen, und auf das Anbieten von nutzerfreundlichen SAR-Systemen und Software.

Resolution II.5: Integrierte Produktionssysteme für GIS

DER KONGRESS

stellt fest

- anwachsende Nutzung von Daten aus einem weiten Spektrum von Sensoren, um bestimmte Aufgaben zu lösen, und den Entwurf spezieller Systeme, um diese bestimmten Anwendungen zu bearbeiten;

er erkennt

- die Notwendigkeit, den Entwurf solcher Systeme durch Nutzung von marktgängiger Hardware, Software und Datenaustausch sowie - Verteilungsmechanismen zu erleichtern;
- den Bedarf an fortgesetztem Informationsaustausch zwischen Spezialisten, Praktikern und Herstellern auf diesem Gebiet;

er empfiehlt,

- das Spektrum der derzeitigen Arbeiten auf dem Gebiet integrierter Geoinformations-Produktionssysteme zu erweitern, um die Entwicklung und das Testen von Produktionssystemen einzubeziehen, die Satelliten- und Luftbilddaten integrieren, mit dem Ziel, anwendungsbezogene Probleme auf dem Gebiet des Umweltmonitorings und -managements zu lösen.

Resolution II.6: Digitale Photogrammetrische Systeme DER KONGRESS

stellt fest

- eine verstärkte Aktivität bei der Entwicklung von Konzepten und Algorithmen zur Automation digitaler Photogrammetrie sowie
- eine gesteigerte Verfügbarkeit von Software, um mittels digitaler photogrammetrischer Systeme (DPS) automatisch und semiautomatisch photogrammetrische Produkte abzuleiten, was erfolgreich durch die Interkommissionsarbeitsgruppe II/III 1992 - 1996 dokumentiert worden ist, und
- eine verstärkte Tendenz, Maschinensehen in photogrammetrische Systeme einzubeziehen;

er erkennt,

- daß digitale photogrammetrische Systeme (DPS) analoge und analytische Systeme mit beispielloser Schnelligkeit ersetzen,
- daß, um bei der Umstellung maximale Effizienz zu erreichen, eine gute Zusammenarbeit zwischen Nutzern und Herstellern auf Gebieten, wie Funktionalität und Datentransfer, nötig ist,
- daß ein Bedarf besteht, weiterhin Visualisierungs- und Multimediatechniken sowie Mensch – Maschine – Schnittstellen beim Entwurf von DPS zu untersuchen,
- die Notwendigkeit zur Weiterentwicklung von Konzepten und Algorithmen und die Installation der sich daraus ergebenden Software in DPS, um den Anteil von Automation besonders auf dem Gebiet der Aerotriangulation und Objektextraktion zu erhöhen,
- den Bedarf für Forschung und Entwicklung bei der Integration von Photogrammetrie und Computervision mit 3D-Daten-Banken;

er empfiehlt,

- daß die Arbeiten auf dem Gebiet digitaler photogrammetrischer Systeme verstärkt im Bereich Automation und Effizienz fortgesetzt werden, eingeschlossen Beurteilung, Implementierung und Test verfügbarer Konzepte und Algorithmen zur Nutzung in DPS,
- daß ein Forum eingerichtet wird, um den Dialog zwischen Nutzern und Herstellern über Nutzerprobleme und Implementierungsangelegenheiten anzuregen,
- daß Anstrengungen fortgesetzt werden, Photogrammetrie und Maschinensehen zu integrieren,
- daß, wenn immer möglich, Zusammenarbeit erfolgt zwischen anderen Kommissionen und mit anderen regionalen oder internationalen Organisationen.

Resolution III.1: Integrierte Sensorkalibrierung und Orientierung

DER KONGRESS

stellt fest

- eine derzeitige Nutzung von und einen Trend hin zu Multisensorplattformsystemen mit Laser, multispektralen/panchromatischen Flächen- und Zeilensensoren sowie SAR,
- die Verfügbarkeit wirksamer und komplementärer Technologien für Sensororientierung (GPS, INS und Bildverarbeitung);

er erkennt

- den Bedarf an Kalibrierung einzelner Sensoren oder des gesamten Sensorsystems, um die Vorteile des Potentials von Multisensorsystemen voll zu nutzen,
- den Bedarf weiterer Entwicklung globaler Konzepte für automatische Sensororientierung mit GPS, INS und Bildverarbeitungstechniken;

er empfiehlt,

- daß entsprechende Aktivitäten während der Periode 1996 - 2000 in Kooperation mit Kommission I und den Schwesterorganisationen der IUSM fortgesetzt werden mit Konzentration auf Multisensorsystemkalibrierung, Integration von GPS, INS und Bildverarbeitungstechniken sowie integrierter Konzepte für automatische Orientierung.

Resolution III.2: Theorie und Konzepte von Objekterkennung und Bildverstehen

DER KONGRESS

stellt fest

- die Bedeutung von theoretischen/konzeptionellen Untersuchungen bei Objekterkennung und Bildverstehen;

er erkennt,

- daß trotz größter Anstrengung und guten Fortschritten, die von 1992 bis 1996 erreicht wurden, erhebliche Lücken im theoretischen Bereich der Automation von Merkmalsextraktion und -Erkennung bleiben;

er empfiehlt

- verstärkte Untersuchungen von Objekterkennung und Bildverstehen, insbesondere auf den Gebieten von Modellierung und Wissens-Engineering, in enger Kooperation mit Forschern im Bereich von Computervision, künstlicher Intelligenz, Linguistik und Wissenschaft der Wahrnehmung.

Resolution III.3: Algorithmen und Werkzeuge

DER KONGRESS

stellt fest

- verstärkte Aktivität bei Entwicklung und Anwendung neuer Algorithmen und Softwarewerkzeugen in digitaler Photogrammetrie;

er erkennt,

- die Bedeutung der Koordinierung von Algorithmen-Entwicklung mit theoretischen/konzeptionellen Untersuchungen und die Notwendigkeit, geeignete Testverfahren sowie Qualitätskontrolle und Leistungsspezifikationen zu entwickeln;

er empfiehlt,

- daß diese Aktivitäten in der Periode 1996 - 2000 fortgesetzt und verstärkt werden mit Konzentration auf die Leistungsbeschreibung von Algorithmen, auf Qualitätskontrolle, Testverfahren und geeignete Dokumentation in enger Kooperation mit der Computervision- Gruppe.

Resolution III.4: Konzeptionelle Aspekte von GIS

DER KONGRESS

stellt fest

- Fortschritte bei der Nutzung von Geoinformation für räumliche Bestandsaufnahmen und räumliche Analyse;

er erkennt

- die größere Komplexität dieser Anwendungen

er empfiehlt

- die weitere Entwicklung von Konzepten sowie Theorie für räumliche Datenmodellierung und Handhabung räumlicher Daten.

Resolution III.5: Theorie und Algorithmen für SAR

DER KONGRESS

stellt fest

- die wachsende Bedeutung von Radar mit synthetischer Apertur für Kartierung und Oberflächengenerierung sowie die Vielzahl neu verfügbarer Sensorsysteme;

er erkennt

- den Bedarf einer streng theoretischen Basis zur Benutzung von SAR für Extraktion von 3 D-Information
- den Bedarf zur Entwicklung und Verbesserung von Algorithmen zur Verarbeitung von SAR-Daten;

er empfiehlt

- daß Theorie und Algorithmen für SAR studiert und entwickelt werden, besonders auf dem Gebiet von Interferometrie und Merkmalsextraktion.

Resolution IV.1: GIS Daten und Anwendungen

DER KONGRESS

stellt fest

- ein gewaltiges Wachstum von GIS-Anwendungen;

er erkennt

- den Bedarf, Schwerpunkte für verschiedene GIS Anwendungen zu schaffen;

er empfiehlt,

- daß Arbeitsgruppen zur Bearbeitung topographischer, thematischer und urbaner GIS-Anwendungen gebildet werden.

Resolution IV.2: Internationale Kartierung aus dem Weltraum

DER KONGRESS

stellt fest

- die Steigerung internationaler Programme der Satelliten-Fernerkundung;

er erkennt

- die Notwendigkeit, diesen Aktivitäten eng verbunden zu bleiben;

er empfiehlt

- daß neuen Satellitenprogrammen und -Sensoren zur Behandlung globaler Angelegenheiten verstärkte Aufmerksamkeit gewidmet wird, und
- daß die Eignung hochauflösender, hyperspektraler und Radardaten für topographische und thematische Kartierungen sowie für GIS-Anwendungen untersucht wird.

Resolution IV.3: Karten- und Datenbanken- Fortführung

DER KONGRESS

stellt fest

- daß Geo-Datenbanken in digitaler Form von nationalen Kartierungs-Institutionen weltweit eingerichtet werden;

er erkennt,

- daß diese Datenbanken auf dem Laufenden gehalten werden müssen;

er empfiehlt,

- daß sowohl Management als auch technische Herausforderungen in Bezug auf die Erhaltung und die Fortführung dieser Datenbanken untersucht werden sollten.

Resolution IV.4: Digitale Geländemodelle und Digitale Orthobilder

DER KONGRESS

stellt fest,

- daß genaue digitale Geländemodelle (DGMs) für eine Reihe von GIS-Anwendungen und Kartierungsaufgaben nötig sind;

er erkennt,

- daß digitale photogrammetrische Methoden entwickelt werden müssen, um DGMe aus abgetasteten Luftbildern sowie aus elektro-optisch erfaßten Satellitenbildern, neuerdings auch aus Aufzeichnungen von Radar mit synthetischer Apertur (SAR), herzustellen,

er empfiehlt,

- daß Datenstrukturen und DGM-Formaten sowie der Verwendung von DGM für die Orthobildherstellung, Geländeansichten, Kartierungen und GIS-Anwendungen in lokalen, regionalen und globalen Maßstäben weiterhin Aufmerksamkeit gewidmet werden sollte.

Resolution IV.5: Kartierung extraterrestrischer Gebiete

DER KONGRESS

stellt fest

- fortlaufende Bemühungen, die Topographie von Mars, Venus und Mond sowie anderer Planetenkörper zu kartieren;

er erkennt

- die Notwendigkeit, existierende Karten fortzuführen, neue Karten herzustellen und Techniken für die Kartierung der Planeten mit optischen, elektro-optischen und elektronischen Datenaufzeichnungen zu entwickeln;

er empfiehlt

- man möge sich fortwährend bemühen, die Fortführung vorhandener Karten anzuregen, die Netz- Bezugspunkte zu schaffen, Paßpunktnetze bereitzustellen und die Entwicklung verbesserter Kartierungstechniken zu unterstützen, wobei schwerpunktmäßig Stereo-Radar-Bilder verwendet werden sollten.

Resolution IV.6: GIS und wissensbasierte Systeme für weltweite Umwelt- Daten-Banken

DER KONGRESS

stellt fest

- das Interesse an und den Wunsch nach globalen Datenbanken verbesserter Qualität, um Kartierung, Überwachung und Modellierung der natürlichen

Ressourcen zu unterstützen;
er erkennt,
- daß Satellitenfernerkundung und GIS-Modellierung ein notwendiger und integraler Teil solcher Aktivitäten sein werden;

er empfiehlt,
- daß die Aufmerksamkeit gerichtet werde auf
1) Herstellung von Referenzinformation über Verfügbarkeit und Qualität globaler Datenbanken
2) Einrichtung von Meta-Daten
3) Entwicklung von für Umweltsanwendungen geeigneten Kartierungs- und Modellierungstechniken,
4) Anregung von Kooperation zwischen internationalen und nationalen Organisationen mit wohlverstandem Interesse an Erfassung und Management natürlicher Hilfsquellen.

Resolution V.1: Entwicklung und Kalibrierung von Nahbereichs-3 D Bildsystemen

DER KONGRESS

stellt fest,

- daß neue und innovative Technologien für digitale Bildaufnahmesysteme mit großer Geschwindigkeit entwickelt werden und daß solche Systeme für eine große Vielfalt von Meßaufgaben in Forschung und Industrie verstärkt verwendet werden;

er erkennt,

- daß neue Technologien zweifelsohne zu verbesserten Genauigkeits- und Leistungsniveaus führen;

er empfiehlt,

- daß weiterhin die Entwicklung und Kalibrierung von Nahbereichssystemen hauptsächlich mit digitaler Bildaufnahme betrieben wird.

Resolution V.2: Bildfolgenanalyse

DER KONGRESS

stellt fest

- verstärkte Bedeutung von Zeitanalysen, von Lösungen mit zeitlichen Randbedingungen sowie von dynamischer Szenenanalyse, insbesondere in der Nahbereichsphotogrammetrie und im Maschinensehen,
- schnelle technologische Entwicklungen, besonders bei bilderzeugenden und Navigationssensoren,
- die Verschiedenartigkeit von Systemen und Anwendungen in Robotik, Fertigungskontrolle, Medizin, autonomer Navigation, mobilen Kartierungssystemen und Visualisierung zeitvariabler Daten;

er erkennt

- die Notwendigkeit, verschiedene wissenschaftliche Aktivitäten der IGPF in einen gemeinsamen Rahmen zu bringen, damit sie nicht unvollständig bleiben,
- die Notwendigkeit vertiefter Erforschung dieses Problems durch die IGPF, sowie den Bedarf, das photogrammetrische Wissen mit dem anderer Disziplinen zu kombinieren, insbesondere aus dem Bereich der Computervision;

er empfiehlt

- verstärkte Forschungen auf diesen Gebieten,
- daß sich die Forschungen konzentrieren mögen auf
1) die Sensoren und ihre Integration,
2) auf die gemeinsame Repräsentation lokaler 3D-Elemente und der Oberfläche,

3) auf gemeinsame Verarbeitung von Multisensordaten und
4) auf Systeme und Anwendungen schwerpunktmäßig mit zeitkritischen Lösungen.

Resolution V.3: Entwicklung und Anwendung photogrammetrischer Techniken in der Medizin

DER KONGRESS

stellt fest

- die erfolgreiche Implementierung von Messungen, die auf digitalen Bildern basieren für eine Reihe medizinischer Anwendungen;

er erkennt

- die wachsende Einbeziehung von Photogrammetern bei diesen Entwicklungen;

er empfiehlt,

- daß das Interesse an Techniken und Systemen medizinischer Anwendungen weitergehen möge,
- daß die zuständige Arbeitsgruppe der IGPF einer verstärkten Verbindung zwischen Photogrammetrie und dem Bereich medizinischer Spezialisten, biomedizinischen Wissenschaftlern und Ingenieuren Priorität einräumt durch Mitwirkung an gemeinsamen Projekten, Veröffentlichungen in medizinischen Zeitschriften und durch Anregungen, geeignete Konferenzen und Zusammenkünfte zu besuchen und darüber zu berichten.

Resolution V.4: Modellierung für Visualisierung und Virtual Reality (virtuellen Welten)

DER KONGRESS

stellt fest

- wachsende Nachfrage nach Modellierung von Objekten und ihrer Umgebung der realen Welt für Visualisierung und *virtual reality*,

er erkennt

- das Potential der Nahbereichsphotogrammetrie, solche Modelle zu liefern,

er empfiehlt

- Nahbereichsphotogrammetrie-Systeme zu entwickeln, die Modelle von Objekten und ihrer Umgebung für Anwendungen bei Visualisierung und *virtual reality* automatisch extrahieren.

Resolution V.5: Beitrag der Photogrammetrie zur Dokumentation des Weltkulturerbes

DER KONGRESS

stellt fest,

- daß die Fortschritte in der photogrammetrischen Bildaufnahme- und Informationstechnologie, wie sie innerhalb des letzten Jahrzehnts gemacht wurden, die Benutzung dieser Systeme durch Forscher in einer Vielzahl naturwissenschaftlicher und geisteswissenschaftlicher Gebiete erleichtert haben,
- daß das Weltkulturerbe bedroht ist, durch Umweltfaktoren oder anthropogene Einflüsse geschädigt oder zerstört zu werden;

er erkennt,

- daß die verstärkte Nutzung von preiswerten digital-photogrammetrischen Erfassungsverfahren und von anderen räumlichen Informationstechnologien die Dokumentation kultureller Denkmäler und Anlagen

- beschleunigt;
er empfiehlt
- Regierungen, Organisationen und privaten Vereinigungen aller Länder die Nutzung digitaler photogrammetrischer Aufnahmeverfahren, um den Dokumentationsprozeß zu beschleunigen,
 - daß die Kommission V fortführt, die IGPF-Aktivitäten Organisationen wie ICOMOS, CIPA, IFRAO und anderen darzustellen und ans Herz zu legen.

Resolution V.6: Integration photogrammetrischer Systeme mit CAD/CAM

DER KONGRESS

stellt fest,

- daß zahlreiche hochentwickelte CAD/CAM-Systeme bei verschiedenen Disziplinen in Verwendung sind;

er erkennt,

- daß solche CAD/CAM Systeme dazu beitragen können, die derzeitigen photogrammetrischen Systeme zu verbessern,
- daß photogrammetrische Arbeit verstärkt in CAD/CAM Umgebung ausgeführt wird;

er empfiehlt,

- daß die Entwicklung von Methoden und Systemen zur weiteren Integration photogrammetrischer Systeme mit CAD/CAM mehr Beachtung finden möge;
- daß Konzepte von CAD/CAM-Modellierung weiterentwickelt werden mögen für die Benutzung modellgesteuerter photogrammetrischer Messungen.

Resolution V.7: Ermutigung von Nutzern und potentiellen Nutzern

DER KONGRESS

stellt fest,

- daß in weiten Bereichen industrieller und wissenschaftlicher Praxis photogrammetrische Techniken ungenügend eingesetzt werden;

er erkennt

- das große Potential, die Nahbereichsphotogrammetrie in vielen Bereichen einzusetzen;

er empfiehlt,

- daß bei bereits existierenden Nutzern eine noch stärkere Einbindung angeregt werden sollte, und
- daß mögliche neue Nutzer gefunden und zur Anwendung von Nahbereichsphotogrammetrie angeregt werden sollten.

Resolution VI.1: Nationale Berichterstattung

DER KONGRESS

stellt fest,

- daß die Ableitung eines signifikanten, aktuellen und weltweit gültigen Berufsbildes auf der Basis der Mitgliedsberichte in ihrer derzeitigen beschreibenden Form schwierig ist, weil der Inhalt von den Autoren frei zusammengestellt wird,
- daß diese Zusammenstellung und das verbreitete Bild durch die IGPF-Mitgliedsberichte verbessert werden könnte dadurch, daß die Information via rechnergestützte, thematische Synthese und Analyse aufbereitet wird. Dies würde weltweit einen Vergleich des Anwendungsspektrums und der verwendeten Methoden ermöglichen, zusammen mit Vergleich von

Stärke, Niveau und Ausrichtung von Lehre und Training, sowie Forschung, Entwicklung und Gebieten der Zusammenarbeit;

er erkennt,

- daß nicht alle Information in den derzeitigen Mitgliedsberichten von derselben Bedeutung und Qualität sind und daß es daher wichtig wäre, einen Satz der wichtigsten Daten auszuwählen, welcher dann den Minimalinhalt eines Mitgliedsberichtes bilden könnte,
- daß der zukünftige Mitgliedsbericht auf einem Fragebogen basieren könnte, geeignet für automatische Datenverarbeitung zusammen mit einem deskriptiven Teil für zusätzliche Informationen;

er empfiehlt

- Forschung fortzuführen zur Optimierung von Form und Inhalt von Mitgliedsberichten
- daß einige Information in der IGPF *home page* enthalten ist, während der volle Inhalt auf der *home page* des jeweiligen Mitgliedslandes gezeigt werden sollte
- daß Mitgliedsberichte die grundlegende Quelle für einen Bericht über den weltweiten Status unseres Berufes bilden könnten.

Resolution VI.2: Rechnergestützte Lehre

DER KONGRESS

stellt fest

- den technologischen Fortschritt von Rechnern und die Bedeutung von guter PC-Software und Datensätzen für die Lehre;

er erkennt,

- daß gute und kostengünstige bzw. freie Software und Datensätze nicht genügend entwickelt oder nicht genügend an Lehrer und Studenten verteilt sind;

er empfiehlt

- Bemühungen, Software und Datensätze weiterhin zusammenzustellen, zu entwickeln und zu verteilen.
- Der CATCON Software Test sollte benutzt werden, um weiterhin Entwicklung und Verteilung guter Software anzuregen.

Resolution VI.3: Sharing räumlicher Daten

DER KONGRESS

stellt fest,

- daß große Mengen raumbezogener Daten, aufgenommen von Satelliten, Flugzeugen und von terrestrischen Plattformen, gespeichert, abgerufen und verarbeitet werden, und zwar auf unterschiedliche Weise mit verschiedener Hard- und Software, und
- daß diese Datensätze über viele Gebiete an verschiedene Länder und Organisationen der Welt verteilt werden sollten;

er erkennt

- die Notwendigkeit einer Politik des *Sharings* räumlicher Daten;

er empfiehlt

- *Sharing* räumlicher Daten stärker zu berücksichtigen durch Kontakte mit anderen maßgebenden Körperschaften, wie die ISO-Sektion „Geomatics and Geo-Information“.

Resolution VI.4: Möglichkeiten des Internet

DER KONGRESS

stellt fest,

- daß weltweit der Zugang zu elektronischer Kommunikation mit schnellen Schritten zunimmt und
- daß die Technologie von Kollegen verbreitet wird, die in einem virtuellen Büro arbeiten,
- daß die Ausbildung der nächsten Generation von Fachleuten auch durch Informationss*sharing* über elektronische Kommunikation verbessert werden kann;

er erkennt,

- daß Gebühren für die Netze Nutzer davon abhalten können, sehr lange im Netz herumzsurfen, um die gewünschte Information abzurufen;

er empfiehlt

- Bemühungen, Internet-Ressourcen in Photogrammetrie, Fernerkundung und räumlichen Informationssystemen zu untersuchen.

Resolution VII.1: Nutzung von Fernerkundung für physikalische Messungen und Signaturen

DER KONGRESS

stellt fest

- ein wachsendes Nutzerinteresse an der Mikrowellenfernerkundung;

er erkennt

- die Bedeutung physikalischer Aspekte der Fernerkundung;

er empfiehlt,

- daß Radar- und andere Fernerkundungsaspekte sowie Lasertechnologie verstärkt beachtet werden.

Resolution VII. 2: Überwachung von Umwelt und natürlichen Hilfskräften über SAR

DER KONGRESS

stellt fest

- die Notwendigkeit, die mögliche Nutzung von SAR-Daten für Nutzer verschiedener Anwendungsfelder zu klären;

er empfiehlt

- die Einrichtung eines Informationsnetzes für SAR-Charakteristika, Datenanalysemethoden usw. (z. B. in Form einer fortgeführten Version einer WWW-Homepage)
- die Auswahl von Fallstudien für Nutzung von Daten derzeitiger Mikrowellenfernerkundungssatelliten.

Resolution VII.3: Erneuerbare Hilfsquellen

DER KONGRESS

stellt fest

- einen erhöhten Informationsbedarf über die Getreideproduktion;

er erkennt

- die weitgefächerte Bedeutung der Fernerkundung für die Landwirtschaft;

er empfiehlt

- die Zusammenstellung von Fernerkundungsstudien für landwirtschaftliche Statistik und Erntevorhersage.

Resolution VII.4: Überwachung des terrestrischen Ökosystems

DER KONGRESS

stellt fest,

- daß sich fortschrittliche Ökosystem-Modelle auf selbstanpassende komplexe Systeme hin bewegen, wobei sowohl objektbezogene als auch relationale Datenbanken einbezogen werden;

er erkennt,

- daß hochauflösende spektrale Daten von Flugzeug- und Satellitensensoren mit Daten von Untersuchungen aus dem Bereich der biologischen Genetik und der Landschaftsökologie zusammengefaßt werden müssen;

er empfiehlt,

- daß eine Modellierung terrestrischer Ökosysteme unternommen wird, um die Integration von Fernerkundung, objektorientierter Datenbanktechnologie, generischer Netzwerksysteme, Visualisierung und Rechnersystemen zu untersuchen.

Resolution VII.5: Global Change

DER KONGRESS

stellt fest,

- daß spezielle Organisationen, wie das IGBP (Internationales Geosphären-Biosphären Programm), die Global-Change-Forschung koordinieren;

er erkennt

- die Bedeutung der Fortsetzung von Global-Change-Forschung;

er empfiehlt

- daß die IGPF nach Wegen sucht, sich mit einer Organisation zusammenzutun, welche sich auf den Bereich der Global-Change-Forschung spezialisiert hat.

SUMMARY OF THE EXHIBITION

Reported by A. Gruen ;Switzerland

Exhibition Hours : 09.00-17.00
Days Open : 15 - 19 July, 1996

The exhibition, which took place during the second week of the Congress, saw 64 commercial, 30 Member and scientific, and 3 special exhibitors. Commercial exhibitors offered sensors, systems, products and services while Member and scientific exhibitors provided information of more general type, research results, and some products too. In the following it is shown what kind of issues were represented in the commercial and non-commercial parts of the exhibition (no. commercial/no. non-commercial): SAR, InSar 3/0, Cameras 5/0, GPS, INS, Laserscanner 7 /1, Image Scanners 3/1, Printers 3/0, Remote Sensing data and value added products 9/10, Analytical Plotters 5/0, Digital Photogrammetric Systems 19/2, GIS 14/3, Digital Mapping, Orthophotos, DTM 3/7, City Models 2/4, Close-Range products and systems 3/9. These numbers show that the Congress exhibition has turned largely digital. As such it followed the trend of the Technical Sessions which was clearly established

While the need for Analytical Plotters is still there, an amazing 19 Digital Stations of various functionality are an indication for the direction the discipline is taking. Also, the interdependence of photogrammetry/remote sensing and GIS became more obvious than before.

In general, there was nothing really new and spectacular. Progress is slow but steady. Contrary to what some prophets claimed that digital photogrammetry is bringing about a revolution, we note only a shift in emphasis, which is consistent with the general development of technology.

The exhibition was compact and could be easily scanned. It was at no moment overrun by visitors and clients. Under this premise it was a good idea of the Congress organisers to restrict the exhibition to 4.5 days only.

SUMMARY OF OTHER TECHNICAL EVENTS AT THE CONGRESS

Presented by John Trinder, Australia

SPECIAL SESSIONS

International Union of Surveys and Mapping (IUSM)

International Union of Surveys and Mapping comprises the ISPRS, International Federation of Surveyors (FIG), International Cartographic Association (ICA), International Association of Geodesy (IAG), the International Hydrographic Organisation (IHO), and the Spatially-Oriented Referencing Systems Association (SORCA), met at the ISPRS Congress in meetings of its two Task Forces to consider the future of the structure of the Union, and its future mode of operation. The Joint Board of IUSM also met to review operations and finances since its last meeting in Boulder in July 1995, to ratify the decisions of the Task Forces, and to plan its future activities.

Three IUSM Working Groups were convened by their Chairs as follows:

- The Future of GIS – Chair: Professor Konecny (representing ISPRS)
- Georeferencing of Satellite and Airborne Images by GPS and INS – Chair: Professor Klaus-Peter Schwarz (representing IAG)
- Automated Control Measurement (ACM) – Chair: Professor Hrnrik Haggren (representing FIG)

Regional Member Meetings

Meetings of the Regional Members of ISPRS were held with topics as follows:

- **OEEPE** (European Organisation for Experimental Photogrammetric Research) - A Partnership for Solving the European Mapping Problems
- **EARSeL** (European Association of Remote Sensing Laboratories)
- **AARS** (Asian Association of Remote Sensing) How to Organise RS and GIS in Asia and Pacific Region
- **UN - AARSE** (African Association of Remote Sensing of the Environment) - The African View of Remote Sensing of the Environment

CATCON

CATCON was the Society's first display of computer assisted teaching software. Eleven non-commercial software packages that were de-veloped for teaching purposes were demonstrated to delegates at the Congress and judged by a jury representing Council and Commission VI. Prize money was donated by Pasco International of Japan. The prize winners are as follows:

- The Gold prize worth Swf 2,500 was award to Dr Høhle (Denmark) for the development of computer assisted teaching software LDIP and ORTO for digital photogrammetry.
- Silver prize worth Swf 2,000 was awarded to Dr Nguyen Dinh Duong (Vietnam) for the development of the remote sensing software WinASEAN.
- Bronze prize worth Swf 1,500 was awarded to Dr Gong Jianya (China) for the development of the GIS software GeoStar.
- The Commercial Award, receiving no prize money, was awarded to Radarsat International Canada for the development of the RADARSAT Sample Images CD-ROM.

Young Authors Papers

Ten young authors under 35 years of age received prizes of Swf 2,500 each from the President, Professor Murai, for best papers by young authors. The authors then presented their papers in two special parallel sessions at the Congress. Funds for these awards were donate by Core Corporation (Japan), by Pasco International (Japan), and by the Inter-Commission Workshop on Pixel Sequences held at ETH Zurich in 1995.

Mapping Support for the Bosnian Talks

A special session was held on the Mapping Support for the Bosnian Talks. The participants described the important role played by the mapping during the Peace Talks. At the start of the Talks, basic mapping facilities were provided, but it was quickly realised that up-to-date maps would play an integral role in the peace negotiations. By the end of the Talks, a major on-site map

production facility was producing updated maps within a few hours of decisions being made. The chief US negotiator used a terminal for real-time visualisation. The systems in use were off-the-shelf commercial systems from several manufacturers.

ICOMOS (International Council on Monuments and Sites) - UNESCO and CIPA

The International Council on Monuments and Sites (ICOMOS) and the International Committee for Architectural Photogrammetry (CIPA) held a special meeting on Photogrammetry and the Cultural Heritage of the World, with emphasis on the preservation of historic sites and monuments.

TECHNICAL TOURS

A total of 17 technical tours were held during the Congress from 11 to 17 July with 514 participants. The tours venues included 11 Institutes at 5 Universities, a department in the Federal Office of Metrology and Surveying, the Environmental Agency, The City Surveyors, a private company, a power plant, and the railway authority.

TUTORIALS

Ten half day and full day tutorials were organised during the two days prior to the commencement of the Congress, attended by 288 participants. The majority of the tutorials were held at the Vienna University of Technology, but others were held at the University of Agriculture, Forestry and Renew-able Resources, and the Federal Office of Metro-logy and Surveying. Half of the fees earned from the tutorials were paid to the presenters who provided all the lecture notes, while the other half was collected by the organising committee.

Doležal Award winners were given the opportunity to join a tutorials free of charge.

Tutorials held were:

- TU1 Integration and Orientation of Sensor Systems
- TU2 Computer Vision in Photogrammetry and Remote Sensing: Towards Automatic Mapping
- TU3 Technologies for Handling Very Large Volumes of Spatial Data
- TU4 Image Metrology Systems and Appli-cations
- TU5 Advanced DTM Technology
- TU6 Digital Photogrammetry in Small Scale Imagery
- TU7 Digital Orthophotos Applied for Topo-graphic Mapping
- TU8 Image Quality
- TU9 Projective Geometry for Geometric Image Analysis
- TU10 Conceptual Aspects of GIS Technology

APPRECIATION OF COMMISSION PRESIDENTS By Shunji Murai, President of ISPRS

Now I want to express my appreciation to Technical Commission Presidents. I would be the first president who continued to give such noises to the Technical Commission Presidents to prevent from sleeping. I apologise them but please understand that this brought great improvement to the Society and the members. In particular, I appreciate their annual reports published in the ISPRS Annual Report. This was tremendous improvement of the Society's activity.

As a token of my acknowledgement. I would like to invite all technical commission presidents up on the stage. Please receive my small gift of Japanese product for your memory.

Professor Luigi Mussio: Commission I
Dr. Mosaad Allam: Commission II
Professor Heinrich Ebner: Commission III
Professor Roy Welch: Commission IV
Professor John Fryer: Commission V
Professor Deren Li: Commission VI
Dr. Roberto Pereira da Cunha: Commission VII

Before I finish my task, I have to report you a very sad news that Mrs. Olayinka Adekoya, past Commission VI President for 1984 – 1988 passed away on 28 June 1995.



Predisent Shunji Murai thanks the Austrian Congress Organisation Team with beautiful gifts reminding of the Japanese Exposition Stand