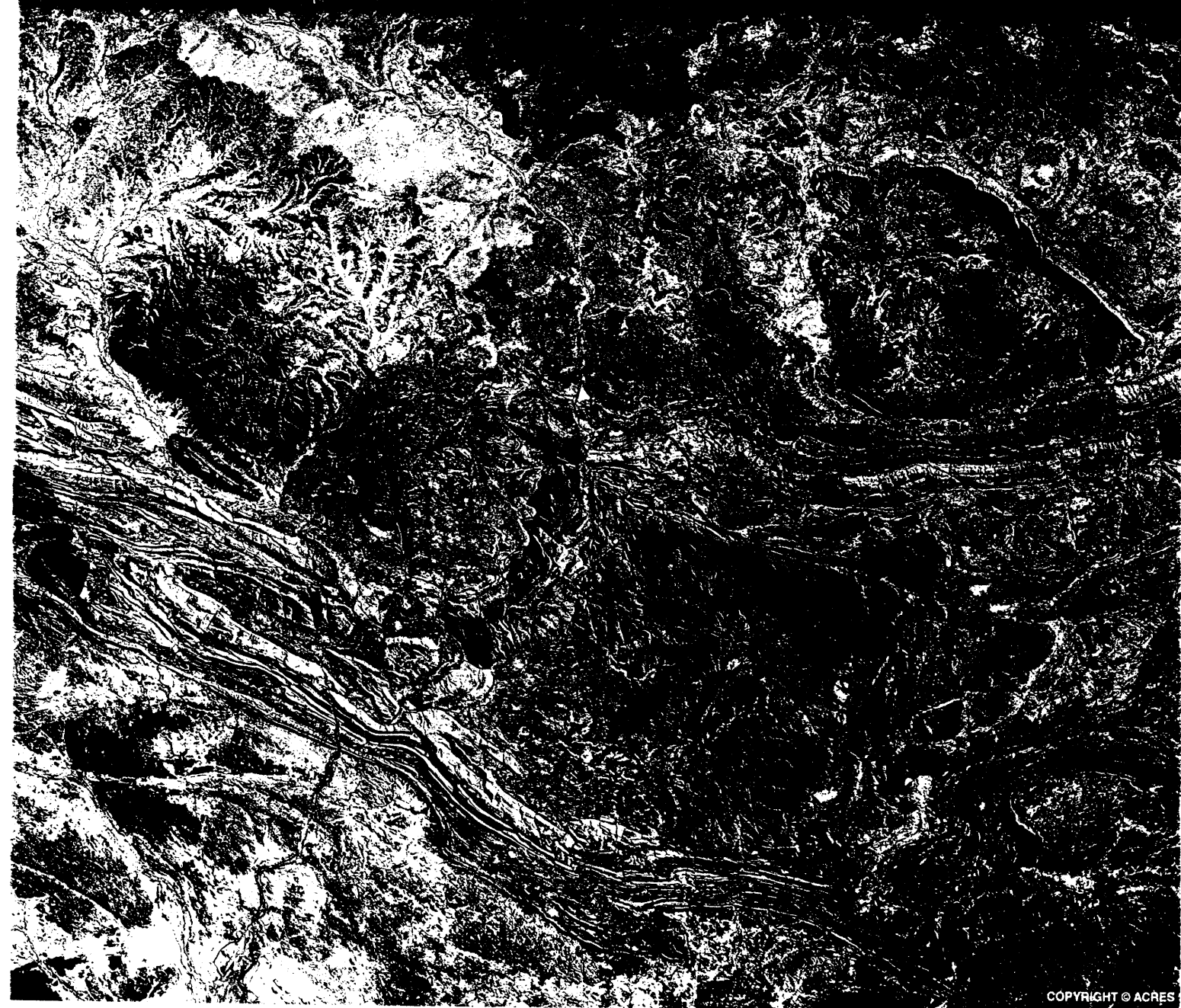


ANNUAL REPORT • 1995



INTERNATIONAL SOCIETY FOR PHOTOGRAMMETRY AND REMOTE SENSING
INTERNATIONALE GESELLSCHAFT FÜR PHOTOGRAMMETRIE UND FERNERKUNDUNG
SOCIÉTÉ INTERNATIONALE DE PHOTOGRAMMÉTRIE ET DE TÉLÉDETECTION



1995 Annual Report
of the
International Society for Photogrammetry and Remote Sensing



"1995 Progress and Activities in Photogrammetry and Remote Sensing"

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Ordinary Members

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Australia - Remote Sensing and Photogrammetry Association of Australasia Ltd
Austria - Österreichische Gesellschaft für Vermessung und Geoinformation
Azerbaijan - National Committee for Photogrammetry, Remote Sensing & Geoinformatics
Belarus - Ministry of Architecture and Construction
Belgium - Société Belge de Photogrammétrie, de Télédétection et de Cartographie
Bolivia - Instituto Geografico Militar y de Catastro Nacional
Brazil - Sociedade Brasileira de Cartografia (SBC)
Brunei Darussalam - Survey Department Ministry of Development
Bulgaria - Union of Surveyors and Land Managers in Bulgaria
Burkina Faso - Institut Geographique du Burkina (IGB)
Canada - Canadian Institute of Geomatics (CIG)
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China - Chinese Society of Geodesy, Photogrammetry and Cartography
China-Taipei - Chinese Taipei Society of Photogrammetry and Remote Sensing
Colombia - Sociedad Colombiana de Percepcion Remota y Sistemas de Informacion Geografica
Congo, Popular Republic - Direction of Cadaster and Topography
Côte d'Ivoire - Comité National de Télédétection et d'Informations Géographiques (CNTIG)
Cuba - Instituto Cubano de Geodesia y Cartografia
Cyprus - Cyprus Photogrammetric & Cartographic Association
Czech & Slovak Republics - Society for Photogrammetry and and Remote Sensing
Denmark - Danish Society for Photogrammetry and Surveying
Egypt - Egyptian Committee of Surveying and Mapping
Estonia - University of Tartu, Dept. of Geophysic
Ethiopia - Ethiopian Mapping Authority
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France - Société Française de Photogrammétrie et Télédétection (SFPT)
Germany - Deutsche Gesellschaft für Photogrammetrie und Fernerkundung e. V.
Greece - Hellenic Society for Photogrammetry and Remote Sensing
Hong Kong - Hong Kong Institute of Surveyors
Hungary - Hungarian Society for Surveying, Mapping and Remote Sensing
India - Indian Society of Remote Sensing (ISRS)
Indonesia - Indonesian Association of Surveyors (ISI)
Iran - National Cartographic Centre (NCC)
Iraq - State Commission on Survey
Ireland - Irish Society of Surveying, Photogrammetry and Remote Sensing
Israel - The Israeli Society of Photogrammetry and Remote Sensing (ILSPRS)
Italy - Societa Italiana di Fotogrammetria e Topografia (SIFET)
Japan - Japan Society of Photogrammetry and Remote Sensing
Jordan - Royal Jordanian Geographic Center (RJGC)
Kenya - The Kenya National Committee for Photogrammetry and Remote Sensing
Korea - National Geography Institute
Kuwait - Directorate of Survey Department, Kuwait Municipality
Latvia - Latvian Society of Geodesy & Photogrammetry
Libya - Surveying Department of Libya
Lithuania - The Lithuanian Committee for Photogrammetry and Remote Sensing
Madagascar - Association de Photogrammetrie et Télédétection

Malawi - The Department of Surveys, Office of the President and Cabinet
Malaysia - Directorate of National Mapping, Department of Survey and Mapping
Mexico - Sociedad Mexicana de Fotogrametria, Fotointerpretacion y Geodesia, A.C. (SMFFG)
Mongolia - Mongolian National Society for Photogrammetry and Remote Sensing
Morocco - La Administration de la Conservation Foncière du Cadastre et de la Cartographie (ACFCC)
Myanmar - Myanmar Survey Department
Nepal - Nepal Remote Sensing and Photogrammetric Society
Netherlands - Netherlands Federation for Earth Observation and Geo-Information
New Zealand - Department of Survey and Land Information
Nigeria - Nigerian Society for Photogrammetry and Remote Sensing
Norway - The Norwegian Association for Cartography, Geodesy, Hydrography and Photogrammetry
Pakistan - Survey of Pakistan
Peru - Direccion General de Aerofotografia
Philippines - Philippine Society of Photogrammetry & Remote Sensing (PSPRS)
Poland - Polish Society for Photogrammetry and Remote Sensing
Portugal - Associacao Portuguesa de Fotogrametria e Deteccao Remote
Qatar - Centre for Geographic Information Systems
Romania - Romanian Society for Photogrammetry and Remote Sensing (SRFT)
Russian - National Committee of Russia
Saudi Arabia - Military Survey Department
Slovenia - Ministry for Environment Protection and Regional Planning
South Africa - The South African Photogrammetry and Geo-Information Society (SAPGIS)
Spain - Spanish Society of Cartography, Photogrammetry and Remote Sensing
Sri Lanka - Survey Department of Sri Lanka
Sudan - Sudan Society of Photogrammetry
Suriname - Central Bureau for Aerial Mapping
Sweden - The Swedish Society for Photogrammetry and Remote Sensing (SSFF)
Switzerland - Swiss Society of Photogrammetry, Image Analysis and Remote Sensing
Syria - General Establishment of Surveying
Tanzania - Survey and Mapping Division, Ministry of Lands, Housing & Urban Development
Thailand - The Royal Thai Survey Department, Supreme Command Headquarters
Tunisia - Office de la Topographie et de la Cartographie, Surveying and Mapping Authority
Turkey - Turkish National Society of Photogrammetry and Remote Sensing
Ukraine - Ternopil Pedagogical Institute, Ministry of High Education
United Arab Emirates - Remote Sensing Center
United Kingdom - United Kingdom National Committee for Photogrammetry and Remote Sensing
United States - American Society for Photogrammetry and Remote Sensing
Uruguay - Servicio Geografico Militar
Venezuela - Sociedad Venezolana de Fotogrametria Percepcion Remote and Cartografia
Vietnam - Institute of Geography, National Centre for Natural Science and Technology of Vietnam
Yugoslavia - Union of Geodetic Engineers and Surveyors of Yugoslavia
Zaire - Agence Nationale de Meterologie et de Télédétection par Satellite (METTELSAT)
Zambia - The Surveyors Institute of Zambia
Zimbabwe - Zimbabwe Society for Photogrammetry, Remote Sensing and Cartography

Regional Members

AARS - Asian Association on Remote Sensing
AARSE - African Association of Remote Sensing of the Environment
EARSeL - European Association of Remote Sensing Laboratories
OACT - Organisation Africaine de Cartographie et Télédétection
OEEPE - Organisation Européenne d'Etudes Photogrammetriques Expérimentales
PAIGH - Pan American Institute of Geography and History
SELPER - Sociedad de Especialistas Latinoamericanos en Percepcion Remota

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INTRODUCTION

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The **1995 ISPRS Annual Report** has been prepared and published to meet several ISPRS objectives:

- Promote international cooperation, coordination and advancement of photogrammetry, remote sensing, geographic information systems (GIS) and related sciences.
- Provide timely information on the state of the art research and development to all interested parties.
- Improve communication of ISPRS objectives and activities to ISPRS Member organizations and to other scientific organizations and international forums such as the United Nations.
- Fulfill reporting requirements of Commissions and Working Groups as prescribed in the ISPRS Bylaws and Guidelines.

During 1995, many workshops, conferences and meetings were conducted by our seven Technical Commissions and their 46 Working Groups. A summary of these events and some of the knowledge shared at them is contained in this report. We hope you will appreciate each of their assessments of the state of the science and technology of the subjects and topics for which they have responsibility.

The official term of all current ISPRS officers is completed on 19 July 1996. At the 18th ISPRS Congress, which convenes during 9-19 July 1996 in Vienna, Austria, the new Council and Commission Presidents will be elected by the ISPRS General Assembly. This quadrennial Congress provides an opportunity for ISPRS to renew its activities with vigor, fed by the innovative and fresh ideas offered from the wealth of knowledge and capabilities of our members. We are fortunate to have a framework which allows for a smooth transition of experience to occur. We encourage all individuals and organizations which have an interest in the subjects covered by ISPRS to participate fully in the Congress which always proves to be a milestone event.

At the Congress, the General Assembly will discuss proposed changes to the Terms of Reference of Commissions and will modify the Society Bylaws as appropriate. In the Commission Open-Business Meetings at the Congress, all interested attendees will discuss and recommend to the General Assembly, a set of general Resolutions formulated to guide the direction of the Commissions for the 1996-2000 term. The essence of these Resolutions forms the basis for the establishment or renewal of Commission Working Groups and for developing the Terms of Reference for their activities during 1996-2000. The purpose for this process is for ISPRS to maintain the relevance and value of its activities by reflecting changes precipitated by advancements in science and technology and by recognition of the need for new innovative applications in order to improve the way of life for humankind.

All persons interested in participating in any of the scientific activities of a Commission are invited to contact the office of the Commission President, whose communication numbers are listed on the facing page (vi). We encourage and welcome you to join the open discussions at the Congress in Vienna.

ISPRS is pleased to welcome our new Regional Member, the Pan American Institute of Geography and History, and we welcome the many new Sustaining Members who help support our endeavors. On behalf of ISPRS Council, I encourage the readers of this Report to send us your comments. We hope that the information contained herein is of value to you and encourage you to make copies for further distribution. It has been my pleasure to have had the opportunity to participate in the preparation of this Annual Report for the past three years.

PRESIDENT'S MESSAGE

Dr. Shunji Murai, President of ISPRS

First of all, I want to report to you that I have returned to Tokyo, Japan after a three year appointment at the Asian Institute of Technology, Bangkok, Thailand from December, 1992 to December, 1995. It was an excellent experience enabling me to better understand the Asian economic growth as well as the Asian culture. I believe the experience will be valuable input to improve the ISPRS community.

The main activities of the ISPRS Council in 1995 were; 1) to restructure the scheme of ISPRS in terms of Statutes and Bylaws in order to expand ISPRS activities, and 2) to prepare for the XVIII ISPRS Congress which will convene in July 1996.

At the ISPRS Congress to be held in Vienna, the Council is going to propose a milestone amendment to the Statutes and Bylaws by introducing Associate Membership which will allow for multiple photogrammetry, remote sensing and/or GIS related organizations to join ISPRS activities. The Council has continued such restructuring and reform through three Presidential generations: Prof. G. Konecny (1984-1988), Prof. K. Torlegard (1988-1992) and me (1992-1996). However the Council had not reached a consensus until the more recent Council Meetings; Beijing, October 1994 and Vienna, June 1995. Another key debate among the Council members was on how to deal with GIS in ISPRS. The conclusion was that GIS should be considered as a discipline rather than a technique or application. This will be reflected in the amendments of the Statutes on Definition as well as on Mission.

The preparation for the Vienna Congress is going on very well in cooperation between Prof. K. Kraus, Congress Director, Council and Technical Commission Presidents/WG Chairmen. There is a great challenge in preparing the Congress by having to fulfill both of two important tasks; how to keep the high quality and how to open the Congress to everybody particularly to those of developing countries and former socialistic countries. The Council always assures that the Congress will be based on free and fair opportunity, friendly and humane atmosphere, and highly informatic and exciting discovery.

In conclusion, ISPRS continues to be successful in maintaining its high standard of following the present technical advancements and the future prospects.

Finally I am very pleased to report to you that Council forms a good team based on democratic but leadership spirit. In particular, I would like to thank Mr. Lawrence W. Fritz, Secretary General for his energetic work in compiling this annual report.



TECHNICAL COMMISSION I

"SENSORS, PLATFORMS AND IMAGERY"

Dr. Luigi Mussio, Commission I President
Gianfranco Forlani, Commission I Secretary
(ITALY)

TERMS OF REFERENCE

- Planning for aerial and space missions
- Design, construction, testing, installation and calibration of analogue and digital imaging sensors
- Design and performance of data reception and preprocessing systems
- Geometric and radiometric properties of image data and quality standards and factors (environmental and others) affecting data quality
- Technical systems for recording sensor data, film scanners and auxiliary data (time, position, attitude, etc.) and media (film, magnetic, optical, etc.)
- Preprocessing techniques to generate datasets suitable for analysis and measurements (radar image synthesis, multisensor integration, radiometric and geometric corrections, etc)

STATE OF SCIENCE AND TECHNOLOGY OF COMMISSION I TOPICS

The most important aspects emerging from the Workshop in Udine are the following:

- data acquisition and update need to be automated to the highest level, not only for object geometry reconstruction (which is anyway not trivial in many applications to civil engineering and architecture) but also for object classification;
- data quality and data currency evaluation is crucial if GIS is to provide meaningful information: testing strategies have been presented for geometric data, but something equivalent is needed also for thematic data; this is even more necessary for Dynamic GIS and Decision Support Systems;
- multimedia integration is at present rather limited, being used mainly to help users get into system applications such as describing historical buildings, where a combination of sound and images becomes very effective;

- applications of GIS are very broad; they cover not only photogrammetry and cartography, ranging from large coverage to close range, but also cover some related sciences and/or techniques, such as astronomy, geodesy, geophysics, geology, geomorphology, civil engineering, architecture, archeology, industrial engineering and robotics;

- direct information about industrial equipment are perhaps missing, but special attention has been paid to covering a lack of content, considering that contributions from industries and engineering firms cannot be neglected or dismissed, especially for digital photogrammetric digital sensors and systems, as well as satellite geodesy (e.g. GPS), automatic surveying and GIS main frames.

ACCOMPLISHMENTS OF COMMISSION I DURING 1995

• *Mid-Term Symposium*

The second volume of the Proceedings of the Mid-Term Symposium "Primary Data Acquisition and Evaluation," held during 12-16 September 1994 in Como, Italy, has been issued. It contains the final program, the "compte-rendu", the WG reports, the list of participants and some late papers.

• *Workshop in Udine, Italy*

The Workshop "Multimedia GIS Data" and the Tutorial "Spatial Data Analysis: Theory and Algorithms", jointly organized by ISPRS Technical Commission I (TC I) and WG III/4, was held during 12 to 16 June 1995 in Udine, Italy. It was hosted by the International Centre for Mechanical Sciences (CISM). The topics of the presentations in both events have been Geographic Information Systems, though addressed from different perspectives.

The Workshop was opened by the ISPRS Secretary General L. Fritz and the Italian Society of Surveying and Photogrammetry (SIFET) President Prof. A. Selvini followed by a keynote lecture by Prof. R. Galetto, the Dean of the Italian professors of photogrammetry.

During the Workshop 27 papers were presented in 10 sessions on very different fields of application. The allotted time for each speaker was half an hour, so there was enough time for presentation and discussion. More than 50 people from eight countries (mostly from Italy) attended the events.

The one-day Tutorial consisted of four presentations by invited speakers. According to the title, the goal was to highlight the current status on the conceptual aspects in designing GIS. In addition, a lecture on Computer Graphics principles was given, with the intent to grasp an impression of what's behind the graphics tools which are of great relevance, at least on the user interface side, to GIS.

The first two lectures provided fundamentals on GIS design: N. Bartelme (Technical University of Graz) focussed on modeling and organizing data in structures, while A. van der Meer (Agricultural University of Wageningen) concentrated on GIS data processing techniques for queries to the system, data transformation and generation of new data by deduction.

In the following speech, R. Laurini (University of Lyon) moved to the less-established field of Dynamic GIS. He addressed the potential application of GIS to object attribute evolution of spatio-temporal data, mobile or deformable object monitoring and active spatio-temporal objects (i.e. objects whose relations or behavior may change in time), pointing out passionately the limits of present systems which are underlying the complexity of the task.

The last speaker, T. Ertl (University of Erlangen), first introduced the principles of Computer Graphics, the basics of line and surface 3-D representation, and then gave some insights on the task of photorealistic rendering of scenes through sophisticated lighting and shading models.

The proceedings of the Workshop and of the Tutorial will be published in an issue of the CISM series and will probably be available early next year.

• *XVIII ISPRS Congress in Vienna*

As a result of the Joint Meetings of Council and Technical Commission Presidents (TCP's), that were held in Beijing and in Vienna, the Technical Commission I received responsibility for eight technical sessions, three poster sessions (about 10 papers each) and two keynote speakers for the July 1996 ISPRS Congress in Vienna. The following list illustrates the preliminary titles of the technical sessions and indicates the responsible Working Group (WG) and the Cooperating WG's:

- "Image Data Quality Control and Standardization," WG I/1 with informal contributions by WG III/4;
- "GPS, INS and Laser-Scanning," WG I/2 with WG's II/1 and III/1 as Cooperating WG's;
- "High Resolution Sensors," WG I/2 with WG's IV/2 and IV/5 as Cooperating WG's;
- "Development in Optical Digital Sensors," WG I/3 where WG V/2 and IC WG V/III could be Cooperating WG's;
- "Calibration of Optical Digital Sensors," WG I/3 with the same arrangement with the same WG's, as noted above;
- "Microwave Data Acquisition Systems," WG I/4 with contributions by WG II/4, according to a special agreement between the Presidents of the Technical Commissions I and II;
- "Quality Analysis of Photo-scanners," WG I/5 to be held in form of a Joint Session with the OEEPE WG which covers the same topics.
- "Preprocessing and Archiving of Satellite Data," WG I/6 with contributions by WG II/3, according to the same special agreement between TCP's I and II as noted above.

It is pleasing to note that all technical sessions will be hosted by one or more Cooperating WG's, indicating that TC I isn't a small, isolated Commission, but plays an important role among several Technical Commissions which are increasing their cooperation and emphasizing the topics of primary data acquisition and evaluation. Furthermore the following remarks, recognizing their importance, must be noted:

- the technical session on High Resolution Sensors will reveal new directions for the future;
- special attention to Industrial Equipment for Data Acquisition, according to the suggestions of the Council in Como, must be given by all WG's. Technical Commission I must pay attention to all aspects of its title "Sensors, Platforms and Imagery" and its Terms of Reference must not neglect or dismiss contributions from industries (this effort will open new directions for the future too).

The keynote presentations will cover both longstanding experiences and results coming from the application of new techniques and methodologies; therefore:

- Prof. H. Ziemann will give a lecture on "Image Quality Assessment and Standardization", and
- Prof. F. Rocca will give a lecture on "Progress in SAR Interferometry".

Finally with regard to presented papers; since the Congress Director gave each Commission the opportunity to decide its own "review process," TC I has selected the following review process for handling papers for Vienna:

- Two people (usually Chairmen and Co-Chairmen of TC I WG's, or Cooperating WG's) will do a "blind review process", assigning a quality grade (A to E);
- Two people (the President and the Secretary of TC I) will prepare the proposals for the Joint Meeting of Council and TCP's in Bali, taking into account the "blind review process", with hopes to receive a large number of high quality abstracts (and papers).

- *Liaison with ISO and IEC*

On the occasion of the WG I/1 Meeting in Dessau, Germany, some informal contacts were established by means of DIN people with ISO and IEC. At the present time it is too early to assess a judgement, but the hope is to involve, through them, industrial and engineering firms.

COMMISSION I NEWS

- *Minor Activities*

The TC I staff promoted and satisfied several contacts with different parts of the ISPRS and some sister societies, taking into account both scientific and organizational aspects. Thus the 2nd Vice-president of ISPRS Prof. A. Gruen gave a lecture last May in Milan on "New Developments in Videogrammetry." Furthermore the Secretary of TC I gave a lecture last March in Ascona, Switzerland, on "Automatic Extraction of Man-Made Objects from Aerial and Space Images."

Finally entering the new year, a one-day Seminar on "Recent Advances in Numerical Cartography" has been scheduled for February 1996 in Milan, Italy. This seminar foresees four lectures to be given by mathematicians, statisticians and computer scientists from Italy and Switzerland (Prof's Carosio, Marazzi, Piccinini and Somalvico). The aim of the Seminar is to provide information on new developments concerning both scientific and technical aspects and to provide a positive conclusion to the four year term of TC I in Italy.

Let us remember that a similar Seminar on "Modern Trend in Photogrammetry" was successfully organized at the beginning of this term, with the participation of photogrammetrists from Germany, Italy and Switzerland (Dr.'s Beyer, De Haan, Heipke and Prof. Prati).

- *Further Activities*

Many activities were organized by the WG's:

- March 1995 - WG's I/3, V/2 and InterCommission WG V/III held a Joint Meeting "From Pixels to Sequences: Sensors, Algorithms and Systems," in Zurich, Switzerland;
- April 1995 - WG I/1 organized a Workshop on "Standardization Concerning Image Quality and Image Digitizing" in Dessau, Germany;
- September 1995 - WG's I/2 and II/1 attended as Cooperating WG's the WG III/1 Conference on "Integrated Sensor Orientation: Theory, Algorithms and Systems," in Barcelona, Spain;
- November 1995 - WG's I/5 and II/1 participated as Cooperating WG's the WG III/3 Workshop on "Integrated Acquisition and Interpretation of Photogrammetric Data," in Stuttgart, Germany;
- December 1995 - WG's I/4 and I/6 had a Joint Meeting on "Recent Advances in Signal Evaluation, Preprocessing and Archiving Systems," in Milan, Italy.

GENERAL COMMENTS CONCERNING COMMISSION I WORK AND COMMENTS ON ISPRS BUSINESS

- *General Objectives*

In the last decade the nature of the primary data has strongly changed. Platforms on board satellites, new sensors, and the different roles of geodesy and cartography have opened new horizons and shown new directions to scientists and engineers. Indeed the contributions of the GPS, INS and laser profiler, the imagery from SPOT, SAR (with special regard to its interferometric use) laser scanning, three line cameras, CCD sensors and scanners, and of GIS have changed not only the nature of the primary data, but also the methodologies to acquire and evaluate them. Further developments of these techniques and methodologies are very important for advancement in photogrammetry, remote sensing and related sciences, as well as for research for developing applications.

The Commission activities should combine suitably the longstanding experiences and the results coming from the application of new techniques and methodologies to acquire and evaluate primary data. The aim is to bring together experts from various disciplines; therefore scientists, engineers and users in the fields of photogrammetry, remote sensing, geodesy, electronics and computer science from universities, research institutes, governmental organizations, industries and engineering firms are kindly invited to participate in the TC I activities.

• *Commission and WG's Activities*

All WG's will be heavily engaged in the Vienna 18th ISPRS Congress. It provides the last occasion to meet and to verify their activities; therefore a final positive judgement for the Commission and all WG's may be formulated.

During this Congress some Business Meetings will be held to plan future activities, especially the preparation of TC I and its WG resolutions. Additional comments can be done at the end of the 1992-96 period, remarking that the participation in TC I has been increasingly offering many occasions to exchange important experiences by means of the Cooperating WG's.

Regarding ISPRS TC I future role, two different strategies can be identified:

- from the point of view of contents: TC's III, IV, V and VII cover all ISPRS scientific and technical arguments;
- from the point of view of participation: TC's I, II and VI offer suitable opportunities to study different aspects which may be considered too small by the other Commissions (which consequently do not offer or provide sufficient discussion, circulation, promotion, etc.)

A possible suggestion is to form a double structure in the ISPRS:

- with four major Commissions,
- that meet three minor Commissions
- by separate, but parallel, WG's,
- whose Terms of Reference recommend to establish close contact among themselves,
- whose activities foresee Intercommission Workshops,
- and participation in the activities of different Commissions as Cooperating WG's.

The philosophy of this opinion is that "cooperation" is better than "competition" and assures bigger and more stable advantages.

WORKING GROUP ACTIVITIES DURING 1995

WG I/1 - "Image Data Quality Control Assessment and Standardization"

by Chairman: Prof. Hartmut Ziemann (Germany)
Co-Chairman: Dr. Wolf-Dieter Schuh (Austria)
Secretary: Dr. Anders Boberg (Sweden)

State of Science and Technology of WG I/1 Topics

Although the number of persons engaged in WG I/1 activities is rather limited, a number of highly interesting papers have been submitted to the ISPRS TC I Symposium in Como, to the WG I/1 Workshop in Dessau and to the ISPRS Congress in Vienna.

Still, assessment methods of aerial photographic image quality has to be specified and standardized. Efforts have been made to base an assessment upon the parameters of tone reproduction, MTF and granularity, to improve the EGA technology to acquire these parameters; to construct test fields and CCD-based microdensitometers for the purpose; and to investigate the relation between objective quality parameters and subjective quality experience.

Based upon experiences with photographic image quality assessment; methods need to be refined for specifying digital image quality and the quality of image scanning. Physical as well as mathematical methods have been suggested. The effect of image compression on image quality, as well as on image geometry has been examined and has to be further investigated.

The concept of color and the standardization of color determination, especially in digital systems and in products generated by digital systems, needs further research. The search for an institution to host these activities is of priority.

In spite of the development of digital image systems, aerial photography is still the most important source of large scale map data. Due to GPS technology and improved optics, the technology to acquire aerial photographs has developed considerably. Also, analytical and digital photogrammetry, image scanning, GIS and database technology have changed the demands on the imagery. Therefore, revised standards to aerial photography missions must be elaborated. Efforts to

standardize image-related procedures and to establish liaison to ISO Technical Committees have been made in collaboration with ISPRS Council. These efforts must continue.

Accomplishments of WG I/1 During 1995

A third WG circular letter was mailed in mid-February 1995 to a wide distribution with intent to mail a further letter before the summer holidays. Unfortunate circumstances prevented the preparation of such a letter. The previous circular letter included the interim WG report prepared and presented in Como by Anders Boberg.

A three-day workshop on image quality, image digitizing, standardization and color order systems was held in Dessau, Germany, 26-28 April 1995. Attendance to the workshop was very low in spite of a relatively wide distribution of the workshop announcement. All presenters at the Workshop were invited speakers resulting in an interesting program covering various aspects of WG I/1 activities, namely standardization within ISO TC 172 and TC 42, image quality (and image digitizing), image quality assessment and color order systems. Proceedings for the workshop are in preparation. Draft resolutions for the WG as prepared by WG Chair and WG Secretary were submitted to the TC I President in June 1995.

Efforts to increase the liaison activities with ISO TC 172 did not yet succeed; new efforts will be made in the near future. The WG Chair also plans to supply the ISPRS Secretary General with background material for preparation of an application to CEOS for observer status of ISPRS.

WG I/1 News

The WG intends to contact ASPRS about their recently published specification for aerial survey photography (PE&RS, Sept. 1995), and to contact other producers of aerial photography for their specifications.

The WG Chair attended a further meeting of the CEOS WG on Calibration and Validation and an introductory seminar on ISO 9000 etc (quality management).

The WG Chair is involved with an attempt to develop a color-IR negative film.

The WG will hold a keynote and a tutorial on image quality in conjunction with the Vienna Congress.

WG I/2 - "System Aspects of Platform Guidance, Navigation and Sensor Positioning"

by Chairman: Dr. Petros Patias (Greece)

Co-Chairman: Dr. Roman Arbiol (Spain)

WG Members: 21

State of Science and Technology of WG I/2 Topics

There has not been much change of the state of science and technology of the WG topics, since the last report period. Specifically, the interested reader can find current references, related to the WG topics, in the following publications:

- a. Colomina, Navarro (Editors), 1995, **"Integrated Sensor Orientation: Theory, Algorithms and Systems"**, Wichmann, 300 pp, in which there are 29 papers covering the following topics:
 - GPS Kinematic positioning methods and applications
 - Trends in Computer Science
 - GPS/INS for kinematic survey systems
 - System aspects on platform guidance, navigation and sensor orientation
 - Range and Imaging systems
 - Integrated sensor orientation
 - Integrated sensor systems for real-time mapping
 - Trends in applied mathematics
 - Space Photogrammetry - Aerial Remote Sensing
 - Two Keynote addresses (by F. Ackermann and by K-P. Schwarz)
- b. D. Fritsch; D. Hobbie (Editors), 1995, **"Photogrammetric Week 95"**, Wichmann, 353 pp. In this publication there are presented papers covering topics such as:
 - CCD sensors: M. Clauss; G. Neukum, et. al.
 - SPOT: A. Baudoin
 - New satellite programs: L. Fritz
 - MOMS-2: F. Schneider et. al.; J. Schiewe; H. Kaufmann, et. al.
 - SAR: J. Mercer; Ph. Hartl, et. al.
 - Laser scanners: U. Lohr
 - GPS/INS/Camera Integration: K-P Schwarz.

Accomplishments of WG I/2 During 1995

• 6-10 February 1995 - Bonn, Germany
Members of the WG participated in the "2nd Course in Digital Photogrammetry" organized by the Institut fuer Photogrammetrie, Universität Bonn.

• 24-29 April 1995 - Ascona, Switzerland
Members of the WG participated in the meeting on "Automatic Extraction of Man-Made Objects".

- 26-30 June 1995 - Udine, Italy
Members of the WG participated in the TC I and WG III/4 Joint Workshop on "Multi-media GIS".

- 8-9 September 1995 - Barcelona, Spain
Joint organization of the Workshop on "Integrated Sensor Orientation: Theory, Algorithms and Systems".
The collaborating WG's were:

- ISPRS WG's I/2, II/1, III/1
- IAG SC4, SSG 1.105, SSG 4.138
- FIG WG 5.4
- IUSM WG on GPS

The workshop was very successful and attracted the interest of 95 participants from different disciplines. The proceedings with the 29 presented papers are available through Wichmann publishing company.

- 3-9 September 1995 - Barcelona, Spain
Members of the WG participated in the 17th International Cartographic Conference.

WG I/2 News

The process of evaluating the abstracts submitted for the Vienna ISPRS Congress has begun. Update reports on the status and the related deadlines can be obtained from the Vienna Congress home page on the Internet.

WG I/3 - "Optical Digital Imaging Systems"

by Chairman: Dr. Hans-Gerd Maas (Switzerland)

Co-Chairman: Prof. Battista Benciolini (Italy)

WG Members: 40

State of Science and Technology of WG I/3 Topics

Whereas 3-line CCD cameras can almost be considered state-of-the-art for satellite imaging applications and have also been installed in aircraft for verification test purposes, large-format area sensors for aerial and space applications are still rare. The highest area-CCD resolution that is currently offered on the market is 4096 x 4096 pixels (disregarding macro- or micro-scanning techniques which are not suitable for data acquisition from a moving platform), but these sensors are still expensive and rather rare. Only sensors with resolutions of 3000 x 2000 or 2000 x 2000 pixels play an important role in the market. A sensor with 5120 x 5120 pixels was presented some years ago, but it is currently being redesigned. At two laboratories, sensors with 8000 x 8000 pixels and 9000 x 7000 pixels are under development but have not reached maturity yet.

Linear array sensors with up to 12000 pixels (today), used in a pushbroom principle, still offer a much better resolution as compared to area-CCD sensors. Stereo is

today achieved by the combination of a nadir sensor with forward and backward looking sensors, thus avoiding the long re-visit times that turned out to be a disadvantage as implemented with earlier concepts.

Even a resolution of 12000 pixels per line is not comparable to film yet. Film-based systems cannot be completely replaced by solid state sensors yet, and analog cameras in combination with high performance image scanners will still play an important role for digital aerial photogrammetry for some time.

Nevertheless, it is interesting to observe the development of large format area solid state sensors closely. Even though the resolution is by far not comparable to the resolution of 9" film yet, the high accuracy potential of these sensors has been shown by a number of applications using aerial imaging, as well as in digital close-range photogrammetry. It thus justifies the expectation that a 5000 x 5000 pixel sensor might compete with 9" film in certain applications. Large format area sensors also show some advantages over 3-line cameras especially for aerial applications because they allow for much higher orientation stability.

Accomplishments of WG I/3 During 1995

The ISPRS Joint Workshop of WG I/3 "Optical Digital Imaging Systems" (chairs H.-G. Maas / B. Benciolini), WG V/2 "Close-Range Imaging Systems and their Performance" (chairs H. Beyer / V. Uffenkamp) and InterCommission WG V/III "Image Sequence Analysis" (chairs E. Baltsavias / H. Baker) was held at the Institute of Geodesy and Photogrammetry at ETH Hoenggerberg in Zurich, Switzerland, from 22-24 March 1995. The title of the workshop was "From Pixels to Sequences - Sensors, Algorithms and Systems" and consisted of 11 technical sessions and 2 poster sessions. In total, 133 people from 17 countries and five continents participated in the workshop.

WG I/3 News

The proceedings of the Zurich workshop "From Pixels to Sequences - Sensors, Algorithms and Systems", ISPRS Archives Vol. XXX, Part 5W1, 396 pp, 1995, (Editors: Baltsavias, Baker, Benciolini, Beyer, Maas, Uffenkamp) are available from RICS Books, Surveyor Court, Westwood Way, Coventry, CV4 8JE, UK, phone: +44-171-222-7000; fax: +44-171-334-3851. The program can also be obtained via World-Wide-Web (WWW-page: http://www.geod.ethz.ch/p02/events/isprs_workshop/isprs_workshop.html).

The three organizing ISPRS working groups of the Zurich workshop decided to use almost all of the

Workshop income, namely 7,500 SFr, for ISPRS prizes for the Best Papers by Young Authors. Each prize consists of 2,500 SFr to enable the author to participate in the Vienna Congress, 9-19 July 1996. The conditions are: maximum age 35 years, single author of a high quality paper referring to the terms of reference of one of the ISPRS working groups I/3, V/2, or IC WG V/III. An application for the award and the full paper must be submitted to the Congress Director, Karl Kraus, by 5 January 1996. Further information on the prizes can be requested from the ISPRS President Shunji Murai.

WG I/4 - "Microwave Imaging Sensors and Preprocessing"

by Chairman: Prof. Claudio Prati (Italy)
Co-Chairman: Dr. Guenter Schreier (Germany)

State of Science and Technology of WG I/4 Topics

The noticeable quantity of data from the numerous satellite missions for SAR interferometry (ERS-1/ERS-2, SIR C - SAR X, JERS and possibly RADARSAT) bring the INSAR technology to a pre-operational status: the most relevant applications are creation of Digital Elevation Models; use of multitemporal coherence together with the amplitude of the returns as an innovative segmentation tool; and finally small motion detection and measurement using differential INSAR.

Many problems are still to be solved completely, such as: automatic phase unwrapping, compensation of atmospheric effects, and complete understanding of the mechanism of coherence loss. However, it is generally agreed that these problems are solvable and the operational phases are mature.

New missions are being prepared: a single pass shuttle based interferometric survey, and the big Advanced SAR system to be mounted on the ENVISAT satellite; to name just two. Further new ideas are being studied, such as, the SAR fleet where several satellites could cooperate in a sort of enhanced Tandem Mission, or GEOSAR where the backscattered electromagnetic energy of digital television broadcasts could be received by a geostationary satellite to generate daily medium resolution interferometric images of an entire continent.

On the processing side, there is consensus on the achievable quality of the phase preserving processors and on the opportunity of ground consistent focusing techniques. New and more robust algorithms are being proposed for medium resolution images, fully phase preserving but exploiting the lower resolution (say $50 \times 50 \text{ m}^2$) to get an order of magnitude gain in processing time, without coherence loss.

Accomplishments of WG I/4 During 1995

The WG hosted, at TU of Milan, Italy on 4 December 1995, a one-day Joint Meeting, organized in conjunction with WG I/6, on "Recent Advances in Signal Evaluation, Preprocessing and Archiving Systems." The quality of the meeting was of high level, despite low attendance. In the business session that concluded the meeting, the WG and TC I officials recognized the difficulties to bring in the photogrammetric community interesting arguments, born in other fields (e.g. electronics, telecommunications, etc.) even if they are closely related to photogrammetry and remote sensing.

WG I/4 News

The WG will hold a keynote talk on Signal Evaluation at the Vienna Congress.

WG I/5 - "Hardcopy Scanning & Preprocessing Systems"

by Chairman: Dr. Ralf Bill (Germany)
Co-Chairman: Prof. Alessandro Carosio (Switzerland)

State of Science and Technology of WG I/5 Topics

The scanner test is on the way. Seven test patterns were scanned at four vendor sites. Still, there are some problems concerning data distribution and evaluation. There are different aspects of interest between OEEPE and ISPRS.

Both, the Joint Workshop in Stuttgart as well as the conference in Lisboa gave opportunities to get in contact with other disciplines outside photogrammetry.

Accomplishments of WG I/5 During 1995

- 18-20 October 1995 - Lisboa, Spain
The "1st Conference on Spatial Multimedia and Virtual Reality" was funded by European Science Foundation and brought together researchers of various scientific disciplines. The chairman of WG I/5 R. Bill was a member of the scientific committee. Participants came from Portugal, United States, United Kingdom, The Netherlands, France, Denmark, Italy, Russia and Canada. The papers are published in a book. The conference had four keynote lectures, approximately 25 further lectures, demos and a video session. Keynote addresses were given by J. Encarnacao on Scientific Visualization, K. Pimentel on Virtual Reality, D. Rhind on Legal Issues on Multimedia and M. Goodchild on Spatial Data Libraries. All other presentations were focused about these topics and also covered issues such as simulation, planning and education.

- 8-10 November 1995 - Stuttgart, Germany

The detailed report on the Joint Workshop of ISPRS Working Groups I/5, II/3 and III/3 on "Integrated Acquisition and Interpretation of Photogrammetric Data" will be sent to the ISPRS council by D. Fritsch as the local host. About 40 invited participants joined this meeting. They came from Germany, United States, Canada, Switzerland, Austria, The Netherlands and France.

Topics of the workshop included Scanners and Calibration, Integrated Sensor Systems, Mobile Mapping Systems, Knowledge based Data Fusion and Scene Analysis, Active Vision and Navigation. WG I/5 organized and chaired one session dealing with the integration of laser scanners and CCD-cameras (El-Hakim) and with photogrammetric scanners (Gruber). All papers and overheads were distributed during the meeting.

WG I/5 News

Together with the OEEPE Group on the "Analysis of Photo Scanners" the WG I/5 is running a scanner test. Questionnaires and test material were sent to the photo scanner vendors. About ten suppliers of photogrammetric scanners were asked to participate in this test. Currently the test material is scanned from four vendors and collected at the Institute for Photogrammetry, EPFL Lausanne (CH). Three to four university teams should evaluate the results of the scans. Hopefully first results will be available for the Vienna Congress. Nevertheless, members of the WG are also looking very seriously at the fast and rapidly developing market of non-photogrammetric scanners, which may be

used in many photogrammetric tasks which have lower accuracy requirements.

WG I/6 - "Preprocessing and Archiving of Satellite Data for Remote Sensing"

by Chairman: Dr. Dan Rosenholm (Sweden)
Co-Chairman: Dr. Philippe Munier (France)
Secretary: Dr. Dan Klang (Sweden)

WG I/6 News

The Working Group I/6 was re-established during 1995. Chairman is now Dan Rosenholm of Swedish Space Corporation and the Royal Institute of Technology (KTH) in Stockholm, Co-chairman is Philippe Munier of SPOT Image in Toulouse and Secretary is Dan Klang of Swedish Space Corporation and KTH. All three parties have extensive experience on distribution, processing and use of satellite data. The constellation is formed around a common idea, to compare users' needs with existing and planned distribution systems.

The activities have so far been limited to communication around how to organize the activities. The original plan was to have a WG meeting where all participants would represent satellite operators, value-added companies and end-users. During the meeting the users needs and the operators' distribution and processing systems would be compared and analyzed. However we found it not realistic to obtain the participation needed. The most important activities are the Joint Meeting with WG I/4 in Milan, 4 December 1995 and the planning of a special session during Vienna Congress.

TECHNICAL COMMISSION II

"SYSTEMS FOR DATA PROCESSING, ANALYSIS AND PRESENTATION"

Dr. Mosaad Allam, Commission II President
Gordon Plunkett, Commission II Secretary
Jeff Labonte, Commission II Co-Secretary
(CANADA)

TERMS OF REFERENCE

- Design and development of integrated systems for measurement, processing, analysis, representation, and storage of photogrammetric, remote sensing and GIS data
- Study and evaluation of system integration aspects for photogrammetry, remote sensing and GIS data processing
- Analysis of systems and their components for automated, semi-automated and manual digital processing systems
- Development of systems and technologies for radar data processing
- Study of real-time mapping technologies
- Standardization of digital systems for photogrammetry, remote sensing and GIS

STATE OF SCIENCE AND TECHNOLOGY OF COMMISSION II TOPICS

A review of the systems aspects for the processing of geographic data reveals that progress in this area continues to be driven by advances in technology. Advances continue to originate from all of the fields of photogrammetry, remote sensing, surveying, and mapping. Acceptance of geographic information systems (GIS) as a unifying technology continues to challenge the "separation of disciplines". Consequently, the shift toward integrated systems for processing of geoinformation is driven by advances in hardware, software and networking.

Trends towards developing integrated systems capable of performing multiple tasks continues to be strong. Although these systems can operate as a stand alone workstations, 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 realized only if they can communicate with multiple databases, the development of a spatial information infrastructure for interoperability becomes paramount.

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, visualization, database management systems and networking). More emphasis is being placed 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.

ACCOMPLISHMENTS OF COMMISSION II DURING 1995

- *Commission II Symposium Proceedings*

Proceedings of the Commission II 1994 Symposium in Ottawa, Ontario, Canada are available through RICS Books in the United Kingdom.

- *Preparation of Papers for International Symposium on GIS Development*

Dr. Mosaad Allam, President of Commission II, prepared two invited papers for an "International Symposium on GIS Development" held in Beijing, China during 12-16 November 1995. One paper addressed Data Sharing and Networking, whereas the other addressed Data Revision and Update.

- *ISPRS Journal*

Commission II continued activities with the **ISPRS Journal of Photogrammetry and Remote Sensing**. In responding to requests from the Editor, Commission II reviewed several papers for publication in 1995.

- *XVIII ISPRS Congress Tutorials*

Commission II has organized and will present two full day Tutorials at the July 1996 ISPRS Vienna Congress. The tutorials are: (1) "Integration and Orientation of Sensor Systems" co-sponsored by WG II/1, and (2) "Technologies for Handling Very Large Volumes of Spatial Data" lead by WG II/3.

- *ISPRS Joint Meeting of Council and Technical Commission Presidents*

Commission II participated in the ISPRS Joint Meeting of Council and Technical Commission Presidents held in Vienna, Austria from 6-9 June 1995.

COMMISSION II NEWS

- *Technical Session and Activities for 1996 - XVIII ISPRS Congress in Vienna*

Commission II was allocated 11 technical sessions, four poster sessions, one joint session with Commissions I/II/III at the 1996 Vienna Congress. It has eagerly worked to collect paper abstracts and invited papers for this activity. Preparations continue with the review of abstracts and development of a technical program.

WORKING GROUP ACTIVITIES DURING 1995

WG II/1 - "Real Time Mapping Technologies"

by Chairman: Dr. Kurt Novak (USA)
Co-Chairman: Michael Hahn (Germany)
Secretary: Holger Schade (Germany)
WG Members: 80

State of Science and Technology of WG II/1 Topics

Real-time mapping gained tremendous interest over the past year. Developments of mobile mapping systems were initiated both in the US and in Europe. In the US there are now at least 5 companies offering mobile mapping services to customers. 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. In Europe there are a number of efforts to design vehicle based mapping systems.

Probably the most significant improvement over the past year was the operational implementation of a number of airborne real-time mapping systems. They integrate GPS/INS with laser scanners and video cameras for mapping of utility corridors. This is a significant step towards the full automation of aerial mapping.

The major objective of real time mapping systems development is the fast collection of digital data for GIS. In the case of airborne systems, research is concentrated on supplementing aerial cameras with GPS, INS, and laser scanners to automate DEM extraction and sensor orientation. There is a clear sign that digital photogrammetry by itself (using stereo image matching and feature extraction) cannot solve the data extraction problem. Additional sensors are needed to create accurate geographic data more efficiently. Beside the installation of GPS in the aircraft for absolute positioning of the exposure station (which is considered operational), inertial systems (INS) are being added for determining the absolute scanner positions (e.g. laser scanning) for automatically generating surface models and even for identifying objects. This technology will also improve the capabilities of automatic feature extraction from aerial photographs.

Terrestrial systems typically integrate even more different sensors than airborne systems: GPS, INS, digital and analog video cameras, voice recording devices, radar, imaging lasers, etc. The major applications of terrestrial systems are the mapping of inventories along linear features, such as highways or railroads. Collection of geo-coded videos has become an important activity to create multi-media GIS. Videos are no longer stored in analog form, but rather are compressed on CD-ROM. They can be linked to geographic databases and serve as important decision making tools, saving the user expensive trips to the field. Precise positioning of objects with terrestrial systems, e.g. with a stereo vision system, is almost possible in real-time. Accuracies better than 30 cm can be achieved. We also found that a number of large contracts have been made in this field, which is an encouraging signal of the maturity of real time mapping technology.

The most important research activities concentrate on the tight integration of GPS and INS sensors. The positioning sensors are the enabling technology for real-time mapping. Improvements of this component will allow positioning with centimeter accuracies in the near future.

On the imaging side we believe that active sensors, such as imaging lasers are the future of real time mapping. These devices create both depth and gray value images instantaneously. This means that each pixel of the digital image has a distance associated with it. Stereo measurements may become obsolete once laser cameras are available. Furthermore, active sensors do not need any light; so they can be used in tunnels or during variable lighting conditions of the day, and they are not affected by shadows. They can be used in terrestrial systems as well as from aircraft.

Accomplishments of WG II/1 During 1995

In 1995 WG II/1 participated in a number of conferences and workshops relevant to its focus of interest. A listing of these activities is:

- 3-6 April 1995 - Stuttgart, Germany
WG II/1 members participated in the "3rd International Workshop on High Precision Navigation." Kurt Novak presented a paper on "Integrated Sensor Systems for Terrestrial Photogrammetry," Michael Hahn was on the organizing committee.
- 24-26 May 1995 - Columbus, Ohio, USA
At the "Mobile Mapping Symposium" WG II/1 members presented papers on mobile mapping; Kurt Novak organized a session on Imaging Systems.
- 4-8 September 1995 - Barcelona, Spain
WG II/1 co-sponsored the "Integrated Sensor Orientation Workshop"; Kurt Novak and Holger Schade organized sessions on "Real-time Mapping Technologies" and "Kinematic Survey Systems."
- 8-10 November 1995 - Stuttgart, Germany
WG II/1 organized three sessions at the Joint Workshop of Commissions I, II, III on "Real-time Mapping" and "Navigation."

WG II/1 News

WG II/1 will concentrate on preparations for the 1996 ISPRS Congress in Vienna, and organize at least two sessions.

WG II/1 will play a major role in the tutorial on "Integration and Orientation of Sensor Systems", which will be presented at the ISPRS Congress.

WG II/1 will continue with the development of a report/bulletin on world-wide real-time mapping activities.

WG II/2 - "Hardware and Software Aspects of GIS"

by Chairman: Dr. Manfred Ehlers (Germany)
Co-Chairman: Nickolas L. Faust (USA)
Secretary: David Steiner (Germany)
Members: 68

State of Science and Technology of WG II/2 Topics

On the hardware side, we see a continuation of last years' trend, especially in the areas of increasing processing power, decreasing costs, and miniaturization. With the introduction of new 32-bit operating systems, PC's challenge workstations in performance. Laptops with GIS software and integrated GPS can be taken to the field. A fax/modem connection makes a mobile on-line GIS workstation. As usual, however, the real revolutions appear on the software side. Low-cost and easy-to-use visualization software with intuitive interfaces, such as ArcView, allow the use and distribution of geographic information to a much wider audience.

The introduction of Windows-NT and Windows 95 with the commitment to transport their software to these operating systems by all major GIS software developers will be a great step in the direction of an affordable GIS for everybody. The rapid growth of the World Wide Web (WWW) as a friendly, easy-to-navigate user interface to the Internet has begun to change our way of thinking about information and its availability.

Last, but not least, the impact that the Open Geodata Interoperability Specification (OGIS) Project will have on the development of GIS is a potential revolution to the GIS market. The goal of the OGIS Project is to promote the development of interoperability standards for the distributed processing of heterogeneous geospatial data. The Open GIS Consortium consists of representatives of government organizations, universities and major GIS developers. Given the tremendous amounts of geospatial data now available and recent dramatic developments in geospatial data generation, there is a great need to focus on techniques for accessing heterogeneous databases in real time across local and wide area networks. The OGIS defines an approach to such access by means of a distributed object-oriented software architecture.

Accomplishments of WG II/2 During 1995

Proceedings of the ISPRS Working Group II/2 "International Workshop on Requirements for Integrated Geographic Information Systems" held in New Orleans, USA during 2-3 February 1994 were published.

A WG II/2 Business Meeting was held during the "9th International Symposium on Computer Science for Environmental Protection," 27-29 September 1995 in Berlin, Germany.

WG II/2 News

Preparations are currently under way for an "International Workshop on New Developments in Geographic Information Systems." This workshop will be held 6-8 March 1996 in Milan, Italy.

WG II/3 - "Technologies for Handling Large Volumes of Spatial Data"

by Chairman: Dr. Ekow Otoo (Canada)
Co-Chairman: Terry Fisher (Canada)
Secretary: Cherian Chaly (Canada)
Members: 16

State of Science and Technology of WG II/3 Topics

Technology to handle very large volumes of spatial data is now perceived as one of the major significant initiatives of most national governments. It is being recognized that Geographic Information Systems and Remotely Sensed Data will play a vital role in social evolution.

A number of countries have initiated programs to establish a National Spatial Database Management Infrastructure with the purpose of:

- providing some degree of standardization in spatial data formats;
- defining the base information content of the metadata for spatial databases; and
- defining the core information content for spatial database repositories and clearinghouses.

These initiatives are intended to promote a high degree of shareability, useability and to facilitate the dissemination of information on the existence of national databases.

The activities of WG II/3 took this recognition and a number of national initiatives into consideration in conducting its activities. Primarily, WG II/3 activities have concentrated on studies, research and programs that support the general principles of the setup and use of spatial database repositories. Towards this end, the WG held meetings, discussion sessions and invited papers on:

- Data models that promote interoperability between heterogeneous technologies of Geographic Information Systems;
- Large capacity storage systems (e.g., RAID, digital tapes, etc.) technology for on-line storage and archiving of large volume spatial databases;
- Limitations of current database technology and models of transaction processing systems to support large spatial databases;
- The advantages and disadvantages of parallel computing in processing very large volume databases; and
- Techniques for modelling time, events and for incorporating event processing in spatial databases.

An item which was of some concern but has been left open is the issue of integrating data of different levels of precision and accuracy.

Accomplishments of Working Group II/3 During 1995

The WG held a meeting of some members in Vancouver, Canada during the IRIS/PRECARC Annual Conference in June 1995. The WG corresponded primarily via E-mail and reading the WG II/3 bulletin at the WG WWW site.

Working Group II/3 News

The working group plans to hold a Business Meeting during the upcoming Canadian Conference on Geomatics in 1996 in Ottawa, Canada.

The group plans to hold a one day working session during the 1996 ACM SIGMOD Conference in Montreal, Canada.

A site for reading about the activities of the WG II/3 and other papers relevant to the WG has been set up at the Geographic Information and Services Division of Geomatics Canada. The URL address is:
<http://gis10.gisd.nrcan.gc.ca>.

A bound publication of paper contributions to WG II/3 is being arranged. We hope this will be completed before the ISPRS Congress in Vienna. Papers on technology for the handling of large volumes of spatial data are being solicited. Further information is available at the WG web site.

WG II/4 - "Systems for the Processing of Radar Data"

by Chairman: Dr. Robert O'Neil (Canada)
Co-Chairman: Dr. Hiroshi Kimura (Japan)
Secretary: Marc D'Iorio (Canada)
Members: 55

State of Science and Technology of WG II/4 Topics

There have been significant developments in several areas, as follows:

- A number of SAR processing systems are available commercially at lower cost than ever before. These make SAR processing directly accessible to new portions of the user community and lead the way to more application specific use of the SAR data;
- SAR interferometry has become a very exciting and promising research topic with numerous potential applications being investigated. Most common applications are related to the precise measurement of elevation differences over land;
- Other applications being investigated are velocity measurements and ocean features. These potential applications have stimulated a great deal of research into the better characterization of the SAR data, the response of SAR to various target classes, and novel processing techniques for manipulating, correcting and visualizing interferometric data sets;

The ERS-1/ERS-2 Tandem Mission is providing very important interferometric SAR data sets. The archive of these data be an important source of global land elevation information;

RADARSAT was launched on 4 November 1995 and the first imagery was released on 14 December 1995. RADARSAT is the first satellite carrying a SAR that has been designed to deliver imagery for routine operational requirements.

Accomplishments of WG II/4 During 1995

Few activities have been initiated since the sessions at the Commission II mid-term Symposium held in June 1994 at Ottawa, Canada and the WG meeting organized at that time.

General Comments

As a general comment it has been difficult to detect/generate much enthusiasm related to the theme of this WG because the reporting of the technology and early applications are very closely associated with the IEEE and IGARSS conferences.

WG II/5 - "Integrated Production Systems"

by Chairman: Dr. Atef Elassal (USA)
Secretary: Dr. Roop C. Malhotra (USA)
Members: 18

State of Science and Technology of WG II/5 Topics

The scope of the WG-II/5 is confined to photogrammetric based Integrated Production Systems (IPS) with data acquisition functionalities. The functionalities of IPS as recognized are:

- Spatial data collection, editing, and storage
- Building topology for GIS applications
- Data transfer
- Integration of data sets (vector/raster, from different sensors)
- 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 IPS development.

• *IPS User's Guide*

Due to a wide range of existing IPS's, from very simple to highly sophisticated systems, the WG II/5 has planned to compile an IPS User's Guide with the following features:

- description of INPUT data to the IPS
- description of data flow or processes in IPS
- description of functionalities of IPS
- definition of accuracy of the data set

This User's Guide will assist in establishing optimum IPS's for users in need of guidance.

Inputs to this IPS User's Guide have been solicited from the WG membership, who in turn are getting in touch with individuals involved in the development and use of an IPS.

Accomplishments of WG II/5 During 1995

Correspondence with the WG membership and the Chair continued regarding the affairs of the WG. No particular date for a formal WG II/5 meeting in 1995 was agreed upon by the membership. However, periodic informal meetings between members residing in the local Washington D.C. metropolitan area were held. Dr. George Lee of U.S. Geological Survey, Menlo Park, California, was able to participate actively in the WG affairs.

On the bright note, Dr. Elassal has agreed to continue as the WG II/5 Chairperson upon retirement from United States Federal Government.

Several responses for the IPS User's Guide have been received and will be included in the Guide. This is an on-going WG II/5 project.

Invited papers for presentation during the XVIII ISPRS Congress were solicited. Three invited papers were forwarded to Commission II for inclusion in the technical program. The Commission has also received directly other papers for inclusion in the WG technical sessions at the Congress.

General Comments

The downsizing of the government and budgetary constraints has impacted Society activities adversely in the United States. In spite of this, essential matters are being addressed. It is hoped that some of these members will be able to travel to attend the XVIII ISPRS Congress in July 1996.

Commission II Special Project WG -

"Upgrading Photogrammetric Instruments"

by Chairman: Dr. Klaus Szangolies (Germany)

Members: 13

State of Science and Technology of Commission II Special Project WG Topics

Several thousand conventional analog plotters and analytical stereoplotters are currently used in practice. We have to consider how to further proceed with them. It is necessary to distinguish between the modernization of existing equipment; e.g. by the exchange of obsolete computers and software for new ones; or the replacement of mechanically connected drawing tables by electronically controlled plotters; and the supplementation of existing equipment, e.g. the extension of the viewing system of stereoplotters by superimposition or higher viewing magnification.

There are company representatives advancing the opinion that in 1996, when the next ISPRS Congress will be held, the upgrading of the conventional instruments will no longer be necessary and will be of academic significance only. They believe digital photogrammetry will have fully replaced traditional photogrammetry at this time.

This opinion seems unrealistic. What can be expected is that the transition to digital photogrammetry will be

steadily continued in map production and in the generation of GIS data banks. It will, however, still take ten years or more until it is completed. And during this time we need functioning optical-mechanical and analytical instruments as well as techniques for mapping.

Accomplishments of Commission II Special Project WG During 1995

Three WG Meetings were held in Germany during 1995:

- in Dresden, Technical University, on 30 January;
- in Cologne, during GEOTECHNICA, on 5 May;
- in Dortmund, during Deutscher Geodatentag, on 24 August.

General Comments

All members of the Special Project WG and all interested photogrammetrists are invited to participate in the ISPRS Congress in 1996 in Vienna with a paper related to the subject.

Inter-Commission WG II/III -

"Digital Photogrammetric Systems"

by Chairman: Prof. Ian Dowman (U.K.)

Co-Chairman: Dr. David McKeown (USA)

Secretary: Zubbi Nwosu (Switzerland)

Members: 220

State of Science and Technology of Inter-Commission WG II/III Topics

Digital photogrammetric systems continue to develop at a rapid rate. Several new systems have been announced during the past year and in particular the Zeiss PHODIS is now installed and operating in a number of centres. A major development in software is for digital aerial triangulation and both Zeiss and Leica now have this software ready. Photogrammetric software is also becoming more widespread within image processing systems and ERDAS have extended their range to include Softcopy Mapper.

A significant meeting for presenting digital systems was the "Photogrammetric Week" in Stuttgart in September 1995 and although this meeting focused on Zeiss products, it also contained papers looking at general software developments.

There is increased 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 modeling within computer vision algorithms. There are active efforts to demonstrate and evaluate the utility of these techniques within several national mapping agencies, particularly IGN in France and USGS in the USA. One merging application area for digital photogrammetric workstations is the construction of large-scale databases for distributed visual simulation.

Accomplishments of Inter-Commission WG II/III During 1995

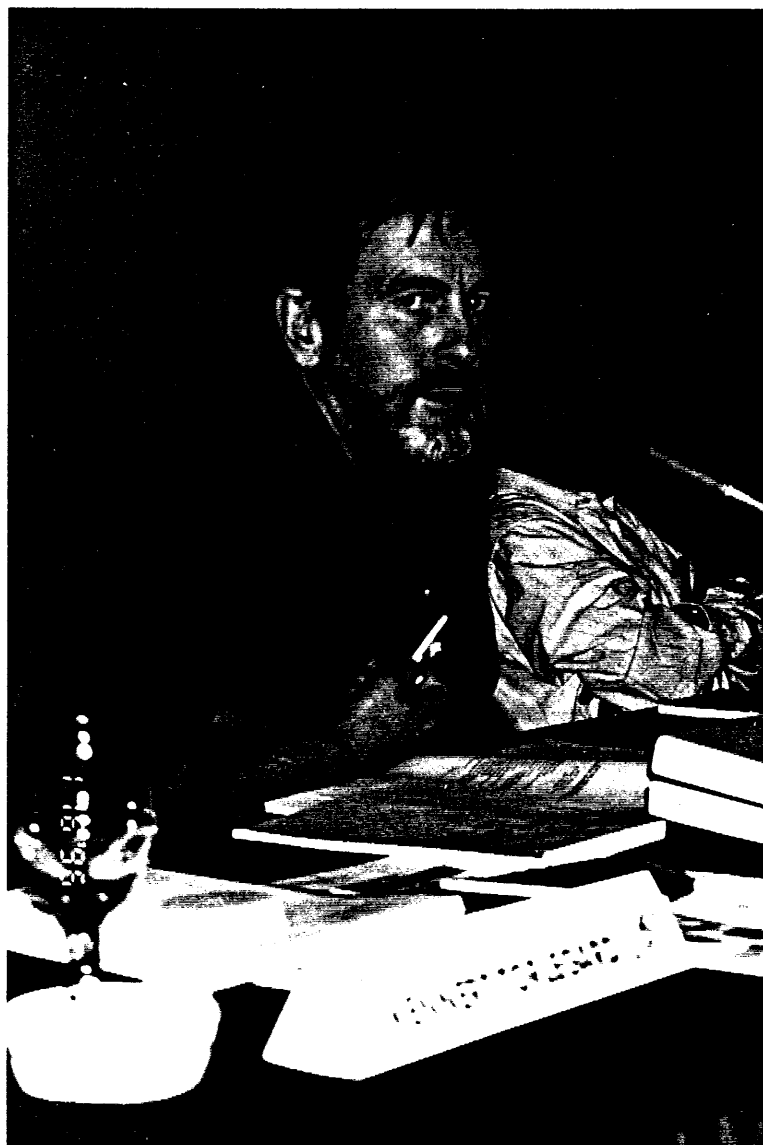
- 27-29 March 1995 - Kuala Lumpur, Malaysia
"Seminar of Integrating Remote Sensing and GIS Data."
Co-organizer with the Technical University of Malaysia.
Published proceedings.

- 19-25 April 1995 - Orlando, USA
Co-organizer with SPIE Conference on "Integrating Photogrammetric Techniques with Scene Analysis and Machine Vision II." Published proceedings: SPIE Volume Number 2486, 27 papers, 300 pp.

- 30 August-1 September - Stockholm, Sweden
Joint Workshop with ISPRS WG's III/2 and III/3 on "The Role of Models in Scene Analysis," in seven sessions, each with two invited speakers and a discussion moderator.

Two newsletters have been produced and circulated to the members of the IC WG II/III.

A business meeting was held at the SPIE meeting in Orlando and a questionnaire has been circulated to determine the interests of members of the working group with a view to planning a program for 1996-2000 term.



TECHNICAL COMMISSION III

"THEORY AND ALGORITHMS"

Prof. Dr.-Ing. Heinrich Ebner, Commission III President

Dr.-Ing. Christian Heipke, Commission III Secretary

Dipl.-Ing. Konrad Eder, Commission III Secretary

(GERMANY)

TERMS OF REFERENCE

- Algorithms for geometric determination and analysis of photogrammetric data
- Feature extraction from multisensor, multiresolution, multitemporal imagery
- Image understanding
- Integrated sensor orientation
- Image sequence analysis
- Algorithms for digital photogrammetric systems and their GIS integration
- GIS concepts, with particular emphasis on integration of image data

reconstruction with uncalibrated or only partially calibrated cameras.

- Image compression is gaining interest, first results are available.
- Image matching is still being developed due to problems related to non-smooth surfaces and occlusions.
- Automated digital aerotriangulation is available.
- Automated topographic feature extraction attracts many researchers. Buildings and roads are of interest especially in the frame of updating such data.
- The cooperation between photogrammetry and computer vision has been broadened through a number of successful meetings and personal contacts.

STATE OF SCIENCE AND TECHNOLOGY OF COMMISSION III TOPICS

- Integration of different sensor models and sensor data makes progress, a future focus will need to be on error modelling for information fusion.
- GPS supported aerotriangulation is operational and continues to gain acceptance.
- Substitution of aerotriangulation by direct measurement of exterior orientation parameters is under way.
- GPS real time kinematic positioning at 1-10 cm level is a reality for baselines up to 20 km.
- An increasing cooperation between the geodesy and the photogrammetry/remote sensing communities is taking place.
- Geometric problems in photogrammetry are becoming more interesting, especially the problems of orientation without approximate values and the

- In image understanding, the complex aspect of object modelling needs more attention.
- A number of common research issues exists between the more theoretical aspects of GIS and digital photogrammetry, especially in real world modelling.
- Concepts of object oriented approaches in GIS are being established, but a widening gap between research and implementation is being observed.
- 3D modelling, mainly based on vector data, has been formulated.
- In order to achieve further progress in 3D modelling a closer link with actual applications is suggested.
- Integration of data from multiple sources needs more attention. The efforts should be integrated with those from automatic object recognition.
- First attempts to handle GIS data at different aggregation levels have appeared.

- Progress can be observed in the investigation on query spaces and the formulation of query languages.
- Uncertainty handling in GIS still needs more attention.

ACCOMPLISHMENTS OF COMMISSION III DURING 1995

Various successful international conferences within Commission III were organised by the individual Working Groups (WG's). Please refer to the individual WG reports for details.

COMMISSION III NEWS

The most important upcoming event is naturally the XVIIIth ISPRS Congress in Vienna in July 1996. Commission III will have an organising meeting for all officers during 1-2 February 1996 for the preparation of the 16 oral and six poster sessions and all other commission related issues. In addition to a number of invited papers, Commission III will feature two highlight papers, to be given by Prof. Toni Schenk, Ohio State University, on "Digital Aerial Triangulation" and Prof. Ram Nevatia, University of Southern California, on "Matching in 2-D and 3-D."

WORKING GROUP ACTIVITIES DURING 1995

WG III/1 - "Integrated Sensor Orientation"

by Chairman: Ismael Colomina (Spain)

Co-Chairman: James R. Lucas (USA)

Secretary: Jose A. Navarro (Spain)

WG Members: 63

State of Science and Technology of WG III/1 Topics

Progress in sensor orientation for frame and line sensors has been made in two different areas. One area of research and development pursues the automation of point transfer for aerial triangulation by means of image processing techniques. This requires digital images and is, therefore, of great interest in digital photogrammetric environments. Operational systems have been already announced by vendors. The second research and development area pursues the elimination of the aerial triangulation itself by the direct determination of sensor orientation parameters by means of GPS and/or INS. Results from written reports as well as from ongoing

experiments indicate that the accuracy delivered by the full integration of GPS and INS is getting close to that of conventional aerial triangulation under production conditions. Results of practical projects indicate that GPS aerial triangulation will soon get rid of operational constraints (cross strips) required in some of the currently applied strategies. This is achieved by improved GPS kinematic processing algorithms. Direct determination of orientation parameters with the above mentioned techniques for range sensors is a reality.

Integration of different sensor models and control information models is no longer a problem. There are a number of experimental, development and operational computer programs which do this. Experiments have been reported with integration of physical and geometrical models for trajectory determination.

Though the use of one dimensional features as control information continues to be an area of further research for practical purposes, the major problems are the reliability of results in automated systems and the automation problem itself. Therefore, quality (photogrammetric/mathematical aspects of reliability) and automation (photogrammetric/computational aspects of automatic system integration) of general sensor orientation systems are the two next challenges.

Bibliography:

We suggest browsing through the following meeting proceedings:

- **Proceedings of the "3rd International Workshop on High Precision Navigation"**. Organized by the Special Study Group 228 (High Precision Navigation), University of Stuttgart, April 1995, Stuttgart. (Published by Dümmler.)
- **Proceedings of the "1995 [1st] Mobile Mapping Symposium"**. Organized by the Center for Mapping and by the Department of Geodetic Science and Surveying at Ohio State University, 24-26 May 1995, Columbus, USA. (Published by the American Society for Photogrammetry and Remote Sensing.)
- **Proceedings of the Workshop "Integrated Sensor Orientation: Theory, Algorithms and Systems"**. Co-organized by FIG-IAG-ISPRS-IUSM, 4-8 September 1995, Barcelona, Spain. (Published by Wichmann.)
- **Proceedings of the 45th Photogrammetric Week**. Organized by the Institute of Photogrammetry at University of Stuttgart, 11-15 September 1995, Stuttgart, Germany. (Published by Wichmann.)

Other interesting publications are:

T. Ohlhof, 1995, "Lokale, regionale und globale Punktbestimmung mit Dreizeilenbilddaten und Bahninformation der Mars96-Mission," PhD thesis, Technical University Munich, Germany.

J. Skaloud, 1995, "Strapdown INS orientation accuracy with GPS aiding," MSc thesis, Department of Geomatics Engineering, The University of Calgary, Canada.

Accomplishments of WG III/1 during 1995

The WG activities have been devoted to the organization of the workshop "Integrated Sensor Orientation: Theory, Algorithms and Systems" in Barcelona, 4-8 September 1995. In addition to ISPRS's WG's I/2 and II/1, the meeting was co-organized by: the International Association for Geodesy (IAG), SC 4, SSG 1.105, SSG 4.138; the International Federation of Surveyors (FIG), WG 5.4 and the International Union for Surveys and Mapping (IUSM), WG on GPS. The meeting was hosted by the Institut Cartografic de Catalunya.

Ninety-five participants from 14 different countries attended the meeting. There were 35 invited speakers. Proceedings were prepublished by Wichmann. They can be also obtained directly from the WG.

General Comments

Contacts to FIG and IAG, also as stated in the Terms of Reference of the WG, have been formally established during the preparation and during the celebration of the Barcelona Workshop. These contacts have confirmed the need for a continuous close cooperation between photogrammetry/remote sensing, geodesy and surveying. We illustrate the statement with two examples: recent developments on the geodesists side in GPS/INS integration for direct determination of sensor position and attitude in photogrammetry and remote sensing; use of radar interferometric techniques to complement high precision GPS for the assesment of tectonic deformation. To keep the contacts some participants and members of the sister society FIG proposed to consider the possibility of organizing a 2nd workshop on the same topic.

WG III/2 - "Geometric - Radiometric Models and Object Reconstruction"

by Chairman: Prof. Dr. Kennert Torlegård (Sweden)
Co-Chairman: Prof. Dr. Wolfgang Förstner (Germany)
Secretary: Dipl.-Ing. Eberhard Gülch (Sweden)
WG Members: 78

State of Science and Technology of WG III/2 Topics

Geometric Problems in photogrammetry are becoming more interesting, especially the problem of orientation without approximate values and the reconstruction with uncalibrated or only partially calibrated cameras.

First results on the effects of image compression on matching for DEM extraction and feature extraction procedures are available.

Matching techniques still are further developed, due to the problems of non-smooth surfaces and occlusions. Matching of 2-D images to 3-D objects is the main focus. The matching of models to images is of increased importance for automatic image registration of aerial and satellite scenes for change detection.

Automated digital aerial triangulation is available. Academia and vendors offer a variety of approaches and solutions for fully automatic block formation and digital point transfer. The measurement of control points or control structures requires user interaction.

Topographic feature extraction from aerial imagery attracts many researchers, especially roads and buildings are of special interest. Interaction is still essential for all methods. The detection of buildings can be based on additional height information from DEM's or laser scans. The strategies for the extraction of buildings do not differ very much and are mostly based on multi-image analysis and linear features. There is so far no common strategy apparent for road extraction. Road extraction is also applied to panchromatic satellite imagery of high resolution.

Accomplishments of WG III/2 During 1995

- Spring 1995 - Proposals and organization of WG III/2 tutorial for the Vienna Congress
 - The Tutorial on "Projective Geometry for Geometric Image Analysis" will be held by Prof. Dr. Roger Mohr of Inria, France.
- 6 July 1995 - Circular Letter No. 4
 - Programme and Registration for Joint Workshop
 - Information and Call for papers ISPRS Congress, Vienna, 1996
- 30 August-1 September 1995 - Joint Workshop of WG III/2 and IC WG II/III on "The role of models in automated scene analysis" held in Stockholm, Sweden. Proceedings are available as **Photogrammetric Report No. 63 of the Department of Geodesy**

and Photogrammetry, Royal Institute of Technology, 10044 Stockholm, Price 250:- SEK.

The workshop was jointly organized by the Intercommission WG II/III "Digital Photogrammetric Systems" and WG III/2. The overall Workshop goal for the about 50 participants was the discussion of the "specific requirements on models for objects, sensors and interpretation and their impact on design and performance of algorithms in automated image analysis for various applications."

Fourteen invited lecturers from both photogrammetry and computer vision presented their opinions in seven "disputations" (sessions). A number of questions raised for each session and distributed beforehand focused the lectures as well as the discussion and are quite a good idea for other workshops of this kind.

The sessions included the following topics and speakers:

- Balance between Semi- and Fully Automated Scene Analysis Systems: O. Jamet; J. Thorpe

- Pro's and Con's of Parametric Models: C. McGlone; P. Fua
- Interpretation Models and Reasoning Strategies: B. Neumann; T. Schenk
- Implementation issues for Orientation Algorithms: H. Haggren; W. Mayr
- Matching, Grouping: R. Nevatia; K. Boyer
- Visualization and Simulation: M. Gross; G. Lukes
- Geometry in Scene Analysis: D. Mulawa; A. Zisserman

- 30 August 1995 - WG III/2 Business Meeting
 - Chairman, Co-Chairman, Secretary and 11 participants
 - WG status report by secretary
 - Discussion on proposals and terms of reference for continuation of WG in period 1996-2000
 - Discussion on proposals for invited speakers for WG sessions at the ISPRS XVIII Congress in Vienna 1996
 - Information on Tutorial by WG III/2 at the ISPRS Vienna Congress 1996



WG III/2 News

The WG is keeping close contact to specific OEEPE projects:

- Feature Extraction from High Resolution Space Imagery
- Digital Methods in Aerial Triangulation
- Planned activities on producing 3D data in built-up areas for a 3D GIS

Forthcoming WG III/2 Activities

- 8 July 1996 - WGIII/2 Tutorial at ISPRS Congress
- 9-19 July 1996 - WG Sessions during ISPRS Congress

General Comments

The 24-28 April Ascona '95 Workshop on "Automatic Extraction of Man-Made Objects from Aerial and Space Images" gave an excellent overview of the state-of-the art in cartographic feature extraction.

The 11-15 September Photogrammetric Week'95 in Stuttgart, Germany gave an excellent overview of the state-of-the art in automated digital aerial triangulation.

All topics from the terms of reference of WG III/2 are still valid and of high interest.

Up to now it is two working groups (III/2 and III/3) that focus on Image Analysis from a theoretical, algorithmic point of view. It should be discussed if a new structure with three working groups on: a) low-level vision; b) high-level vision; and c) a linking WG could be advantageous.

Image compression and its effects on algorithms and results should be addressed by a WG.

A specific WG should take care of the mathematical and algorithmic aspects of the analysis of radar imagery.

WG III/3 - "Semantic Models and Object Recognition"

by Chairman: Dr. Toni Schenk (USA)

Co-Chairman: Dr. Dieter Fritsch (Germany)

Secretary: Monika Sester (Germany)

WG Members: 49

State of Science and Technology of WG III/3 Topics

During the reporting period the following workshops were held with topics related to WG III/3:

- Ascona Workshop - "Automatic Extraction of Man-Made Objects from Aerial and Space Images

- Stockholm Workshop - "The Role of Models in Scene Analysis"
- WG III/3 Workshop in Stuttgart (see below).

All these events revealed the state of the art of science related to our working group topics. It appears that within the paradigm of object recognition and image understanding the aspect of modeling the objects to be recognized is a crucial and yet unsolved problem. The flexibility and the richness of models determine the applicability and generality of an interpretation system. Still another major problem is the incorporation of knowledge into the interpretation process. That is, its acquisition and its interaction with generating and verifying hypotheses.

Accomplishments of WG III/3 During 1995

The major event was the second workshop of WGIII/3. It was held in Stuttgart during 8-10 November 1995, under the title "Integrated Acquisition and Interpretation of Photogrammetric Data." This Workshop was jointly organized with WG I/3: Integrated Data Acquisition Systems and WG II/1: Real Time Mapping. Sponsors of the workshop included the Stiftung Volkswagenwerk.

Integration was the main focus of the workshop. Several experts from different disciplines, such as, Photogrammetry, Computer Vision and Geodesy were invited to discuss common problems. Common interest of these disciplines is the acquisition and processing of spatial data. In order to achieve some degree of automation, different sensors and sources of knowledge have to be used together in an integrated way - an awareness shared by all disciplines. The major issues related to WG III/3 are summarized as:

- concerning the interpretation of man-made objects, more and more different sensors are used in an integrated manner (e.g. range and image information: Riseman, Haala)
- the use of parametric models is quite frequent, especially when modeling buildings (Weidner, Haala)
- new approaches attempt to model objects based on relational structures, e.g. semantic networks (Liedtke)
- the integration of GIS in image understanding is not yet fully exploited; in fact, only very specific data is used for supporting the interpretation process (Maitre, Plietker). Additional structural information is not used, for example.

Another important activity of our WG is the test on image understanding. By the time of the deadline in April 1995 we received results from some 10 research groups. Currently, we are evaluating the results. A final report will be presented at the ISPRS Congress in Vienna in July 1996.

WG III/4 - "Tutorials on Theory and Algorithms"

by Chairman: Prof. Fabio Crosilla (Italy)
 Co - Chairman: Gábor Mélykúti (Hungary)
 Secretary: Roberta Raber (Italy)
 WG Members: 3

Accomplishments of WG III/4 During 1995

The working group organized the following tutorials:

Basic Concepts of GIS

Place: Technical University of Budapest, Hungary
 Date: 12-13 June 1995
 Participants: 15 people from Europe and Asia
 Objective: To give an overview of GIS theory
 Description: The two-day tutorial consisted of five presentations. Prof. Detrekóti (TU Budapest) held a lecture on "Data Captures for GIS". Prof. Molenaar (Agricultural University Wageningen) spoke about "Spatial Data Modelling". Gy. Szabo (TU Budapest) concentrated on "GIS Methods," systems components, input/output procedures in respect of data presentations. P. der Haar (Intergraph European HQ) presented a lecture on "Future Trends in GIS." Prof. A.U. Frank (TU Vienna) gave a lecture on the "Strategies for the Introduction of GIS."

After the lectures there were some demonstrations by Gy. Szabo and A. Barsi (TU Budapest) on Data models for GIS, Digital Elevation Modelling, Data Capture Using Digital Photogrammetry and Thematic Mapping Procedures.

Spatial Data Analysis: Theory and Algorithms

Place: International Centre for Mechanical Science, Udine, Italy
 Date: 13 June 1995
 Participants: More than 50 people from four countries (mostly from Italy)
 Objective: To highlight the current status on the conceptual aspects in designing GIS
 Description: The one-day tutorial consisted of four lectures. N. Bartelme (TU Graz) focused on modelling and organizing data in structures. A. van der Meer (Agricultural University of Wageningen) concentrated on

GIS data processing techniques for queries to the system, data transformation and generation of new data by deduction. R. Laurini (University of Lyon) moved to the less-established field of Dynamic GIS. The last speaker, T. Ertl (University of Erlangen) introduced the principles of Computer Graphics and the basics of surface 3D representation.

Inter-Commission WG III/IV -

"Conceptual Aspects of GIS"

by Chairman: Prof. Dr. Martien Molenaar
 Co-Chairman: Dr. Ryosuke Shibasaki
 WG Members: 46

State of Science and Technology of Inter-Commission WG III/IV Topics

State-of-the-art of WG topics are summarized mainly based on the discussions in the Commission Symposia and in the workshop mentioned below.

• Object/Space Modeling for GIS

- Concepts on object oriented approaches in GIS are being established today, and the number of papers on the object-oriented approach already seem to be decreasing in conference proceedings and journals. But very few geo-information systems can really handle such an approach, and a gap between research and implementation is observed.

- 3D modeling mainly based on the vector form have been formulated. For further development, closer links with actual applications of 3D GIS would be helpful to validate proposed formulations and data structures and to drive research towards more efficient 3D data acquisition and development of 3D databases.

• Integration of data from multi-sources

- Unfortunately, there have not been many papers presented in the Symposia and the workshop on this topic. However, integration of data from multi-sources especially for continuous and efficient update of GIS databases is increasingly important as more remote sensors are emerging. Since integration or fusion of data is also recognized as a indispensable concept for automated object- recognition, the approach should be integrated at higher levels of GIS framework to realize autonomous and continuous development and update of GIS databases.

• Linking aggregation levels

- Relevant developments are in the field of map-generalization, but this is mainly directed at handling maps at different scale levels and thus

oriented toward the production of graphical output. Although several papers addressed issues of linking thematic aspects and keeping consistency between different levels, this direction should be promoted more.

• *Query space*

- Development of query spaces and formulation of query languages is steadily progressing, especially towards accommodating more cognitive aspects. It is expected that these discussions will be feedback to object/spatial modeling.

• *Handling uncertainty*

- As for uncertainty issues, several papers have dealt with specific problems such as fuzzy views due to DEM uncertainties and merging several fuzzy lines into one. Directions toward more general theoretical frameworks have been developed to the effect that a mathematical formulation has been given for handling the fuzzy spatial extend of objects in vector and raster formats. The formulation of fuzzy spatial relationship is at present a topic of research for several scientists.

Accomplishments of Inter-Commission WG III/IV During 1995

In June 1995 the IC WG III/IV participated in the organization of:

- a tutorial in Budapest Hungary on "Basic Concepts in GIS" on 12-13 June together with WG III/4 and the Technical University Budapest. This tutorial was organised in conjunction with the GIS/LIS Conference on 14-16 June; and
- a tutorial in Udine Italy on "Spatial Data Analysis: Theory and Algorithms" on 13 June, together with WG III/4 and CISM in Udine.

In August 1995, the IC WG III/IV jointly organized with the Asian Association on Remote Sensing (AARS), AM/FM International, GIS Commission of International

Geographical Union (IGU) and other institutions in Bangkok, Thailand:

- a tutorial workshop GIS/LIS on 21 August;
- the GIS AM/FM ASIA'95 conference (ASIA: And Spatial Information Analysis) on August 22-25. Topics of technical sessions included Development of GIS in Asia; Data Structure; Spatial Analysis; Spatial Modeling; Quality of GIS Data and Error Propagation; Integration of GIS and Remote Sensing; Integration of GPS and GIS, and; Automated Data Capture.

In October'95, the IC WG III/IV organized a "Second Workshop on Advanced Geographic Data Modeling" (AGDM'95) near Ottawa, Canada with the Canadian Centre for Remote Sensing (CCRS) and Laval University. The main topics planned were: data integration, RS-GIS integration, multiscale problems, uncertainty.

Due to circumstances, the meeting had to be cancelled. The proceedings will be published in a special issue of *Cartographica* in spring 1996.

WG III/IV News

The WG with CCRS in Ottawa will publish the proceedings of AGDM'95 as a special issue of *Cartographica*.

The WG is preparing a full day tutorial on "Conceptual Aspects of GIS Technology" for presentation on 8 July 1996 as part of the XVIII ISPRS Congress in Vienna.

The WG will organise four (Joint) technical sessions at the Vienna ISPRS Congress, topics are: 3-D GIS, Uncertainty in Scene Analysis and GIS, Multiscale Problems.

The WG is involved in the organisation of the "International Symposium on Spatial Data Handling" (SDH'96) to be held 12-16 August Delft, The Netherlands.

TECHNICAL COMMISSION IV

"MAPPING AND GEOGRAPHIC INFORMATION SYSTEMS"

Dr. Roy Welch, Commission IV President
Dr. Marguerite Remillard, Commission IV Secretary
(UNITED STATES OF AMERICA)

TERMS OF REFERENCE

- Analog and digital mapping procedures and products
- Revision of topographic maps and map databases
- Data acquisition, data processing, analysis of data and visual representation in GIS
- Application of GIS to land related record management (e.g., multipurpose cadastre and utility mapping) and decision making tasks
- Radar and planetary mapping
- Digital elevation models

STATE OF SCIENCE AND TECHNOLOGY OF COMMISSION IV TOPICS

Accurate maps and digital databases from which large scale thematic maps can be prepared for resource inventory, change assessment and map revision tasks are needed by organizations concerned with applications such as preservation of the natural environment and urban planning. Pressures from urban development, loss of wetlands, intensified use of agricultural lands and clear cutting of timber all threaten the long-term sustainability of the world's resources and contribute to non-point source pollution. Also, the recent popularity of geographic information systems (GIS) as a tool for combining diverse data sets to manage land resources and model future land uses, threats to the environment and sustainability of resources has been a catalyst for the increased demand for accurate spatial information.

However, in order to effectively produce maps, generate statistics and model future developments, the various data sets must be thematically correct and geometrically positioned on a standard reference datum so that there is exact registration of the (map) data layers and an accurate "fit" to the earth's surface. Thus, although it is often overlooked in the enthusiasm to manipulate data, the first and most important requirement is to be able to assemble data layers of adequate detail and accuracy for resource management/inventory tasks. Consequently,

there must be an understanding of positioning, measurement and analysis techniques and how they interrelate in the preparation of maps and databases.

In planning for the compilation of resource/urban databases and the eventual preparation of products in digital format, thoughtful consideration must be given to:

- project and end-product requirements;
- coordinate systems and GPS;
- mapping and database assembly techniques; and
- GIS analysis procedures.

In the upcoming years, new advancements in GPS, softcopy photogrammetry and GIS technologies, along with improvements in computer hardware processing power/storage capabilities and the acquisition of new high-resolution satellite image data from commercial satellites will be particularly critical to the successful implementation of projects requiring the preparation of maps and databases in digital format.

ACCOMPLISHMENTS OF COMMISSION IV DURING 1995

In June 1995, Dr. Welch and Dr. Remillard attended the ISPRS Joint Council and Technical Commission Presidents Meeting in Vienna, Austria. At this meeting, the upcoming XVIII Congress in Vienna, review procedures for abstract selection, and organization of Congress Technical Sessions were discussed. The Vienna Convention Center where the Congress will be held in July 1996 also was toured.

Several Commission IV Working Groups conducted Workshops in 1995. Dr. Marguerite Remillard participated in the WG IV/6 "International Workshop on Global Databases," held in conjunction with the "Global Land One-Km Base Elevation Data" (GLOBE) Meeting at the National Geophysical Data Center (NGDC/NOAA) during 30-31 May 1995 in Boulder, Colorado, USA. At this meeting, two papers were presented entitled "Remote Sensing and GIS for Regional/Global Scale Vegetation Mapping" authored by herself, and "Image and Map Data for Global DEMs" by Dr. Roy Welch. Dr. Welch and Dr. Remillard also

contributed to the Proceedings of this Workshop (Edited by R. Tateishi) with two written papers.

Mr. Thomas Jordan of the Center for Remote Sensing and Mapping Science (CRMS), Department of Geography, The University of Georgia, represented Dr. Welch at the IUSM GIS/LIS WG Workshop held September 25-27, 1995 in Hannover, Germany. The Workshop, entitled "Current Status and Challenges of Geoinformation Systems", was organized by Prof. Gottfried Konecny, Chairman of ISPRS WG IV/2. Mr. Jordan presented a paper at this meeting authored by Dr. Welch. Dr. Welch also contributed a written paper to the published proceedings of this Workshop.

Dr. Remillard attended the ISPRS WG IV/2 "International Mapping from Space Workshop" held 27 November-1 December 1995 at Anna University, Madras, India and organized by Prof. Gottfried Konecny. At this meeting a paper authored by Dr. Roy Welch and Dr. Remillard was presented entitled, "U.S. Government and Commercial Remote Sensing Satellite Programs: 1995 - 2000".

In addition to attending these various workshops and meetings, Dr. Welch and Dr. Remillard have collected invited papers for a special issue of the *ISPRS Journal of Photogrammetry and Remote Sensing* that will be focused on Commission IV activities. A total of five papers were reviewed, edited and submitted to the Editor of the *Journal* for inclusion in the June 1995 issue. The titles and authors of these papers are listed below:

- "Mapping from Digital Satellite Image Data with Special Reference to MOMS-02" by Gottfried Konecny and Jochen Schiewe, Institute for Photogrammetry and Engineering Surveys, University of Hannover, Germany,
- "Costs of Softcopy Orthophoto Bases for GIS Projects" by L. Harold Spradley, Survey Resources International, Inc., Houston, Texas.
- "Digital Images in the Map Revision Process" by Paul R. T. Newby, GEO-UK, Ltd., Hants, United Kingdom.
- "3-D City Models for CAAD-Supported Analysis and Design of Urban Areas" by Martina Sinning-Meister, Armin Gruen and H. Dan, Institute for Geodesy and Photogrammetry, Swiss Federal Institute of Technology, Zurich, Switzerland.
- "Mapping Evapotranspiration and Water Balance for Global Land Surfaces" by Ryutaro Tateishi and C. H. Ahn, of the Center of Environmental Remote

Sensing, and the Department of Information and Computer Science, respectively, Chiba University, Japan.

COMMISSION IV NEWS

Commission IV is currently heavily involved in preparations for the XVIII ISPRS Congress to be held July 1996 in Vienna, Austria. Having received the largest number of solicited abstracts of any Commission (a total of 246), Dr. Roy Welch, Dr. Marguerite Remillard and the WG Chairpersons have finalized the selection of abstracts for the Technical Program. Commission IV has been allocated a total of 14 oral Technical Sessions and six Poster Sessions and will be involved in two Inter-Commission Sessions with one Inter-Commission WG III/IV session and one shared session with Commission I.

WORKING GROUP ACTIVITIES DURING 1995

WG IV/1 - "GIS Data and Applications"

by Chairman: Dr. E. Lynn Usery (USA)

Co-Chairman: Dr. Kirsi Artimo (Finland)

State of Science and Technology of WG IV/1 Topics

The following statements relate advances in science and technology to the Terms of Reference for WG IV/1.

- *Digital technologies for the integration of photogrammetric and remote sensing data with GIS*

Softcopy photogrammetry:

- Continued improvements in performance of PC platforms are creating a significant market in areas where workstations are not affordable and extending softcopy photogrammetry to general GIS users.
- Advances in PC-based operating systems and windowing environments are providing common user interfaces for integrated raster/vector GIS in the commercial marketplace.
- Object orientation allows support of multiple applications including photogrammetry, remote sensing, and GIS on a single platform and in a single windows-based environment.

- *Role of GPS, photogrammetry, remote sensing and digital image processing in the construction and revision of GIS databases*

- GPS/GIS integration is occurring with the use of GIS on notebook computers interfaced to GPS receiving units for real-time mapping and data collection.

- Remote sensing and digital image processing provide fundamental inputs for GIS database construction and are included in the real-time mapping applications.

- *Status of computer hardware and software for GIS*

Hardware:

- Continued improvements in CPU performance, memory and disk storage capacities, and notebook computers increase the spread of GIS to new applications and realtime use for data collection.
- Advances include abilities to produce CD-ROM archives on a PC with the write devices below \$1,000 and the inclusion of multimedia capabilities on PC's.
- A summary of multimedia advances was prepared for the WG by Loey Knapp and Fred Ris of IBM Corporation and is published in the **Proceedings of the Workshop on Mapping and Environmental Applications of GIS Data**.

Software:

- User interfaces have improved with new object-oriented approaches and easily support integrated raster/vector systems.
- Software support on a single system for GIS, image processing, and softcopy photogrammetry is now common on both PC and Unix workstation platforms.
- Traditional DOS-based applications are rapidly being migrated to windows environments.
- *Methods of applying GIS technology to mapping, planning and natural resource inventory at local, regional and global scales*
- Applications of GIS continue to expand as evidenced by the growing number of GIS related conferences, magazines and publications. The **Proceedings of the Workshop on Mapping and Environmental Applications of GIS Data** provides an example of the diversity of methods and applications of GIS.

Accomplishments of WG IV/1 During 1995

- March 1995

WG IV/1 conducted a planning meeting at the American Society for Photogrammetry and Remote Sensing Annual Meeting held in Charlotte, North Carolina, USA.

- 28-29 September 1995

WG IV/1 held a meeting on "Mapping and Environmental Applications of GIS Data" in Madison, Wisconsin, USA. The meeting included 26 technical presentations to an audience of 75 attendees. Proceedings of the meeting including 23 technical papers were published.

WG IV/1 News

WG IV/1 is continuing the study of the development of cartographic objects from GIS. These objects are feature-oriented and provide complete information for placement on a map when the feature is selected from the GIS database.

WG IV/1 has finalized the selection of abstracts for the 1996 ISPRS Congress in Vienna. A total of 90 abstracts were submitted to WG IV/1. Three Technical Sessions have been allocated

WG IV/2 - "International Mapping from Space"

by Chairman: Prof. Dr. Gottfried Konecny (Germany)
Co-Chairman: Donald Light (USA)

State of Science and Technology of WG IV/2 Topics

During the report period a tendency for the use of high resolution satellite imagery has become obvious. While the classical programs of NASA/NOAA, CNES, NASDA, ISRO all plan higher resolution imagery systems, the MOMS 02/D2 Mission has provided high resolution imagery at the five meter resolution level in addition to the release of Russian: KWR 1000 and KFA 3000 high resolution photography. The ESA ERS-1/2 tandem mission for radar interferometry was launched at the end of 1995. In addition a number of commercial ventures for high resolution stereo imagery are in the planning stages for the next five years. The "Mapping from Space" interest has gained a great momentum.

Accomplishments of WG IV/2 During 1995

Since the 1994 Commission IV Symposium in Athens, Georgia, the WG members have participated in the following main events.

- June 1994

EARSeL Workshop "Topography from Space", Goteborg, Sweden (Proceedings in print)

- July 1995

DLR-EARSeL Symposium "MOMS 02/D2", Cologne, Germany (Proceedings in print)

The publications can be obtained at cost from the EARSeL Secretariat, 2 Ave. Rapp, F-75340 Paris Cedex 07, France, Fax: +33-1-4556-7361.

The proceedings of the WG IV/2 Workshop and Conference "International Mapping from Space" held in

1993 in Hannover, Germany, can be ordered at cost (DM 60,-) from the Institute for Photogrammetry and Engineering Surveys, University of Hannover, Nienburger Str. 1, D-30167 Hannover, Germany, Fax: +49-511-762-2483.

WG IV/2 News

The WG conducted a Workshop "International Mapping from Space" held from November 27 to December 1, 1995 at Anna University in Madras, India. This workshop concentrated on the topics:

- Space Programs
- Sensor Requirements
- Tests with Space Imagery
- International Mapping Projects and Updating
- Evaluation Methods (Optical)
- Evaluation Methods (Radar)
- Interface with GIS Technology
- Applications in Thematic Mapping and GIS

46 papers were scheduled, of these 14 were from non-Indian participants.

The workshop helped to finalize the invited papers for the ISPRS Congress in Vienna and make recommendations on the topics given in the terms of reference.

General Comments

Topics on the work of the WG have also been presented at the following conferences establishing a new network of groups interested in space mapping.

- U.N. Cartographic Conference for Asia and the Pacific in Beijing in 1994
- EURISY Space Symposium in Vienna in December 1994
- Africa GIS Conference in Abidjan in March 1995
- MARISY 1995 Symposium in Ifrane, Morocco in October 1995
- The First Arab Space Conference in Damascus in October 1995.

WG IV/3 - "Map and Database Revision"

by Chairman: Paul R. T. Newby (United Kingdom)

State of Science and Technology of WG IV/3 Topics

In a year without meetings of this WG it is hard to report on worldwide progress in research and development. However it is clear from correspondence that system developers and vendors are continuing to make progress in bringing digital photogrammetry

toward real practical application in map and database revision. Leading practitioners continue to develop their own special approaches, and researchers are also assumed to be making progress which can be reported at the Vienna Congress. Meanwhile I have written a commissioned review paper covering progress through the whole session since 1992, which should appear in the **ISPRS Journal of Photogrammetry and Remote Sensing** just before the Congress.

Accomplishments of WG IV/3 During 1995

Unfortunately due to the pressures of my transition from government service to self-employment during the past year, it has not proved possible to hold a WG Workshop. However, in the course of 1995 I participated in the "Seminar on the Integration of Remote Sensing and GIS for Applications in SE Asia," in Kuala Lumpur, Malaysia. There I made a keynote presentation on "Developments in Map Revision" as well as giving a tutorial on practical developments in digital photogrammetry. I was also Manager, under contract from the Ordnance Survey of Great Britain, of the "Cambridge Conference for National Mapping Organisations." At both of these meetings it was possible to renew old contracts across the world of modern mapping.

WG IV/3 News

I followed these meetings by issuing a circular letter to my (now slightly reduced) mailing list of some 320 recipients. This still covers all those who have expressed interest in the WG over the past seven years, as well as ISPRS National Correspondents, and the bulk of ISPRS officers and sustaining members. This letter encouraged participation in the two WG IV/3 sessions and in post sessions at the Vienna Congress, and reached recipients just in time to stimulate them into submitting abstracts before the deadline of 16 October. The response is encouraging, particularly from developing countries which might not have been expected to contribute to the Congress without such a stimulus.

I have also submitted an abstract on my own account, to cover my WG Report to Congress as well as a review of progress in map and database revision during the session. The duration and content of this report and review will depend on the quantity and quality of material submitted for the WG sessions and will be decided in consultation with Commission President Roy Welch.

The WG sessions are provisionally entitled:

- "Map Revision : where are we now?"
(Progress and Practice 1992-96)"
- "Change at the Millennium : is automation possible?"

(Ongoing developments, with total automation the ultimate goal)

A useful subtitle may be "Graphic Revision and Digital Update -field, office and user." (Diverse needs, diverse processes: where should photogrammetry fit in ?). However, final details will also await sight of all abstracts submitted.

WG IV/4 - "Digital Elevation Models (DEMs) and Digital Orthoimages for Mapping/GIS Applications"

Chairman: Dr. Luiz Alberto Vieira Dias (Brazil)

State of Science and Technology of WG IV/4 Topics

The major development was the increase in performance of personal computers, thus enabling GIS systems to be run on small computers, such as the "Spring for Windows".

The contribution of European (German, Austrian and Dutch) and American research in the WG is very strong. There are some contributions from Asia and Latin America, but very few from Africa.

Accomplishments of WG IV/4 During 1995

It was possible for the Chairman of WG IV/4 to attend some meetings and conferences during 1995. Below is an example of events held on the subject of DEMs and digital orthoimages.

- May-Jun 94-ISPRS Comm IV Symposium - USA
- Aug 1994-IEARSS - USA
- Sep 1994-Comdex - Brazil
- Sep 1994-EcoRio 94, ISPRS Comm VII Symp -Brazil
- Nov 1994-Space Conference of the Americas - Chile
- Apr 1995-SOSPAION - Brazil
- May 1995-Cartographer week - Brazil
- May 1995-The Space Congress - Germany
- Jul 1995-Fenas-Fi - Brazil
- Jul 1995-Brazilian Cartography Congress - Brazil
- Aug 1995-Comdex South America - Brazil
- Sep 1995-UN/ESA Meeting - Austria
- Oct 1995-Annual Meeting - Brazil
- Nov 1995-SELPER Meeting - Mexico

WG IV/4 News

As chairman of the Earth Observation Group at the Brazilian National Space Research Institute (INPE), I am in contact with Brazilian and Latin American persons involved in research dealing with the WG IV/4. This year I contacted Chinese researchers on geo-processing and DEMs. Increasing cooperation with the Chinese is

expected. A contact was established with Italy, but the financial resources are not yet secured.

WG IV/5 - "Extraterrestrial Mapping"

by Chairman: Dr. Sherman S. C. Wu (USA)

WG Members: 35

State of Science and Technology of WG IV/5 Topics

Research currently being conducted in Germany and the United States was reported at the Commission IV Symposium. Papers of note included German scientists' plans for the processing and analysis of image data acquired by the Mars '96 pushbroom cameras (Oberst, et al and Tang) and an Invited Paper on the Lunar Clementine mapping mission and Lunar Control Network by Davies (USA).

Accomplishments of WG IV/5 During 1995

WG IV/5 currently has over 35 members organized into eight Sub-Working Groups listed below. A major goal of these Sub-Working Groups is to produce a book entitled, "Extraterrestrial Mapping".

1. Cameras, remote sensing devices, and data acquisition.
2. Data processing, enhancement, and management.
3. Coordinate system and control network.
4. Mapping techniques and instrumentation.
5. Advancement of technology.
6. Archives and publications.
7. Planetary missions and coordination.
8. International cooperation.

WG IV/5 News

WG IV/5 has organized two sessions for the Vienna ISPRS Congress, one on "Mars Mapping Efforts" and one encompassing other planetary mapping missions such as the Lunar Clementine, Venus Magellan and Jupiter Galileo Missions. The first session will include presentations on mapping Mars from data acquired by the Russian Mars '96 Mission and the Mars Global Surveyor Mission.

WG IV/6 - "GIS and Expert Systems for Global Environmental Databases"

by Chairman: Dr. Ryutaro Tateishi (Japan)

Co-Chairman: Dr. Hiroshi Murakami (Japan)

State of Science and Technology of WG IV/6 Topics

The main topic of the WG is the development of global databases for key environmental variables to be used in global change studies and the establishment of global

environmental policies. Though many organizations and individual researchers are developing global datasets of environmental variables such as DEM, land cover, soil type, population, etc., there currently is no standard framework. Subjects to be pursued for the development of better global databases are:

- establishment of several standards of legend/classification systems for categorized variables;
- methods for the estimation of accuracy and standard formats of recording accuracy/quality data;
- selection of map projections;
- data management/distribution system; and
- methodology of integration of local data into global datasets.

Accomplishments of WG IV/6 During 1995

The International Workshop on Global Databases was held on May 30-31, 1995, at the National Geophysical Data Center, Boulder, Colorado, USA. A report of the **International Workshop on Global Databases, Vol. XXX, Part 4W1** of the ISPRS Archives, was published and is available from RICS Books (Fax: +44-171-334-3800).

A questionnaire about National and Regional Geographic Databases was distributed in order to collect the information about availability of geographic data such as DEM, Hydrology, Land use/cover, Soils/Geology, Political boundaries, Roads and Population. The result of 53 responses from 18 countries is available from the WG IV/6 chairperson.

WG IV/6 News

The WG activities are focused on:

- Development of standard of metadata
- Classification system of land cover
- Integration of local-data into global dataset

Coordinators of ongoing projects to develop global environmental datasets are encouraged to attend the WG IV/6 meeting at the ISPRS Congress in Vienna. Communications among active global dataset developers is the MUST to find better direction on where we should go.

TECHNICAL COMMISSION V

"CLOSE RANGE TECHNIQUES AND MACHINE VISION"

Prof. John G. Fryer, Commission V President

Dr. Mark R. Shortis, Commission V Secretary

(AUSTRALIA)

TERMS OF REFERENCE

- Close-range and microrange measurements
- Recording and monitoring of 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, semi-automatic and manual mode in close-range applications

STATE OF SCIENCE AND TECHNOLOGY OF COMMISSION V TOPICS

The use of still video (sometimes called digital) cameras continues to grow at an ever-increasing rate. 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.

One area where photogrammetric measurements are making a large impact and much new research has been reported from around the world is in the area of dentistry. The measurement of teeth, gums and dentures, especially for the elderly, is an area of research which is attracting a lot of attention as the populations of the developed countries grow increasingly older and health workers realise that they have very little data on this aged sector of the population. In fact, as will be seen in the following report of Working Group V/5,

there is much renewed interest in Biostereometrics in general, and dental photogrammetry in particular.

Another area of global interest is in the recording of some of man's oldest work ... rock-art. Carvings, engravings and paintings on rock faces, caves and shelves are one of the oldest signs we have of our forebears' beliefs, lifestyles and inspirations. Until a concerted effort was begun this year, many of these 'works of art' have been left neglected and have been slowly eroding away under the pressures of our modern world. Photogrammetry, in all its forms from the conventional stereo to analytical to digital analyses and reproduction in the form of printed, plotted, computer-enhanced and even set to ethnic music on a CD-ROM, is playing a leading role in the recording and preservation of this global resource. Look out for more exciting news on this topic in Vienna in July 1996!

The XVIII ISPRS Congress in Vienna will portray this increased emphasis on still- and moving-video technology in the close range environment. At the time of writing this report, abstracts are arriving every day which detail 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 now arises is whether the existing range of photogrammetric journals adequately cover these new developments? Is this the time for ISPRS to launch a new information service or dedicate more of its journal to close-range video theory and applications?

ACCOMPLISHMENTS OF COMMISSION V DURING 1995

The past year has been an active one with several Workshops and Symposia organised by various Working Groups (WGs) and individual Chairmen. Notable amongst these was the Workshop "From Pixels to Sequences" held in Zurich, Switzerland in March 1995. The wide diversity of the audience was noteworthy, as were the leading edges of technology which were discussed. The reports from the individual WG Chairs describe in greater detail the specific activities with which they have been involved.

WORKING GROUP ACTIVITIES DURING 1995

WG V/1 - "Knowledge Based Vision Metrology"

by Chairman: Prof. Kam W. Wong (USA)

Co-Chairman: Dr. Sabry El-Hakim (Canada)

State of Science and Technology of WG V/1 Topics

- *General Comment*

Monitoring trends in the topics of this WG, and Commission V in general, has become increasingly difficult using existing photogrammetric journals. Most have been concentrating their issues on remote sensing and GIS. We have become almost entirely reliant on workshops or conferences organized by the WGs, many in cooperation with other societies, to find the new trends. Is it time for new Journal? It may also be a good opportunity for the **ISPRS Journal** to fill the void.

- *Systems for close range metrology*

For off-line target-based applications, high-resolution digital still cameras have become the sensor of choice. For on-line applications, more precise analogue cameras and frame grabbers are becoming available and at lower costs. Combined with the computer power that is increasingly available, hardware issues are becoming of less concern for close-range digital photogrammetry.

- *Human-machine interface*

The use of Virtual Reality (VR) techniques for computer interaction with environments is an emerging trend. The 3-D environment or site (for example a historical site or a dangerous environment such as nuclear waste site) can be created using photogrammetric techniques and interfaced with VR tools for use in many new applications.

Integration of other sensors, mainly active sensors, with traditional intensity-based CCD cameras has become important for many applications. Obtaining complete, accurate, and fast description of a 3-D object or environment may not be possible without such integration. Methods for data registration and various sensor calibrations are important issues now being addressed in research. Techniques for modelling of objects and environments from the 3-D points obtained by various sensors are also required for convenient analysis, display, and manipulation by computers.

Other WG topics, particularly the use of Artificial Intelligence (AI) techniques, have not gained much interest. However, research on using neural networks for camera and system calibration is gaining popularity in computer vision. Nevertheless, the need to develop

expert systems or AI to computerize some of the routine decision-making functions of photogrammetrists continues to impede wide spread acceptance and applications of metric vision systems.

Accomplishments of WG V/1 During 1995

The main activity for WG V/1 was organizing the SPIE conference "Videometrics IV" held 23-26 October 1995 in Philadelphia, USA. The conference included 38 papers from 15 countries and produced **SPIE Proceedings Vol. 2598** (about 400 pages). The trends mentioned above are evident in the proceedings. The next Videometrics is planned for July 1997 in San Diego, USA, as part of the SPIE Annual meeting.

The Future

In order to refocus the WG to match the emerging trends, it should be renamed to: "Integrated Systems for Modelling Objects and Environments (Sites)."

WG V/2 - "Close Range Imaging Systems and Their Performance"

by Chairman: Dr. Horst A. Beyer (Switzerland)

Co-Chairman: Volker Uffenkamp (Germany)

State of Science and Technology of WG V/2 Topics

This WG was one of the main organisers of the Inter-Commission Workshop "From Pixels to Sequences" held in Zurich during March 1995. Some of the topics covered included:

- Performance in Algorithms
- Advances in Imaging Technology
- Calibration of Optical Systems
- Performance in Applications

Some quite interesting presentations were given, and reading the proceedings of the Workshop is very worthwhile. The papers clearly indicated that the basic research and developments are undergoing an optimisation process with regard to user friendliness.

A highlight was the relatively new technology of still-video cameras, which have come onto the market within the last couple of years. They allow an acquisition of digital images without the necessity of a permanent linkage between camera and computer. With a commercial resolution of up to 3000 x 2000 pixels now available, these cameras offer format and accuracy comparable to film-based middle-sized format cameras. They are on the way to revolutionise the daily practical

work of close-range photogrammetry and demonstrate a certain gain in performance.

Accomplishments of WG V/2 During 1995

The Workshop "From Pixels to Sequences - Sensors, Algorithms and Systems", was held from 22-24 March 1995 in Zurich, Switzerland. Common workshops were also planned together with "Videometrics IV," 22-26 October 1995, Philadelphia, USA and "Optical 3-D Measurement Techniques," 2-4 October 1995, Vienna, Austria.

The WG V/2 chairmen have met several times in the period of March to October 1995 to discuss WG affairs. The publishing of the Zurich workshop proceedings besides the distributed invitation sheets using personal contacts and the evaluation of invited speakers have been the main topics. The remainder of 1995 will continue this theme, including the session planning for the XVIII Congress in Vienna.

WG V/3 - "Structural and Industrial Measurements with Consideration of CAD/CAM Aspects"

by Chairman: Dr. Clive S. Fraser (Australia)

Co-Chairman: Prof. Heinz Ruther (South Africa)

State of Science and Technology of WG V/3 Topics

Rather than addressing each Term of Reference of the WG separately, we will provide a general review which implicitly considers all of them. In regard to digital close-range photogrammetry, or vision metrology, for industrial measurement, 1995 was a watershed year. Over the past 12 months or so, we have witnessed a true commercial acceptance of single- and multi-sensor vision metrology for high-precision 3-D coordinate determination, primarily in the aircraft/aerospace manufacturing sector, but also in shipbuilding and the nuclear industry. The impetus for the growing application of vision metrology, apart from the fact that the photogrammetric research in this area is reasonably mature, is attributable to two factors, one photogrammetric and one not so. The first is the successful configuring of large-area CCD cameras into on-line, real-time measurement systems, and the second is the burgeoning use of still-video technology for single-sensor vision metrology systems.

In the multi-sensor, real-time systems we see innovations such as fully automated exterior orientation and the introduction of different forms of trackable measurement probes. Moreover, CAD analysis is finally being incorporated as an integral component of these systems,

although primarily for application at the measurement analysis stage and not so much at the design or image mensuration phase. With due attention to calibration, and with strategies for automated monitoring and updates of calibration and exterior orientation, these systems are now yielding to object space positioning accuracies of 1:50,000 and better.

In the single-sensor environment, still-video imagery has had a profound effect, to the point where film-based systems are now obsolescent for all but the relatively few applications demanding accuracies exceeding, say, 1:150,000. Although commercial progress has been strong, much scientific research interest remains in vision metrology, especially in the still undeveloped area of precision object reconstruction in the absence of artificial target points. The perennial question of sensor calibration still poses some vexing problems as does the development of fully automated orientation and object measurement/reconstruction procedures which are sufficiently robust for industrial use. The role of CAD is potentially very important in this regard, and this remains an area worthy of further scientific enquiry.

Accomplishments of WG V/3 During 1995

Although many of the terms of reference of WG V/3 appeared in themes for a number of conferences and technical meetings throughout the year (e.g. "Videometrics IV," Philadelphia, USA; "Optical 3-D Measurements III," Vienna, Austria; and the US-based meeting of the Coordinate Measurement Systems Committee), our WG was only formally involved as a sponsor for one conference. This was the very successful "Photogrammetry in Engineering Surveying" which was organised by Prof. H. Ruther and held in Cape Town, South Africa during 7-10 February 1995, in conjunction with the "International FIG Symposium on Deformation Analysis and Engineering Surveying". Among the many international visitors attending this meeting was the Commission V President, Prof. John Fryer.

The long-noticed characteristic of limited formal activities by 'members' of this WG between ISPRS Congresses and Inter-Congress Symposia continued in 1995, as did the notable fact that the WG draws a very strong interest when it comes to hosting presented papers at major conferences. The XVIII ISPRS Congress in Vienna in July 1996 looks likely to again re-enforce this trend.

WG V/3 News

All energies of the WG V/3 are now focussed on the Vienna ISPRS Congress, where the WG has twenty-five abstracts submitted for the technical and poster sessions.

WG V/4 - "Photogrammetry in Architecture and Archaeology"

by Chairman: Cliff L. Ogleby (Australia)

Co-Chairman: Dr. Andreas Georgopoulos (Greece)

State of Science and Technology of WG V/4 Topics

This WG continues its consolidation of research directions with respect to the use of CAD to aid in the visualization of ancient monuments. Research has continued into appropriate surface modelling routines to best define surfaces derived from photogrammetric measurements. The development of photogrammetric systems on portable personal computers for the use of architects and archaeologists has been pursued with vigour. Several of these activities have taken place in close liaison with WGs of CIPA.

One 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 for the Australian Rock Art Research Association has been established. Rock art, and its recognition as a major cultural heritage, is an important emerging trend for CIPA and this WG. 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://www.p.igp.ethz.ch/cipa/cipa.html>

WG V/4 News

Considerable energies of WG V/4 are now focussed on the July 1996 Vienna ISPRS Congress, where the WG has 40 abstracts submitted for the technical and poster sessions and will be responsible for part of the organisation of a special session devoted to CIPA.

WG V/5 - "Biostereometrics and Medical Imaging"

by Chairman: Dr. Thomas Leemann (Switzerland)

Co-Chairman: Dr. Harvey L. Mitchell (Australia)

State of Science and Technology of WG V/5 Topics

Changes in the various established technical approaches to biostereometrics do not appear to have come about in the past year, (nor indeed in the life of this WG). Medical measurement continues to involve from both film and images from electro-optical cameras, and it also continues to see widespread use of structured light techniques. However, the co-chairs continue to seek out papers which are notable because they:

- a. report photogrammetry which has attained genuine medical use in clinical or surgical applications (see e.g. *Photogrammetric Record* 1995)
- b. signify developments in medical photogrammetry and in other measuring techniques beyond institutions whose members are associated with ISPRS and published in journals not connected with ISPRS. Such publications can indicate interesting achievements of which ISPRS members are not aware, or they can indicate development work which may not be benefitting from input by photogrammetrists. Indeed, it is one of the problems of medical photogrammetry to keep up with relevant publications in journals such as *Medical & Biological Engineering and Computing*, *Spine*, and many others.

Papers in both these groups continue to appear. The paper by Adams et al., "Stereophotogrammetric Pointing Device for Neurosurgical Use, *Medical & Biological Engineering and Computing*, 33: pp 212-217, 1995, is mentioned here because it fits both categories above. However its photogrammetric significance is less than its medical significance.

A paper by one WG co-chair reviewed progress in digital image usage: Mitchell, H.L., "Applications of Digital Photogrammetry to Medical Investigations," *ISPRS Journal of Photogrammetry & Remote Sensing*, 50(3): pp 27-36, 1995.

Accomplishments of WG V/5 During 1995

Responses continued to be received in 1995 from the WG Questionnaire which was sent to:

- the full WG mailing list;
- most Commission V correspondents from ISPRS member countries;
- ISPRS office bearers;
- a number of ISPRS members known to have medical imaging experience; and
- a number of non-ISPRS colleagues and contacts known to have medical imaging experience.

A WG Newsletter was circulated in May 1995 and covered the following topics:

- WG Questionnaire responses (see above);
- announcements relating to the Vienna Congress;
- announcements of two medical (i.e. non-ISPRS) meetings of photogrammetric interest.

WG V/5 News

The major effort of the WG has been a report on the state of medical photogrammetry which is being prepared for the July 1996 Vienna ISPRS Congress. The report

concerns itself primarily with promotion of use in clinical or surgical applications of medical photogrammetry and the development of measuring techniques in institutions whose members are not associated with ISPRS and published in journals not connected with ISPRS. The first draft of this report, titled "The State of Medical Photogrammetry in the Digital Imaging Era" has been completed, and circulated to all those who had responded to survey and selected others on the WG mailing list, and E-mailed to others with E-mail address. Reactions from WG members were invited but so far only four have been received, even though questionnaire response was over 50 replies.

As a result of contact with the International Research Society for of Spinal Deformities, the WG should be a cooperating participant in the next IRSSD meeting to be held in Stockholm in 1996. Formal approval has not yet been received from the IRSSD executive, but approval to have it included as an ISPRS event will then be sought.

The Future

The WG V/5 emphasised issues of implementation in medical photogrammetry, rather than technical matters of limited interest to diverse medical photogrammetry studies. The ordeals of communication in medical photogrammetry continue with e.g. the apparent demise of the UK Medical Photogrammetry Group, and the apparent discontinuation from of the longstanding Biostereometrics series of meetings, the last being held in 1990.

WG V/5 has recognised the need to communicate the difficulties of implementing, rather than developing, medical photogrammetry, and the importance of going beyond ISPRS membership for both input and information. No change is seen to be likely in these matters unless the WG report to be distributed at the Vienna Congress can have its desired aim of improving communications in the broad field of medical photogrammetry, well beyond ISPRS.

Inter-Commission WG V/III -

"Image Sequence Analysis"

by Chairman: Dr. E. Baltasvias (Switzerland)

Co-Chairman: Dr. H. H. Baker (USA)

State of Science and Technology of Inter-Commission WG V/III Topics

In general there is an increase of dynamic applications and processes involving imaging sensors and digital photogrammetric techniques. These developments refer almost exclusively to close-range. In the algorithmic

point of view there was no spectacular development in 1995. There are however new technological developments (e.g. in imaging and navigation sensors) and also new applications and systems.

Applications and systems can be found in the traditional areas of robotics, industrial inspection, medicine, sports etc. A significant number of contributions were in the field of particle tracking in fluid flows and related tasks. Particle Tracking Velocimetry using imaging sensors has now reached a state of maturity and can provide accurate results with high spatial and temporal resolution.

Other applications that are attracting a lot of interest are navigation of vehicles and mobile mapping systems. The first case includes autonomous navigation of vehicles on natural terrain, mainly for military purposes (see the UGV project of ARPA in USA) but also for planetary exploration (relevant research work is done at JPL, Pasadena and CMU). It also includes Intelligent Highway Vehicle Systems that find a lot of attention in N. America and autonomous driving on highways (see also the European project Prometheus). Autonomous driving over long distances at about 90 km/h has been successfully demonstrated.

Several mobile mapping systems have been developed in USA, Canada and in Europe and are starting to find a use in practical applications. Their aim is to map roads, railway tracks etc. and their environment (e.g. traffic signs and lights, neighboring objects of interest etc.). 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 integrating data processing.

Other emerging applications that have not found a big interest in ISPRS include the entertainment industry, digital video, multimedia and human machine interfaces. As an example systems have been developed for tracking of the human eyes as an interface in multimedia systems, or accepting commands by hand movements in multimedia systems or for giving commands to a TV instead of using a remote control. Other applications relate to visualisation, e.g. imaging buildings all around with ground based systems and constructing a detailed 3-D geometric and textural representation of them.

Hardware developments have been noticed in the imaging sensors (higher resolution, faster frame rates, wider use of progressive scan sensors, smart sensors with native intelligence and processing capabilities) as well as in GPS (on-the-fly ambiguity resolution), INS (cheaper sensors), and in storage devices.

There is a large bibliography on the topics of the WG that can not all be mentioned here. Instead we will mention the following conferences where papers on the subject can be found (more details such as contact addresses, etc. can be found in the Calendar of the **ISPRS Journal of Photogrammetry and Remote Sensing**). These 1995 Conferences include:

- 5-10 Feb IS&T/SPIE
"Symposium on Electronic Imaging"
- 22-24 Mar ISPRS Inter-Commission Workshop
"From Pixels to Sequences"
- 3-5 Apr Workshop on "High Precision Navigation"
- 17-21 Apr SPIE Symposium
- 12-14 Jun IFAC Conference on
"Intelligent Autonomous Vehicles" (ICCV)
- 26-28 Jun Workshop on
"Automatic Face- and Gesture-Recognition"
- 3-6 Jul Conference on
"Image Processing and its Applications"
- 9-14 Jul SPIE Annual Meeting
- 4-8 Sep ISPRS Inter-Commission Workshop on
"Integrated Sensor Orientation"
- 6-8 Sep Conference on
"Computer Analysis of Images and Patterns"
- 13-13 Sep Conference on
"Image Analysis and Processing"
- 18-19 Sep Symposium on
"Visualising Time-Varying Data"
- 18-22 Sep ISATA Symposium on
"Manufacturing and Transportation"
- 2-4 Oct "Optical 3-D Measurement Techniques III"
- 9-11 Oct IFAC Workshop "Motion Control"
- 22-26 Oct SPIE Symposium "Photonics East"
- 23-26 Oct ICIP'95
- 22-26 Oct IFAC Workshop
- 8-10 Nov ISPRS Joint Workshop on
"Integrated Acquisition and Interpretation of
Photogrammetric Data"
- 9-11 Nov "World Congress on Int'l Transportation
Systems"
- 20-22 Nov IEEE Symposium on "Computer Vision"
- 5-8 Dec Asian Conference on "Computer Vision"

Accomplishments of Inter-Commission WG V/III During 1995

The major event for the IC WG was the organisation of the Inter-Commission Workshop "From Pixels to Sequences - Sensors, Algorithms, and Systems", in Zurich, Switzerland, 22-24 March 1995 in cooperation with the WGs I/3 and V/2. The workshop attracted 130 scientists from 17 countries with a good blend among academia (60%) and research institutes and private companies (40%). More than half of the participants were non-photogrammetrists. The sixty presented papers

are published in a 400 page volume of the **ISPRS Archives**. The income of the workshop was used to finance three Best Young Author Awards, each 2,500 SFr, for the 1996 ISPRS Congress. More details on the workshop can be found in the **ISPRS Journal of Photogrammetry and Remote Sensing**, Vol. 50, No. 3, p. 38. As a note, the WG used for the first time the WWW on the Internet with very positive results.

The IC WG V/III participated in the organisation of a mini-workshop that took place in Zurich on March 21. This workshop was co-organised by the Swiss Society of Photogrammetry, Image Analysis and Remote Sensing and the Japanese "Association for Real-Time Imaging and Dynamic Analysis" and aimed at the exchange of scientific information between the two groups. Several of the workshop talks were on topics of our WG. In addition, the IC WG V/III sent the second announcement and call for papers for the ISPRS XVIII Congress to 50 scientists that were not addressed by the Congress organisers.

Inter-Commission WG V/III News

The following activities are planned until the next ISPRS Congress:

- Evaluation and selection of the papers for the ISPRS Congress and preparation of the three WG sessions
- Evaluation of the papers for the Best Young Author Award that were sponsored by the three WGs that organised the IC Workshop "From Pixels to Sequences"
- Reformulation of the terms of reference of the WG for discussion at the ISPRS Congress

The Future

Future developments will probably move along the tracks outlined in section above on State of the Science and Technology with faster changes expected in hardware and systems and relatively little change in the algorithmic part. For certain classes of applications integrated use of sensors is mandatory and thus, improvements in the whole system design and processing algorithms will also be observed.

The field is already strongly interdisciplinary and as new applications are developed, some of them quite exotic, this trend will become stronger. This fact and the plethora of events where related topics are presented lead to a fragmentation and make a mutual exchange of information and a study of the international developments difficult. Therefore, it might be necessary for the WG to focus on certain selected subjects for the period 1996-2000 and change appropriately its terms of references.

TECHNICAL COMMISSION VI

"ECONOMICS, PROFESSIONAL MATTERS AND EDUCATION"

Prof. Dr.-Ing. Deren Li, Commission VI President
Dr. Jianya Gong, Commission VI Scientific Secretary
Xiaoqin Hu, Commission VI Administrative Secretary
(CHINA)

TERMS OF REFERENCE

- Collection, analysis and comparison of educational and training programs and changes in photogrammetry, remote sensing and GIS/LIS
- Investigation of cost and efficiency models in photogrammetric and remote sensing operations
- Investigation of operational management aspects for remote sensing and GIS technology
- Collection and synthesis of reports on national and regional activities
- Promotion and dissemination of information
- Promotion of computer assisted teaching
- Identification of the proper channels for international technical cooperation
- Completion of the History of Photogrammetry
- Promotion of the inclusion of other languages in the Multilingual Dictionary
- Development of recommendations for standards of competence in photogrammetric and remote sensing practice

STATE OF SCIENCE AND TECHNOLOGY OF COMMISSION VI TOPICS

As a very important issue in our discipline, education and training will follow the progress and changes in the high technologies, will take the mode of multi-level, multi-status and multi-way in the future, will be more active, flexible, modular and project-oriented, and will integrate photogrammetry, remote sensing and GIS.

Hardware, software and data sets are now available for Computer Assisted Teaching (CAT), but more attention to CAT is required in developing countries.

Faced with changes, chances and challenges, our discipline needs reorganization, reorientation and even renaming, which calls for more reviews and discussions and should be a topic at the Vienna 18th ISPRS Congress in July 1996.

ACCOMPLISHMENTS OF COMMISSION VI DURING 1995

Commission VI co-sponsored and co-organized the fourth international colloquium of the National Laboratory for Information Engineering in Surveying, Mapping and Remote Sensing at Wuhan Technical University of Surveying and Mapping, together with the Geomatics Center of Laval University, China National Natural Science Foundation and China State Remote Sensing Center. The international colloquium, called "LIESMARS '95" for short, was held during 25-27 October 1995, and was centered around the main theme of "three-dimensional, temporal and dynamic spatial data modelling and analysis."

Officially registered participants to LIESMARS '95 included thirteen scholars from Austria, Canada, France, Hungary, Japan, The Netherlands, Pakistan and Sudan with forty-eight scholars from within China. This small scale colloquium aimed at the exchanges of research findings and practical experience in the area, exploration of the latest development, problems and future trends therein, and the possible international cooperation in this field.

Apart from the technical visits, the lecture and discussion topics included:

- Three-dimensional data modelling and analysis
- Spatio-temporal data modelling and analysis
- Dynamic spatial data structures
- Implementation methodology, tools, languages and applications

This colloquium is regarded by international colleagues as of high academic standard, which is reflected in two aspects:

- *Good selection of theme and topics*

Three-dimensional, temporal, and dynamic spatial data modelling and analysis is now a focus of attention from colleagues in the relevant subject areas worldwide.

- *High quality of papers*

Most papers reflected the latest research findings and applications in the area in the world, with some excellent contributions from young Ph.D and MSc. candidates, which is a good sign of the future of our discipline.

On the whole, with the spread of E-mail, Internet, the World-Wide-Web (WWW) and other modern means of communication, the mode of activities of Commission VI needs to be carefully reconsidered and discussed, especially at the July 1996 Vienna Congress.

WORKING GROUP ACTIVITIES DURING 1995

WG VI/1 - "Education, Training and Educational Standards for Photogrammetry, Remote Sensing and GIS/LIS

by Chairman: Prof. Dr. Jozef J. Jachimski (Poland)

Co-Chairmen: Dr. Greg P. Ellis (Australia)

Prof. Chen Tuan-chih (China Taipei)

Prof. Olubodun O. Ayeni (Nigeria)

Prof. Zong-guo Xia (USA)

Accomplishments of WG VI/1 During 1995

WG VI/1 sponsored and organized, together with WGs VI/4 and WG VI/6, a small scale conference during 21-22 September 1995 in Krakow, Poland. The five participants: Jachimski of Poland, Schuhr of Germany, Badekas of Greece, Waldhaeusl of Austria and Sitek of Poland, held productive discussions on development of the standards for National Reports for ISPRS and will submit their opinions at the Vienna Congress.

WG VI/1 News

Prof. Dr. Zong-guo Xia of the University of Massachusetts at Boston has been appointed co-chairman of the working group to cover activities in the Americas.

WG VI/2 - "Computer Assisted Teaching"

by Chairman: Dr. Kohei Cho (Japan)

Co-Chairman: Prof. Dr. Joachim Hoehle (Denmark)

Co-Chairman: Prof. Charalabos Ioannidis (Greece)

State of Science and Technology of WG VI/2 Topics

- *CAT Software Fact Information Form*

In order to survey the availability of user friendly CAT software in the market and in the network ftp sites, the WG VI/2 prepared a fact information form for describing the contents of the software. The WG VI/2 is providing the contents of the software. The WG VI/2 is providing the fact form to those interested in providing the information on their software to others. The provided information is open to the public through the WG VI/2 newsletters as well as other media.

- *Issuing of Newsletters*

The WG VI/2 issued CAT (Computer Assisted Teaching) Newsletter No. 3 in 1994. The newsletters cover all the activities of WG VI/2 and are distributed to all members of the WG and all others who are interested in CAT.

- *Software Distribution*

The WG is collecting/developing non-commercial software for computer assisted teaching. The software was distributed at the Commission VI Symposium and other occasions. The WG will continue to collect/develop software for training. The following software are currently distributed by the WG:

- **IMDISP (NASA/JPL)**
An image processing software developed by NASA/JPL which runs on IBM-PC/MS-DOS environment.
- **IMVIEW (Tokai Univ.) for MS-WINDOWS**
A simple image display software developed by Tokai Univ. which runs on MS-WINDOWS.
- **ASEAN (by Dr. Duong of NCSR, Vietnam)**
An image processing software for remote sensing which runs on IBM-PC/MS-DOS environment.
- **GIW (by Dr. Fuhu Ren of UNCRD)**
A GIS software package which runs on IBM-PC/MS-DOS environment.

- *Data Sets Distribution*

With the cooperation of NASDA, the WG distributed the "SAR and Optical Sensor Data Set" CD-ROM upon request to the WG members. The

WG will continue to collect and provide this kind of data sets for training.

Accomplishments of WG VI/2 During 1995

- *The International Conference on "Computer Based Learning in Science" (CBLIS '95)*

- During 30 June to 4 July 1995, nearly 90 participants came to Opava, Czech Republic from all over the world, including Canada, Australia, Thailand and the European Union; although most were from the United Kingdom and the Czech Republic. The four day program was filled with about 30 lectures and some fine social events. Most of the presented learning programs dealt with mathematics and physics. With respect to photogrammetry was Dr. J. Hoehle's learning program "Learning about Digital Photogrammetry" which was presented by means of a PowerBook with attached LCD screen for display from an overhead projector. The proceedings contains 58 papers which are structured in: Invited Lectures; Review Lectures; Teaching and Learning: Educational Strategy and CBL structures; Monitoring of Performance; Software and Hardware Developments; Intelligent Software; Teaching Packages; Teaching with Simulation; Interactive Programming; Networking and Distance Learning.

- *"The 4th Regional Remote Sensing Seminar on Tropical Ecosystem Management"*

- The seminar was held during 4-9 September 1995 at Subic, Philippines, and was jointly organized by the National Space Development Agency of Japan (NASDA), The National Coordinating Committee of Remote Sensing (NCCRS) of the Philippines, and the Economic and Social Commission for Asia and the Pacific (ESCAP). The Remote Sensing technology Center of Japan (RESTEC) provided technical support and the National Mapping and Resources Information Authority (NAMRIA) of the Philippines spearheaded the preparation and organization of the seminar.

The main objectives of the seminar were to provide scientific and technical information about remote sensing to terrestrial ecosystem, to discuss how to integrate remote sensing with sustainable development planning and to provide hands-on training with the use of personal computers and training materials. A total of 61 participants from 19 countries and organizations attended the seminar. The Program was chaired by Prof. Shunji Murai of

the Asian Institute of Technology and the President of ISPRS. Dr. Kohei Cho and a number of experts from ISPRS WG VI/2 were invited to this seminar to perform the PC based hands-on training. Eighteen junior participants from 15 countries attended the training and learned about remote sensing and GIS.

WG VI/2 News

- *Software Evaluation*

The WG plans to collect and evaluate software for computer assisted teaching. The results will be reported in the newsletter.

- *Software Contest*

The WG plans to perform a software contest on computer assisted teaching at the 18th ISPRS Congress in Vienna, Austria. The details are still under consideration.

- *"The 16th Asian Conference on Remote Sensing" November 1995, Nakhon Ratchasima, Thailand*

The conference (ACRS) was successfully held at the Suranaree University in Nakhon Ratchasima, Thailand during 20-24 November 1995. A total of 358 participants from 31 countries attended the conference. On the third day of the conference, a working group meeting on "GIS Textbook/Software for Education" was held. The meeting was co-chaired by Dr. Ryusuke Shibasaki of Tokyo University and Dr. Kohei Cho. It was agreed to prepare a new textbook and a software for GIS education in the framework of ACRS. It was also agreed to coordinate the activities with ISPRS WG VI/2.

- *"The 5th Regional Remote Sensing Seminar on Tropical Ecosystem Management" August 1996, Fiji*

This planned seminar will receive the support of WG VI/2 and a small WG meeting is planned to take place during the seminar.

WG VI/3 - "Terminology and ISPRS Multilingual Dictionary"

by Chairman: Dr. Gerhard Lindig (Germany)

Co-Chairman: Dr. Joern Sievers (Germany)

Co-Chairman: Prof. Dr. Hans-Peter Bahr (Germany)

State of Science and Technology of WG VI/3 Topics

The international progress of the ISPRS-Dictionary is still not very satisfactory. Proposals should be made and discussed at the Vienna ISPRS Congress as to how to accelerate the work.

Accomplishments of WG VI/3 During 1995

In 1995 neither positive nor negative information came from the WG members, giving hope that work is steadily going on. A new questionnaire/action will start soon to deliver up to date information for the WG Report to be presented at the Vienna Congress.

Good progress can be reported from the German language group which is preparing the 2nd edition of the German part of **ISPRS Multilingual Dictionary**. In spite of the extended content and more detailed information, the improved new concept will remain very handy.

WG VI/3 News

E-mail address for WG VI/3 Chairman, Dr. Gerhard Lindig is: Lindig@ p 14.ifag.de

WG VI/4 - "International Cooperation and Technology Transfer"

by Chairman: Dr. Stanley A. Morain (USA)
Co-Chairman: Prof. Dr. Walter Schuhr (Germany)

Accomplishments of WG VI/4 During 1995

The WG VI/4 was one of the responsible parties for an ISPRS WGs VI/1, VI/4, VI/6 meeting on the topic "Model for Numerical Representation of Production, Research, Education and International Cooperation in Remote Sensing and GIS/LIS," which took place in Krakow, Poland during 21-22 September 1995. At the meeting, a modern concept for the ISPRS National Reports was discussed and it will be presented at the Vienna Congress. The National Report shall inform and stimulate the progress in our profession. The detailed content and analysis of National Reports will be reviewed, as well as the use of E-mail and WWW for this purpose.

WG VI/4 News

The WG members are planning to attend the "Geoinformatics '96 Wuhan" conference in October 1996 at Wuhan Technical University of Surveying and Mapping and present papers on the work of the WG.

WG VI/5 - "Tutorials"

by Chairman: Dr. Th. Bouloucos (Netherlands)
Co-Chairman: Prof. Dr. Zongjian Lin (China)

Accomplishments of WG VI/5 During 1995

The planned international workshop on "Digital Photogrammetry and Geographic Information Systems" was regrettably not materialized due to reasons out of the control of the WG.

WG VI/5 News

A one-day tutorial "Making the Introduction of GIS in Large Organization Manageable" has been proposed for the Vienna Congress.

WG VI/6 - "Economics and Business Management"

by Chairman: Dr. Gerard Begni (France)
Co-Chairman: Prof. Dr. Richard Groot (Netherlands)

WG VI/6 News

The WG Chairman Dr. Gerard Begni of France resigned from the post in the middle of 1995 due to his heavy work load, but promised to continue making his contribution to the work of the Commission.

TECHNICAL COMMISSION VII

"RESOURCE AND ENVIRONMENTAL MONITORING"

Dr. Roberto Pereira da Cunha, Commission VII President
Ms. Mônica Aparecida de Oliveira, Commission VII Secretary
(BRAZIL)

TERMS OF REFERENCE

- Methodology of visual image interpretation
- Methodology of computer-aided analysis of sensor data
- Spectral, spatial and temporal radiation properties of objects
- Environmental studies, resources inventories, and interpretative aspects of thematic mapping as applied in studies of vegetation, forestry, agriculture, soils, land and water use, geology, geomorphology, hydrology, oceanography, coastal zones, snow and ice, atmospheric sciences, archaeology, human settlements and engineering
- Integration of remote sensing and GIS techniques for the monitoring of resources and environment

Editor Mauricio Araya from Chile. SELPER, the Latin American Remote Sensing Society is a Regional Member of ISPRS.

During 1995, Commission VII activities also concentrated on the promotion of the XVIII ISPRS Congress to be held during 9-19 July 1996 in Vienna, Austria. For this major Congress, the Commission VII prepared a special color poster. This poster was initially distributed at the WG VII/1 and EARSeL International Colloquium on "Photosynthesis and Remote Sensing," which was held 28-31 August 1995 in Montpellier, France. The poster displays the major remote sensing satellites and their respective spectral bands as well as announcing the ISPRS Congress and its major deadlines. These posters were also distributed during the 5-10 November 1995 "VIIth Latin American Remote Sensing Symposium" organized for SELPER in Puerto Vallarta, Mexico. About one thousand copies of the poster have been mailed to different organizations and individuals worldwide.

ACCOMPLISHMENTS OF COMMISSION VII DURING 1995

Major activities since the mid-term Symposium include the distribution of the **Proceedings of the "ISPRS Commission VII Symposium: Resource and Environmental Monitoring"** in three Volumes containing 1106 pages. In 1995, Commission VII received and attended to several letters requesting copies of the Proceedings. The Proceedings were also shipped to RICS Books, the ISPRS distributor located in the United Kingdom.

During 1995, the Commission prepared and produced two special publications on ECO-RIO'94 Commission VII Symposium. One consisted of a special SELPER Newsletter with the highlights of the Symposium and the other consisted of a special SELPER Journal with selected and missing papers of the Symposium. Those publications were sponsored by ISPRS Commission VII and printed with thanks to the support of SELPER

COMMISSION VII NEWS

The Commission VII has been working on preparations for the XVIII ISPRS Congress in Vienna. A total of 207 papers have been received to-date, with the following break down by Working Group (WG): WG VII/1 - 35; WG VII/2 - 25; WG VII/3 - 36; WG VII/4 - 27; WG VII/5 - 50; WG VII/6 - 25; WG VII/7 - 17; WG VII/8 - 20; WG VII/9 - 18; WG VII/10 - 14.

There are several news items for the year 1995 for Commission VII, however I would like to register only two highlights from São José dos Campos, SP, Brasil.

- The first is that Commission VII Secretary, Ms. Mônica has got married, however she says she will still keep her artistic name "Monica de Oliveira."
- The second news is that Maria Langwinski has also joined us in Commission VII and will help us with the activities.

WORKING GROUP ACTIVITIES DURING 1995

WG VII/1 - "Physical Measurements and Signatures in Remote Sensing"

by Chairman: Dr. Gérard Guyot (France)

Secretary: Dr. Thierry Phulpin (France)

State of Science & Technology of WG VII/1 Topics

The state of Science and Technology of WG Topics is presented in the conclusions of the Montpellier's Colloquium (pages: 489-496)

Accomplishments of WG VII/1 During 1995

The WG VII/1 has organized jointly with EARSeL, the International Colloquium "Photosynthesis and Remote Sensing" in "le Corum", the Congress Centre of Montpellier, France from 28 to 30 August 1995. It was a satellite colloquium of the "10th International Photosynthesis Congress" and was supported by:

- Agence Française de l'Espace (CNES, France)
- European Commission (JRC ISpra, Italy)
- Institut National de la Recherche Agronomique (INRA, France)
- Institut Français pour l'Exploitation de la Mer (IFREMER, France)
- National Aeronautics and Space Administration (NASA, USA)

The Colloquium was also sponsored by the following scientific societies:

- Association Québécoise de Teledetection (AQT)
- Canadian Remote Sensing Society (CRSS)
- The Remote Sensing Society (RSS, United Kingdom)
- Société Française de Photogrammétrie et de Teledetection (SFPT)

The aim of the Colloquium was to open up discussion and the exchange of ideas between specialists in remote sensing and those in photosynthesis. Its objective was also to establish a dialogue between the two communities of scientist interested both in the activity of oceanic and terrestrial phytomass. This Colloquium thus allowed the evaluation of the state of the art and perspectives for the combined use of remote sensing data and ecosystem functioning models for:

- estimating photosynthesis and net primary production of natural terrestrial and oceanic ecosystems;
- estimating agricultural and forest production with special attention to the distribution of assimilates;
- developing predicative models taking into account biosphere-climate interactions.

The scientific program was organized about five different scientific topics:

- Specificity and points in common of the marine and terrestrial phytosphere;
- New means of characterizing the state of the photosynthetic apparatus;
- Determination of photosynthetic activity using remote sensing;
- Models of photosynthesis and net primary production for the marine and terrestrial phytospheres; and
- The assimilation of remote sensing data within models.

The objective of the Colloquium was to highlight methodological developments rather than applications. This is why most papers were presented in interactive poster sessions rather than parallel sessions. Each plenary session was reserved for a limited number of papers (3-5), to allow enough time for presentations and discussions.

The Colloquium gathered 142 participants representing 24 countries. It lasted three days, with six plenary sessions (26 papers presented) and four interactive poster sessions (52 papers presented). In addition, at the end of the second day, a plenary discussion was organized on the integration of remote sensing data within models, and at the end of the third day, the Colloquium was closed with a general concluding session.

To increase the interest and efficiency of interactive poster sessions, each was introduced by the chairpersons, at the end of the preceding plenary session. This introduction gave, in 15 minutes an overview of the several presentations, based on overhead transparencies (one per poster) prepared by the authors. Moreover the presentations were systematically mixed in order to have in one session less than five presentations relative to a given subject to allow enough time for the exchanges and discussions with the interested participants.

The Colloquium also included an exhibition of field instrumentation for radiometric and photosynthesis activity measurements.

The proceedings are under preparation and will be available around 15 December 1995. Only 62 contributions presented in both plenary and interactive poster sessions are published (520 pages) because of the strict deadline for submitting the papers for having the proceedings within less than three months after the conference.

The concluding statements presented during the general concluding session are placed at the end of the proceedings. They emphasize the key of the

presentations and outline recommendations for future research programs.

WG VII/1 News

The WG VII/1 plans to organize the "7th International Symposium on Physical Measurements and Signatures in Remote Sensing" are underway. It will take place in the French Alps, in the beginning of 1997 with the support of:

- CNES; (JRC Ispra, Italy); INRA; Deutsche Forschungsanstalt für Luft und Raumfahrt (DLR); European Space Agency (ESA); NASA; IFREMER; and, Centre National de la Recherche Scientifique (CNRS).

The Symposium will also be sponsored by the following scientific societies:

- EARSeL; AQT; CRSS; RSS; and SFPT.

This symposium is a continuation of the series of six symposia organized since 1981 by the ISPRS WG VII/1 on "Physical Measurements and Signatures in Remote Sensing". It will focus on the following topics:

- analysis of the relationships between the specific properties of a target (plant canopies, soils, rocks, water bodies, snow, ice,...) and its spectral characteristics in different spectral domains (from ultraviolet to microwaves);
- determination of the factors affecting the spectral response of an object (atmospheric effects, measuring techniques,...); and
- development of interpretation models.

Such research activities are essential for any studies related to remote sensing and is of interest for any specialist involved in large range of applications: physicists, agronomists, foresters, geologist, hydrologists, oceanologist, etc.

The Symposium will also include an exhibition of radiometric and related ground measurement equipment including instruments available on the market and prototypes developed by research laboratories. It will be completed by a display of scientific books recently published.

The success of these symposia can be measured by the growth of the number of submitted papers, entailing a more and more severe selection (more than 40% of the paper were rejected for the last WG VII/1 Symposium held in Val d'Isère) while the number of participants

increased from 220 to 310 (24 countries represented). This Symposium has become during the past years one of the major international scientific meeting in the domain of the research in remote sensing and it provides a valuable overview of current research on earth resources and environmental monitoring. However, the increasing audience was seen as limiting one of the specific characteristics of the first meetings, that was to facilitate exchanges and discussions among participants. Therefore, it has been decided to limit the number of participants to about 200, presumably leading to a more severe selection of the submitted papers.

The presentations will cover the following points relative to the whole spectral range covered by remote sensing instruments (short wavelengths, thermal infrared, microwaves):

- Data pre-processing: calibration and intercalibration, correction algorithms for instrumental, atmospheric, directional and topographic effects;
- Simulation of space data, physical modelling and sensitivity analysis;
- Retrieval of bio-ge-physical and chemical parameters: empirical approach (vegetation indices, etc.), inverse problem;
- Utilization of remote sensing data: assimilation into models, spatial and temporal approaches, synergy among several observation methods.

In addition, two evening sessions with general presentations and discussions will be organized:

- Scientific results of large international programmes: IGBP, WRCP;
- Assimilation of remote sensing data within meteorology and agrometeorology applications (discussion of concrete examples).

The Symposium will highlight methodological developments rather than applications, in order to ease scientific exchanges and discussions. It will consist of eight plenary sessions allowing about 30 papers plus seven interactive poster sessions with 15 papers each. The total number of papers being limited to 135, a selection will be done by the International Scientific Committee.

Each half will consist in a plenary session followed by an interactive poster session. The Symposium will end with a general concluding session prepared by the chairpersons and rapporteurs of each session. The concluding statements will emphasize the key points of the presentations and outline trends in future research program. The proceedings will be published soon after the Symposium (less than three months).

WG VII/2 - "Resource and Environmental Monitoring Using Radar Data"

by Chairman: Hiroyuki Wakabayashi (Japan)

State of Science & Technology of WG VII/2 Topics

• Research Progress

The land surface changes, such as the growth of crops, the change of soil wetness and so on, have been successfully detected using multi-temporal SAR data. Using temporal change of backscatter, better classification accuracy of land cover is expected. The land level change caused by the Kobe earthquake could be detected by the JERS-1/SAR data using a differential interferometry technique. The spaceborne SAR data proved to be a powerful tool to find out the change of land surface condition as well as land level.

• New Available SAR data

The ERS-2, a successor of the ERS-1, was launched in April 1995 and has the identical C-band SAR as on board the ERS-1. During the period from August 1995 to May 1996, the ERS-1 and ERS-2 will be in tandem operation mode. The RADARSAT was launched in November 1995. Its on board C-band SAR has a unique feature that can change the elevation beam angle. Since frequent SAR data and interferometry data sets can be acquired by these satellites, much progress for resource and environmental monitoring is anticipated.

Accomplishments of WG VII/2 During 1995

A home page for WG VII/2 in the World-Wide-Web (WWW) is now under construction. It will contain sensor characteristics for the current and planned radars; potential application fields; and recent research results in environmental and resource monitoring. This home page will open to the public in early 1996.

WG VII/2 News

For the activities of WG VII/2 in 1996, a special radar session is planned in the "Earth Observation Research Center Symposium", which will be held in Tokyo, Japan.

WG VII/4 - "Geological and Mineral Resources"

by Chairman: Dr. James V. Taranik (USA)

Co-Chairman: Dr. Alvaro Crósta (Brazil)

WG Members: 18

State of Science and Technology of WG VII/4 Topics

• Landsat

Currently Landsat-5 continues to acquire data and the U.S. Government has made a commitment to fly an Enhanced Thematic Mapper-Plus on Landsat-7.

Plans are now underway to define a Landsat-8 payload for the EOS AM-2 satellite to be launched in 2006. These plans may include development of an operational hyperspectral sensor that will also provide Landsat-TM data for data continuity.

• SPOT

The French SPOT program continues to post successes with the successful launch of SPOT-3 and approval of funding for SPOT-4 and SPOT-5.

• JERS-1

The Japanese JERS-1 program has successfully acquired both optical and synthetic aperture radar of much of the Earth's land surface. A follow-on JERSS radar imaging satellite is planned for launch in 2000 which will have electronic beam steering and multiple frequencies.

• Commercial Programs

Several commercial programs in the United States propose to acquire 1-meter to 3-meter spatial resolution data and 3 to 5 meter global multispectral stereoscopic data (CTA-Clark, Earth Watch, Orbview, etc.). These satellite systems could allow geoscientists to develop digital terrain data at 1:50,000 scale with 10 meter contours for the entire land surface of the earth.

• Indian Space Program

The Indian Space Program has developed a series of operational satellites (IRSS) for natural resources management.

• Hyperspectral Imaging

NASA recently selected TRW to provide a Hyperspectral Imager (HSI) with 384 spectral bands at 30 meter spatial resolution on the Lewis spacecraft as part of the Small Satellite Technology Initiative (SSTI). Hyperspectral imagers are being developed in the United States, Europe and Japan that show promise for improving mineral and petroleum detection. One such sensor, the Hyperspectral Digital Imaging Collection Experiment (HYDICE) is now acquiring 210 spectral bands in the visible and reflected infrared, with 3 meter spatial resolution over a 1 kilometer swath from aircraft flight heights of 6000 meters.

• Thermal Mappers

Multiband thermal emission mappers have been developed for flight in aircraft which show great

promise for geologic and mineral resources applications. Japan, with the assistance of NASA, plans to fly a multiband thermal mapper as a part of the ASTER payload on EOS AM-1 by the end of the decade. The U.S. Department of Energy is proposing to develop a Multispectral Thermal Imager for flight on a dedicated small satellite. The MTI would have 10 VNIR-SWIR bands with 5 meter spatial resolution, 2 bands in the 3-5 um region with 40 meter spatial resolution and three bands in the 8-14 um spectral region with 40 meter resolution.

• *Space Radar Systems*

The United States and Germany successfully flew Space Radar Laboratory-1 on the Shuttle in 1994 and acquired 2000 Gigabytes of three frequency/four polarization imaging radar data over 30 percent of the Earth's surface. The Canadian Radarsat program successfully launched a C-band imager (Radarsat) on 4 November 1995. Future plans for microwave sensors include the development of SAR interferometry and polarimetric SAR.

Computer technology has now rapidly evolved to place robust desktop workstations and laptop computers easily within the reach of individual consulting geoscientists working in remote areas of the world.

Airborne geophysical remote sensing (airborne magnetics, gravity and electromagnetic) are being successfully analyzed in conjunction with aerospace remote sensing data, and ground geoscience information, using geographic information systems technology for mineral exploration in poorly mapped, remote areas.

Software developments now include automated neural network, n-dimensional classification, constrained energy minimization, convex geometry, spectral mixture analysis, etc., for hyperspectral analysis.

Global position system data has revolutionized exploration and geotechnical investigations in remote areas. Cellular telephone technology now allows geoscientists to transmit information data from the most remote areas of the world.

WG VII/4 News

ISPRS WG VII/4 will hold a workshop on 29 February 1996 at the Eleventh Thematic Conference on Applied Geology Remote Sensing "Practical Solutions for Real World Problems", in Las Vegas, USA. Dr. Taranik, Chairman of WG VII/4 is the Master of Ceremonies for the Conference which will present over 60 plenary papers, 231 poster papers, six workshops and five field trips.

On 18 July 1995, the WG Chairman presented a summary of state of the art in Geologic and Mineral Resources Remote Sensing the annual meeting of the Energy Minerals and Environment Divisions of the American Association of Petroleum Geologists, cordilleran section meeting in Sparks, Nevada, USA.

WG VII/5 - "Terrestrial Ecosystem Monitoring"

by Chairman: Prof. Paul Curran (United Kingdom)
Co-Chairman: Dr. Ake Rosenqvist (Japan)

State of Science and Technology of WG VII/5 Topics

The WG uses remotely sensed data to further understanding of terrestrial ecosystems at local to global scales. The activities promoted, discussed and presented by the WG encompass research involving all remotely sensed data and ecosystems where the goal is to understand ecosystem function rather than to know ecosystem characteristics or to manage ecosystem change.

Accomplishments of WG VII/5 During 1995

The WG organized a very successful meeting in conjunction with the Remote Sensing Society of the University of Southampton during 11-14 September 1995. There were 340 registered (a quarter from outside the UK) and the theme of the ISPRS sessions was the remote sensing of vegetation and land cover. The proceedings were published at the time of the meeting: Curran, P.J. and Robertson, Y.C. (Editors), 1995, **ESS '95 Remote Sensing in Action**, Remote Sensing Society, Nottingham, 1359pp, (ISBN 0 946226 20 2).

WG VII/5 News

There will be two WG VII/5 sessions at the XVIII ISPRS Congress in Vienna, Austria, 9-19 July, 1996.

WG VII/7 - "Hazardous Waste & Environmental Pollution"

by Chairman: Dr. Vernon Singhroy (Canada)
Co-Chairman: Dr. Charles Nalezny (USA)
WG Members: 8

State of Science & Technology of WG VII/7 Topics

- *Development of Remote Sensing (RS)/GIS Techniques to Monitor the Effects of Large Scale Pollution:*
 - Biomass Burning Emissions in the Cerrado of Brazil Using RS/GIS - (Agency: ANSA)
 - Ozone Air Pollution on Canopy Reflectance (Agency: INPE)

- *Environmental Site Characterization from RS/GIS Techniques in Relation to Site Rehabilitation*

- Environmental Restoration Techniques in the U.S. (US Dept. of Energy)
- Remote Sensing Techniques to Detect the Effects of Mining in Canada (CCRS).

WG VII/8 - "Snow, Ice, Ocean & Coastal Zone Monitoring"

by Chairman: Dr. Shintaro Goto (Japan)

Co-Chairman: Dr. Katsumoto Seko (Japan)

State of Science & Technology of WG VII/8 Topics

- Monitoring the 2-dimensional wave distribution practically by using microwave remote sensing technics
- Constructing GIS for marine environment
- Glacier-ice-sheet monitoring by microwave remote sensing

Accomplishments of WG VII/8 During 1995

- Participated in the "Third Thematic Conference Remote Sensing for Marine and Coastal Environment" 18-20 September 1995 in Seattle, USA, to establish a dense human network. Held a planning meeting there for scheduling the WG VII/8 Workshop in November 1995.
- Expect a successful WG VII/8 "International Workshop on Remote Sensing for Coastal and Marine Engineering" during 17-18 November 1995 in Hiroshima, Japan. (This report was submitted before the event date - see below.)

WG VII/8 News

The planned ISPRS WG VII/8 "International Workshop on Remote Sensing for Coastal and Marine Engineering," to be held 17-18 Nov 1995 in Hiroshima, Japan is sponsored by the ISPRS WG VII/8 and the Japan Society of Photogrammetry and Remote Sensing with support of the Japan Coastal Engineering Association.

The following Sessions and speakers are planned:

- "Remote Sensing for Coastal Environment" Yasuhiro Sugimori, Japan

- "Microwave Remote Sensing for Sea Surface Monitoring"

Hisashi Mitsuyasu, Japan; Gordon Staples, Canada

- "Monitoring Sea Surface Wave Field"

Yoshiyuki Kawata, Akihiro Yamazaki, Japan; F. Ziemer, Germany; Shintaro Goto, Kiyonori Iisawa, Japan

- "Geomatics for Marine and Ocean Environment"

Katsutoshi Kozai, Japan; Yukio Akamatsu, Naoki Shirai, Tadashi Asai, Kazuo Murakami, Japan; Ren Jinsong, Tong Yu, Chen Hedong, China; Tsukasa Nishimura, Tomonao Kobayashi, Sotaro Tanaka, Toshiro Sugimura, Yuji Hatakeyama

- "Monitoring Sea Surface by HF Radar"

Sei-chi Saitoh*, Kazuhiko Kasuga, Hiroji Onishi, Yutaka Isoda, Hideo Miyake, Akitugu Nadai, Satoshi Fujii; Akitsugu Nadai, Japan; Shinichi Sakai, Masafumi Mizutori, Hiroshi Kuroiwa, Akitsugu Nadai

- "New Sensor - Monitoring Sea Surface by Interferometric SAR"

John W. M. Campbell, A. Laurence Gray, Karim E. Matter, Canada

- "Discussion Session"

- What is the point of contact of remote sensing & GIS technologies and coastal & marine engineering?
- Example of Marine Radar Application in Germany
- Example of RADARSAT Application in Canada
- What can remote sensing do for coastal & marine engineering?
- What is the necessary specification of remote sensing data in terms of spatial and temporal resolution for coastal remote sensing?
- SAR data
- HF radar
- Marine radar
- Optical sensor
- GIS

WG VII/9 - "Human Settlement"

by Chairman: Dr. Bruce Forster (Australia)

WG Members: 4

State of Science & Technology of WG VII/9 Topics

With the rapid growth of urban areas, particularly in developing countries, there has been a rapid increase in the demand for urban information to satisfy the needs of urban planners and decision makers. Satellite remote sensing is being increasingly used for this purpose. With the greater availability of synthetic aperture radar

satellite systems, a number of researchers are examining backscatter modelling of urban areas, to enable all weather information to be acquired. Increasingly urban remote sensing and urban GIS are being seen as two parts of the whole, of data acquisition and analysis. Over the next two years a number of companies are proposing to launch satellite systems with one to four meter pixel resolution, and turn-around periods of two to three days. This will have a tremendous impact on data gathering for human settlements.

Accomplishments of WG VII/9 During 1995

A major accomplishment has been the development of an extensive network of researchers involved in remote sensing of human settlements. As researchers and practitioners come from many and varied backgrounds this is a difficult task. This task is continuing.

A number of WG members are contributing to the writing of a Volume on remote sensing of human settlements for the ASPRS Manual of Remote Sensing. The Chairman of WG VII/9, Professor Bruce Forster, is volume Editor.

Working VII/9 News

Paper presentations to the Vienna Congress are being widely encouraged.

WG VII/10 - "Global Monitoring"

by Chairman: Dr. Sergio Camacho (United Nations)

WG Members: 8

State of Science and Technology of WG VII/10 Topics

As three fifths of the land area and nearly all tropical regions of the world, with the bulk of the global biodiversity, is in developing countries, the WG considers it very important to promote a more active participation by these countries in studying and understanding the global environment and its resources scientifically.

Through activities of some of the institutions of the WG members, the WG conducted a survey on the participation of developing countries in Global Change. The work began in 1994 and continued in 1995. Through workshops and meetings organized by the United Nations and the European Space Agency (ESA), the survey gathered and disseminated information on the factors that limit the participation of developing countries. The results of the survey have been described in a United Nations study entitled "Global Change: Participation of Developing Countries and Possibilities of Enhancing It" (document A/AC.105/590) presented to

the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) in 1995. The survey also compiled information on activities by space agencies that could facilitate the participation of developing countries, such as the link between CEOS and IGBP-DIS.

The trend observed was that low awareness of the value of participating in Global Change among decision-makers; and economic limitations and limited access to regional and global databases, were the main factors for low participation of developing countries. Scientific groups are highly sensitive to political and economic instabilities and have a tendency of partially or completely disintegrating under such circumstances. The study concluded that stronger technical cooperation within and outside regions could alleviate this situation. It is also necessary to promote the Global Change program among governments since outside of universities, most agencies that can conduct research and support applications are in that sector.

The study indicated that there are data accessible on-line and at no cost through the Internet and listed space agencies which have offered to provide images at discounted prices for global change research.

Accomplishments of WG VII/10 During 1995

The study entitled "Global Change: Participation of Developing Countries and Possibilities of Enhancing It" was distributed at the workshop, conference and training course identified below to 129 participants from 44 developing countries from all regions. These meeting activities served as a forum for the participants to attend scientific presentations on monitoring of the environment, and to hold discussions about the factors which limit the participation of developing countries, and to discuss actions which could facilitate such participation. Summaries of the discussions and recommendations of these activities have been published in United Nations document A/AC.105/612, 613 and 622 which will be presented to the Scientific and Technical Subcommittee of COPUOS in February 1996.

- *UN/ESA Training Course on the "Use of ERS-1 Data for Mapping and Inventory of Natural Resources in Africa,"* Libreville, Gabon, 15-20 May 1995.
- *UN/IAF Workshop on "Space Technology for Health Care and Environmental Monitoring in the Developing World,"* Oslo, Norway, 28 September-1 October 1995.
- *UN/ESA Regional Conference on "Space Technology for Sustainable Development and Communications,"* Puerto Vallarta, Mexico, 30 October-3 November 1995.

WG VII/10 News

WG VII/10 is working with ESA and other institutions to establish a dedicated server for electronic mail that will interconnect space scientists from Latin America and the Caribbean; a bulletin board of this service will be dedicated to Global Monitoring of the environment and will provide referrals to data and information sources as

well as a medium to exchange experiences. The WG will also explore the possibility of joining on-going efforts (e.g. MERCURE and COPINE) or to establish an independent server to extend the service to other regions in the developing world. The WG hopes to be able to report on this initiative during the XVIII Congress of ISPRS in July 1996.

INTERNATIONAL SOCIETY FOR PHOTOGRAMMETRY AND REMOTE SENSING

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REGIONAL MEMBER ACTIVITIES - 1994

ISPRS REGIONAL MEMBERS

AARS - Asian Association on Remote Sensing

AARSE - African Association of Remote Sensing of the Environment

EARSeL - European Association of Remote Sensing Laboratories

OEEPE - Organisation Européenne d'Etudes Photogrammétriques Expérimentales

PAIGH - Pan American Institute of Geography and History

SELPER - Sociedad de Especialistas Latinoamericanos en Percepción Remota

ASIAN ASSOCIATION ON REMOTE SENSING (AARS)

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AARS ACTIVITIES DURING 1995

The main activity of AARS in 1995 was to have organized the 16th Asian Conference on Remote Sensing (ACRS) at Suranaree University of Technology, Nakhon Ratchasima, Thailand, from the 20th to the 24th, November 1995. On behalf of AARS, I would like to express our respect and honor to Her Royal Highness the Princess Maha Chakri Sirindhorn for inaugurating the opening ceremony, in which the first gold medal; the "Dr. Boon Indrabarya Medal" -Remote Sensing for Mankind- was presented to two Asian scientists; Dr. Kaew Nualchave and me for contributions to the advancement and promotion of remote sensing in Asia. The total number of conference participants was 358 from thirty-one countries, while the total number of presented papers including poster papers was eighty.

The keynote speech was lectured by Prof. Armin Gruen with the title of "Advanced Technologies in Photogrammetry and Remote Sensing."

At the two general conferences in conjunction with ACRS, the following items were decided.

- Laos, Jordan and China Taipei were admitted to join AARS as an ordinary member. The total number of

ordinary members is now 20: Australia, Bangladesh, China, China Taipei, India, Indonesia, Japan, Jordan, Korea, Laos, Malaysia, Mongolia, Nepal, New Zealand, Pakistan, Philippines, Singapore, Sri Lanka, Thailand and Vietnam.

- Shunji Murai and Manu Omakupt were elected as General Secretary and Deputy General Secretary respectively for 1996/1997.

- Sri Lanka was elected as the host of the 17th Asian Conference on Remote Sensing. The date and venue will be from the Monday the 4th to Friday the 8th of November 1996 in Colombo, Sri Lanka.

- Three Working Groups were approved to continue their activity for 1996/1997.

- *Working Group 1 - "One-Kilometer Land Cover Data Base in Asia"* Chair: Dr. Ryutaro Tateishi, Chiba University, Japan

- *Working Group 2 - "GIS Textbook"* Chair: Dr. Ryosuke Shibasaki, Institute of Industrial Science, University of Tokyo, Japan

- *Working Group 3 - "GIS Software for Education"* Chair: Dr. Kohei Cho, Tokai University, Japan

- It was reported that the remote sensing text book; "**Remote Sensing Notes**" is now being translated into local languages for Thai, Persian, Indonesian and Mongolian versions. English, Japanese and Chinese versions have been already completed.

In conclusion, the activities of AARS through the annual conference of ACRS and its three working groups are very active and successful, particularly in forming human networks and promoting regional cooperation among Asian remote sensing and GIS scientists.

Finally I would like to express our thanks to the UN ESCAP, Space Technology Application Section for having organized a Workshop on "Regional Spatial Information Networks" in conjunction with the 16th ACRS. The Workshop brought about 30 Asian scientists to Nakhon Ratchasima. In addition, AARS was one of eight co-organizers of "GIS, AM/FM, ASIA'95 Conference" which was held in Bangkok, Thailand with 230 participants. It will be followed by the "GIS, AM/FM ASIA'96 Conference" in Taipei, 1996.

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GENERAL INFORMATION

The EARSeL Council, at its 3 September 1995 meeting, voted to renew the mandate of the present Bureau for a further term of two years, until the General Assembly 1997. The Bureau therefore remains as follows:

Chairman:

Prof. Dr. Gottfried Konecny
University of Hannover, Germany

Vice-Chairman:

Prof. Dr. Manfred Buchroithner
University of Dresden, Germany

Secretary-General:

Dr. Roeland Allewijn
Rijkswaterstaat, Delft, The Netherlands

Treasurer:

Dr. Robin Vaughan
A.P.E.M.E., University of Dundee, U.K.

Twenty-one new member laboratories were admitted during the General Assembly, which taking into account some resignations, brings the membership to 296 institutes and eight observer members.

EARSeL ACTIVITIES DURING 1995

Since the last General Assembly held in Göteborg, Sweden during 6-8 June 1994, the Association has organized three high-level scientific Workshops:

- "*Remote Sensing and GIS for Coastal Zone Management*"
24-26 October 1994, Delft, The Netherlands
The Proceedings have been published and a selection of papers have been peer-reviewed and have now been printed in the EARSeL Journal "*Advances in Remote Sensing*." (ISBN 2-908885-13-1 - ISSN: 1017-4613)
- "*Remote Sensing and GIS for Pollution Monitoring*"
15-18 May 1995, Brandys-nad-Labem, Czech Republic
The Proceedings have now been published. (ISBN 2-908885-12-3)
- "*Satellite Meteorology and Hydrology*"
6-7 September 1995, Basel, Switzerland
Papers presented are to appear along with the Proceedings of the annual Symposium, to be published by Messrs. Balkema, Rotterdam, The Netherlands in Spring 1996.

The annual EARSeL Symposium was held in Basel, Switzerland, from 4-6 September 1995. Papers will be published in the Spring of 1996 by Messrs. Balkema, Rotterdam, The Netherlands, in Spring 1996

EARSeL also participated in the organization of a Symposium on the "Modular Optoelectronic Multispectral Stereo-Scanner (MOMS-02)" held in Köln, Germany, from 5-7 July 1995, and is publishing the Proceedings.

Likewise, EARSeL participated, together with Commission VII Working Group VII/1 of ISPRS, in the organization of an International Colloquium on "Photosynthesis and Remote Sensing", held in Montpellier, France, from 28-30 August 1995. The Proceedings are now being printed (ISBN 2-908885-16-6).

MAJOR ACCOMPLISHMENTS OF EARSeL DURING 1995

Activities and guidelines for participating in EARSeL activities are included in the EARSeL Multi-Year Programme available from the Secretariat.

Last year a new mechanism was introduced for getting the EARSeL members more actively involved in the work of the association. So called "Special Interest Groups" (SIG's) were formed. In these SIG's, institutes are grouped which are interested in specific application fields.

At the EARSeL Symposium in Basel an important step forward was made since seven groups are now active and three more groups are expected to be formed in the near future. These groups are:

- Land ice and snow
- Marine waters, inland waters and coastal zones
- Atmosphere
- Land use and forestry
- Developing countries
- Hydrology and water management
- Geology
- Disaster management
- Landslides and mudflows
- Imaging Spectroscopy

• *General Objectives and Activities of SIG's*

Although these may vary slightly between the different groups the objectives and activities of the SIG's are focused on three main topics:

- Information exchange and network building
- Organization of meetings
- Projects and study contracts

• *Foreseen Activities of the SIG's*

- During their meeting at the Basel Symposium the SIG on "Land, ice and snow" expressed the wish for a "list server" on Internet, using a central address which automatically distributes the information to the members of the SIG. Furthermore, the SIG wants to organize a workshop on snow and land ice monitoring. They are still looking for an institute which is willing to organize such a workshop.
- In the *EARSeL Newsletter* of June 1995 the SIG on "Land use and forestry" was announced. One hundred replies have been received in the meanwhile. Based on these replies and following from the discussions in Basel the group has decided to focus their activities on forestry, agriculture and urban areas. Their plans for the future consist of an annual circular in the *EARSeL Newsletter* and the preparation of a handbook with demonstration examples. This handbook may lead to the definition of a European Union project proposal.
- The objectives of the SIG on "Marine waters, inland waters and coastal zones" have already been described in the December 1994 issue of the *EARSeL Newsletter*. As a follow up of the successful workshop on coastal zone management, held in October last year in Delft, members of this SIG will participate in the workshop on "the application of remotely sensed data for monitoring coastal processes" to be held in Dundee, 19th and 20th of December 1995. During the discussions in Basel it was concluded that as far as projects are concerned, demonstration projects and cost-benefit analyses are of the highest priority in this field.
- In Basel the future activities of the SIG on "Atmosphere" were discussed. It was concluded that institutes which are involved in remote sensing for atmospheric applications are already well organized. So, first it will be evaluated what the added value of a SIG on atmosphere could be before further activities will be performed.
- The objectives of the new SIG on "Developing countries" are given in the September 1995 issue of the *EARSeL Newsletter*. As this SIG is not concerned with one type of application a large diversity of interests is present in this group. Internet facilities were seen as a good opportunity to advertise remotely sensed and other types of data

available at different institutes working in developing countries. The EARSeL Symposium to be held in May 1996 in Malta, was seen as an important step for this SIG, as network building between institutes from Southern Europe and Northern Africa is one of the main topics of this Symposium.

- The old EARSeL working group on hydrology was revitalized at the Basel Symposium in the new SIG on "Hydrology and water management." The first step of this group will be to bring in new members. In this they are not only looking for remote sensing specialists but also for environmental managers interested in applied satellite hydrology. Furthermore, they are aiming at organizing a "water related session" at the Malta Symposium.

EARSeL MEETINGS PLANNED FOR 1996

- General Assembly and Symposium on the theme of "Integrated Applications for Risk Assessment and Disaster Prevention for the Mediterranean" including

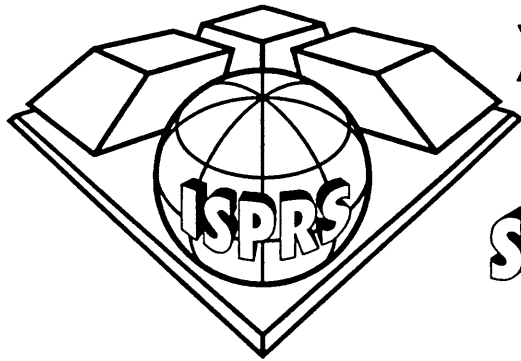
Round-Table discussions "Towards creating Euro-Med Remote Sensing Networks" - to be held in Malta, 20-23 May 1996.

- Specialist Workshop on "Lidar Remote Sensing of Land and Sea" to be held in Tallinn, Estonia, 26-28 September 1996.

- EARSeL is also coordinating a meeting on "The Role of Earth Observation Data in Forecasting, Managing and Recovering from Natural Disasters" to be held in London, UK, 8-10 July 1997.

RELATIONSHIPS WITH ISPRS

As reported above, EARSeL assisted Commission VII Working Group VII/1 in the organization of a Colloquium on "Photosynthesis and Remote Sensing," held in August 1995. EARSeL will also co-sponsor the next Symposium on "Spectral Signatures of Objects in Remote Sensing" to be held in Courchevel, France, in 1997, which is to be organized by this ISPRS Working Group.



XVIII ISPRS-Congress

Vienna, 9-19 July 1996

Spatial Information from Images

The International Society for Photogrammetry and Remote Sensing (ISPRS) invites you to its XVIII quadrennial Congress hosted by the Austrian Society for Surveying and Geoinformation in Vienna, Austria. This major event covers topics in

Photogrammetry, Remote Sensing Geo-Information Systems, Vision Sciences and other related areas

Programme Overview:

⇒ **9 July, evening:**

Opening Ceremony in the ceremonial hall of the former Imperial Palace, the **Hofburg**. Keynote address by Prof. Gottfried Konecny.
Viennese music performed by the Johann Strauss Orchestra;
Dancing by members of the Ballet of the Vienna State Opera.

⇒ **8 and 9 July:**

10 Tutorials (full day as well as half day lectures).

⇒ **From 10 July onwards in the Austria Center Vienna:**

11 Presentations of Highlight Papers;

81 Technical Sessions (oral presentations, mainly in English);

32 Interactive Poster Sessions (include short oral introductions)

⇒ **12 and 13 July:**

11 Special Sessions on interdisciplinary topics and related fields
(AARS, CIPA, EARSel, IUSM, OEEPE, UN-AARSE, UN-Subjects)

⇒ **From 15 to 19 July:**

Great Commercial Exhibition, members' exhibition and scientific exhibition.

Technical Tours, various *Social Events* including *Weekend Tours* and *Pre- and Post-Congress Tours*, extensive *Programme for Accompanying Persons*.

The Congress Director
Karl Kraus

Note:

If you have access to the **WorldWideWeb**, you find regularly updated information about the Congress (including form for registration) at the address:

<http://www.ipf.tuwien.ac.at/isprs.html>

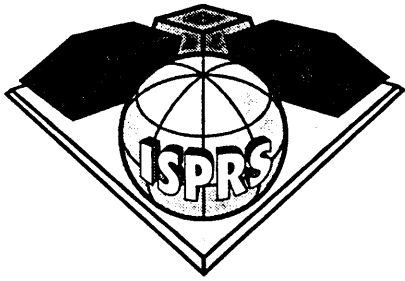
Information and Registration:

MONDIAL Congress
ISPRS'96
Faulmanngasse 4
A-1040 Vienna, Austria

Tel: +43 1 58804 0

Fax: +43 1 5869 185

Email: congress@mondial.via.at



XVIII ISPRS-Congress Vienna, 9 -19 July 1996 *Spatial Information from Images*

TU = Tutorial
 TS = Technical Session
 SS = Special Session
 PS = Poster Session
 TT = Technical Tours

ESS = Exhibitor Showcase Session
 SP = Social Program
 AP = Accompanying Persons Program
 GA = General Assembly Meeting
 BM = Technical Commission Business Meeting
 OBM = Open Commission Business Session
 CD-INFO = Information by Congress Director

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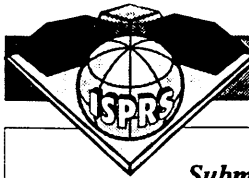
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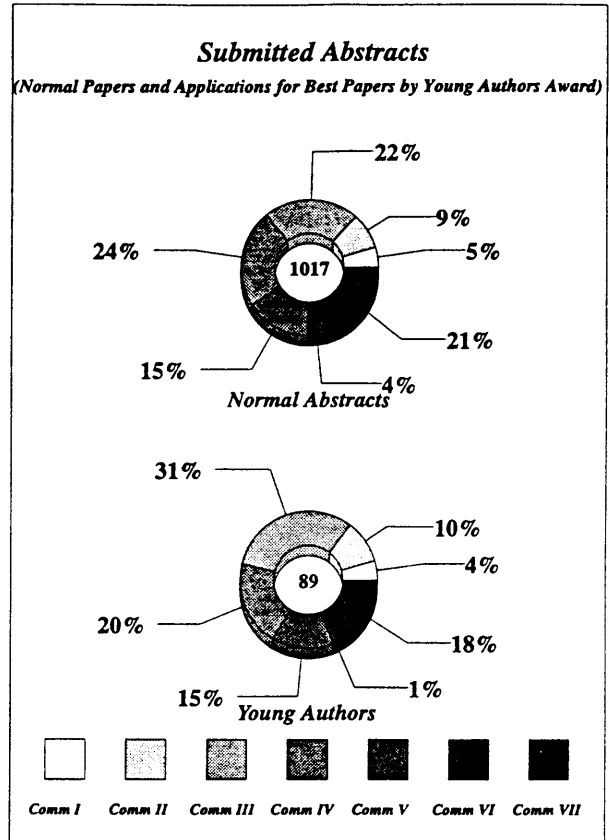
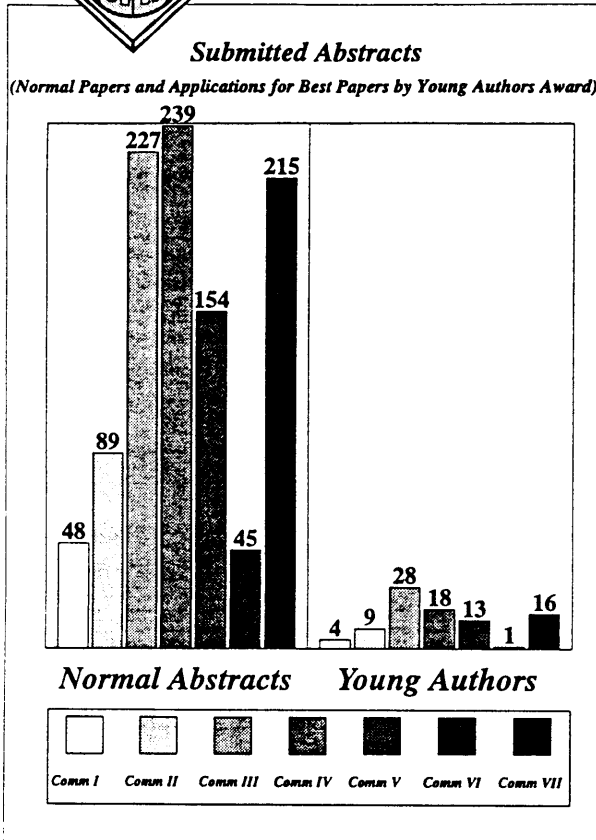
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TT 6 Environment Agency																						
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OVERVIEW

sat 6	sun 7	mon 8	tue 9	wed 10	thu 11	fri 12	sat 13	sun 14	mon 15	tue 16	wed 17	thu 18	fri 19	sat 20	sun 21	mon 22
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Prague															Budapest + TT 12	
Accompanying Persons' Programmes																



Submitted Abstracts (update: 30 November 1995)



Normal abstracts: from 65 different countries; Young Authors: from 26 different countries

Dolezal Awards



The Eduard Dolezal Award, sponsored by the Austrian Society of Surveying and Geoinformation, is presented to persons from a developing or reform country, who have successfully contributed to development of applications of photogrammetry, remote sensing and GIS. The Award is a grant to cover expenses for the participation in the Congress. **On the occasion of the 1000th anniversary celebrations of Austria in 1996** the life-work of internationally renowned Austrians should be highlighted. Since Eduard Dolezal as founder of the International Society of Photogrammetry is such an outstanding personality, the Austrian Federal Ministry of Science, Research and the Arts has donated notable funds for the Dolezal Award, thus making possible the presentation of **up to 50 awards**.

INTERNATIONAL
SPACE UNIVERSITY



International Space University

Created in 1987, the **International Space University (ISU)** is an interdisciplinary, intercultural and international institution preparing individuals to respond to the current needs and the increasing and evolving demands of the space sector in a rapidly changing world. Today's challenges require professionals capable of a comprehensive vision in order to deal with the physical, social, political, and economic environment in which space programs evolve and to meet the requirements of future generations. They must therefore have a good understanding of the full range of space-related disciplines. ISU meets the challenge with its interdisciplinary curriculum which provides considerable scope for interaction between its components in a truly international environment. The curriculum complements traditional, discipline-specific educational programs. The ISU organizes its 9th Summer Session, an intensive 10-week program, in Vienna from 1 July 1996 to 7 September 1996. **Some 120 participants of the ISU will attend the ISPRS Congress on 17 July.**

Registered Exhibitors

An up-to-date list of the registered exhibitors can be accessed at the World Wide Web address:
<http://www.ipf.tuwien.ac.at/isprs.html>

INTERORGANIZATIONAL ACTIVITIES - CIPA

INTERNATIONAL COMMITTEE FOR ARCHITECTURAL PHOTOGRAMMETRY COMITÉ INTERNATIONAL DE PHOTOGRAMMETRIE ARCHITECTURALE (CIPA)

ANNUAL REPORT FOR 1995

Submitted by: Dr. John Badekas, President of CIPA

COMMUNICATION WITHIN CIPA

Several decisions have been taken with are expected to improve the functioning of the committee:

- a. All CIPA correspondence will be circulated through the Secretary General.
- b. Minutes of CIPA meetings will be broken down into specific items and each specific CIPA member will be made responsible to take action by a given date.
- c. An effort has been made to improve communication between CIPA committee members by free distribution of the International Council on Monuments and Sites (ICOMOS) News to ISPRS members and of the proceedings of the Symposium of Commission V of ISPRS. So far the response was negative.

CIPA INTERNET POSTMASTER

There will be the "CIPA Postmaster" tool that should be made available to CIPA. This tool will be used by the Secretary General to facilitate and expedite correspondence between CIPA Committee members at little or no cost.

WORLD-WIDE-WEB (WWW)

A "CIPA Home Page" has been developed by Andre Streilein in Zurich. It has been decided that the Home Page must be developed further, that it will be updated frequently and be maintained as the prime information center for CIPA.

MARKETING CIPA PUBLICATIONS

Regarding CIPA Publications an effort is in progress for finalizing a contract with RICS Books. This will be done in parallel with ISPRS publications being dealt with by D. Tait and L. Fritz.

It was decided that CIPA related books would sell for \$40 US so as to cover all related costs.

ARCHIVING CIPA DOCUMENTS

All CIPA documents produced from now on will be stored in the ISPRS Archives using ISPRS standards. Those that organize CIPA symposia and seminars in the future will be responsible for sending proceedings, reports and other related documents to these archives.

1996 & 1997 CIPA SYMPOSIA AND MEETINGS

- *Proposed Symposium in Bali, Indonesia
November 1996*

The proposal for a CIPA symposium to convene in Bali in January 1995 was initially proposed by Tono Saksono in 1994. This proposal was approved during the CIPA annual meeting in Bari, Italy, in November of 1994. The symposium was later postponed to November 1996. The final decision by the Indonesian authorities is still pending.

- *CIPA Participation in the July 1996 XVIIIth ISPRS
Congress in Vienna, Austria*

A 90 minute Special Session has been identified within the ISPRS Congress Program for CIPA (i.e. Friday, July 19 between 08:45 hrs. and 10:15 hrs.). To make best use of this time to sensitize ISPRS members to CIPA activities and to attract more ISPRS participation in CIPA future meetings, the following proposed list of speakers and time frames have been arranged:

1. CIPA President, J. Badekas will give an overview of CIPA (15 minutes).
2. CIPA Secretary General, R. Letellier will talk about CIPA's "outreach concept" to integrate ICOMOS, ICCROM, UNESCO's World Heritage Center clients into CIPA's activities (20 minutes).
3. Two ICOMOS & UNESCO world class speakers, each one to take 20 minutes to inform ISPRS and Commission V of ISPRS about

Cultural Heritage Programs in the world and how ISPRS could participate more in the practice of conservation through CIPA activities and CIPA working groups.

4. Question period (15 minutes).

• *Proposed CIPA Working Group IV Workshop Vienna - July 96*

It was proposed by R. Letellier that Working Group IV will organize a two to three day CIPA workshop in July of 1996, in a remote location of the Alps. This workshop would include CIPA Committee members and a few special guests. It is to address questions pertaining to how best CIPA can manage its needs, i.e. ICOMOS, ICCROM, and UNESCO's World Heritage Center's requirements for recording, documentation and monitoring. The dates identified for the Workshop are between 21-25 July 1996.

• *ICOMOS 1996 General Assembly - Sofia, Bulgaria*

It has been decided that the 5-9 October 1996 ICOMOS General Assembly in Sofia must be used as an opportunity for CIPA to advertise its activities by displaying photogrammetric results, displaying a CIPA pamphlet/poster, and/or by giving a report during the General Assembly. It was suggested that additional ideas on CIPA's participation in Sofia be sent to President Badekas.

• *1997 CIPA Symposia.*

Prof. Rosswall from Sweden has proposed that a CIPA Symposium be organized in Gotemborg, Sweden in 1997. This has been approved in principle by CIPA awaiting final commitment from Prof. Rosswall. Edel Lundemo will contact Prof. Rosswall in the near future to discuss her possible assistance in the organization of this symposium.

It was also mentioned that CIPA Symposia and other meetings should be advertised using ICOMOS and ISPRS Newsletters as much as possible. This requires advance planning as the Newsletters are generally published only once or twice a year.

ANNUAL MEETINGS

• *1995 CIPA Annual Meeting.*

The 1995 CIPA Committee meeting was organized by Prof. J. Jachimski and took place during 22-24

September 1995 at the Department of Photogrammetry and Remote Sensing Informatics of the University of Mining and Metallurgy in Krakow, Poland. Members present were:

Prof. Dr. J. Badekas, Greece
Arq. Antonio Almargo Gorbea, Spain
Arch. Robin Letellier, Canada
Prof. Dr. Peter Waldhaeusl, Austria
Prof. Dr. Jozef Jachimski, Poland
Eng. Edel Lundemo, Norway
Dr. Chryssy Potsiou, Greece (as assistant to the President)

• *1996 CIPA Annual Meeting.*

The next CIPA meeting should be held in Bali, Indonesia, following the above mentioned Bali Symposium. Should the Bali Symposium not take place, the CIPA meeting will occur in conjunction with the XVIII ISPRS Congress in Vienna between 20-25 July 1996.

• *1997 CIPA Annual Meeting.*

The 1997 CIPA Annual Meeting is planned to take place in Gotemborg, Sweden in conjunction with the 1997 CIPA Symposium.

REVIEW OF CIPA WORKING GROUP ACTIVITIES

• *Working Group I - "Control Information"*

Chair: P. Waldhäusl and J. Peipe

- The results of CIPA Karlplatz Test have been used at several occasions. A series of measurements have been finished in 1995. The best of them were made by the Slovak Technical University. The final report of this test will be published by Petros Patias, Aristotle University, Thessaloniki, Greece; Antonio Almagro, Escuela de Estudios Arabes, Granada, Spain and Peter Waldhäusl, University of Technology, Vienna, Austria, at the Vienna Congress of ISPRS 1996.
- Rollei and Leica are testing their own software by using the material produced by the Test.
- The list of all centers which have managed to make acceptable restitutions will be approved by CIPA; sent to ICOMOS and UNESCO; published in the *ICOMOS News* and the *ISPRS Journal of Photogrammetry & Remote Sensing*; and will be accessible on the WWW.

• *Working Group II - Digital Image Processing*
Chair: A. Strelein and K. Henke

- A questionnaire on "the use of digital architectural photogrammetry" was structured in order to investigate the present level of application of Digital Architectural Photogrammetry. The final results and their evaluation are expected by the summer 1996.

• *Working Group III - Simple Methods for Architectural Photogrammetry*
Chair: A. Almagro

- The software Maas-CR from Leica was tested. It works with the Leica SD2000 for bundle adjustment not including control measurement with theodolite; only with plumb lines and tape measurements. The results are very satisfactory because of the simple user interface and the possibility to work on line with the stereoplotter used as measuring device. Some other works using ORIENT have also been conducted. Experience has been gained in recording using stereo-photogrammetry with reduced control (distances and plumb lines).

• *Working Group IV - Recording Documentation and Information Management*
Chair: R. Letellier

The purpose of Working Group IV is to provide a forum for photogrammetrists from CIPA and conservationists at large from ICOMOS to discuss and work toward linking and integrating recording, documentation and information management practices for cultural resource conservation needs.

Working Group IV undertook the following:

1. Got financial support from ICCROM to publish, during the winter of 1995-1996, guidelines entitled "Recording, Documentation and Information Management Guidelines for World Cultural Heritage Sites."
2. Invited over 120 Organizations and experienced practitioners from more than 25 countries to review the Guidelines. This invitation was sent to members of ICOMOS, ICCROM, UNESCO and CIPA.
3. Received 81 positive responses from the above organizations and practitioners which reviewed and commented on the Guidelines. They are being considered as corresponding members of this working group. The 30 people that provided detailed remarks to enhance the

Guidelines are also being considered as Active Members of Working Group IV.

4. Presented the above mentioned Guidelines at the September 1995 CIPA Annual Meeting in Krakow. These Guidelines were discussed during the Krakow meeting and adopted by CIPA.

5. Presented a "CIPA Outreach" Concept in Krakow. As a result of the past two years of activities, Working Group IV recognizes that CIPA should now disseminate its knowledge by sharing it with ICOMOS membership from other Continents.

• *Working Group V - Archeology and Photogrammetry*
Chair: C. Ogleby and M. Doneus

The aims of Working Group V are to make archaeologists aware of the possibilities and the limits of photogrammetry and remote sensing within their field. The following steps are suggested:

- To get in contact with the ICOMOS Working Group for Archaeology and prepare an address-list via Internet and WWW.
- active participation at archaeological congresses
- setting up a questionnaire within the archaeological section of the WWW.

The objectives of this working group are under review.

• *Working Group VI - Monuments Information System*

P. Waldhäusl has taken the responsibility for developing a proposal for a new CIPA Working Group on this field.

• *Working Group VII - Non Professional Cultural Heritage Recorders*

J. Jachimski has taken the responsibility for developing a proposal of a new CIPA Working Group on this field.

PROPOSED UK/FRANCE ICOMOS RECORDING GUIDELINES

The Guideline document was presented by Philip Withbourn at the ICOMOS 1995 Advisory Committee meeting in Krakow in mid-September 1995. It was then proposed by ICOMOS Canada that the document will be

reviewed by a Scientific Committee of ICOMOS as stipulated in a procedure document of ICOMOS. This proposal makes reference to the CIPA as the Scientific Committee to review the document.

The suggestion for the CIPA's involvement in reviewing the Guidelines was made by R. Letellier who attended the September 1995 Advisory Committee meeting. This suggestion implied that the CIPA Working Group IV would be representing CIPA on this review. Working Group IV involvement will be to ensure that the UK/France Guidelines are at a high standard and are well linked to the "Recording, Documentation and Information Management Guidelines for World Cultural Heritage Sites" to be published by ICCROM soon.

CIPA is in contact with Secretary General Luxen of ICOMOS for establishing the proper ad-hoc Working Group and R. Letellier is actively preparing the first meeting of the Working Group.

SELECTION OF NEW BOARD MEMBERS

A. Daoulatli, CIPA committee member from the part of ICOMOS, has submitted his resignation. Also F. Ursua-Cocke and R. Dallas, both members of CIPA from the part of ICOMOS, have expressed their intention to leave the Committee. There is then a need for the replacement of one or possibly three members of the Committee.

Despite that several names of European based people were suggested it has been decided that people from other countries should be attracted by proper advertising in the *ICOMOS News*, so as to reach all member countries equally and strive to get representation from all continents.

NATIONAL DELEGATES AND CORRESPONDENTS

- *CIPA National Delegates*

It was discussed that selection criteria should be defined to ensure that designated National Delegates are active in their respective countries.

- *CIPA Corresponding Members*

It was discussed and agreed that CIPA should broaden this membership to include those interested and actively involved in "Recording, Documentation, Information Management and Monitoring" activities. It was observed that it is very important to activate as much as possible National Delegates and Corresponding Members.

- *Membership Database*

National Delegates and Corresponding Members will be compiled into a database for reference and mailing. R. Letellier offered to manage and maintain this database.

CIPA OFFICERS

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Fax: +30-1-7722-677
E-mail: jbadibad@central.ntua.gr

CIPA Secretary General:

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Hull, Quebec K1A 0H3, Canada
Tel: +1-819-997-0146
Fax: +1-819-997-6252

INTERORGANIZATIONAL ACTIVITIES - ISO

THE INTERNATIONAL ORGANIZATION FOR STANDARDIZATION ORGANISATION INTERNATIONALE DE NORMALISATION

Submitted by: Prof. Dr. H.-P. Bähr, Co-Chairman ISPRS Working Group VI/3
Lawrence W. Fritz, Secretary General ISPRS

GENERAL INFORMATION

The ISO is a worldwide federation of national standards bodies comprising 118 members (85 Member Bodies, 24 Correspondent Members, nine Subscriber Members), one in each country. ISO international standards are developed in agreement between its Member Bodies. A committee draft is given to an ISO Technical Committee (TC) for discussion. After consensus in the TC, the central secretariat of ISO emits a Draft International Standard (DIS). The drafts include the vote results from the respective countries. Final voting is done by all ISO Member Bodies and the final ISO version has to be agreed by at least 75% of the voters.

International Organizations such as ISPRS may be granted liaison status (Category A or B) with an ISO TC, ISO Subcommittee (SC) or ISO Working Group (WG). Category "A" liaison gives right to full participation, whereas Category "B" liaison is to be kept informed only.

ISPRS LIAISONS AND REPRESENTATIVES

During 1995, ISPRS has had liaison status on the following ISO committees.

- *ISO/TC 20 "Aircraft and Space Vehicles"*
- ISO/TC20/SC14 "Space Systems and Operations"
Category B liaison
ISPRS representative is Prof. Dr. H.-P. Bähr
Co-Chairman, ISPRS WG VI/3
- ISO/TC20/SC13 "Space Data and Information Transfer Systems"
Category B liaison
ISPRS representative is Dr. Hartmut Ziemann
Chairman, ISPRS WG I/1
alternate representative is Dr. Ekow Otoo
Chairman, ISPRS WG II/3
- *ISO TC 42 "Photography"*
- WG 03 "Sensitometry, Image Measurement and Viewing"

- WG 05 "Physical Properties and Image Permanence of Photographic Materials"
- WG 12 "Lens Quality Characteristics"
- WG 18 "Electronic Still Picture Imaging"
Category A liaison
ISPRS representative is Dr. Hartmut Ziemann
Chairman, ISPRS WG I/1
alternate representative is Dr. H.-P. Bähr
Co-Chairman, ISPRS WG VI/3
- *ISO TC 172 "Optics and Optical Instruments"*

ISO/TC172/SC9 "Electro optical systems"
Category A liaison
ISPRS representative is Dr. Hartmut Ziemann
Chairman, ISPRS WG I/1
alternate representative is Dr. H.-P. Bähr
Co-Chairman, ISPRS WG VI/3
- *ISO TC 211 "Geographic information/Geomatics"*

Category A liaison
ISPRS representative is Lawrence W. Fritz
Secretary General, ISPRS

Efforts to establish Category A and B liaisons with the subcommittees SC 1 of ISO TC 172 and SC 6 of ISO TC 20 respectively, have been unsuccessful to-date. TC/172/SC1 addresses "Fundamental Standards," TC/20/SC6 addresses "Standard Atmosphere."

REPORTS

During 1995 ISPRS was not represented but, did receive information about the following meetings:

- ISO TC 20/SC 13
May - Sant Hubert, Canada
Nov - Toulouse, France
- ISO TC 20/SC 14
Jan - Cannes, France
Apr - Paris, France
- ISO TC 172/SC 1
Jun - Tucson, USA

TC 42 and TC 172/SC 9 provide their draft and adopted standards regularly to ISPRS. Prof. Bähr maintains an available registry of them. The documents considered of most interest to ISPRS members from TC 42 (Photography) are:

- ISO 5-3 Density Measurements, Part 3: Spectral conditions
- ISO 5-4 Density Measurements, Part 4: Geometric conditions for reflection density
- ISO/DIS 517.2 Apertures and related properties pertaining to photographic lenses: Designations and measurements
- ISO/DIS 5466 Processed Safety Photographic Films: Storage practices
- ISO/DIS 6221 Films and papers: Determination of dimensional change
- ISO/DIS 8478.2 Camera Lenses: Measurement of ISO spectral transmittance
- ISO 10602 Processed silver-gelatin type black-and-white film: Specifications for stability
- ISO/DIS 12231 Electronic still-picture cameras: Terminology
- ISO 11145 Lasers and laser-related equipment: Vocabulary and symbols

The documents considered of most interest to ISPRS members from TC 172/SC 9 (Optics and Optical Instruments/Electro-Optical Systems) are:

- ISO 9334 Optical Transfer Function: Definitions and mathematical relationships

ISPRS was represented at the ISO TC 211 plenary meeting which convened in Reston, USA during 28-29 May 1995. ISPRS Category A liaison with TC 211 was officially established 29 September 1995.

TC 211 on "Geographic information/Geomatics" was initiated in late 1994 and is now very active in drafting standards for GIS activities. It has formed five Working Groups within which one or more Work Items are being addressed. The following is a listing of the five WGs, their Convener (host), the Work Items, and their Chairpersons:

- *WG 1 - Framework and Reference Model (Greg Smith, USA)*
 - Reference Model (N. Andersen, USA)
 - Overview (Gower, UK)
 - Conceptual Schema Language (Berre, Norway)
 - Conformance Testing (Imai, Japan)
- *WG 2 - Geospatial Data Models and Operators (Ken Bullock, Australia)*
 - Spatial SubSchema (Parker, UK)
 - Temporal SubSchema (Roswell, USA)
 - Rules for Application (Hoseggen, Norway)
 - Spatial Operators (open Chair)
- *WG 3 - Geospatial Data Administration (Les Rackham, United Kingdom)*
 - Cataloging (Rugg, USA)
 - Geodetic Reference System (open Chair)
 - Indirect Reference System (Walker, UK)
 - Quality (Morrison, USA)
 - Quality Evaluation Procedures (Shibasaki, Japan)
 - Metadata (Danko, USA)
- *WG 4 - Geospatial Services (Morten Borrebaek, Norway)*
 - Positioning Services (open Chair)
 - Portrayal of Geographic Information (Toppe, Norway)
 - Encoding (Skogan, Norway)
 - Services (Berre, Norway)
- *WG 5 - Profiles and Functional Standards (David McKeller, Canada)*
 - Profiles (O'Brien, Canada)

ISPRS has been invited to provide specialists to work in these groups, and even to lead by Chairing open Work Item positions (as listed above), and to provide reviews of the draft standards being developed in each of the Work Items. Addresses of the chairpersons and a registry of all documents produced by TC 211 are available and are being maintained by the ISPRS Secretary General.

INTERORGANIZATIONAL ACTIVITIES - SPIE

THE INTERNATIONAL SOCIETY FOR OPTICAL ENGINEERING

Submitted by: Prof. Dr. Armin Gruen, 2nd Vice President ISPRS

1995 VIDEOMETRICS IV CONFERENCE

For the fourth time in a row ISPRS has supported the Videometrics Conference of SPIE. Videometrics IV took place from 22-26 October 1995 at the Pennsylvania Convention Center, Philadelphia, USA as part of Photonics East (comprising 45 conferences and 67 courses). The conference on Videometrics addressed developments and applications of the state of the art of vision-based measurement technologies.

The primary function of Videometrics is to obtain quantitative information about physical objects or the environment. This includes methods to accurately and automatically recover 3-D properties, such as coordinates and dimensions, from images. These images are obtained not only from traditional CCD cameras but also, among others, active 3-D laser scanners, high resolution digital still video, VCR's, structured light, and integrated different types of data.

Calibration and performance evaluation of vision systems for measurement-related applications remains an important issue. The designer must be able to precisely predict the resulting accuracy from a given version system, in a given configuration, under all the conditions expected during operation.

Improving the metric performance of object positioning, orientation and tracking in three-dimensional space, and geometric modelling of the environment is also dealt with in this conference.

Recent advances, notably those documented in photogrammetric publications, show that the achievable accuracy has reached a level that makes it acceptable for many industrial requirements such as gauging and reverse engineering.

An important objective of this conference was to bring together machine vision specialists, photogrammetrists, system designers, and potential users, particularly those with high tolerance requirements and those already convinced of the importance and payback of vision

metrology, to discuss and exchange ideas on the above issues.

Papers have been solicited in the following and related areas, with particular emphasis on system applications:

- successfully demonstrated system applications
- on-line control systems
- processing and analysis of 3-D data
- object and environment (site) modelling
- dynamic tracking in 3-D
- rigorous and practical camera and system calibration
- accuracy and performance evaluation
- precise and robust measurement algorithms
- integration of various sensor data for metrology

In eight sessions 37 papers were presented and printed in the **SPIE-Proceedings Volume 2598**.

RELATIONSHIPS WITH ISPRS

At Videometrics IV, ISPRS was given the opportunity to display and distribute information material about the Society and for the XVIII ISPRS Congress in Vienna 1996.

As the number of SPIE conferences, conducted in parallel, has increased in recent years, the attendance has partly dropped substantially. Therefore, SPIE is currently reevaluating its conference program with the aim to focus more on the well-attended, attractive topics.

Videometrics, which is chaired by Sabry El-Hakim, with Hirofumi Chikatsu, Armin Gruen, Henrik Haggren, Kurt Novak, Mark Shortis and Walter Snow on the Program Committee, ranks among the most stable and well-attended single conferences (it was actually the second biggest of the Photonics East Symposium) and is thus likely to survive at least for a few more years.

The next conference Videometrics V will move to the SPIE Annual Meeting, San Diego, July 1997.

ISPRS PUBLICATIONS

Lawrence W. Fritz, Secretary General

The publications of ISPRS are in six categories:

1. International Archives

The *International Archives of Photogrammetry and Remote Sensing* contain the proceedings and the scientific and technical presentations of each Congress, edited and distributed by the Member organization responsible for the Congress. The scientific and technical presentations at Technical Commission Symposia are published by each of the Commission sponsoring Members, also as volumes of the *Archives*.

In 1995 the Proceedings from three Workshops organized by ISPRS Working Groups were published in Archives Volume XXX. These additions to the Archives are the result of new ISPRS Guidelines for publication which establish the criteria for publication eligibility of Proceedings from Tutorials, Workshops and Conferences organized by ISPRS Working Groups. The listing of all books published in the *International Archives of Photogrammetry and Remote Sensing* and their availability is presented on page 66.

2. Official Journal

The *ISPRS Journal of Photogrammetry and Remote Sensing* is the official publication of the Society. It contains peer reviewed scientific and technical articles and reviews in the field of photogrammetry and remote sensing. It also reports on Congresses, Symposia and other activities of the ISPRS and as such, endeavors to be a primary channel of communication for specialists in all countries working in the many disciplines applying photogrammetry and remote sensing.

The *ISPRS Journal* is published by Elsevier Science Publishers and is issued six times per year.

3. The ISPRS Home Page on the World-Wide-Web

Starting in August 1995, the ISPRS server was established. Since then several new sections have been added. As of 1 January 1996, André Streilein has been appointed by ISPRS Council to serve as ISPRS WebMaster. He can be reached by E-mail at: andre@geod.ethz.ch.

The ISPRS Home Page currently consists of sections on:

- Statement of ISPRS Aims and Activities
- Members of ISPRS
- ISPRS Council 1992-1996

- ISPRS Archives
- Official Journal of ISPRS
- Additional Information on ISPRS Activities
- What's New on the ISPRS Server

The ISPRS WWW Home Page can be accessed at:
<http://www.p.igp.ethz.ch/isprs/isprs.html>

4. ISPRS Annual Report

The *ISPRS Annual Report* contains current information regarding the state of the science and technologies in the fields of photogrammetry, remote sensing, GIS, machine vision and computer vision and other related sciences. Since 1993 it has been published annually and distributed to organizations and scientific institutions which collaborate or have interest in ISPRS activities.

5. Activities and Members of ISPRS

The *ISPRS Organization and Programs* (Silver Book) is published every four years. It contains:

- A brief summary of the Society history, objectives, members, awards, finances and structure;
- Officers, activities, Commissions and Working Groups, Terms of Reference and planned events; and
- Society Statutes, Bylaws, Guidelines and Awards.

The *ISPRS Member List* (Blue Book) is published annually. It contains complete up-to-date addresses and communication numbers of each member organization (Ordinary Member), its officers and Commission Correspondents, and the officers, Regional Members, Sustaining Members and Honorary Members of the Society.

The Silver Book and Blue Book are available from the Secretary General for a nominal fee (150 Swf each, 250 Swf for both).

6. Special circulars and announcements

The *ISPRS Brochure* is a trifold published periodically and contains a brief description of the Society objectives, members and activities.

Special circulars, announcements and Working Group newsletters are produced and distributed by the ISPRS Technical Commissions to provide information on Congresses, Symposia and other activities of ISPRS.

THE INTERNATIONAL ARCHIVES OF PHOTOGRAMMETRY AND REMOTE SENSING

Compiled by: Lawrence W. Fritz, Secretary General ISPRS

Until 1994, the publication and distribution of the official **Archives** produced from the quadrennial Congresses and Symposia of the International Society for Photogrammetry and Remote Sensing was the responsibility of the hosting ISPRS Member organization. In 1993 the ISPRS signed a contract with RICS Books to serve as the official repository for post-Congress and post-Symposia sales of all **Archives** produced after 1993. This arrangement was designed to make the **Archives** more accessible from a single source without diverting revenues from the producing organizations.

In the early years of the Society, **Archive Volumes** were published independent of Congress or Technical Commission Symposia. Some of these **Archives** are still available from the ISPRS Member listed under "**Repository**" below. A reference copy of all **Archives** listed (past and future) resides at the International Training Center (ITC) in The Netherlands.

Addresses:

RICS Books	ITC Librarian	Lawrence W. Fritz
Surveyor Court	350 Boulevard 1945	ISPRS Secretary General
Westwood Way	P.O. Box 6	Lockheed Martin Corp.
Coventry CV4 8JE	7500 AA Enschede	14833 Lake Terrace
United Kingdom	The Netherlands	Rockville, MD 20853-3632, USA
Fax: +44-171-334-3800	Fax: +31-53-874400	Fax: +1-301-460-0021

The **Archives** are numbered odd for Congress Volumes and even for Commission Symposia. Volume Parts are given the Commission number and are separate books. When a Volume or Part is composed of multiple books, the number of total books of the Volume or Part is given in parentheses below. The Part for other ISPRS Conferences, Workshops or Tutorials is the Commission number followed by a C, W or T respectively and a sequence number.

To obtain **Archives** please contact the repository listed below:

<u>Years</u>	<u>Archive Event & Venue</u>	<u>Vol-Part</u>	<u>Repository</u>
1908-1909	International Archives	I	Austria
1909-1911	International Archives	II	Austria
1911-1913	International Archives	III	Austria
1913-1914	International Archives	IV	Austria
1915-1919	International Archives	V	Austria
1919-1923	International Archives	VI	Austria
1924-1930	III Congress - Zurich	VII	Austria
1931-1934	IV Congress - Paris	VIII (2)	ITC
1935-1938	V Congress - Rome	IX (3)	USA
1939-1948	VI Congress - The Hague	X (2)	ITC
1948-1952	VII Congress - Washington, DC	XI (3)	USA
1952-1956	VIII Congress - Stockholm	XII (4)	Sweden
1956-1960	IX Congress - London	XIII (6)	UK
1962	Comm VII Symposium - Delft	XIV	ITC
1960-1964	X Congress - Lisbon	XV (7)	ITC
1966	Comm II Symposium - Bad Godesberg	XVI	Germany
"	Comm IV Symposium - Prague	XVI	Czech Rep.
"	Comm VII Symposium - Paris	XVI	France
1964-1968	XI Congress - Lausanne	XVII (10)	Switzerland

<u>Years</u>	<u>Archive Event & Venue</u>	<u>Vol-Part</u>	<u>Repository</u>
1970	Comm II Symposium - Munich	XVIII	Germany
"	Comm V Symposium - Paris	XVIII	France
"	Comm VII Symposium - Dresden	XVIII(2)	Germany
1971	Comm III Symposium - London	XVIII	UK
1968-1972	XII Congress - Ottawa	XIX (6)	Canada
1974	Comm III Symposium - Stuttgart	XX	Germany
"	Comm IV Symposium - Paris	XX	France
"	Comm VII Symposium - Banff	XX (2)	Canada
1972-1976	XIII Congress - Helsinki	XXI (13)	Finland
1978	Comm I Symposium - Tokyo	XXII-1	Japan
"	Comm II Symposium - Paris	XXII-2	France
"	Comm III Symposium - Moscow	XXII-3	Russia
"	Comm IV Symposium - Ottawa	XXII-4	Canada
"	Comm V Symposium - Stockholm	XXII-5	Sweden
"	Comm VI Symposium - Krakow	XXII-6	Poland
"	Comm VII Symposium - Freiburg	XXII-7 (3)	Germany
1976-1980	XIV Congress - Hamburg	XXIII-A,B(11)	Germany
1982	Comm I Symposium - Canberra	XXIV-1	Australia
"	Comm II Symposium - Ottawa	XXIV-2	Canada
"	Comm III Symposium - Helsinki	XXIV-3	Finland
"	Comm IV Symposium - Washington, DC	XXIV-4	USA
"	Comm V Symposium - York	XXIV-5(2)	UK
"	Comm VI Symposium - Mainz	XXIV-6	Germany
"	Comm VII Symposium - Toulouse	XXIV-7(2)	France
1980-1984	XV Congress - Rio de Janeiro	XXV-A(8),B	Brazil
1986	Comm I Symposium - Stuttgart	XXVI-1	Germany
"	Comm II Symposium - Baltimore	XXVI-2	USA
"	Comm III Symposium - Rovaniemi	XXVI-3(4)	Finland
"	Comm IV Symposium - Edinburgh	XXVI-4	UK
"	Comm V Symposium - Ottawa	XXVI-5	Canada
"	Comm VI Symposium - Badagry	XXVI-6	Nigeria
"	Comm VII Symposium - Enschede	XXVI-7(3)	Netherlands
1984-1988	XVI Congress - Kyoto	XXVII-A,B(13)	Japan
1990	Comm I Symposium - Manaus	XXVIII-1(2)	Brazil
"	Comm II Symposium - Dresden	XXVIII-2	Germany
"	Comm III Symposium - Wuhan	XXVIII-3	China
"	Comm IV Symposium - Tokyo	XXVIII-4	Japan
"	Comm V Symposium - Zurich	XXVIII-5	Switzerland
"	Comm VI Symposium - Rhodes	XXVIII-6	Greece
"	Comm VII Symposium - Victoria	XXVIII-7(2)	Canada
1988-1992	XVII Congress - Washington, DC	XXIX-A,B(7),Index	USA
1994	Comm I Symposium - Como, Italy	XXX-1	RICS Books
"	Comm II Symposium - Ottawa, Canada	XXX-2	RICS Books
"	Comm III Symposium - Munich, Germany	XXX-3	RICS Books
"	Comm IV Symposium - Athens, USA	XXX-4	RICS Books
"	Comm V Symposium - Melbourne, Australia	XXX-5	RICS Books
"	Comm VI Symposium - Beijing, China	XXX-6	RICS Books
"	Comm VII Symposium - Rio de Janeiro, Brazil	XXX-7	RICS Books
1995	Intercomm Workshop - Zurich, Switzerland	XXX-5W1	RICS Books
"	WG IV/6 Workshop - Boulder, USA	XXX-4W1	RICS Books
"	WG IV/1 Workshop - Madison, USA	XXX-4W2	RICS Books

On 9 July 1996 Part B of the XVIIIth ISPRS Congress Archives will be available:

1992-1996	XVIII Congress - Vienna, Austria	XXXI-7	RICS Books
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**ISPRS JOURNAL OF
PHOTOGRAMMETRY AND REMOTE SENSING**
(The Official Publication of the International Society for Photogrammetry and Remote Sensing)

Annual Report to ISPRS Council

Editor-in-Chief, David A. Tait

For the third successive year, the Journal has been published according to schedule, with no significant delays in delivery. At the end of 1995, there were 15 papers with the publisher awaiting publication and a further 16 in the pipeline.

Volume 50 has been rather unusual in that it has contained three Theme Issues. Those on "Applications for Close Range Digital Photogrammetry" and "Image Understanding" were organised and submitted by Commissions V and III respectively and thanks are due to the Commission Presidents and Secretaries for their efforts on behalf of the Journal. It is hoped that the third Theme Issue on the life and work of Dr. Uki Helava will be a fitting tribute to a most remarkable photogrammetrist and scientist.

The Theme Issue concept will continue next year, with one issue devoted to aspects of the work of Commission IV.

The introduction of a major review paper to each normal issue of the Journal has been more difficult to arrange than expected but will start in 1996. Drs. Fritz Ackermann, Wang Zhizhuo and Clive Fraser will be contributors.

The Ad Hoc Committee on Journal Development met with representatives of Elsevier Science Publishers in Amsterdam, The Netherlands in February 1995 and reported to the ISPRS Council at the Vienna meeting in June. Council has initiated negotiations with Elsevier

over the renewal of the present contract and is considering the role of the Journal in the overall strategy for communication within the Society.

The percentage of contributions which now come from individuals active in ISPRS work continues to increase, making the Journal content more representative of ISPRS activity.

Scientific and technical manuscripts may be submitted in triplicate to:

David A. Tait
Editor-in-Chief, ISPRS Journal
Department of Geography and Topographic Science
University of Glasgow
Glasgow G12 8QQ
United Kingdom
Tel: +44-141-339-8855 x4783
Fax: +44-141-330-4894.

Subscriptions to the **ISPRS Journal of Photogrammetry and Remote Sensing** (ISSN 0924-2716) may be entered with subscription agents or directly with:

Elsevier Science Publishers
Attn: Jenny Henzen
PO Box 1930
1000 BX Amsterdam
The Netherlands
Tel: +31-20-586-2911
Fax: +31-20-586-2696.

ISPRS MEMBERSHIP AND STATE OF AFFAIRS

Submitted by: Prof. John Trinder, ISPRS Treasurer

MEMBERSHIP

The current membership of ISPRS is:

Ordinary Members 94
Regional Members 6
Sustaining Members 31

Ordinary Membership remained unchanged in 1995.
Two new Regional Members joined the Society in 1995:

- PAIGH - The Pan American Institute of Geography and History representing the Americas,
- AARSE - The African Association for Remote Sensing of the Environment representing Africa.

Following the drive by Council to increase Sustaining Membership which began in early 1994, a further six new Sustaining Members joined ISPRS in 1995, due especially to the encouragement of the Secretary General. They are:

Member	Country	Category
• Geocarto International Centre	Hong Kong	D
• Eastman Kodak Company	USA	D
• AERIAL	France	D
• Autometric, Inc.	USA	B
• Lockheed Martin Corporation	USA	A
• Space Imaging Inc.	USA	C
• "Sovinform Sputnik"	Russia	C

These new members are welcomed to ISPRS and Council looks forward to many fruitful years of association with them.

Two Sustaining Members unfortunately have been deleted in 1995 due to non payment of dues. They are:

Ex-Member	Country	Category
Image Interpretation Systems	USA	C
Agusta OMI	Italy	B

Invoices for payment of 1995 subscriptions were distributed by the end of January 1995, and reminders were sent out in July. By the end of November, 40% of Ordinary Members, 50% of Regional Members and 77% of Sustaining Members have paid their 1995 dues. Due to the different categories of membership, the sums collected for 1995 are 62% of total Ordinary Membership dues, 88% of total Sustaining Membership dues, and 50% of total Regional Membership dues. The total amount of unpaid dues at the end of November 1995 is Swf 26,023 or 28% of income from dues. A significant number of members have also not paid their subscriptions for previous years. The budget has allowed for a total non payment of dues for 1995 of Swf 10,000.

The Society's investments have earned Swf 15,331 in 1995.

Expenditure for 1995 has funded Council activities and subscriptions by ISPRS to a number of related international organisations. Council's decision to provide complimentary issues of the ISPRS Journal of Photogrammetry and Remote Sensing to Ordinary Members for the years 1994 and 1995 in an attempt to increase subscriptions has required the expenditure of Swf 12,966.25 in 1995. Council has determined that the payment of these subscriptions will be discontinued.

Despite the shortfall in income derived from subscriptions, caused by the significant number of unfinancial Members, the Society's investments in Swiss bonds have enabled it to remain in a very sound financial position. The accounts were audited in May 1995 by the Financial Commission and found to be correct and in good order.