

SPECIAL SESSIONS

Special Session SS01

EARSeL (European Association of Remote Sensing Laboratories)

July 12, 1996, 13:39-15:00

Session Reporter: **Madelaine Godefroy** (France)

Chairman: **Manfred Buchroithner** (Germany)

Emilio Chuvieco (Spain), D. Cocero - **Forest Fires from Space: Considering Spatial and Temporal Resolution**

Key points were the present applications and future prospects for the utilisation of remote sensing data for short and long-term fire risk mapping and fire effects assessment and management.

The author explained that forest fires are one of the most important problems for the environment world-wide, also claiming human lives and property. Remote sensing data with their wide area coverage and repetivity, as well as information on non-spectral regions, are particularly valuable the detection and mapping of wildland fires. Four types of applications were described: short-term fire danger estimation, long-term fire risk assessment, fire detection and fire effects assessment.

The future availability of better spatial, spectral and temporal resolution sensors will overcome some of the present limitations of remote sensing data for fire management, particularly the MODIS data along with Meteosat Second Generation will be very valuable for operational fire detection. The combined analysis of GIS and remote sensing data will benefit fire risk and fire effects assessment as well.

Q1 (M. Buchroithner - Germany): Have you tried filtering historic weather data to determine the types of weather situations when large forest fires occurred?

A (E. Chuvieco - Spain): There has been no such study. Second generation Meteosat should be very useful from this point of view, but until now our team has not studied historical weather data.

Q2 (M. Buchroithner): What concrete measures are being taken to develop operational methods of fighting forest fires at supra-national level?

A (E. Chuvieco): In the last Framework Programme of European Commission DGXII there is an European project "MEGAFIRES" on "Regional Fire Risk and Fire Mapping for the Mediterranean Basin", of which I am the co-ordinator. We are studying fire modelling in order to understand how fires behave and we are developing methods to improve risk assessment.

Robert Soeters (The Netherlands), K. v. Westen (The Netherlands), M. Buchroithner (Germany) - **Potential and Limitations of Satellite Remote Sensing for Geo-Disaster Reduction**

Key points were the definition of disasters as events bringing great damage, loss or destruction, and geo-disasters could be landslides, floods, hurricanes, volcanic eruptions, etc. To reduce the impact of natural disasters a complete strategy for disaster management is required,

including disaster prevention, preparedness and disaster relief.

The authors described how remote sensing data can contribute in each of these areas, and emphasised that optimum benefit can be obtained by combining different

Special Session SS02

OEEPE (European Organisation for Experimental Photogrammetric Research): A Partnership for Solving the European Mapping Problems

July 12, 1996, 13:30-15:00

Session Reporter: **C.M. Paresi** (The Netherlands)

Chairmen: **Riccardo Galetto** (Italy), **C.M. Paresi** (The Netherlands)

The Session Chairman, **Riccardo Galetto** (Italy), President of the OEEPE, shortly introduces the OEEPE activities, achievements and perspectives. In particular, he states that user requirements and technology have changed drastically during the last few decades, from a pure data acquisition to an information system perspective, enabling cost effective access, exchange and integration of Geoinformation. The present OEEPE research perspective is that Photogrammetry should not be considered in a narrow sense but in the framework of Geoinformatics, specially in view of the trend towards large systems and system integration; it should serve the whole European Geoinformatics Community, deal with problems of more than local significance, and be carried out by means of international co-operation; it normally relates to technical and scientific questions or deals with the performance status of methods, but also operational and organisational aspects can be included.

Then, the Session Chairman introduces the first paper entitled "**First Experiences from the OEEPE Scanner Test**" which is delivered by **Otto Kölbl** from the Ecole Polytechnique Fédérale de Laussane (Switzerland).

The conversion of photographic images into a digital form by scanning still represents a key operation for digital photogrammetry. Currently, a considerable number of scanners specially developed for the requirements of photogrammetric processes are available.

In order to develop criteria for a systematic analysis of scanners and to gain experience on different systems, the OEEPE has set-up a working group, which besides other activities launched a test.

The test material which included 7 different test-patterns and aerial photographs, was sent to different vendors. Up till now, test results have been received from 4 firms, using different systems. The results of the scanner test confirm the high standard reached by photogrammetric scanners.

The scanning of the original negatives is still not very satisfying due to the limited dynamic range of the scanner and high image noise in the darker areas. Problems arise

also when scanning colour, especially false colour photographs due to the lower sensitivity in the blue area. The scanning process also affects the resolution of the original images and a thorough control of the MTF of the scanner is highly recommended.

Furthermore, it is apparent that the scanning process is still a very time consuming operation, mainly because each photograph has to be treated individually and hardly none of the scanners is equipped for film roll. A problem linked to the management of the scanning process is the organisation of the data.

After a short discussion on the availability of data by other members of the OEEPE working group on Photoscanners, the Chairman of the Session introduces the second paper entitled "**Experimental Tests on Fast Ambiguity Solutions for Airborne Kinematic GPS Positioning**" which is delivered by **Friedrich Ackermann**, Honorary Member of the ISPRS.

High precision kinematic GPS positioning, based on differential methods, has always had the problem of correct ambiguity solutions for the phase observations, especially under the conditions of airborne applications for photogrammetry and remote sensing.

Recently, the appearance of dual frequency receivers and the development of methods for fast ambiguity solutions, known as "on the fly" (OTF) solutions, have created a new situation. Those methods simplify the airborne kinematic GPS application considerably, especially also the application to photogrammetric block adjustment.

There is the problem, however, that the present methods for fast ambiguity solutions are not very reliable. Safe application seems to be limited to short distances between receivers; available experience suggests safe maximum distances of about 30 km only. This represents a serious restriction, at least in some conditions of application.

It is therefore to be investigated how far the stationary and the roving receivers can be separated and still give reliable ambiguity solutions. The second point of research is to develop methods or conditions which make the OTF ambiguity solutions safer and more robust.

Friedrich Ackermann (Germany) reports on a number of experimental tests on fast ambiguity solutions which are undertaken by the GPS working group of OEEPE (Stuttgart Pilot Centre). Several test flights have been flown, each with several stationary dual frequency receivers which were positioned at different distances from the project area. The range extends up to several hundred km. Receivers of different manufacturers have been used, in order to cover different cases. The tests include smooth flying, avoiding loss of lock as much as possible, as well as rough flights with sharp and steep turns, producing loss of lock by intention.

The GPS data processing (and checking via aerial triangulated camera positions) uses several software programs for the ambiguity solutions. The results are analysed with regard to the accuracy and the sensitivity of fast ambiguity solutions.

Some experiments have already been worked out, and the results seem to prove that the fast ambiguity solutions are reliable; but as systematic errors are involved in the results obtained up till now, additional information from other systems might be needed to frame the results. Full results of the test will be available by the end of 1996.

After a short discussion on the reliability of the fast ambiguity solutions, the Chairman of the Session introduces the third paper entitled "**Updating Complex Databases: the Next Step**" which is delivered by **Michael Brand** from the Ordnance Survey of Northern Ireland.

Digital topographic databases are fundamental to the management of an ever increasing range of business functions within a GIS environment. It follows that currency of such databases is critical to effective use of the new technology.

The more complex the topographic information involved, the greater are the implications to the updating procedures, particularly if in addition to current data, archiving of a historical perspective is a requirement. To date these matters have remained largely unaddressed.

Michael Brand (U.K.) reports on the recently completed OEEPE I project "**Updating of Complex Digital Topographic Databases**" which was an attempt to tease out the principles involved and the difficulties to be overcome in seeking solutions to the problem of updating complex digital databases. The following key areas for further development were identified: recording of the time/historical dimension; production of user friendly/cost effective updating procedures; production of software which can produce and accept change only data; data compatibility.

As no discussion takes place on the subject of the third paper, the Chairman of the Session requests **Otto Kölbl** (Switzerland) to shortly introduce the proceedings of the **OEEPE Workshop on Application of Digital Photogrammetric Workstations** which was distributed during the Session. The workshop revealed the efficiency of digital aerial triangulation and the advantages of incorporating matching techniques for the derivation of digital terrain models; furthermore, the costs for orthophotos and map printing could be reduced considerably through the application of digital data; finally, standards for image formats, transformation parameters, and orientation elements would be necessary.

The Chairman of the Session, **Riccardo Galetto** thanks **Otto Kölbl**, **Friedrich Ackermann**, and **Michael Brand** for their contribution, and the audience for attending the Session in such a large number.

types of remote sensing data, especially radar data, which is particularly useful in tropical countries. SAR interferometry is also an extremely promising technique. The speaker gave a summary of the usefulness of satellite data in the different phases of disaster management for flooding, earthquakes, volcanic eruptions and landslides. The author concluded that it is vitally important that more resources should be devoted to research in this area and that access to data is of vital importance when disasters occur. Decision-makers need to be made aware of these issues.

Jacques Megier (Italy), **P. Winkler** (Hungary) - **The Use of Satellite Remote Sensing for Land Cover Mapping in Europe**

Key point of the presentation was the use of Earth

Special Session SS03

IUSM : The Future of GIS

July 12, 1996, 15:30-17:00

Session Reporter: **Doug Selley** (Canada)

Chairman: **Gottfried Konecny** (Germany)

observation satellites for large-scale mapping in Europe with the CORINE Land Cover Project. High resolution mapping making maximum use of automatic procedures and large-scale low resolution mapping using NOAA-AVHRR data at continental level were also presented.

The author described the various phases of the CORINE (Co-ordination of Information on the Environment) programme of the Commission of the European Communities that have been accomplished. It is foreseen that this land-cover mapping project will have covered the whole of Europe by the end of 1997, and extensions to Norway and the Mediterranean basin are being considered. The CORINE Land Cover includes 44 land cover classes embedded in a 3-level hierarchical system. When applying high resolution mapping making maximum use of automatic procedures, a maximum of 25 classes of land cover has been adopted. In the frame of the PHARE programme an experimental CORINE Land Cover interpretation in the scale of 1:50 000 in selected areas of the Czech Republic, Hungary, Poland and the Slovak Republic should be completed by the end of 1996.

The authors outlined the advantages and drawbacks of the use of automatic computerised procedures. They then described various projects being undertaken to use the CORINE Land Cover data for practical purposes, such as hydrology/water management.

Roeland Allewijn (The Netherlands), H. Kloosterman (The Netherlands), R. Vaughan (U. K.) - **EARSel Activities in the Field of Coastak Zone Management**

Key points of the paper were the research activities of the members of the EARSel Special Interest Group on Coastal Zones. These activities are grouped under three headings:

- water quality
- coastal morphology, and
- ecology an vegetation.

The problems encountered in moving from research to operational use were stressed.

The authors presented as typical problems where remote sensing techniques can be applied: waste water disposal, algae monitoring, and bathymetric surveying (sediments). Until now airborne data have proved most suitable for coastal zone monitoring with their temporal flexibility and the new hyperspectral scanners now being flown which enable the detection of subtleties not possible from satellites.

The main problems in moving from research to applications are:

- need to develop new cost-effective remote sensing techniques,
- need to have access to low-cost airborne and spaceborne data,
- need to develop techniques for data integration with point observation and models,
- need for standardisation of remote sensing tools,
- need to find methods for the translation of remote sensing data into management information,
- creation of user demand (education of decision-makers).

Michael Brand (Germany) gave the opening address. He outlined the role, work program and challenges facing EUROGI. The key issues facing EUROGI at this time are legal issues, standards, the roles of the public and private sectors and global issues. A discussion of the key issues followed.

Franz Steidler (Germany) spoke on the factors which impact on the viability of the introduction of geographic information systems. For successful GIS projects there is a requirement for clearly defined objectives, acceptance of the project at all levels of management and effective project management, including cost-benefit analyses.

A list of tasks was discussed. F. Steidler concluded that the key factors that will lead to the success of a GIS project are clearly defined objectives and work targets.

Ernst Höflinger (Austria) provided the FIG point-of-view on GIS/LIS. FIG recognises that access to data is the most important aspect in establishing a viable GIS. This problem is most serious in less-developed countries, where it can be a serious hindrance to the development of a GIS.

E. Höflinger also stated that FIG is concentrating on the issues of policy, law and organisation. It does not compete with the other societies on the issues of software and hardware.

Mohammed Al Zaffin (Dubai) addressed the topic of the establishment of a GIS for the Dubai Municipality in the United Arab Emirates. He described the control surveys that were established, the base mapping and the thematic mapping. He spoke on the establishment of a cadastre for the municipality and how it has been combined with the GIS. He concluded by stating that the GIS that has been established is serving well the rapidly expanding economy of Dubai.

The chairman summarised the session by reflecting on the need for a business-like orientation of any GIS.

Special Session SS04

Asian Association on Remote Sensing (AARS): How to Operationalise Remote Sensing and GIS in Asia & Pacific

July 13, 1996, 8:45 -10:15

Session Reporter: **Sarath Jayatilaka** (Sri Lanka)

Chairman: **Kaew Nualchawee** (Thailand)

Bruce Forster (University of New South Wales, Australia) **Operation and Application of Remote Sensing in Asia and the Pacific.**

His paper highlighted that Asia-Pacific region contains

over half the world's population in physically and culturally diverse areas. Remote Sensing has been widely used for environmental and resource monitoring and sustainable development.

To monitor and manage various problems of the region the scientists are increasingly turning to remote sensing (and GIS). There has been a great number of technical publications from this region. Three countries of the region have launched their own remote sensing satellites: India, China and Japan.

He then spotlighted that there is a great need for co-operation of scientists of Remote Sensing in this region. He also stressed attention on lack of staff training in many countries of this region.

Shunji Murai (Japan), Secretary General of the Asian Association of Remote Sensing, said that the AARS had 21 Ordinary Members, 5 Associate Members and 15 Sustaining Members. Since 1980 it has been organising Annual Conferences on Remote Sensing (ACRS) in various parts of Asia. The 17th ACRS is scheduled in Colombo, Sri Lanka, on 4th - 8th November 1996.

Besides holding annual conferences AARS is actively publishing: (a) the proceedings of these conferences, (b) a publication on Applications of Remote Sensing in Asia and Oceania. (c) a book on Remote Sensing by Shunji Murai, which has been printed in Japanese, Chinese, Thai, Persian, and Mongolian. (d) and another book on GIS.

There were several working groups: (1) on a 1 km² land-cover data base (2) on a GIS text book (3) on software for education. He finished his speech by saying that the spirit of ACRS and AARS was friendship and to build up a human network, and that money was considered secondary.

Bulusu Lakshmana Deekshatulu (India), Director of the Centre for Space Science and Technology Education at Dehra Dun. He said that the United Nations have established this centre for creation of a greater awareness of the environment and for a better understanding of the needs of developing countries.

The centre envisages to contribute towards the above by providing a framework for the development of the nations of this region by education, indigenous capabilities of research and applications in remote sensing and geographic information systems, satellite communications, satellite meteorology and global climate research, space sciences and natural resources management. A comprehensive curriculum has been designed for the various courses to be conducted by this centre.

Q (A. Narayan, India): Who is bearing the costs of the participants of the courses?

A (B. L. Deekshatulu, India): The first course takes place already; for its two years the participants will be funded by UN. For later courses a fee will be charged.

Kaew Nualchawee (Thailand) presented the paper on behalf of **Suvit Vibulsresth** (Thailand): **Remote Sensing Activities in Thailand.**

The Thailand Remote Sensing programme was established in 1971. In 1981 they obtained the final receiving station which can receive Landsat-TM, MS, SPOT, JERS-1, NOAA and ERS data.

The Thailand Remote Sensing Centre distributes satellite data, it gets involved in research activities, organises training courses and seminars and also allocates research grants for research activities. In Thailand many agencies are using Remote Sensing for their work.

Many universities have Remote Sensing courses. Thailand co-operates in many projects with international organisations like the EC-Asian ERS programme, Asian JERS programme, Globesat/Radarsat programme, IGBP's land-use programme and the small satellite programme. In his conclusion he said that the Thailand Remote Sensing Programme has developed in parallel to the world-wide space technology.

Sarath Jayatilake (Sri Lanka) presented an overview of the proposed 17th Asian Conference on Remote Sensing to be held in Colombo on Nov. 4th-8th 1996. There will be eight different topics of this conference like Landuse, Forestry, Marine Applications, Data Processing, GIS, Training. Which will be treated in two parallel sessions. The second announcement leaflet was available to the participants. A two day workshop will be given on microwave remote sensing on 2nd and 3rd November. The speaker invited the participants to come to Sri Lanka for this conference.

Special Session SS05

Georeferencing of Satellite and Airborne Images by GPS and INS

July 13, 1996, 08:45-10:15

Session Reporter: **Robert Weber** (Austria)

Chairperson: **Klaus-Peter Schwarz** (Germany)

Attendance: approx. 130 persons

Panel discussion SS05 was opened by **Klaus-Peter Schwarz** (Germany) with few remarks concerning the topics and objectives of the session followed by a brief introduction of the panellists. The chairperson describes in this context direct georeferencing as the process of obtaining position and orientation of an imaging sensor from on-board navigation systems without the use of ground control or a digital terrain model. Afterwards the panellists (Friedrich Ackermann, Bruce Landis, Ivan I. Mueller, Klaus-Peter Schwarz, Ch. Reigber; in order of their appearance) were asked to give their introductory statements.

Friedrich Ackermann (Germany) starts by illustrating his doubts about the ability of multiple sensors like GPS and INS to provide an absolute orientation without ground control. He argues that georeferencing can essentially reduce the expenses for establishing ground-control networks but complete independence will never be possible.

Afterwards **Bruce Landis** (USA) quantifies current requirements on attitude control to be at the level of 5 arcsec, alignment determination of the aircraft should be better than 3 arcsec and the accuracy of satellite ephemeris is asked to be not worse than 5 meters.

Ivan I. Mueller (USA) presents the objectives of the International GPS Service for Geodynamics (IGS). The accuracy of IGS data and products like orbits, earth rotation parameters, global troposphere and ionosphere models is sufficient to support most of the scientific requirements. Currently a Rapid Orbit service provides the user community with satellite positions within 24 hours after data collection and the combined orbits, which are consistent at a level of 10 cm, are available not later than 11 days after data collection.

Klaus-Peter Schwarz (Germany) quantifies the achievable accuracy of inertial systems under lab conditions to be about 3 arcsec. Unfortunately this number rises by a factor of 5 when looking at an aircraft environment. GPS can provide INS with position updates. Finally he presents two projects which were carried out in order to compare INS output with ground controlled missions.

Ch. Reigber (Germany) talks about the capabilities of modern microwave tracking techniques like GPS, PRARE and DORIS. Furthermore he states, that currently the accuracy of the radial component for Topex /Poseidon and the ERS -satellites amounts to a few centimetres.

Extended versions of these brief introductions will be published in Volume 6 of the congress proceedings.

These presentations were followed by the panel discussion. A list of questions to be dealt with was prepared by K.P.Schwarz in advance.

Q1: What are the advantages and drawbacks of direct georeferencing as compared to indirect georeferencing (interpolation from ground control)

- in mapping applications ?
- in non-mapping applications ?
- in real-time positioning ?

A (Fr. Ackermann – Germany): The main advantage of direct georeferencing is that these autonomous microwave techniques helps us to reduce errors stemming from the ground control network. On the other hand the drawbacks are various. The new systems are more complex and in some cases not accurate enough. The height problem (geoid) is not sufficiently solved and the reliability tends to zero without any ground control.

A (K.-P. Schwarz – Germany): The reliability problem can easily be solved by measuring few checkpoints but the question if direct georeferencing is accurate enough for mapping purposes still remains. Otherwise there is no doubt that the classical approach is much to expensive for multi spectral sensing and modern sensors are unrivalled in real-time applications. Concerning the geoid problem he proposes simultaneous INS and gravity missions.

Q2: What are the advantages and drawbacks of using the IGS with a suitably defined datum as the position reference for satellite and airborne images? How can this reference network meet user demands for regional and local networks?

A (I. Mueller – USA): The density of the IGS network is still growing and in addition a lot of local organisations like GSI , DGFI, EUREF or the Central European Initiative

are interested to increase the number of reference points. On the other hand the density is still not sufficient for photogrammetric missions.

A (K.-P. Schwarz): Therefore transformationsto the local datum are still necessary.

A (Ch. Reigber – Germany): It is under no circumstances the duty of the International Earth Rotation Service (IERS) to provide the user community with transformation parameters between the ITRF and the various local systems.

A (I. Mueller): IGS tries to densify the network (1000 km station distance). These stations should act as reference points for local control networks.

Q3: Will the orientation information for satellite images ever be good enough to allow direct georeferencing at the level of a few meters? If not, what are the alternatives?

A (Ch. Reigber): In real time these goals are actually not achievable. The situation might improve in the near future. Post mission the orbit representation even for Low Earth Orbiter amounts to 5 cm in the radial and out of plane components, 10 cm for the along track component.

A (K.-P. Schwarz): Assuming a satellite altitude of 500 km, the necessary orientation accuracy is about 1 arcsec. Economic star trackers can deliver 5 arcsec, very expensive systems approximately 1 arcsec.

Q4: Considering the advances in satellite imaging, are airborne methods on their way out for most mapping applications?

A (Fr. Ackermann): Under no circumstances, because the resolution of satellite images is not sufficient. They may have a great impact on various applications , for example remote sensing, but mapping requirements are higher.

A (I. Mueller): During the past 10 years GPS has revolutionised the surveying techniques. Why should something similar not be possible in photogrammetry?

After the panel discussion the floor was opened for further questions and comments.

Comment1: Concerning the short term impact of new satellites. High resolution spaceborn sensors will give the opportunity to produce in developing countries base maps of good quality and free aerial survey capabilities for larger scale applications.

A (Fr. Ackermann): The provision of image data is not the major cost factor when producing maps. Additionally we may run into problems , when lowering the standards of our maps , even in developing countries.

Q5: What is the actual accuracy of geoid height differences over a distance of about 100 km?

A (K.-P. Schwarz): The accuracy of relative geoid heights in Europe, Canada and the United States is about 1ppm. Unfortunately in some parts of the globe no detailed gravity information is available. There we had to work with global geopotential models which are accurate to about 1-2 meters.

Comment2: I propose to talk about the co-operation of satellite and ground based orientation systems instead of discussing about competition between both techniques. There are a lot of more issues which should be addressed, for example the troposphere calibration. Another point is, that even if detailed geoid maps are available, they are unfortunately very often not used.

Not least because of the late hour this comment was generally approved to be a perfect closing remark. Therefore the chairperson closes the session after expressing his thanks to all panellists and to the audience.

Special Session SS06

IUSM (International Union of Surveying and Mapping) Automatic Control Measurements (ACM): The IUSM, FIG ISPRS and IAG Perspectives (Panel Discussion)

July 13, 1996, 10:45-12:15

Session Reporter: **Doug Selley** (Canada)

Chairman: **Henrik Haggren** (Finland)

Henrik Haggren (Finland) opened the session by providing an overview of the work of the IUSM Working Group. He noted that the chairman of the Working Group, Prof. Dr. Heribert Kahmen, Austria, is on his sabbatical year at the University of New Brunswick (Canada).

He then asked the other three panellists to concentrate on the four following questions:

1. What is ACM from your organisation's point of view?
2. How are ACM activities organised in your organisation?
3. What are your organisation's relationships with others relating to ACM?
4. How should knowledge of ACM be promoted?

Larry Hothem (USA) provided an overview of the FIG Commissions concerned with ACM, notably those on Hydrography, Positioning and Measurement, and Engineering Surveys.

He outlined what GPS and other new technologies can and cannot do; on the trends toward integration using GPS, CAP and GIS technologies. He provided examples of applications in earth moving and in forming. He closed by emphasising the importance of co-operation between FIG, IAG and ISPRS with respect to ACM.

Armin Grün (Switzerland) stated that ACM is used for automated process central of anything that moves, with applications at close range. He noted that methodologies and applications are converging such that there will be real-time solutions to all problems.

He stated that ISPRS Commissions I, 2 and 3 are involved in ACM and that good relations exist with ISB and IEEE.

Important points to consider are that information must be provided to new users, probably best done commercially.

Fritz Brunner (Austria) stated that IAG had established a Special Commission, at Vienna in 1991, on the "Applications of Geodesy to Engineering. The Special

Commission has four working groups which are involved with different aspects of work.

He provided examples of applications in various areas such as realignment of railway tracks; monitoring of structures on natural features; use on highspeed trains and on dams.

A number of other issues were raised and discussed, including the following: should the activities of the IUSM Working Group be extended beyond the IUSM; overlaps in different areas of engineering education; funding needs for development; problem solving cannot be done inside scientific societies because they do not have the funds needed and often do not have hands-on contact with problems; advantages of an IUSM Home Page; question whether IUSM should be involved in technology.

Vaclav Slaboch (Czech Republic) pointed out that very intensive work is being done by ICO with five Working Groups on 20 teams. IUSM is not involved and should be.

The Chairman thanked the participants for their valuable contributions, and closed the meeting.

Special Session SS07

The Best Papers by Young Authors (I)

July 13, 1996, 10:45-12:15

Session Reporter: **Shunji Murai** (Japan)

Chairman: **Shunji Murai** (Japan)

Attendance: approx. 160 persons

The ceremony to present the certificates of Young Authors Award was conducted by Shunji Murai, President of ISPRS.

All ten winners as listed below participated in the ceremony and received their certificate from Shunji Murai.

Mr. Xiuxiao Yuan, China
Mr. Jeffrey A. Shufelt, USA
Mr. Naser El-Sheimy, Canada
Mr. Reda Ezzat Fayek, Canada
Mr. Woosug Cho, USA
Mrs. Christine Pohl, Spain
Mr. Gaudenz Danuser, Switzerland
Ms. Yingchun Zhou, USA
Mr. Chuang Tao, Canada
Mr. Xiaojun Yang, USA

Shunji Murai announced the sponsors of Young Authors Awards as listed below.

1. Core Company, Japan
One million Japanese Yen (about 13,000 SF)
2. PASCO International Co., Japan
Five hundred thousand Japanese Yen (about 5,500 SF)
3. Inter-commission III/V, Workshop on "From Pixels to Sequences" held in Zürich, Switzerland in 1994:
Five thousand Swiss Francs (5,000 SF)

After the ceremony, the group of awardees was divided into two: the first five awardees remained in Room F1

(Chair: S. Murai) and the second five awardees changed to Room F2 (Chair: J. Trinder).

Shunji Murai (Japan) reported that 54 papers were received for consideration, 20 papers were screened by seven Technical Commission Presidents and finally, the papers were selected by Shunji Murai, the President of ISPRS. 2,500 Swiss Francs were presented to each to enable the winner to participate in the Congress.

All five speakers as scheduled in the program actually presented their papers.

Xiuxiao Yuan, Associate Professor, School of Information Engineering, Wuhan Technical University for Surveying and Mapping (China) - **GPS-supported Determination of Interior Orientation of Aerial Camera**

Key point was the method for determination of interior orientation elements of aerial camera. The author raised two kinds of methods: GPS-supported single-image resection in space and GPS-supported bundle block adjustment. Based on the two methods, we can solve together the elements of interior orientation and those of exterior orientation with the least square adjustment method. A set of actual determination results obtained by camera Wild RC-20 with GPS data from the test field in Taiyuan of China are given and discussed. The correctness and efficiency of two presented methods are confirmed with experiment. The two kinds of methods can be widely applied in photogrammetry.

Jeffery A. Shufelt, Post Doctoral Fellow, Digital Mapping Laboratory, School of Computer Science, Carnegie Mellon University (USA) - **Exploiting Photogrammetric Methods for Building Education in Aerial Images**

By incorporating knowledge about the image acquisition geometry at every phase of a building detection process, robust performance can be achieved on a wide variety of scenes.

This paper presents PIVOT (Perspective Interpretation of Vanishing points for Objects in Three diversions), a fully automated building extraction system that uses only a single view to generate three dimensional structural hypotheses in object space.

PIVOT uses a combination of vanishing point geometry and composition of primitive volumes to detect and delineate buildings in complex aerial imagery.

Naser El-Sheimy, Ph.D. Candidate at University of Calgary and Senior Engineer at GEOFII Inc. (Canada) - **A Mobile Multi-Sensor System for GIS Applications in Urban Centres**

Multi-sensor systems have become an emerging trend in Mapping Applications typical examples of such systems is Mobile Mapping from vans and trains. Multi sensor systems are characterised by fast and cost-effective data acquisition. The paper presents a mobile van which integrate Video-Inertial-Satellite (VISAT). The VISAT system could be used to create or update GIS database very quickly. Accuracy of 0.3 m for all objects 35 m away for the van while moving at 60 km/hr. Results are presented about system repeatability and absolute accuracy.

Reda Ezzat Fayek, Ph.D Student, Department of Systems Design Engineering, University of Waterloo (Canada) - **Preserving Topography in 3D Data Compression for Shape Recognition**

This paper presents a powerful interaction of two 3D objects. The first concept is the subjective coarsening of triangular meshes representing the sensor data with preservation of the main topographic features of the scene. This iterative step is based on local surface properties and yields multi-resolution models of the data. The second concept is the use of generic symbolic 3D models for object recognition and scene segmentation. These models describe topologic and structural relations between the planar sections of the objects surfaces. They are, therefore, invariant to scale, rotation, translation and partial occlusion. The abstraction of the sensory data using triangular meshes and the use of symbolic models facilitate various remote sensing applications.

Woosug Cho, Associate Research Fellow Department of Geodetic Science and Surveying, The Ohio State University (USA) - **Relational Matching for Automatic Orientation**

Key points were:

- 1) Relational Matching with features and relations. Binary relations of shortest distance, angle and distance between centre points are used for relative matching.
- 2) Automatic Relative Orientation
- 3) Heuristics (Unit Ordering and Forward Checking)
- 4) Evaluation (Cost and Benefit Function)

Special Session SS08

The Best Papers by Young Authors (II)

July 13, 1996, 11:15-12:15

Session Reporter: **John C. Trinder** (Australia)

Chairman: **John C. Trinder** (Australia)

Christine Pohl (Spain) - **Multisensor Image Maps: A contribution to Topographic Map Updating in the Tropics**

The key point was the study of methods of fusing microwave data with electro-optical data in tropical areas where cloud cover obscures the terrain. An important issue was the correction of geometric errors in the images were fused by applying colour transformation techniques. The initial test was undertaken in the Netherlands. Experience gained from this test was applied to areas in Indonesia. Two prototypes of annotated 1:100,000 scale maps were produced.

Gaudens Danuser (Switzerland) - **Stereo Light Microscope Calibration for 3D Submicron Vision**

Key points were: A first attempt to adapt photogrammetric technique such as sensor calibration and 3D reconstruction to Stereo Light Microscopy (SLM). Major Problems are: (1) Difficulty to find a 3D calibration standard with homogenous neighbouring accuracy on the

submicron range. (2) On one hand poor image quality (weak contrast, dust particles, blur) and (3) on the other hand weak numerical condition of the normal equation system leading to undetectable oscillations in the parameter estimation in presence of noisy image co-ordinates. Thus, there is (4) a strong requirement to automatically detect and measure only high quality target points. This is achieved by combining low-level Computer Vision with a set partitioning algorithm in one framework. (5) A new imaging model based on the weak perspective matrix and distortion term considering the non paraxial optical set-up in a SLM has to be installed. The current implementation allows one to measure relations in the object space with an accuracy of laterally 300nm and vertically of 500nm using a microscope that resolves 2 μ m and 6 μ m in lateral and vertical direction, respectively.

Zhou Yingchun (USA) - An Ecological Regionalization Model Based on NOAA/AVHRR Data and Ancillary Data

Key points were: (1) An automated multivariate ecological-region mapping method was developed, (2) Remotely sensed AVHRR data have great potential in multivariate ecological-region delineation.

A quantitative, multivariate regionalization model was developed and applied on vegetation region delineation of Nebraska, the United States. The model aggregated small ecosystems into larger regions in a hierarchical clustering procedure. Small units were merged into larger clusters based on similarity of their ecological features, and their spatial neighbourhood relationship derived from GIS topological files. Vegetation regions of Nebraska were generated using digital state soil geographic data and multitemporal NOAA/AVHRR data of the growing season of 1991.

Tao Chuang (Canada) - An Integrated Approach to Road Centreline Reconstruction Using Stereo Image Sequences from a Mobile Mapping System

It is one of the key automatic techniques in mobile mapping systems. The automatic reconstruction of 3D road centrelines from the image sequences was accomplished using the approach of "shape from image sequences". The key is to use road information from image sequences rather than from a single image or a stereo pair. The reconstruction is described as a process whereby a 3D road centreline shape a model is deformed gradually, driven by forces arising from knowledge and image information of roads. Shape model generation using vehicle trajectory, model-driven feature extraction, stereo-motion matching, and B-snake model based constraint combination, constitute the four major components of this approach. It is essentially a global and model-based reconstruction approach.

Yang Xiaojun (USA) - Satellite Monitoring of the Dynamic Environmental Change of the Active Yellow River Delta, China

Key points were: (1) Satellite remote sensing has been successfully operationized for surveying and monitoring the comprehensive macro-evolution of the active delta after 1976; (2) The set of multi-temporal MSS&TM image data

has been selectively scanned, georeferenced, and digitally interpreted on ILWIS environment to quantify and characterise the dynamic environmental changes, both influvial morphodynamics and coastal dynamics; (4) Since 1986, after ten years of its existence, the present river channel has entered a stage of "decay" even under a natural condition. Human intervention maintains the actual running state of the river course. However, for the near future, an artificial diversion has to be carefully considered and probably to be carried out; (5) the results of this study demonstrate that satellite remote sensing combined with GIS technology is very useful for documenting time-sequential morphodynamic changes and for analysing the contemporary processes involved.

Special Session SS09

International GIS Activities

July 13, 1996, 8:45-10:15

Panel Discussion

Session Reporter: **David Danko (USA)**

Chairpersons: **Roberta Lenczowski (USA),
Lawrence Fritz (USA)**

Panel members in order of presentations:

Thomas Usselmann (National Academy of Science, USA)

David Schell (Open GIS Consortium, USA)

Werner Kuhn (Vienna University of Technology, Austria)

John Trinder (University of NSW, Australia)

Ryutaro Tateishi (Chiba University, Japan) for Asia

Yves Prevost (World Bank, USA) for Africa

Chairperson **Roberta Lenczowski (USA)** opened the panel session providing an outline of the scope of international activities. These activities included the identification, collection, and certification of data sources; the extraction of data and information; data and its management; the exploitation of data and information including, economic, environmental, political planning, in-depth analysis; positioning, and visually (cartographic). She discussed the tri-lateral relationship and interdependency between government entities, the commercial sector, and the consumer of geo-spatial information.

Roberta Lenczowski (USA) then asked each panel member to present a ten minute overview of international issues from their perspective. Global issues were covered first, followed by regional issues.

Thomas Usselmann (USA) discussed Earthmap and the events which led to this initiative. In 1987 the lack of standards, the lack of leadership, data redundancy and the fact that GIS had been over sold created a chaotic situation. However by 1993 the US National Spatial Data Infrastructure (NSDI) was defined to address societal needs with respect to geo-spatial information. On the international

front a Global Spatial Data Infrastructure will address international needs as well. A design study was initiated in 1995 with the participation of the US Federal Government, Non-Governmental Organisations (NGOs), and private industry. As a result of this study the US National Research Council requested the US State Department to organise the development of Earthmap, starting as a US initiative and growing to become international in scope.

David Schell (USA) discussed the Open GIS Consortium (OGC) and the changing technical approach to GIS from the age of monolithic GIS and data transfer between systems to the future with complete transparency in the access and processing of geo-data. Industry is migrating from a vendor trying to solve all aspects of GIS application to one of a system-integrator finding the set of best solutions for the identified problem set. OGC is a consortium of government and private sector organisations with the objective of insuring unimpeded access to geo-data and geo-processing. The consortium Open GIS Specification (OGIS) will facilitate a restructuring of the GIS market and integrate advanced IT into geo-processing. OGC is now reaching critical mass in providing industry leadership. OGC's successes to date are the OGIS, its 65 members, and its expansion into the global arena with the inclusion of EUROGI on its Board of Directors.

Werner Kuhn (Austria) discussed the need to move toward usable spatial information. Our profession focuses on data collection and supply; but does this supply satisfy the demand? Our community should consider the use and the user of spatial information. He stated that international co-operation implies multiple agents and multiple users, which we seem to be addressing. However, it also implies multiple models, languages, organisations, and cultures, which we have yet to adequately address. Co-operation starts with communication in knowing what data exists, its quality, its purpose, and what is available under what conditions. Dr. Kuhn then indicated that today's metadata was producer oriented and confused the user and questioned whether it achieved communication. He stated that to improve this situation producers need to understand that users want information, not data. That data, operators, and interpretability result in information services. That users require modular information services instead of documented data sources, people are more interested in buying services and information, not raw data.

John Trinder (Australia) discussed the state of the GIS infrastructure in Australasia. The realisation that data will not be available unless an infrastructure exists led to the development of Australia-New Zealand Land Information Council (ANZLIC). This was established in 1986 to provide the forum and leadership to the land information community and insure the sharing of national and state data-sets. The objectives are to provide the infrastructure, standards, access, organisational framework, and provide support for industry development. Dr. Trinder indicated that ANZLIC was transition into the international scene.

Ryutaro Tateishi (Japan) discussed international activities from three perspectives. The first standpoint was a chair of ISPRS WGIV/6 GIS and Expert Systems for Global Environmental Databases. Major inhibitors to a

global database are the lack of standards in land and feature classification and problems with locating and integrating local data. He felt the working group could provide a solution to ease these problems by establishing an international authorised data centre and promote data quality and an increased use of metadata at the national and regional level. The second perspective was from involvement in the establishment of a land cover data set of Asia by 29 Asian and Oceania countries. Problems exist because of: different classifications systems, cultural bias, and difficulties in data exchange. To solve these problems they intend to remove cultural bias by co-operative research. The third standpoint was from that of the Global Mapping Project initiated at the Earth Summit in 1992. The intent is to establish a global database at 1:1M scale or at one kilometre resolution. He stated that the UN committee on GIS infrastructure for Asia and Pacific defined infrastructure as: institutional framework, technical standards, fundamental data, and fundamental technology.

Yves Prevost (USA) discussed the Environmental Information Systems (EIS) in Sub-Saharan Africa. He defined environmental information as information relevant to the environment and resource planning. An advisory committee was set up in 1990 as a forum for information exchange, to promote a demand driven approach, to establish 12 thematic working groups, and to address a wide range of scales (level of detail). To date, EIS has 500 initiatives on a large array of topics. Core data-sets are topologically structured topographic information, land use/land suitability, population census, bio-diversity, and geo-imprint. Mr. Prevost stated that all countries in the region had similar issues/problems. The primary overriding problem was insufficient connection between the information and decision making. Countries were not applying data to their problems. Many problems were political not technical. Critical issues were the need to share: vision, data, and experiences.

Panel Discussion: Following the brief presentations by the panellists Chairperson **Lenczowski** suggested that there were common themes and topics among the presentations: interoperability, standards (regional/national), the availability of data, tools, applications, and connectivity. She questioned the panel about advances in interoperability and mentioned the ISO activities (ISO Technical Committee TC 211 Geographic Information/Geomatics). **D. Schell** stated that the OGC Specification would be brought in line with the ISO standards and that ISO was essential for a broad use of a common standard and would promote wide use. He also stated, standards may not help in Africa EIS were the problems were political vs. technical. It was suggested that standards need to be developed bottom-up. **Y. Prevost** stated that even with much focus on standards, there were still institutional problems; at the smaller scales, organisations seemed to use common standards but at larger scales organisations seem to go their own way. **Th. Usselman** stated that content standards were still very much a problem, and mentioned the work that the US FGDC was undertaking.

Comments from the floor: **Sidney Witiuk**, Canada, stated he thought it was an excellent and much needed panel discussion. He posed the question about geographic

information update. What happens when organisation make decisions and then the database is updated? **Y. Prevost** responded that the answer was to impose responsibilities on both the producers and the users. However in most cases data is a one-shot deal, data is produced and then deteriorates. **R. Lenczowski** stated that the US Defence Mapping Agency addresses this situation with its updates to navigation information such as Notice to Mariners and using standard update cycles as with aeronautical navigation information (28 day cycle). She stated on the digital side there were new challenges with dynamic decision making etc. **Th. Usselmann** mentioned the need for information in time-slices. **W. Kuhn** stated that this was hindered by our present data models. **Dr. Witiuk** (floor) mentioned the problems with data ownership and copyright problems.

R. Lenczowski thanked the panel and the audience for their participation and closed the session.

Note: Due to a change in presentation times, many Congress attendees missed the session. The session was repeated in another room later the same morning, attended by **Gottfried Konecny**, chair ISPRS WGIV/2 on International Mapping from Space, and others.

Special Session SS03

AARSE (African Association of Remote Sensing of the Environment) The African View on Remote Sensing of the Environment (Panel Discussion)

July 13, 1996, 10:45 - 12.15

Session Reporter: **Paddy Matambanadzo** (Zimbabwe)

Chairman: **Peter O. Adeniyi** (Nigeria)

Mehdin Hadgu M. (Ethiopia) - Institutional Development of Surveying and Mapping in Ethiopia

Key points were: (1) Change has become a necessity at the Ethiopian Mapping Authority, which is one of the few non-governmental mapping agencies, as they have to democratise to suit the free market economy working on a cost recovery basis; (2) organisational restructuring has been most demanding particularly with the aim of effectively addressing and meeting the increasing demands for geoinformation (3) International and local consultants have devised a masterplan for the organisation for the effective running of the department; (4) the authority is now in the implementation phase of the masterplan whereby they have bought digitising equipment, digital photogrammetric systems as well as other state-of-the-art equipment; (5) The organisation is currently engaged in orthophoto mapping supported by airborne GPS as well as production of orthophotos from SPOT; (6) The future seems bright and EMA is presently engaged in the production of 1:50000 and the revision of the 1:250000 national topographic series.

Chima Tabitha J. (Zimbabwe) - Photogrammetry, Remote Sensing and Geographic Information Systems: Zimbabwe's Contribution to the Regional Activities.

Key points were: (1) From its formation in 1891, the Department of Surveyor General (DSG) has been mostly involved with cadastral and territorial surveys. It then broadens its scope in 1937 when it started its mapping activities. (2) The DSG has been involved in manual plotting at 1:40000 and 1:50000 and it bought its first stereoplotters in the 1960s working on the 1:50000 (National Series) and 1:5000 (Urban and Town Series) from 1:24000 photography. (3) As there were many resignations prior to the country's independence, the department got aid from the German government in the form of a stereoplotter, plotter and point transfer device. The Canadians have since added an Orthophoto device and provided GIS hardware for cadastral mapping. (4) Recently the department has co-operated with the French government which has provided a soft loan for the acquisition of a national coverage of SPOT data at 1:50000 (Urban areas) and 1:100000 (for the rest of the country). (5) More equipment is expected from various donor countries.

Ogunlami J. A. (Nigeria) - The Role of Regional Centres in the Development and Application of Geographic Information Technology (GIT) in Africa.

Key points were: (1) Regional centres were formed to cater for the inability of African states to use modern technologies by the Economic Commission for Africa (ECA) in the early 1970s. (2) RECTAS was formed in 1972 with the assistance of the ITC and the Netherlands government to cover photogrammetry, remote sensing, GIS and cartography which can be grouped as geographic information technology (GIT). (3) Equipment was provided and the manpower in the form of experts came from various African countries to cover the main objective of providing training to African countries. (4) Although funding from neighbouring states is a problem, RECTAS, which is a bilingual centre, has trained people from 26 countries at technician, technologist and professional levels. (5) Most of its support is now coming from the European Union (EU), the French government and the Netherlands.

Q1 (H. Ruether – South Africa): Is it correct to concentrate on transfer of state-of-the-art technology exclusively and isn't it necessary to also produce appropriate technology to adapt existing technologies to the financial and other constraints experienced in developing countries?

A (J. Ogunlami - Nigeria): I agree and emphasise that the institute was educating students with this in mind.

Q2 (E. Otoo -Canada): Given the defined objectives of the regional centres, have these centres defined the criteria for measuring the success of the programme? Has any review been done on the success of it and what is the conclusion?

A (J. Ogunlami): Yes, the centres have measured success by considering the number of people from the different countries it has trained and several reviews have been made.

Adeniyi Peter O. (Nigeria) - The Way Forward for GIT in Africa

Key points were: (1) Based on an ECA study, the main problems faced by African institutions regarding GIT development and applications are lack of awareness of GIT potential, inadequately skilled and experienced manpower, lack of financial resources, unavailability of digital databases, poor documentation on available data, poor remuneration of staff, structural incompatibility and lack of clear national strategies. (2) The possible reasons for the state of GIT in Africa are: the different value attached to resources and information and thus geoinformation technology (3) some implicit assumptions of the technology transfer e.g. that the products of surveying and mapping are routinely used for national planning; that the provision of data sets would lead to their utilisation for planning and management. (4) The way forward is through the legitimisation of GIT at the national level with such things as having a legislative policy on data access, use and long term financial provision for the process. (5) How to obtain legitimacy for GIT is, expected among other things, through the formation of national professional associations and by international co-operation.

Woldai Tsehaie (Eritrea) - AARSE Activities and its Future Plans

Key points were: (1) After attempts to form such an organisation dating back to 1982, AARSE was formed in 1992 during the UN conference in Colorado Springs. (2) Its main objectives are now as follows: contribute to international space science and technology, to publicise works in remote sensing and GIS through conferences, seminars and workshops, promote greater co-operation in Africa, to develop integrated research agendas, promote African GIS professionals, promote capacity in Africa and to establish a journal. (3) AARSE has held several conferences and workshops of which the most successful was the conference on the "Application of Remotely Sensed Data and GIS in Environment and Natural Resources Assessment in Africa" held in Zimbabwe in March 1996 which had over 300 participants from 39 countries. (4) African scientists are encouraged to form national GIT committees and subscribe to AARSE. (5) Financial support for a new journal to be launched at the end of 1996 is being sought by AARSE.

the recent past, earth observation through space systems has increasingly being applied for environmental monitoring and resource management, assisting national planners and decision-makers to establish short- and long-term development plans.

Catherine Ticehurst (Australia) highlighted that satellite and radar remote sensing provides a relatively inexpensive and rapid method of acquiring up to date information on the urban environment, especially in regions where cloud and rain may affect visible and infrared sensors. She indicated that radar remote sensing through satellites will become increasingly important in the future, and mentioned that research activities are already carried out to produce also space borne radar data.

Julius Adeoye Ogunlami (Nigeria) introduced a digital base map production for the City of Ibadan, emphasising the accuracy that can be reached through the digitalisation of maps. He provided the participants with information on RECTAS. He informed that RECTAS provides training programmes for young professionals and specialists. In particular, Diploma and Post Graduate Professional Courses are held in the fields of photogrammetry, remote sensing and GIS, lasting from 12 to 18 months.

Mohamed Talbi (Tunisia) presented a paper on monitoring desertification in Tunisia, showing that the main contribution to desertification are overgrazing and deforestation. He introduced an Integrated Information System on the Environment, developed in Tunisia, aiming at producing timely and accurate maps for national planners and decision-makers.

C.S. Murthy (India) explained that irrigation is one of the most important economic concerns in India, and demonstrated the capability of remote sensing for generating information on crop patterns, aiming at preparing canal operation plans for efficient water supply in dry areas. The results shown in the presentation indicate the need for achieving synchronisation between the crop growth patterns and water supply systems in order to improve crop productivity.

Special Session SS12

Combating Natural Disasters and Environmental Pollution

July 15, 1996, 15:30-17:00

*Session Reporter: **Stephan Mayer** (Austria)*

*Chairman: **Roberto Pereira da Cunha** (Brazil)*

*Co-Chairman: **Nandasiri Jasentulyana** (Austria)*

Attendance: approx. 60 persons

Heinz Gallaun (Austria) pointed out the importance of remote sensing for monitoring fire affected wildlands in the mediterranean region. He provided images of burnt areas, showing the potential of remote sensing and GIS for assessing the risk of desertification and erosion, and also monitoring regeneration rates.

Special Session SS11

Environmental Monitoring and Natural Resource Management

July 15, 1996, 13:30-15:00

*Session Reporter: **Mayer Stephans** (Austria)*

*Chairman: **Nandasiri Jasentulyana** (Austria)*

*Co-Chairman: **Roberto Pereira da Cunha** (Brazil)*

Nandasiri Jasentulyana (Austria) deputy to the Director General of the United Nations Office at Vienna and Director of the Office for Outer Space Affairs, formally opened the session, emphasising the tremendous potential of space remote sensing and Geographical Information Systems (GIS) for sustainable development. He pointed out that in

H. Gonca Coskun (Turkey) informed the participants of the potential of space technology for detecting and monitoring human induced waste deposits at the Bosphorus, helping to understand that waste distribution varies to a large extent in different regions.

Epifanio D. Lopez (Philippines) presented a study to investigate the capability of ERS-1 Synthetic Aperture Radar Data in providing basic information for the assessment of environmental degradation caused by the eruption of Mount Pinatubo in June 1991. This study was funded by the European Community and the European Space Agency through the EC-ASEAN ERS-1 Radar Research Pilot Projects.

Conclusions and Recommendations:

Firstly, in the remote sensing area, it can be said that radar remote sensing is a very valuable source of complementation to already existing earth observation systems. Yet, there is a great need to convince decision-makers that remote sensing is a useful tool for decision making, land use planning and for the future economy of every nation. In the future, remote sensing will be run by the private sector, consequently, creating competition whose greater accessibility would benefit developing countries. To better promote the uses of remote sensing, a better co-ordination and infrastructure to accelerate the provision of data is needed.

The main areas of focus of remote sensing in developing countries for the future are to increase education and training facilities in order to build up indigenous capability (short and medium term courses for young professionals); food self sufficiency and security; and public health (which is dependent on food security). To focus on these aspects, it is therefore essential to regulate the pricing of data and increase government support.

In terms of accuracy, radar ERS-1 Data has proved to be very accurate as well as the combination of radar and IR images. Map digitalisation increases accuracy and provides more precise information. Also digitalized maps can be easily verified by field specialists making it a useful tool for architects and urban planners. Projects such as Habitat II support map digitalisation by emphasising that for appropriate urban planning and settlement, accurate mapping is essential. Another project where the importance of map digitalisation is reflected upon urban planning, is the Kobe pilot project. This project consists in providing aid to disaster mitigation as well as in preventing the effects of natural disasters through means of appropriate urban planning (building material etc.). The project is still in its developmental phase, but will be implemented to most major Japanese cities in the near future.

Special Session SS13

CIPA , the International Committee of Architectural Photogrammetry

July 19, 1996, 8:30-10:15

*Session Reporter: **Robin Letellier** (Canada)*

*Chairman: **Armin Gruen** (Switzerland)*

With in mind to increase Cultural Heritage Conservation knowledge and interest within ISPRS membership, CIPA was invited to deliver a 90 minute Special Session at the ISPRS Congress.

This Special Session had for objective to introduce ICOMOS, UNESCO and ICCROM to ISPRS so as to stimulate "information providers" to promote their technologies and share their products with "information users" responsible for managing cultural heritage sites. An other objective was to introduce the CIPA-ICCROM Five year Outreach Plan as a mechanism to inform and sensitise Information Providers towards understanding better Users needs so that future technical developments take into account the realities of recording, documentation and conservation practices in all regions of the world (see appendix A).

Armin Grün (Switzerland) - Second Vice President of ISPRS – opened explaining the two main purposes of this CIPA Special Session:

- To report to ISPRS on CIPA's achievements to date and on the role CIPA is planning to play in the next five years towards integrating itself more to the activities of ICOMOS, ICCROM and UNESCO
- To attract ISPRS members to participate more to Cultural Heritage Conservation activities.

He stressed attention to the following:

- provide ISPRS members with a broad understanding of how CIPA relates to ISPRS, ICOMOS and UNESCO activities
- introduce ICOMOS, ICCROM and UNESCO conservation practices to ISPRS members
- provide ISPRS members with an understanding of heritage conservation needs in terms of recording, documentation, information management and monitoring
- provide ICOMOS and UNESCO SS13 Session participants with an understanding of ISPRS potential input to conservation activities

John Badekas (Greece) - President of CIPA:

Introduction to CIPA

Starting with CIPA activities in general the speaker changed quickly to a compressed report on CIPA's Working Groups:

- Working Group on Control Information for Photogrammetric Records
- Working Group on Digital Photogrammetry
- Working Group on Simple Photogrammetric Systems
- Working Group on Recording, Documentation and Information Management

- Working Group on Applications in Archaeology, Early History and Rock Art
- Photogrammetry within Conservation Practices

This presentation outlined the big picture pertaining to where CIPA is coming from, what it has achieved over the past years, and described the working groups and results obtained over recent years. This presentation was meant to set the scene for the other 3 speakers to expand on Information Users' needs and related issues.

Leo van Nispen tot Sevenaer (France, The Netherlands), Co-ordinator of ICOMOS-UNESCO Risk Preparedness Programme, former Secretary General of ICOMOS:

ICOMOS Views and Needs

Recording data becomes more and more accurate and more and more abundant, with the risk of becoming contra-productive: too much to handle!

The conservation field knows many actors; all these actors have their own needs, budgets for specific recording activities and, even if they deal with the same cultural values, have different appreciations for them, so, this is hardly a climate in which the improvement of efficiency and effectiveness through coherency, consistency and cross references between the various information levels and recording methods will be promoted. Who will advocate this and who listen to this? Who are the clients and what are their needs? Thanks to its structure with National Committees and International Scientific Committees, ICOMOS can contribute efficiently in a process to recognise the clients and their (potential) needs.

In two areas' dramatic changes occur that justify, no, urgently require and possibly facilitate an advocacy and (re)orientation on needs and on questions of coherency, consistency and cross references. These changes relate to:

- The recent digital recording tools and their electronic data management and distribution which allow easily the use of cross-references;
- The changes in professional perception of the heritage professionals and their attitude that demands more and more coherency and consistency between the actions of the various actors.

Exploring the ideas and dreams in specific situations and in limited conditions might give the answer; restraints could purify and clarify the various issues and could focus the energy. To match ICOMOS priorities, these restraints could be linked to the debate and the activities regarding Monitoring World Heritage Sites, Authenticity and Risk Preparedness; These activities also demand a thorough reflection about the "who are the clients?" and "what are their needs?".

Coherency and consistency between the various levels of recording with the relevant, applicable cross-references should be discussed and determined with representatives of all disciplines involved, a team approach with a marketing component. CIPA's Outreach Workshop on 22-23 July 1996 seems to give an opportunity for that.

Minja Yang (UNESCO, France), **Paul Box** (UNESCO, Regional Office for Asia and the Pacific, Thailand) – **The World Heritage Centre of UNESCO**

UNESCO's World Heritage Convention has two principles:

- to recognise the duty of each State Party to ensure conservation of the World Heritage;
- to recognise the duty of all State Parties to co-operate in ensuring conservation of a heritage of universal character.

The nomination procedure for "World Heritage", its approval and the assistance policy of UNESCO for its conservation have been outlined in short. UNESCO welcomes an invigorated partnership with CIPA and ISPRS to join the international efforts to make new recording and measuring techniques available also for people in developing countries.

Paul Box requested for the Cultural Resource Management (CRM) agencies access to modern technology, stated, that photogrammetry played a leading role in the democratisation of spatial data capture activities, but "low end" technology is needed for the developing countries, low cost, simple to use by non-experts, and flexible, so that the end users are enabled to create their own Spatial Information Products (SIP's). These were needed in two categories:

- 1) for individual sites as means for the site's management
- 2) for inventories and management of all sites by the CRM agencies.

The typical products needed in category 1 are facade and ground plans, rectifications, as needed for construction purposes. In category 2 photogrammetry contributes with orthophotos and topographic data bases with special thematic layers.

Robin Letellier (Canada) - Secretary General of CIPA, and Scientific Advisor to ICCROM: **CIPA and ICCROM's Five Year Outreach Plan**

Based on the premise that Recording, Documentation and Information Management activities are central to effective conservation practices, this presentation introduced CIPA's goals and objectives for the next 5 years. It also addressed the need for CIPA to integrate its activities to those of ICOMOS' Scientific Committees activities.

Finally, it addressed the importance for CIPA/ISPRS members to understand better who are the 'Information Users' so as to appreciate the gaps and potential needs that are awaiting to be addressed within ICOMOS, ICCROM and UNESCO.

The ICCROM guidelines entitled "Recording, Documentation and Information Management Guidelines for World Cultural Heritage Sites", which were adopted by CIPA in 1995, were referred to as one of the prime guiding document for CIPA to 'Reach Out' and attract those involve in ICOMOS, ICCROM and UNESCO activities.

Robin Letellier is also chairman of CIPA's Working Group on "Recording, Documentation and its Management". Concluding he gave an overview on its work:

Purpose and Objectives of the Working Group

Purpose:

To provide a forum for photogrammetrists from CIPA and conservationists at large from ICOMOS and other conservation organisations, to discuss and work towards linking and integrating recording, documentation, information management and monitoring practices to cultural resource conservation needs.

Objectives:

- To write GUIDELINES that provide common direction for members of CIPA, ICOMOS (including ISPRS Commission V members)
- To establish a FRAMEWORK for CIPA, ICOMOS and other conservation organisations, to better integrate the principles and practices of Recording, Documentation, Information Management and Monitoring to conservation practices;
- To organise Outreach Workshops that bring together members of both organisations to dialog and propose ways to better integrate their respective activities;

Further information on CIPA can be achieved from the World Wide Web:

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

In the discussion, Cliff Ogleby, Australia, mentioned that ISPRS Commission V, Working Group 5 is concerned with architectural and archaeological photogrammetry. Its projects have included remotely sensed data, GIS, photogrammetry and spatial information technology. It is able to provide the technical support to the documentation programmes of CIPA through the official executive position but also the working group on archaeology and photogrammetry of CIPA can provide such support.

H. P. Baehr, Germany, recommended to read resolution V-5 on the use of digital photogrammetry.

Special Session 14

Mapping Support to the Bosnian Peace Talks

July 17, 1996, 14:15–15:00

Session Reporter: Peter Waldhäusl (Austria)

Chairman: Karl Kraus (Austria)

Marianne V. Kramer (USA) reported in a full session talk about the work of the US Mapping Support Team in November 1995 in Dayton, consisting of persons of the Defence Mapping Agency, the Army Topographic Centre, contractors from the 3M Corporation, from Cambridge Research Associates, Camber Corporation and ERDAS.

They were able to provide the negotiators practically on-line with a great variety and also great number of updated digital map products in three different scales, 1 : 600 000 on a 2' by 2' sheet, 1:250 000 for a general survey on 8 sheets mosaicked on a 5' by 6' board and 1: 50 000 on 120 sheets for detail decisions papered on two walls 9' by 25' of each of the six delegations' conference rooms, and all that updated for each of the many phases of the negotiators' proposals. In one shift they had even 57 revisions of boundary lines, because a certain area relation 51 : 49 % had been agreed on and had to be reached exactly. "It was amazing that no matter what we were able to do digitally, we couldn't get away from paper maps."

At the beginning the group of 12 was but small and located outside the security area of the conference, but from the second week onwards the team became larger and larger up to a maximum of 55 and a part of it had to move right into the centre of the peace talks activity.

A second task was to demonstrate the terrain along the roads and borderlines by means of a DMA virtual reality fly-through or terrain visualisation system with two screens in parallel, on one of them 30 scenes/second were shown of a perspective view combination of line maps with project injection and 10 or 5 m ground pixel raster images, on the other the way of the projection centre over a line map. The reader can imagine that the politicians liked it and that they were interested to take turns flying the interesting terrain. Certainly a positive amendment of earlier green desk talks.

The total cost of this activity was estimated initially with about 900 000 US\$ and ended up with 4 million US\$.

Mrs. Kramer showed in an lively way and by means of an added five-minute video not only the power of her Mapping Support Team but gave also an excellent demonstration of the progress of our profession. The reporter adds a cordial thank you also for the activities as such which helped to finish a cruel and hopefully the last ethnic cleansing war in Europe.

Special Session 15

CATCON, First ISPRS Software Contest for Computer assisted Teaching

July 12, 1996, 08:45-17:00

Session Reporter: Joachim Höhle (Denmark)

Chairman: Kohei Cho (Japan)

The session was opened by **Shunji Murai** (Japan), President of ISPRS. He pointed out that PC based software packages or datasets, which are often public domain or of low cost, will help teachers as well as learners of photogrammetry and remote sensing. Therefore the software contest CATCON was created in ISPRS to promote the development and dissemination of teaching and learning software. It is believed that CATCON will possibly attract many young people to participate in the Commission VI of ISPRS. The CATCON awards will be given to the winners with a total of 6,000 Swiss Fr which were donated from PASCO International to ISPRS. The chairperson of the working group VI/2, **Kohei Cho** (Japan) explained that the winners out of eleven nominations will be selected by the CATCON jury which consists of Shunji

Murai and Armin Gruen from the Council, Deren Li, and Kohei Cho from Commission VI, and some professional people from other Commissions. It was also mentioned that the room fee was kindly covered by Japan Society of Photogrammetry and Remote Sensing.

There were two presentations scheduled for the participants, a five minutes introduction with OHP in Room M and a fifteen minutes demonstration at the computers in Room L. The following CAT software packages or datasets were presented at the contest.

WinASEAN (Windows based Advanced System for Environment Analysis), a remote sensing data processing software package developed by **Nguyen Duong** and some others of the National Centre for Natural Science and Technology of Vietnam under the co-operation and support of RESTEC and NASDA. Nguyen Duong demonstrated the software

LODIA (LOW Cost Digital Image Analyser), a remote sensing data analysing software package developed by **NEC Aerospace Systems Ltd.** Mitsunori Yoshimura of Kyoto University (Japan) demonstrated the software for NEC.

LDIP (Learning Digital Photogrammetry), a CAT software for photogrammetry developed by **Joachim Höhle** and two students of Aalborg University (Denmark). Joachim Höhle demonstrated the software.

GIWIN, a GIS software developed by **Len Fufu** of China. **Shiro Ochi** of Utsunomiya University (Japan) demonstrated the software for him.

SPISY/WIN, a software package for viewing satellite images stored on a CD-ROM. The software and CD-ROM dataset were developed by **NASDA**. Shoji Takeuchi of RESTEC (Japan) demonstrated the software for NASDA.

Radarsat Sample Images CD-ROM, a dataset with viewing and guiding software for Radarsat SAR data developed by **Radarsat International** (Canada). Dennis Nazarenko of the company demonstrated the software.

PC-TAS (PC-tooled Analytical Stereo-modelling), an Excel sheet for teaching analytical photogrammetry developed and demonstrated by **Jonas Nelson**, Dept. of Geodesy and Photogrammetry (Sweden).

ORTO (Learning about Orthophotos and their use in LIS/GIS), a CAT software for photogrammetry developed by **Joachim Höhle** and **Bjarke Pedersen** of Aalborg University (Denmark). Joachim Höhle demonstrated the software.

GeoSET (Mapping System with photogrammetric data capture), a mapping system developed and demonstrated by **Jerzy Saczuk**, Warsaw Agriculture University (Poland).

GeoStar, an object oriented GIS software developed and presented by **Y. Gong**, Wuhan Technological University of Surveying and Mapping (China).

WuCAPS, a package for GPS supported aerotriangulation

developed by **Deren Li** and others of Wuhan Technical University of Surveying and Mapping (China). **Tao** of the university demonstrated the software.

In addition to CAT software contest, two videos concerning computer simulation for road design and architectural photogrammetry were demonstrated at the contest place. It was a trial to seek the various possibilities of CATCON.

After the official presentation to the jury, individual demonstrations using five PCs took place. CATCON was finished approximately at 17:00. It was a long but inspiring day for all participants. More than 100 people visited the contest place, and more than 30 people voted for the best software. Considering the result of voting, the CATCON jury will be selecting the winners and announcing the result on July 17 at the technical session of WG VI/2.

Session SS16

Remote Sensing from Satellites – New approaches

July 11, 1996, 15:30-16:50

*Chairman & Session Reporter: **Rainer Kalliany** (Austria)*

Participation: approx. 80 - 100 persons

Johann Bodechtel (Germany), M.Frei, J.Henkel, Q.Lei, H.Mehl, H.Preissler, H.Kaufmann - **The German MOMS Concept for Geoscientific Applications and Future Development**

The history of the Modular Optoelectronic Multispectral Stereo Scanner MOMS started with the flight of MOMS-01 on the Shuttle, already in 1979. The advanced MOMS-02/D2 was flown in 1993 on Shuttle mission STS-55 at a low-inclination orbit, which did not cover Europe. MOMS-2P, the most recent instrument, was successfully delivered to the Russian Space Station MIR in April 1996. The system is installed on the new PRIRODA module and currently is in its commission phase. First images are expected within one month.

Concept (two modules, in-flight-stereo by 3-line-architecture), technical parameters (high-res pan at 5.3m pixelsize, pan-stereo at 15.9m pixelsize and 4 multispectral channels . VIS to NIR - at 15.9m resolution) and (since all channels are not possible at once) acquisition-modes were explained in detail. Geometric and radiometric capabilities of the system were demonstrated by impressive slides from the mission of 1993.

The concept of 3-line-scanners is pursued in respect to the upcoming mission for mapping planet Mars. Using latest technology, a new generation of sensors with the High Resolution Stereo Camera HRSC, the Wide Angle Optoelectronic Stereo Scanner WAOSS and the Wide Angle Airborne Camera WAAC have been developed.

Harald Arend (ESA Headquarters, France; speaking on behalf of CEOS) "**Committee on Earth Observation Satellites (CEOS): Open Forum**"

CEOS is an international organisation of governmental

agencies and institutions, founded in 1984. It aims at achieving international co-ordination in the planning of satellite missions for Earth Observation and to maximise the utilisation of data from these missions world-wide. Presently, CEOS comprises 20 members (organisations operating Earth Observation missions), 4 observers (prospective members with programs in Phase A or with a significant groundsegment activity) and 10 affiliate agencies (international scientific or applications-oriented groups). The chair of CEOS changes annually; currently it is held by the Commonwealth Scientific and Industrial Research Organisation CSIRO (Australia).

The speaker explained structure, goals and achievements of CEOS to the ISPRS audience. CEOS has plenary meetings once a year, and is running two standing working groups (i.e. on Calibration & Validation, and on Information Systems & Services). CEOS releases dossiers, yearbooks and concept documents. A recent publication, which can be ordered from the speaker, is the CEOS yearbook of 1995 (summarising sensors, mission descriptions and applications). On the WWW, up-to-date information is located at <http://ceos.esrin.esa.it/CCEOSinfo>.

The objective of this Open Forum during the ISPRS congress was to foster interaction between CEOS and non-CEOS entities, to inform a wide audience about the organisation and major activities of CEOS and finally to provide an opportunity for the active discussion of CEOS-related topics. This specific Open Forum was supported by the European Space Agency ESA, which is a member of the permanent CEOS secretariat.

During the Discussion, **Gottfried Konecny** (Germany) suggested a stronger involvement of scientific and user-oriented organisations in CEOS, since there are gaps between their needs and the views of the organisations planning and funding the space programs. Organisations as in particular ISPRS are a platform where user demands are developed and defined; they also should be represented within CEOS. This view was supported by **Volker Liebig** (Germany), who also mentioned the importance of high resolution data, in particular for the mapping community. Another question raised by V. Liebig was the status of future commercial data providers within the given structure of CEOS. Also the chairman **Rainer Kalliany** (Austria) asked for the position of CEOS in the current transition phase of Earth Observation to commercial systems and applications.

Harald Arend responded to these contributions by explaining that CEOS in fact is well aware of the current developments and changes. The wish to inform the non-CEOS communities about CEOS (and to get feedback from them) was the very reason for this Open Forum and similar events at other congresses. According to the current CEOS terms of reference, organisations like ISPRS cannot join as such.

CEOS is currently reviewing its terms of reference with a view to strengthening the role of Affiliates and Observers; further, a dedicated user panel will allow to better address the requirements of users currently not yet represented in CEOS.

The next plenary meeting where the terms of reference might be updated will be in November 1996 in Canberra.

However - already now, experts from "outside" can contribute a lot to the dedicated working groups organised by CEOS. Since there is some overlap in affiliations and functions with many experts, CEOS is by no means as exclusive as it might appear.

CEOS welcomes developments towards a commercial Earth Observation market are much welcomed, since this is an obvious proof of the maturity of Remote Sensing. However, not all user requirements are covered by the free market and general concepts and regulations fostered by the public sector are required. CEOS will stay in touch with private/commercial data providers, for the benefit of all institutions and users within the Earth Observation community.

Session SS17

Comparison of Photo-Scanners

July 15, 1996, 14.15-15.15

Session Reporter: **E. Baltsavias** (Switzerland)

Chairperson: **R. Bill** (Germany),

Co-Chairperson: **E. Baltsavias** (Switzerland)

Attendance: approx. 150 persons

The session was organised as a round table discussion with participation of the following manufacturer representatives:

- **Hans Wehrli** (RFI - Wehrli & Assoc. Inc., USA),
- **Herwig Mehlo** (Carl Zeiss, Germany),
- **Marty Best** (Vexcel Imaging Corp., USA),
- **Alex Dam** (Helava Assoc. Inc., USA),
- **Garry D. Wylie** (Intergraph Europe, The Netherlands),
- **John Sjolander** (Lenzar Imaging, USA).

The aim was to focus on certain important aspects which were helpful for users and potential customers and which could be a motivation for further and more detailed discussions during the exhibition.

Firstly, **E. Baltsavias** (Switzerland) made a short overview of the developments since the Washington Congress in 1992, presented the current status and pointed out several still existing problems. Then, R. Bill posed different questions/topics to be discussed and the manufacturer representatives gave answers, while the audience also actively participated with additional questions and comments. The following topics were handled:

1. What are the most important scanner problems today? Why do these problems occur?

Some of the problems that were mentioned include:

- geometric and radiometric quality due to hardware and/or software problems
- lacking or insufficient automated, fast and accurate calibration procedures. Lacking or insufficient specifications of performance and possible errors (RMS and max. errors)

- software deficiencies (fast, easy and automated setting of scan parameters, missing functionality)

2. Testing and evaluation of scanners.

Within this topic the ongoing OEEPE/ISPRS Test of film scanners was also discussed. In addition the following aspects were treated:

- How should a customer test and evaluate a scanner?
- What test patterns should be used and how should the data analysis be?

The discussion included the major parameters to be tested, e.g. geometric and radiometric accuracy, MTF, stripes etc.

3. Technological developments

Answers were given to questions like:

- What are the current technological developments that have or can have an impact on scanner technology (e.g. in sensors, optics, illumination)?
- What are the advantages and disadvantages of the different technological alternatives?

The discussion did not go too deep into technical details but rather gave answers to questions that a user might ask himself, e.g.

- what are the advantages and disadvantages of area CCDs, line CCDs, TDI CCDs, tri-linear CCDs?
- does it make any difference whether the illumination source is xenon, halogen, fluorescent etc.?
- what are the advantages and disadvantages of different techniques for colour scanning?
- comparison of lenses versus mirrors.

4. Expected developments in the next four years (in scanner technology and performance in general and for each product in particular).

Finally, **R. Bill** (Germany) drew some conclusions. The session was very successful and lively.

The Hyde Park Corner

Many participants arrived claiming time for presentation of a late paper which was not on the congress programme. For such cases Dr. Forkert of the programme committee has invented the ISPRS Hyde Park Corner, where one late poster contribution was free for each participant. These late contributions have been announced daily, but this took place outside the official programme. No reports can be given!



Congress atmosphere

The Exhibition Areas at the Austria Centre Vienna

