

# TECHNICAL COMMISSION VII - RESOURCES AND ENVIRONMENT MONITORING

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Gabor Remetey-Fulopp, Commission VII President (HUNGARY)

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## STATE OF SCIENCE AND TECHNOLOGY OF COMMISSION VII TOPICS

Some of the most significant results and developments in 1997 can be summarized as follows:

- An increased emphasis was given to hyperspectral and radar technologies in the study of physical measurements and signatures.
- Radar backscatter modelling from built environments, and the integration of radar and optical data was examined both by WG VII/1 in modelling WG VII/6 pilot project.
- Inventory for land use and cover changes, crop monitoring and yield forecasting, technology assessments for creating self-adaptive vegetation models, integrative approach to regional investigations of land resources and development issues, analysing the societal impact of improved agricultural information system are research subjects to be further investigated.
- A study group on "agriculture statistics and crop forecast" is anticipated to be established at the mid term Symposium under the umbrella of WG VII/2 - Application of Remote Sensing and GIS for Sustainable Development.
- Urbanisation, HABITAT II - By the launch of the high spatial resolution satellite systems (IRS-1D etc) the research agenda of the remote sensing based urban applications have to be reshaped with a view to its rapid integration into operational monitoring of urban areas and urban GIS and use as a data source in civil engineering (WG VII/3)
- Global Monitoring Efforts have been made by ISPRS Commission VII to involve representatives of organisations and institutions such as UN COPUOS/OOSA, INPE, ESA, EC DG JRC, UNEP GRID, FAO, NOAA, NASA GSFC with special emphasis on subsequent follow-up activities related to Rio, including Agenda 21. In this field, the Santa Barbara Statement and developments such as the 2nd GSDI conference means progress toward the establishment of a global geospatial data infrastructure. The Earth observation and georeferencing/GI technology plays a fundamental role in the terrestrial ecosystem modeling by provision of the state-of-the-art solutions for integration of remote sensing, object database technology, genetic networking systems, visualization and computational systems (in WG VII/5 Global Monitoring). For example, as part of the US Global Change Research Programme, NASA's Mission to Planet Earth (MTPE) activities will be increased significantly by starting a 15-year series of consistent, high-quality global observation using over 20 different kind of advanced, satellite remote sensing instruments in frame of the Earth Observing System, partly in international cooperation with Japan, United Kingdom, Canada, France etc. The main target areas of the MTPE research are as follows: Studying global climate change, radiation, clouds and atmospheric water, the ocean,

the troposphere: the greenhouse gases, land cover and water cycle, polar ice sheets and sea level, the stratosphere: ozone chemistry as well as volcanoes.

- The integration of remote sensing and GIS techniques offers unprecedented improvement in efficiency, effectiveness and user friendliness. The scientific investigation, systematic Earth observation and data management using global information system will help not only the better scientific understanding of the natural processes and phenomena, but will allow also better decisions. This in turn opens up new horizons in further commercialisation of geospatial information, enabling us to solve problems related to the environment and sustainable development on local (precision farming), regional (integrated rural development) and global level (Agenda 21). Focusing on resource and environment monitoring, the application-oriented ISPRS Commission VII scientific community is dealing with these issues intensively.
- Noticing the potential economic importance, the European Commission has realised: Earth observation in particular, is rapidly emerging as a major tool for resource management and environmental monitoring in its document The European Community and Space Challenges, Opportunities and New Actions. Accordingly, the EC Joint Research Centre plays an active role in ISPRS Commission VII activities.

## **ACCOMPLISHMENTS OF COMMISSION VII DURING 1997**

### **Relevant workshops and seminars in 1997**

Earth Observation and the Environment: Benefits for Central and Eastern European Countries. Under the Co-chairmanship of Hubert Curien, President of EURISY and Karoly Lotz, Minister responsible for Space Affairs in Hungary, a 3-day Colloquium was held at the Hungarian Academy of Sciences, Budapest, May 15-16, 1997. Keynote addresses on the Earth Observation and the Environment was given by Guy Duchossois of ESA and Adam Linsenbarth, IGIK, Poland. The following session topics have been discussed: Natural Resources Management and the Environment (Chaired and introduced by the ISPRS Commission VII President); Natural and Technological Risks and the Environment (Chaired by Guy Duchossois, European Space Agency); Agriculture and the Environment (Chaired by Vanda Perdigao, EC JRC SAI); Cartography and the Environment (Chaired and introduced by Gottfried Konecny, University of Hannover/EARSeL); Round Table Discussion (Chaired by Herbert Curien, President of EURISY) with representatives of the UN OOSA(Petr Lala), EC DG XII(Michel Paillon), FAO RSC(Carlo Travaglia), Hungarian Ministry of Transport, Telecom and Water Management(Kalman Kovacs), National Commission of Informatics, Romania(Angela Ionita).

The event was co-organised by the Hungarian Space Office and the Institute of Geodesy, Cartography and Remote Sensing (FOMI), Hungary. Over 80 participants from more than 20 countries attended the Colloquium. The round table discussion underlined the importance of the basic research, standards, technological development and IT infrastructure, know-how transfer, information access and data services, partnership, co-operation and networking as well as education and training. As far as the perspectives are concerned, considerable improvement has been achieved by real time acquisition, synergism of multiplatform and multisensor technologies, the integrated use of Remote Sensing and GIS by the multipurpose databases and the advanced modeling of environmental processes.

The 1997 Open Meeting of the Human Dimension of Global Environmental Change Research Community was held in Laxenburg, Austria, June 12-14, 1997. The purpose of the meeting was to bring together the growing human dimensions research community to promote exchanges of information on current research, teaching and outreach, to encourage networking in investigations and integrated assessments related to environmental security, population dimensions of regional environmental changes, consumption as a cause of environmental degradation, interactions between environmental regimes, deforestation and regrowth in the Brazilian Amazon etc. Supported by Sergio Camacho of the UN OOSA and hosted by the International Institute for Applied Systems Analysis, the meeting had a special session devoted to remote sensing and GIS applications with research in global monitoring and in large/global dataset managements respectively, with active participation of ISPRS Secretary General John Trinder, Shintaro Goto, Mark Imhoff, Stanley Morain, Ryutaro Tateishi and others. The event was also an action of the co-operation between ISPRS WG VII/5 and WG IV/4.

An Inter-commission ISPRS Workshop was prepared on GIS, Airborne Remote Sensing and Geospatial Data Clearinghouse scheduled for February 19-20, 1998 with Commission III with direct involvement of President Toni Shenk, WG III/3 Co-chair Beata Csatho (Ohio State University, Columbus) and Secretary Erzsebet Merenyi (Arizona University, Tucson).

The participants of the second world conference on "Global Spatial Data Infrastructure" were invited by the Governor of North Carolina hosted by the oldest public university in the U.S. located in Chapel Hill. The closed shop event was organised by DDGI, AI, ILI, FIG Commission III, and EUROGI. ISPRS Commission VII was also represented. The GSDI Conference participants found among others, that it is important that all international groups working toward the development of the GSDI participate in the future processes of its evolution and that they communicate, coordinate and collaborate to the fullest extent applicable. These groups include (but are not limited to) FIG, ICA, IHO, ISPRS, ISO, ISCGM, OGC and NATO DGIWG. GSDI found also that GSDI is of vital importance to implementation of Agenda 21 of the Rio Summit and to the multi-national environmental conventions, and should be placed as central support for decision making before the meeting of the UN Commission on Sustainable Development in 2001. Due to the fact that in the global spatial data infrastructure, the majority of aerospace spectrally sensed data acquired are based on remote sensing and a significant part of the data are using or based on photogrammetry and/or remote sensing ground segment technology, ISPRS pro-active presence in the GSDI processes are important.

About 100 participants attended the 4th International Symposium on Spectral Sensing Research (ISSSR) in San Diego between 14-19 December 1997. ISPRS Commission VII was represented by Karl Staenz (also member of the ISSSR Scientific Organising Committee), Hermann Kux of INPE, Istvan Kadar of MH TEHI, Hungary and by the Commission president. Tutorials focused on the remote sensing perspective of the Internet, as well as on the hyperspectral imagery exploitation. Workshops discussed the commercial systems (Orbimage, Space Imaging etc) and the ground truthing procedures and protocols. The conference had the following session topics: data acquisition, features in hyperspectral data, modeling and simulation, information extraction, terrestrial/littoral feature extraction, information on Internet. ISPRS WG VII/1 Chairman Karl Staenz's personal impressions on the instrumentation, data

analysis techniques, applications scientific and application programmes have been already published by ISPRS Highlights. In a formal talk, ISPRS Commission VII representatives Karl Staenz and the President, as well as the ISSSR management led by USATEL director W.Roper, Betty Mandel and John Swistak has been agreed to a closer cooperation for the future. It is unfortunate that the real commercialisation era in remote sensing has been delayed by the loss of the 3-meter resolution EarlyBird 1 satellite late December 1997.

### **The preparation of the ISPRS Commission VII mid-term Symposium**

The preparation of ECO BP 98, the Symposium of the ISPRS Commission VII (Budapest, 1-4 September 1998) is underway. Supported by the cohesive power of the activities of the Commission's seven thematic Working Groups, the theme: Resource and Environment Monitoring - Local, Regional and Global attracted about 200 scientists from nearly 40 countries to present their results in application oriented research and technology development of remote sensing. The major goal of the ISPRS Commission VII's mid-term symposium is to reflect on the state of the art of the exploitation of the research and technological development in remote sensing applications with special emphasis on environment and resource monitoring. A special feature of the Symposium is its interdisciplinary approach. The Symposium will address a variety of subjects according the topics of the Commission's Working Groups. Moreover, special sessions will be devoted to demonstrating the activities of the scientific network of the European Association of Remote Sensing Laboratories (EARSeL). Under the auspices of the UN Office of Outer Space Affairs, the objectives of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space, expected results and the way in which the scientific community can utilise them, will be discussed. For topics such as local, regional and global spatial data infrastructure and related interoperability issues, a special session is foreseen under the theme "Geo-information to All" of the ISPRS Congress 2000. The agencies and the private sector representatives are invited to attend the Technical Exhibition.

Invited Advisory Board members of the Commission VII will be serving as rapporteurs: Sergio Camacho (OOSA, United Nations, Vienna, Austria), Simonetta Cheli (ESA, Paris, France), Thelma Krug (INPE, San Jose dos Campos, Brazil), Ake Rosenqvist (JRC SAI, Ispra, Italy) and Charles T. Wooldridge (NOAA, Washington, USA). Unfortunately, IAB member Roberto Pereira da Cunha, former President of ISPRS Commission VII between 1992-1996 died of cancer in November 1997.

Dissemination of Commission VII related information on the Internet webpages of the Commission VII are maintained by M.Goodenough and Paul Pilon in Victoria, Canada. Mirrored webpages can be accessed also at the Budapest Technical University mastered by Sandor Mihaly . It contains regularly updated news on Commission VII activities with in-depth information related to the forthcoming mid-term Symposium. The 1st and 2nd Announcement of the Symposium were disseminated worldwide at international meetings (eg. CERCO, EARSeL, UN ECE MOLA, FAO, HDGC, EUROGI), conferences (ISSSR, GSDDI) and exhibitions (JEC-GI).

## **COMMISSION VII WORKING GROUP ACTIVITIES IN 1997 (based on reports provided by the Chairpersons)**

### **WG VII/1 - FUNDAMENTAL PHYSICS AND MODELLING**

Chairman Dr.Gerald Guyot, INRA, FRANCE

Co-Chair Dr.Karl Staenz, CCRS, CANADA

Secretary: Dr.Jan G.P.W.Clevers, AUW, THE NETHERLANDS

Dr.Phil Teillet, CCRS,CANADA

#### **Accomplishments of ISPRS WG VII/1 during 1997.**

The 7th International Symposium on Physical Measurements and Signatures in Remote Sensing took place in Courchevel from 7 to 11 April 1997. It was organized by the French Space Agency (CNES) and the Joint Research Centre (JRC/SAI) of the European Commission under the auspice of ISPRS, with the support of:

- NASA: National Aeronautics and Space Administration
- CNRS: Centre National de la Recherche Scientifique
- INRA: Institut National de la Recherche Agronomique
- DLR: Deutsche Forschungsanstalt für Luft- und Raumfahrt
- ESA: European Space Agency
- NERC: Natural Environment Research Council

The Symposium was also sponsored by the following scientific societies:

- European Association of Remote Sensing Laboratories (EARSeL)
- Association Québécoise de Teledetection (AQT) Canadian Remote Sensing Society (CRSS)
- The Remote Sensing Society (RSS)
- Societe Francaise de Photogrammetrie et de Teledetection (SFPT)

This symposium was a continuation of the series of 6 symposia organised since 1981 by the Working Group VII/1. It focused 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), and determination of the factors affecting the spectral response of an object (atmospheric effects), measuring techniques, 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 by physicists, agronomists, foresters, geologists, hydrologists, oceanologists, meteorologists. Among these applications special attention will be paid to the use of remote sensing for ecosystem monitoring at different scales. The Symposium also included an exhibition of radiometric and related ground measurement equipment eg. available on the market and prototypes developed by research laboratories. A display of scientific books was also provided. The success of these symposia was reflected by the gradual growth of the number of submitted papers, (more than 40 % of the papers were rejected for the last symposium held in Val d'Isère), while the number of

participants increased from 220 to 316 (represented 24 countries). 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 is, 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 highlighted the following points relative to the whole spectral range covered by remote sensing instruments (short wavelengths, thermal infrared, microwaves):

- Physical modelling for data simulation and sensitivity studies
- Retrieval/inversion methods
- Data pre-processing
- Physical modelling
- Bio-geo-physical and chemical variable estimation use of remote sensing data
- Satellite data assimilation
- Impact assessment of environmental change by remote sensing
- Mission objectives for new instruments
- Applications

About 220 abstracts were received and selected by the International Scientific Committee. The number of participants was around 240. Publication: Abstracts of the 7th International Symposium on Physical Measurements and Signatures in Remote Sensing, 7-11 April 1997, Courchevel (France), G. Guyot Ed. CNES Toulouse (France), 434 pp.

## **WG VII/2 - APPLICATION OF REMOTE SENSING AND GIS FOR SUSTAINABLE DEVELOPMENT**

Chair: Dr.Dasika P.Rao, NRSA, INDIA

Co-Chair: Dr.Vernon Shingroy, CCRS, CANADA Secretary: Dr. S.K. Subramanian, NRSA, INDIA

### **Accomplishments of ISPRS WG VII/2 during 1997**

An International Workshop on Applications of Remote Sensing and GIS for Sustainable Development was organised by WG Chairman D.Rao in November 24-25, 1997, Hyderabad, India, sponsored by the Indian Space Research Organisation, Department of Space, Government of India. The Workshop was attended by Commission I President G.Joseph (SAC, Ahmedabad) and Commission VII Secretary P.Winkler (FOMI RSC, Budapest).

Background to the topics of the WG VII/2 Workshop, The Rio Declaration 1992, emphasized amongst many important actions, that Remote Sensing and GIS have a prominent role in promoting efforts for sustainable development. The agricultural production in the developing countries is presently not able to meet the needs of the growing population. This is because the potential advantages of Science and Technology are not fully exploited. There is an urgent need to evolve methods to

improve production by making optimal use of available land and water resources through sustainable development. If the development of rural areas has to sustain a growing economy and ensure ecological balance, an integrated and holistic approach is required to make optimal use of land and water resources. The satellite remote sensing applications for agriculture, soil, water and land management have ample scope to prepare an integrated plan for an action program for achieving the sustainable development of land and water resources.

Keeping in mind the aspirations of the India, an operational exercise was carried out in India in a major mission project called Integrated Mission for Sustainable Development (IMSD) where resources information is generated using remote sensing and ancillary sources including ground verification. The information layers are subsequently integrated through GIS to derive locale specific activities in consultation with the people and their aspirations through Participatory Level Appraisal . This experiment has yielded very encouraging results. The data from Indian Remote Sensing Satellite series including the latest state-of-art technology satellites IRS 1C/1D which have 5.8 m resolution camera, 23.5 m multispectral camera and 188 m wide field camera with a re-visit period of 5 days have provided valuable information at operational scale in this Project. This approach needs to be further refined taking into account the need to identify indicators for sustainability. The approach to improve the environmental conditions, monitoring of such improvements through remote sensing and the impact of the implementation activities on the social fabric at the grass roots level will have a far reaching effect on the utility and acceptability of remote sensing and GIS techniques.

### **Scope of the Workshop**

- Development of concepts for Sustainable Development using Remote Sensing and GIS techniques. Development of concepts for Sustainability Indicators.
- Promotion of applications in environmental and natural resource management.
- Monitoring and assessment of environmental hazards and disasters.
- Monitoring environmental changes including socio-economic factors.

### **Subjects discussed**

Remote Sensing, GIS and Sustainable Development, Water Resources Management for Sustainable Development, Coastal Zone Management for Sustainable Development, Land Resources for Sustainable Development, Agricultural Management for Sustainable Development, Forestry, Environment and Rural Development in Sustainable Development

### **Participation**

The Workshop was attended by 125 experts of 8 countries. Exhibition was not planned initially. However, at the insistence of a few companies, developments in hardware and software for the use of satellite data, IRS-1C/1D data products, and work done by a Provincial Remote Sensing Centre in the fields of sustainable development were exhibited.

Six Technical Sessions were held during the two-day workshop. As part of the social event Indian Classical Dance was arranged on 24th November, 1997

Substantial outcomes of the Workshop are as follow:

1. There is a need for more training and awareness programmes for users to effectively take advantage of the remote sensing and GIS techniques.
2. There is a need to work towards activities aimed at making the Sustainable Development process more effective. Dissemination of remote sensing and GIS technology up to end-user level is a critical need. Presently, it is not adequate. Algorithms and procedures/methodologies developed should be made available more openly to all the users.
3. Functional relationships between CO<sub>2</sub> concentrations, photosynthesis and productivity levels need to be understood more thoroughly i.e., the studies related to the effect of green house gases on total biomass production needs to be carried out.
4. Under IMSD substantial work has been done by Department of Space, Government of India with the utilisation of Remote Sensing and GIS in Natural Resources Management and dissemination of this information to the end users. This can serve as an example for other developing countries working in these areas.
5. Detailed scientific investigations in evolving procedures for estimating carrying capacity of the land need to be carried out.
6. Involvement of private entrepreneurs should be encouraged.

#### **Problem areas**

1. Technology is available but the policy to use it effectively is a limitation.
2. It is a matter of concern that although the use of remote sensing and GIS in sustainable development has been demonstrated, the efforts are inadequate to make it a sustainable proposition.
3. While technology has been demonstrated for its use in perspective/regional planning, its utility for on-farm management has not been well appreciated. This is particularly necessary since the sustainable development can only be realised with the farmers'½ participation. Development of integrated crop yield models using remote sensing as well as soil, water related parameters is necessary.
4. Synergy between Remote Sensing/GIS and socio-economic aspects have not been well understood. Mechanisms for integration of these two parameters has to be developed.
5. Dissemination of remote sensing technology in the local language for better understanding and acceptability needs to be done on a large scale.
6. Duplicity in the efforts in the generation of Remote Sensing Information/Thematic Maps should be avoided.
7. Lack of proper career opportunity for professionals of remote sensing and GIS is also an area of concern.

#### **Outlook on future**

1. Building up awareness about the benefits of technology needs to be strongly pursued.
2. With availability of higher spatial and spectral resolution data particularly from IRS-1C/1D, new avenues are opened now to work towards sustainability more effectively.
3. Work on water management at farm level like irrigation scheduling can be attempted.

4. For infrastructural planning the technology needs to be used for providing necessary vital information. This is particularly necessary since sustainable development can only be realised with the farmers' participation.
5. Evapo-transpiration modelling studies of crops may be undertaken.

Information on the contact address for acquiring the proceedings: Only the abstracts volume has been published. The proceedings of the full papers presented in the workshop will be published in due course of time. For more information: Dr.Subramanian, Fax: +91-40-277210

### **Follow-on activities planed:**

May 1998 - Short Course on Environmental Modelling in GIS under the aegis of ITC (Enschede, The Netherlands).

September 1998 ECO-BP 98 International Symposium of the ISPRS Commission VII, Budapest, 1998

February 1999 - International Workshop on Integrated Remote Sensing and GIS for Sustainable Rural Development. Venue: Hyderabad or Bangalore, India.

## **WG VII/3 - THEMATIC APPLICATIONS OF HIGH SPATIAL RESOLUTION SATELLITE IMAGERY**

Chair: Prof.Bruce Forster, UNSW, AUSTRALIA

Co-Chair: Dr.Tina K.Cary, USA

### **Accomplishments of the ISPRS WG VII/3 in 1997**

The major activity of the WG VII/3, "Thematic Applications of High Spatial Resolution Satellite Imagery", was the organisation and conduct of a special session on high spatial resolution data at the Asian Remote Sensing Conference, held in Kuala Lumpur, Malaysia, October 1997. A similar session will be conducted at the Australasian Remote sensing Conference, to be held in Sydney, July 1998, and planning is advanced for a workshop to be held in North America in 1999.

The special session had the following program and was attended by approximately 50 persons. The agenda was as follows:

Introduction, Professor Bruce Forster

"Current and Future High Spatial Resolution Satellites." Speaker: Professor Shunji Murai.

"Earth Observation Programme - Indian Scenario" Speaker: Representative of the Indian Space Research Organisation.

"Future SPOT High Resolution Satellite Systems." Speaker: Mr Yves Bechacq, Spot Asia.

"Comparitive Analysis of the Resolution of Air Photo and Satellite Digital Images." Speaker: Professor Bruce Forster

"Space Imaging Satellite Systems and their Applications." Speaker: Susan Sinclair, Managing Director, Worldwide Distribution, Space Imaging EOSAT.

"Earthwatch Satellite Systems and their Applications." Speaker: Representative of Earthwatch Incorporated (John Douglas)  
Potential Market for High Spatial Resolution Data in the Asian Region." Speaker: Professor Bruce Forster  
The Session closed with Open Forum.

### **Proposed Future Working Group Program**

The advent of high spatial resolution remote sensing image data from space, means that the fields of feature extraction from digitised air photos as undertaken by photogrammetrists, and that of image classification as carried out by remote sensing specialists, must increasingly be seen as the one activity, extraction of information from images. Both groups can learn from one another, and it is hoped that the Budapest conference in September 1998 can assist in this process.

## **WG VII/4 - COMPUTER ASSISTED IMAGE INTERPRETATION AND ANALYSIS**

Chair: Prof.Dr.Barbara Koch, University of Freiburg, GERMANY

Co-Chair: Dr.Alois Sieber, EC JRC, ITALY

### **Accomplishments of the ISPRS WG VII/3 in 1997**

The discussion during the WG VII/3 Workshop Sensor fusion and advanced classification algorithms was focused mainly on the sensor fusion topic. After the DLR presentation entitled "Overview of DLR-forest projects and future perspectives" delivered by Wolfgang Steinborn, the following topics were discussed:  
Sensor Fusion (chaired by Christine Pohl, WEU, Satellite Centre, Spain)

"Operational issues of multisensor data fusion for visual image exploitation" Werner Schneider, University of Vienna, Austria

"Image information fusion in remote sensing: towards a framework and a consistent terminology" Roland Fritz, FeLis, University of Freiburg, Germany

"Practical Application of Multisensor Data Fusion for Forest Inventory Mapping" Mathias Schardt, Joanneum Research, Austria

"Combining Satellite data and auxiliary GIS data" Advanced Classification Algorithms and Procedures (chaired by Mats Nilsson, SLU, Sweden)

"Evaluation of the kNN method for combining NFI sample plot data and satellite data" Matthias Dees, FeLis, University of Freiburg, Germany

"Integrating satellite and GIS data into a large scale sample based forest inventory - the classical sample based approach" Klaus Steinnocher, Department of Environmental Planning, Austria

"Feature based image fusion " Alois J. Sieber, JRC, Italy "Needs for data fusion in the area of landmine survey and detection" Silvana Dellepiane, University of Genova, Italy and Gianni Vernazza, University of Cagliari, Italy

"Model regularization in remote-sensing image analysis" Tobias W. Kellenberger, RSL, Switzerland

### **Evaluation of the Workshop**

The discussion showed that all participants agreed that sensor/data fusion will be one of the important topics within the next years. According to the amount of earth observation satellites already in orbit and the future satellite program, the requirement to fuse the information from different satellites will gain increasing relevance. It was agreed that until now the remote sensing society is missing a standardization of definitions in the field of data fusion. For example, what kind of data are included in the topic 'data fusion'; outline of the benefits of sensor and data fusion techniques; outline of examples for educational purpose. It was pointed out that there is still a gap between developer of fusion algorithms and users. In order to improve the contact there should be more joint meetings between developer of fusion algorithms and users. New algorithms from the developer community should be implemented in standard software and be available in the public domain. Only if the algorithms are provided to the large group of users will they be used and verified. The algorithms must be transparent to the users to estimate the reliability of the results. Representatives from the algorithm developer side confirmed that feedback from the user is important to improve the algorithms and adjust them to demands of the users.

The final proposal of the working group meeting was:

- There is a need for the working group to address the topic data fusion also in future
- The approach for the working group to the topic should be from a scientific user stand point, complementary to the algorithm developer groups.

The next meeting should be a joint meeting between the EARSeL data fusion group and ISPRS WG VII/4 . A next meeting is planned for the middle of 98. All participants agreed that the meeting was very successful.

## **WG VII/5 - Global Monitoring**

Chair: Dr.Shintaro Goto, Environmental Information Research Lab./ Kanazawa Inst. of Technology, JAPAN

Co-Chair: Dr.Mark Imhoff, NASA Goddard Space Flight Center, USA

Secretary Dr.Ake Rosenqvist, EC JRC, European Union In collaboration with ISPRS WG IV/6 (Global Databases)

### **Accomplishments of ISPRS WG VII/5 During 1997**

- Organized the session "Current, Waves and Nearshore Processes" in 4th International Conference on Remote Sensing for marine and Coastal Environments, Orlando, USA, 17-19 March 1997.
- Organized the "Research Gr. on RS and GIS for the Oil Spill Disaster" after the Nakhodka oil spill accidents in JSPRS and held two workshop, in Japan.
- Held the International Workshop on " Remote Sensing and GIS in support of HDP (Human Dimensions Program)", IIASA, Laxenburg, Austria, in 13 June 1997. (Attendance: 25 participants from 10 countries.)

*The contents of the HDP workshop and the session were as follow:*

- 1) Examples of the use of RS and GIS in conjunction with socio-economical models for global environmental change were showed.
- 2) The sensors were classified from the application point of view for the global monitoring, especially on the LUCC (Land Use Cover Change), and showed the direction of the use RS data for HDP.
- 3) The use of nighttime DMSP satellite data was demonstrated for detecting the urbanization of agricultural areas.
- 4) Land cover mapping and monitoring of the whole Asia and the present status of development Global Data Base were given.

*The results of the workshop*

- 1) RS and GIS is effective for analyzing global environmental change.
- 2) Because RS and GIS is being used more on HDP, the presentation of data in a GIS may have to be modified to account for human factors. For example, if socio-economists want to know the driving force on LUCC, they must deal with many spatio-temporal LUCC(Land Use Cover/Change) data. In such cases, GIS will be the efficient tool for this purpose.
- 3) To include human factors in GIS, RS, GIS and HDP scientist must cooperate with each other.

**Future Proposed Working Group Program:**

- Organize the session "Oil Spill Disaster on Nearshore Region" in 5th International Conference on Remote Sensing for Marine and Coastal Environments, San Diego, USA, Oct, 1998.

**WG VII/6 - Radar Applications**

Chair: Prof.Dr.Tony Milne UNSW,AUSTRALIA

Co-Chair: Dr.Jurg Lichtenegger, European Space Agency ESRIN, ITALY

**Accomplishments of ISPRS WG VII/6 during 1997**

The usefulness of radar in mapping land use/land cover and in assessing environmental conditions depends on the optimisation of wavelength, polarisation and incidence angle combinations available within each of the sensor systems. Much of the research involving single band satellite data has been reported in recent conferences (Canadian Space Agency GER, Ottawa, May 1997, ERS-1 Florence Symposium April 1997) and is the result of the work of Principal Investigators associated with these particular assessment programs. The evaluation of multi-wavelength, multi-polarised radar imagery acquired from the SIR-C has also recently been published. Much of the

work of this Working Group in Radar Applications has been involved with promoting radar technology and applications within the ASEAN region, thereby complementing the activities of ESA, (ERS 1/2), the Canadian Space Agency (GLOBESAR and RADARSAT) and NASDA CJERS-1 program, and has involved the Pacific Rim Deployment NASA airborne radar system (AIRSAR).

A Science and Applications Workshop was held in Pasadena, 24-28 March 1997, which brought together over 60 participants from the USA, Australia, New Zealand and several southeast Asian countries. The focus of the workshop was the evaluation of AIRSAR data acquired during the Pacific Rim (PACRIM) Mission, October-December 1996 when some 126 sites throughout the Asia-Australia region were flown. The first two days of the meeting were taken up with the fundamentals of radar, AIRSAR standard data products, ordering procedures and data processing and analysis. The remainder of the workshop was concerned with reports on the objectives and planning for the various scientific applications of the data over the next two years.

A three day follow-up PACRIM Applications Workshop was held at the Malaysian Centre for Remote Sensing, Kuala Lumpur, 11-13 August 1997, in which delegates broke into six application groups namely, geology, vegetation, marine applications, interferometry and topography, regional analysis, and agriculture. These application groups were led by US and Australian investigators and sought to achieve an overview of the radar potential for the relative discipline area. Regional scientists also evaluated research objectives for individual projects and determined what was feasible from the available data. Each group then outlined an optimal approach to data analysis, identified processing requirements, determined what field information was required and undertook hands on image processing to demonstrate various processing applications. Further radar applications workshops will be held in Bangkok, Thailand 4-6 March 1998 and Manila, Philippines, 27-29 April 1998.

### **Future Work Program and Actions**

A PACRIM Significant Results Workshop will be held in Sydney, Australia, 26-28 July 1998 in association with the 9th Australasian Remote Sensing and Photogrammetric Conference ([www.geog.unsw.edu.au/arspc98](http://www.geog.unsw.edu.au/arspc98)).

## **WG VII/7 - Non-Renewable Resources and Geotechnical Applications**

Chair: Dr.Tsehaie Woldai ITC, THE NETHERLANDS

Co-Chair: Dr.James V. Taranik Desert Research Institute, USA

### **Accomplishments of ISPRS WG VII/6 during 1997**

A Scientific Workshop as joint action of the European Commission's European Scientific Research Network and ISPRS Working Group VII/7 was held in the Netherlands on the 17 and 18th of February 1997.

Co-organized by J. L. van Genderen and T. Woldai, the sixth and final synergy of Remotely Sensed Data Network Workshop under the title of Synergy of Remotely Sensed Data took place at the Auditorium of the International Institute for Aerospace

Survey and Earth Sciences (ITC), Enschede. The following scientific papers were presented under the chairmanship of Dr T. Woldai:

Forest Area Mapping Based on Optical and Radar Data (B. Koch/ T. Kremmers, Institute of Forestry, University of Freiburg. Presented by F. Horlacher)

Analysis of Wavelet-Compressed ERS-PRI Imagery of Tropical Guyana (B. Triebfuerst, C. Schneider, IPG, Freiburg/ R. Verhoeven, Wageningen Radar Surveys)

Synergy of Remotely Sensed Data - Network Contributions by the Department of Physical Geography of the University of Freiburg (H. Gossmann, C. Schneider, H. Saurer) Knowledge-Based Interpretation of Remotely Sensed Data

(K. Pazad, H.-J. Birkner, University of Hannover) Compression of NOAA-AVHRR Data with a Wavelet Transform

(C. Schneider, B. Triebfuerst, IPG, University of Freiburg/A. R. S. Marcal, R. A. Vaughan, University of Dundee) Forestry Information from Microwave and Optical Remote Sensing ; The JRC Geophysical Processor (GPROC) (T. Tares, JRC)

Synergy in Remote Sensing - What is in a Pixel? (A. P. Cracknell, University of Dundee. Presented by C. Cassells, ITC)

Image Fusion Activities at the Western European Union

(D. Munro, WEU Satellite Centre)

Under the Chairmanship of Prof. J.L. van Genderen, ITC the following topics were highlighted:

Geometric Aspects of Multisensor Image Fusion for Topographic Map Updating in the Humid Tropics (C. Pohl, Western European Union Satellite Centre)

Laboratory Modelling of Underground Coal Fires (C. Cassells, ITC)

Quality Assessment of Interferometric Data (R. Gens, ITC)

Investigations on Synergy and Complimentarity of Multispectral and Anisotropy Information from MOMS-02/D2 Mode 3 Data for Land Use Classification in the Sinaloa District of Mexico (T. Schneider, Dept. of Land Use Planning, University of Munich)

Geometrics Aspects of Multisensor Image Fusion for Topographic Map Updating in the Humid Tropics (C. Pohl, Western European Union Satellite Centre), Laboratory Modelling of underground Coal Fires (C. Casselles, ITC).

Besides, the network members spent considerable time in reviewing the past three years collaboration, proposing improvement for Synergy II and planning further bilateral and multilateral research cooperation between network members now that Synergy I research network has completed its tasks. This final workshop was co-hosted by the International Society of Photogrammetry and Remote Sensing (ISPRS),

Commission VII, Working Group VII on Non Renewable Resources and Geotechnical applications.

### **Future Work Program for the year 1998-1999**

A Conference on the application of remotely sensed data and GIS in environmental and natural resources assessment is planned in Abidjan, Ivory Coast for March, 1998. One of the principal organizer, such as the March 1996 Conference in Harare, is the African Association of Remote Sensing of the Environment (AARSE) in which the WG Chairperson is the Secretary General. The last conference in Harare attracted more than 350 remote sensing and GIS expert from all over the world with more than 20 international companies and organizations displaying their hardware and software. A total of 10 Organizations including the ITC have already pledged to give their full support to the Abidjan conference. As non-renewable resources is one of the main theme in plan, the Chairman would like to see the involvement of ISPRS-WG VII/7 in this conference.

A workshop and a seminar are also planned for the end 1998 (in South Africa) and the beginning of 1999 (venue still unknown). However, they are still at a preliminary stage and the main theme of these workshop and seminar have still to be discussed. Main emphasis of the workshop and seminar will be on Environmental Impact Assessment of Mining.