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1 EDITORIAL

Recently I have been involved in a project dealing with Internet-based solutions for the distribution of Earth Observation data. Using an interactive approach that enables definition of the 'region and time series of interest', hidden pre-processing (basic data are raw data) and value adding (all processing done by remote servers) in this project, the objective was to find some ways for enlarging the market potential for EO data. From the technical point of view I think the project was a success; it is possible to deliver specific portions of information to the end user either by via the Internet or by direct communication links. However, two of the problems that still stood out by the end of the project should be mentioned. Today's data and pricing policies do not have 'rules' for EO data covering small areas, and, how to price 'value-adding'? The other problem is related to the 'quality' of the information retrieved - what information is given on the accuracy and by what organisation ? When, for example, some Internet-derived land cover map might be used for planning purposes of my province I would be the first one to object against using such a map which could be quite inaccurate. These days, any person that can push buttons can produce 'information'.
When it comes to enlarging the market for applications of EO data, technology is the first thing that can be solved by hard labour. Data policies and accepted standards and/or procedures for quality definition of (value-added) products take more. Some of us see a correspondence between selling cans of soup and EO data to anonymous customers. In this marketing context during one discussion one of my colleagues said "under those conditions this person will become a real potential customer". From that remark I concluded that there is a long way to go before we are facing a market of cash paying customers. In fact, because of the complexity of interpreting EO data it is my opinion that the largest share of value-added products can only be generated in close communication with specific customers.

Now, let us see what we have in this December issue of the Newsletter. First of all I would like to thank guest editor Michael Schaepman who has produced (with his co-authors) a report on the Imaging Spectroscopy SIG workshop that was held in Zürich just a few weeks ago. I think the Newsletter is to serve the Special Interest Groups in their activities as much as possible.
Included with this issue you will find a CD-ROM "Window on the World" that has been produced by BNSC and RSS (Great Britain) which was circulated to all readers of the Sunday Times. Before putting this into your PC please read the separate sheet of instructions "Travel the World" and the review provided by Nick Kew on page 23.
Wim Bakker provides us with some new 'observations' on what is happening in the space related EO activities; reading his contribution four times a year will keep you up-to-date on what you should know (plus some extras).

I want to remind you that EARSeL now has its own web entry (www-earsel.cma.fr), including the member's directory, possibilities for tendering and SIG related sites. There has been discussion with some members on the way the Newsletter is published on the web site. At this moment we only publish the Table of Contents and the chapter on Association News. We think that if people and organisations are interested they should at least pay the subscription rate for the Newsletter (better still to become a member of course). I would be interested in hearing strong opinions in favour or against this policy - please react to my address and we will come back to this issue in the March 1999 EARSeL Newsletter.

Just a few weeks to go before the holidays. On behalf the EARSeL Bureau I would like to wish everybody a Merry Christmas and a Happy New Year !

The editor

2 NEWS FROM THE ASSOCIATION AND ITS MEMBERS

2.1 ECO BP'98 and EARSeL Bureau meeting

The organisers of the ISPRS Commission VII mid-term Conference EOC BP'98 held from 1-4 September 1998, invited EARSeL to organise a session to present some of the work being carried out by our Special Interest Groups. The session was well attended and much appreciated according to the reports we have received. After an introduction describing the aims and activities of the Association, given by our Chairman, Robin Vaughan, the following presentations were made :

• A European proposal for terms of reference in data fusion given by Lucien Wald, our Secretary General
• Cartographic relief representations with DEM filtering techniques given by Manfred Buchroithner, our former Vice-Chairman
• The design of a regional approach to combat disasters employing the logical framework methodology given by Anna Spiteria, our representative in Malta, and
• Remote Sensing tools for forest fires prevention and assessment given by Emilio Chuvieco, convener of our Forest Fires SIG

The Bureau took advantage of the fact that they were all present in Budapest on this occasion to hold a short Bureau meeting, which in fact took place in the office of Bela Bartok at the Hungarian Academy of Sciences.

Bureau at work in Budapest.

Among topics discussed were arrangements for the meeting on "Space Techniques for Natural Disaster Monitoring and Management", to be held 6-8 April 2000. Discussions are under way that the organisation Perspective 2100 should look after the practical organisation with EARSeL/UNESCO being responsible for the scientific content.

The dates of the EARSeL General Assembly and Symposium were decided. These are Monday 22nd May - Wednesday 24th May with Bureau and Council meetings on 21st May and the General Assembly on 23rd. The general theme of the symposium is still to be considered, but it would reflect progress made in East/West co-operation since the Symposium held in Graz, Austria in 1991. A workshop is planned for the 25th May, which is still being negotiated.

A report on ECO BP'98 is included in chapter 6.

The next EARSeL Bureau and Council meetings will take place on 14/15 January in Paris.

2.2 Prof. Dr. Ing. Dr. h.c. mult. Gottfried Konecny has retired

The EARSeL Honorary Vice-President and former EARSeL Chairman, Prof. Dr. Gottfried Konecny retired this year from his position as professor and director of the Institute of Photo-grammetry at the University Hannover. Gottfried Konecny is also Honorary Member of ISPRS.

On September 14 his retirement was celebrated with a small symposium joined by about 200 participants from all over the world. Who ever has met Gottfried - and who has not? - knows that he is an enthusiast in photogrammetry and remote sensing, a visionary brain in the development of new techniques and methods and a friend of international and interdisciplinary co-operation. He probably is one of the few scientists

Former EARSeL chairman Gottfried Konecny

who has visited more than 120 countries throughout the world sharing his scientific knowledge and representing our discipline in national and international committees and societies at the highest level of science and technology. The forum of the retirement celebration was impressive and mirrored the world-wide activities of Gottfried Konecny. After a series of welcome addresses from various international associations the symposium went on with invited speeches given by some of those people who shared a good part of their life with Gottfried. EARSeL was represented by its Treasurer Peter Winkler and its Vice-Chairman Eberhard Parlow who expressed the warmest greetings of the EARSeL community in a short honouring address.

The celebration ended with a marvellous party in Gottfried's institute and no one had to suffer from a lack of food or beer. Gottfried answered the many addresses and talks given by thanking all those who had crossed his scientific and private life. He ended his talk with a quotation received from his good friend, Prof. H.K. Meier, some days ago: "There is a life after Photogrammetry! From the outside it may have appeared to you like a black hole. And in fact almost no ray of light is emitted from a pensioner's life to the active one. But inside it is incredibly bright and busy. A wealth of so far reflected interests and possibilities are here for the taking. You will experience it: a human being is more than the square minimum of his residual errors!"

EARSeL wishes Gottfried Konecny all the best for this new step in a scientist's life - but we would very much appreciate if Gottfried would keep contributing to future EARSeL activities and help the Bureau with his advice on how to navigate EARSeL through maybe rough waters in the future.

Dear Gottfried - many warm thanks from all EARSeL-members for your important contributions to our association.

Prof. Dr. E. Parlow, Vice-Chairman

2.3 THE EARSEL/SEE SIG ON DATA FUSION

Sophia Antipolis, *January 30, 1998*

The Special Interest Group "data fusion" has been created within EARSeL and SEE to better understand data fusion for a better exploitation of the synergy between all instruments observing and measuring our environment. It met on January 30, 1998, in the wake of the 2nd Conference "Fusion of Earth Data", in Sophia Antipolis, and gathered about forty persons.

As decided in the last meeting, the debate focused on the formalisation of the data fusion in remote sensing which is sorely needed and would shape the domain. The main outcomes of the debate were on definitions and terms of reference. The following definitions were agreed upon:

Data fusion: data fusion is a formal framework in which are expressed means and tools for the alliance of data originating from different sources. It aims at obtaining information of greater quality; the exact definition of 'greater quality' will depend upon the application. Here quality has not a very specific meaning. It is a generic word denoting that the resulting information is more satisfactory for the "customer" when performing the fusion process than without it. For example, a better quality may be an increase in accuracy, or in the production of a more relevant information. In this definition, spectral channels of a same sensor are to be considered as different sources, as well as images taken at different instants.

It then has been suggested to use the terms merging, combination in a much broader sense than fusion, with combination being even broader than merging. These two terms define any process that implies a mathematical operation performed on at least two sets of information. These definitions are very loose intentionally and offer space for various interpretations. Merging or combination are not defined with an opposition

to fusion. They are simply more general, also because we often need such terms to describe processes and methods in a general way, without entering details. Integration may play a similar role though it implicitly refers more to concatenation (i.e. increasing the state vector) than to the extraction of relevant information.

Other definitions were accepted, such as attributes, features, rules, decisions, etc., which actually follow international standards and terms of reference (information theory, ISO/DIS 12651).

Prior to closing the meeting, it was recalled
• the venue of the next meeting of the SIG in Valladolid (Spain), June 3-4, 1999, a joint meeting with several working groups of ISPRS, in the wake of the 19th EARSeL Symposium
• the holding of the 3rd International Conference on 'Fusion of Earth Data', in Ecole des Mines de Paris, Sophia Antipolis, January 26-28, 2000. The meeting of the SIG will take place the day after, Friday 29th, at the same place.

More information on the Data Fusion Web server:
http://www-datafusion.cma.fr

3 1st EARSEL WORKSHOP ON IMAGING SPECTROSCOPY

Michael Schaepman[1], Daniel Schläpfer[1], Freek van der Meer[2], Andreas Müller[3], and Klaus Itten[1]

3.1 Introduction

This report summarises the 1st EARSeL Workshop on Imaging Spectroscopy that was held at the Remote Sensing Laboratories (RSL) at the University of Zürich, Switzerland, from 6-8 October, 1998. The workshop was organised by the EARSeL Special Interest Group on Imaging Spectroscopy (SIG-IS), which is chaired by Andreas Müller. The workshop was hosted by RSL and chaired by Klaus Itten with co-chairmen Michael Schaepman and Daniel Schläpfer.

The workshop focused on the development and application of imaging spectroscopy techniques to solve practical problems of environmental monitoring. The main aspects, such as hyperspectral data acquisition including fundamental principles, advanced techniques, data interpretation and operational use of imaging spectrometers were covered. A major focus was to present the state-of-the-art and progress made in this remote sensing science, and to exchange information on large national and international projects, existing equipment and methods, and requirements for future scientific and technical development.

The workshop team consisted of the secretariat (Mme. Madeleine Godefroy, EARSeL), the workshop chairman (Klaus Itten, RSL), the workshop co-chairmen (Michael Schaepman, Daniel Schläpfer, both RSL), and the scientific committee (Eberhard Parlow, University of Basel; Klaus Itten, RSL; Franz Lanzl, DLR; Andreas Müller, DLR; Allan Nielsen, TU of Denmark)). The local RSL team supporting the workshop included Peter Keller (exhibition and instruments), and Mathias Kneubühler (social events).

Initially, the workshop was planned for 60 to 80 participants. Finally the workshop ended up with a total of 140 participants from 5 continents and 75 contributions (31 posters in 2 sessions (43%) and 40 oral presentations in 9 sessions (57%); 71 presentations in total (or 95% of all scheduled events)).

Michael Rast (ESA) and Dieter Oertel (DLR) seem to be pleased with the starting session of the workshop.

3.2 Summary of the Workshop Programme

Welcome Session

The workshop was opened by its chairman, Klaus Itten, who welcomed the participants and then summarised the evolution of imaging spectroscopy in Europe and especially at RSL, starting in the late 1980's up to the present day.

The head of the Swiss delegation to ESA Programme Board for Earth Observation (PB-EO), Jean-Pierre Ruder then urged the workshop participants to provide information for environmental and other current local and global problems. The forecasting ability of remote sensing data is one of the best possibilities to help survive in a fast changing world. He hopes to see people coming out of their research laboratories and telling the public as well as the politicians about their findings in order to create more awareness. Research and its

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related funding depends on the goodwill of society through politicians. Only by convincing them of the value of research can funding for this be maintained. Furthermore, Ruder stated that research should put emphasis on forecasting. His slogan for this is "forecasting is surviving".
The co-ordinator of the EARSeL Special Interest Group on Imaging Spectroscopy (SIG-IS) Andreas Müller then welcomed all attendees by giving a short overview of EARSeL activities and the aims of the SIG-IS.

Invited Papers
Three invited papers by Alexander Goetz, Karl Staenz and Michael Rast concluded the morning session of the first day. The first presentation was given by Thomas Chrien in place of Alexander Goetz on "Recent imaging spectroscopy activities at the Jet Propulsion Laboratory (JPL)". Thomas reported on the status of AVIRIS showing that the instrument had gone through a remarkable transition of improvements now leading to a SNR of the order of 1000:1 for a 50% reflecting target at 23.5 degrees solar zenith. He also stressed five requirements for high quality imaging spectroscopy data: high SNR, stability, uniformity, calibration, and reflectance inversion. Also the data processing facility and processing needs have increased enormously. During peak days, 180 scenes of nearly 1 gigabyte each are processed. Chrien announced that AVIRIS would be flown on a low altitude aircraft, such as the NOAA Twin Otter to reduce costs and strive towards more operational use.
Karl Staenz (CCRS) discussed imaging spectroscopy in Canada starting with the PMI/FLI instrument, SFSI and CASI. He showed operational and commercial applications of imaging spectroscopy in the fields of mineral prospecting as well as approaches to precision farming with hyperspectral data. According to Staenz, further commercialisation is needed providing an end-to-end solution. Future work should be conducted within the framework of international collaboration leading to improved access to data for users.
Michael Rast (ESA/ESTEC) focused his presentation on ESA's Earth Explorer Land Surface Processes and Interactions Mission paying particular attention to PRISM: the Processes Research by an Imaging Space Mission. Quoting the IGBP 1992 report, Rast addressed the extrapolation of local observations on biophysical processes and land-surface interactions to a global scale. Radiometric parameters acquired at a local scale such as BRDF, temperature, and emissivity should be used to derive model parameters such as APAR, LPAR etc. needed as input to models such as the SVAT approach. These models need to provide in turn the input to global change models driving the Earth ecosystems. The issue for the coming years according to Rast is to derive model parameters for global circulation models, thus overcoming the scale problems in between the local observation typically made at 10 metre resolution and the general circulation models that typically operate at 50 km resolution. Rast's message is "think local, act global!".

Oral Sessions
Session 1 - Sensor systems
This session, chaired by Franz Lanzl (DLR), contained presentations on new technologies, DAIS 7915, ROSIS and HyMAP. Chrien continued on AVIRIS and its improvement in performance from its early operation in the late 1980's. New developments are the low altitude flights, which are planned for this flight season. He also reported on significant reduction of keystone and smile effects using a laboratory prototype with an Offner relay.
The DAIS 7915, as reported by Andreas Müller, has been operated by DLR for a period of three years within the framework of the EU TMR programme. Through the large scale facility project, European users have been able to work on imaging spectroscopy data with the DAIS resulting in a total of 115 flights in 12 European countries. Significant modifications were made to the original sensor configuration as delivered by GER. Although the LSF project is planned to end in 1999, several flights with the

DAIS are planned for the 1999 flight season mainly in France and Spain (the Barrax test site) as preparatory investigations for PRISM.
As opposed to this, ROSIS, another instrument maintained by DLR, reported Peter Gege, is likely to be operated in 1999 for the scientific preparation of MERIS. ROSIS III, reflecting the present design status of this instrument has undergone substantial changes and enhancements, including some detector binning.
The most remarkable instrument presented by Terry Cocks was the Australian HyMAP. HyMAP, developed by Integrated Spectronics, is a high spectral resolution 128 band imaging spectrometer (0.4-2.5 micrometer) with 5 m pixels from 2500 m flight altitude, and very good radiometric resolution. The spectral resolution in the order of 15 - 20 nm allows to serve a suite of applications and particularly the very high SNR (>2000:1!) permits to gather high quality spectra to be recorded.

Session 2 - Future sensors

This session chaired by Karl Staenz communicated results on the APEX experiment, a Fourier transform spectrometer, a new hyperspectral imager IFRI and on the SmartSpectral initiative.
The Airborne PRISM Experiment (APEX), presented by Michael Schaepman, strives to develop an airborne pushbroom imaging spectrometer simulating PRISM to contribute to the calibration, validation and application development of PRISM. This Swiss-Belgian instrument is now entering phase B: a nine months preparatory phase preceding the actual design phase which is estimated to last 24 months.
The Imaging Spatial Heterodyne Spectrometer (ISHS), presented by Barry Smith, is a pushbroom Fourier transform ultraspectral imager with no moving parts developed at Los Alamos National Laboratory. This instrument is designed for the detection of gaseous effluents through the deconvolution of thermal IR molecular spectra. The Integrated Fluorescence and Reflectance Imager (IFRI) is developed for remote sensing in the shortwave infrared at NASA Goddard Space Flight Center (Fran Stetina) in collaboration with Science & Technology International.
An initiative on the commercialisation of remote sensing called SmartX, (Systematic Market Development for Remote Sensing Techniques), presents a joint effort of Dornier Satellitensysteme (Jochen Harms), DLR, Integrated Spectronics and HyVista. Five leading German remote sensing value added companies and six well-known research institutes in Germany and Switzerland are combining their expertise to develop more than 30 high level information products within agriculture, forestry, environment and planning. In total, three hyperspectral campaigns have been and will be carried out in 1998-1999 using HyMAP, the HRSC camera and an E-SAR system.

Session 3 - Data calibration and processing

Data calibration and data processing was the theme of this session chaired by Dieter Oertel with five contributions.
A new approach for the calibration of the thermal channels of the DAIS 7915 using a simplified sensor model was presented by Peter Strobl. Significant improvements on calibration were achieved by in-flight data processing based on laboratory coefficients, blackbody readings and temperature measurements. The definition of an across-track function for the correction of the changing background influence during the scan process helped to improve reliability in the thermal wavelength range.
Similar problems were solved for the calibration of the CASI sensor (Ivo Keller), where the 'frame shift smear' effect on the pushbroom detector could be corrected successfully. Furthermore it was proven that the residual errors encountered originate from the readout electronics, rather than from the CCD array inhomogeneities.
As for the data processing Daniel Schläpfer presented an innovative concept for the upcoming APEX processing and archiving facility. It includes a modular design and is based on a central database, while interactions will be done directly over the WWW.
Michael Lazar then evaluated various

atmospheric correction methods over lakes: empirical line correction proved to be less reliable compared to radiative transfer models.
Finally, brand new results achieved by HRSC-A flights in combination with HYMAP data were presented by Frank Lehmann. This research showed the potential for better classification of hyperspectral data with the aid of visually interpretable high spatial resolution data. Also the use of digital terrain models clearly demonstrated their potential as a clarification tool.

Session 4 - Atmospheric and limnologic applications

Session 4, chaired by Daniel Schläpfer, dealt with atmospheric and limnologic applications (each represented by two papers).
The plans for the delivery of Aerosol products by the SCIAMACHY sensor on ENVISAT were presented by Thomas König. The instrument evolved from the GOME experiment and will support the detection of various aerosol components.
Rolf Richter described the retrieval of columnar water vapour from MOS-B Imagery in the following talk. The APDA technique provided satisfying results in comparison with in situ measurements.
Don Pierson compared a variety of in situ spectroradiometric measurements to chemical analysis and model simulations for inland water quality monitoring. He found good agreements with suspended matter, while the signal of chlorophyll is partly covered by other effects.
A Dutch project to increase the end-use of spectral water monitoring techniques was presented by Steef Peters. Data from MOS and MERIS will be used for monitoring purposes and the systematic production of end products on request.

Session 5 - Vegetation signal analyses

The vegetation signal analyses session chaired by Joachim Hill concentrated on the use of imaging spectroscopy to derive parameters that drive radiative canopy transfer models.
Many researchers are currently working with data from the DAIS instrument. A radiative canopy transfer model inversion using DAIS data acquired under the Alphilles/ReSeDA experiment was presented by Fréderic Baret using 10 variables and 20 spectral bands between 450-2300 nm.
The following presentation (Mathias Kneubühler) focused on endmember selection procedures for partial spectral unmixing indicating that in situ reflectance measurements and SVAT modelled endmember spectra are more promising than image derived endmembers in offering the possibility of retrieving plant canopy biochemistry parameters.
Assessment of evapotranspiration patterns through a SVAT-model named PROMET (Process Oriented Multiscale EvapoTranspiration) using DAIS data was presented (Heike Bach) showing remarkable changes not only in spatial distribution but also in quantitative evapotranspiration rates. The conclusion derived was that accurate vegetation databases and the application of imaging spectrometry are indispensable for microscale SVAT modeling.
The last presentation in the session was given by Anatoly Gitelson and focused on the quantitative estimation of plant states investigating the basic spectral properties of leaves to estimate pigment contents. His final question on how many spectral channels are necessary for his research remains unanswered.

Session 6 - Land cover monitoring

Fréderic Baret chaired the land cover monitoring session. The two contributions focused on grasslands and eucalypt trees.
Anne Jacobsen presented an approach monitoring semi-natural grasslands using convex geometry and partial unmixing. The method used proved the possibility of monitoring encroachment at individual shrub level.
The talk given by Brian Turner presented a method to characterise eucalypt forests. Three approaches were discussed including field spectro-radiometric measurements, CASI data, and spectral analyses of dried leaves to

identify toxic phenols. The question on whether the endmember signature of the Koala bear should be introduced remained open.

Session 7 - Geological applications

This session chaired by Andreas Müller focused on geological applications mainly using DAIS data.
The first presentation (Lucca Merucci) centred on a combined campaign acquiring DAIS and MIVIS data over Mt. Etna. Large discrepancies were found in temperatures derived from DAIS (realistic values ranging to 70 degrees in the crater) and MIVIS (values of over 200 degrees in the crater and large areas of the summit over 150 degrees Celsius). Despite this, it was concluded that imaging spectrometers are useful in monitoring temperature and temperature changes as well as SO2 emission over active volcanoes.
The use of DAIS for mineral mapping in the La Peyne area was subsequently presented by Harald van der Werff. Spectral unmixing was used to constrain minerals and further highlight basalts and limestones using both weathered and fresh field spectra.
An application of DAIS to environmental mapping of lignite dumps using thermal infrared spectroscopy succeeded in extrapolating narrow laboratory spectral measurements modelled with laboratory XRD analyses of clay and silica to the coarse DAIS spectral channels.

Joachim Hill presenting his paper in the workshop auditorium.

Götz Reinhäckel obtained good correlations for the mineralogy versus the field measurements as well as for the mineralogy versus the DAIS spectra. The chair of the SIG-IS and the co-chairmen would like to mention the outstanding quality of this presentation.
An application of mineral mapping of DAIS data using spectral angle mapping and classification in the Maktesh Ramon test site revealed undiscovered mineralogical composition of limestones. Photointerpretation for geological mapping of hyperspectral data and processed data was promoted by Asun Riaza.
The final application of DAIS data for geological mapping presented by Charly Kaufmann was centred on the Greek Island of Naxos where the researchers attempted with success to map isograde (chlorite, biotite, muscovite) using spectral unmixing in combination with field spectral measurements.

Session 8 - Soil composition monitoring

This session was chaired by Charly Kaufmann and centred on soil applications.
An application of AVIRIS to mapping and identification of expansive clays was presented (Sabine Chabrillat). A model for inversion of engineering swell tests and spectral measurements to predict swelling potential from spectral characteristics was successfully tested on AVIRIS data.
A completely different application followed (Joachim Hill) who concentrated on the mapping of soil crusts in Nizzana (Israel) using false colour aerial photographs. Stratified unmixing was applied to dune and inter-dune areas leading to accurate mapping of the various components of the dune system including the soil crusts. The work will be extended to the scale of DAIS.

An application of MIVIS to the mapping of oil polluted soils due to an outburst of an AGIP rig in northern Italy concluded the session (Stefano Pignatti).

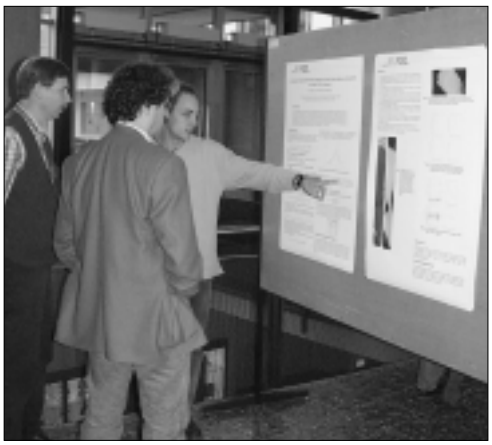
Session 9 - Environmental applications

This last session of the conference chaired by Michael Schaepman was devoted to environmental applications.

The first presentation was a more philosophical one where the potential use of imaging spectroscopy to aid in the identification of stressed vegetation using red edge modelling algorithms was discussed. After apologies for being the sole UK representative at the workshop, Andrew Folkard talked about the evolution of the analysis of land fill sites from red-edge analysis to other spectral features of stress.
Several examples of applications of MIVIS to environmental problems were presented (Stefano Pignatti) including the mapping of buried cities in archaeology, mapping of different types of pavements in cities and mapping of asbestos rooftops.
The last presentation (Helen Preissler) focused on a spectral database of filed spectroradiometric measurements to support the use of imaging spectroscopy data for land degradation studies in the Mediterranean environment (MEDSPEC). Currently, some 200 spectral field measurements of different sites are stored in this database that can be queried using logical operators.

Poster Sessions

The poster sessions were well attended despite a certain lack of time to have in depth discussions with more than a few authors during the extended coffee break. The poster sessions included various contributions on sensor calibration, atmospheric correction methodologies, limnologic applications and vegetation monitoring, as well as a variety of other applications. The calibration of the DAIS sensor was widely discussed and evaluated over test sites in Spain. The Nordic countries were present with studies on the monitoring of lakes using the CASI sensor (Sweden) and new information about the Finnish imaging spectrometer named AISA. Similar studies were carried out over Alpine lakes. Vegetation studies were shown for rangeland characterisation as well as for specific test areas in a controlled environment. One poster proved an excellent agreement of sun photometer measurements and radiosonde data of atmospheric water vapour.



Peter Keller (RSL) explaining his latest results to his Dutch colleagues (Hans van der Woerd, Steef Peters) during the poster session.

Discussion meeting and closing session

The discussion meeting focused on the possibility of flight campaigns in 1999 and onward. Since the DAIS LSF project is ending next year with a final workshop in the Spring, these EC opportunities are unavailable beyond 1999. However, possibilities of the DAIS flying in preparation of PRISM over the Barrax test site in Spain in June next year are investigated. Other flights with DAIS are scheduled over environmental sites in Eastern Europe. It is possible to put forward flight requests to DLR given that funding is available to cover the expenses (approx. DM 10.000 per day for plus/minus 4 flight hours, DM 3.000 for radiance calibrated data per flight line and DM 10.000 for geocoded reflectance data per flight line (please contact Andreas Müller for exact pricing, prices are subject to change)). Within the scope of the SmartSpectral initiative another combined flight of HRSC and HyMAP is planned for 1999. Those interested in existing processed HRSC-HyMAP data with available field measurements can consult the consortium. These data are freely available given that results are made available to this group. For ROSIS no flight campaign is scheduled, however it is intended to fly the instrument in summer 1999 for similar rates as for the DAIS. Commercial flights with CASI can be ordered through the Institute of Space Sciences of the University of Berlin. Similarly

researchers may approach CNR to order MIVIS data. Michael Rast commented on ESA's philosophy which is airborne campaigns to facilitate the spaceborne programme. Again DAISEX 98 was mentioned which will be extended with flights in 1999 over the same test sites. Interested researchers can join in. Rast argued that the various instruments should concentrate on the same sites to allow instrument calibration and validation studies facilitating the spaceborne programmes. Baret commented on the French situation where no hyperspectral instruments are currently available although several companies have shown interest. Canada's programme focuses on moss and lichen detection and the relation to the underlying geology for mineral prospecting. Other applications that will be investigated are precision farming and environmental problems. Furthermore it should be noted that within the Netherlands, Rijkswaterstaat is currently in the process of operating an EPS-A for water quality and coastal zone management applications.
The last part of the discussion led by Prof. Lanzl was directed toward possibilities within the EU Fifth Framework programme.

In the final roundup session, Klaus Itten insisted that each group of researchers should act as a local Centre of Excellence. Pragmatic results and simple answers on simple questions should be given to politicians as well as to 'people on the street'. Users of the results have to be found and contacted and information to ESA and politicians should be spread. A strong need for the LSPIM mission was expressed and is visible by the fast growing number of users and the proven possibilities of this new technique. An official resolution was drafted in the name of the workshop participants to ESA. It contains an urgent call for support to imaging spectroscopy projects in Europe. The resolution is signed by the workshop chairman, the co-chairman, and the chair of the EARSeL SIG-IS and reads as follows:
(i) At the Zurich workshop of the EARSeL Special Interest Group Imaging Spectroscopy 6-8 October 1998, which was attended by 140 people, the strong need for a LSPIM (PRISM) was emphasised, based on the experience of the participants and the deliberations and discussions during the conference.
(ii) The SIG-IS confirms its willingness to contribute to the planning and execution of future European flight campaigns and experiments in support of the PRISM mission.

Some of those responsible for the EARSeL workshop (from left: Klaus Itten (chair), Allan Nielsen (scientific committee), from right: Michael Schaepman (co-chair), and Franz Lanzl (scientific committee)).

3.3 Events

Exhibitors
The meeting had a small exhibition with representatives of GER Corp. (Tom Corl and Dennis Witz), ASD Inc. (David Beal) and CreaSo GmbH (representing the European distributor of IDL and ENVI, Fred Kruse, Jürgen Schwarz). During the workshop CreaSo offered two courses on IDL and ENVI in the facilities of RSL.

The major part of the exhibition was the display of equipment for field spectroscopy measurement. RSL displayed their measurement equipment (e.g. four spectroradiometers (3 GER, 1 ASD), one sunphotometer (Univ. of Arizona), and their field goniometer system (FIGOS)). This part as well as the presentation of RSL activities in Remote Sensing and the sale of publications was organised by Peter Keller.

Tom Corl (GER Corp.) explaining the goniometer system of RSL at the exhibition to Freek van der Meer and Steven de Jong.

Ice Breaker

The ice breaker reception on the first day of the workshop was sponsored by a local company called Netcetera AG. Their involvement with the European Space Agency (ESA) and their work for the electronic submission of the Envisat and ERS-2 Announcements of Opportunities led to their decision to sponsor this event. The sponsoring of this event is greatly acknowledged!

The instrument manufacturers seem to be fully satisfied with the outcome of the workshop (from left: Rainer Bärs (Specim), Dennis Witz (GER), and Lillo de Gasparis (Hyvista)).

Workshop Dinner

The workshop dinner was organised by Mathias Kneubühler and took place on the famous Uetliberg Mountain overlooking Zürich. A bus took the 91 participants across the city to the Uetliberg train, which brought them close to the hilltop. After a short 5 minute walk (the rain was not planned by the organiser) the hilltop restaurant was reached. The dinner included a typical Swiss meal (-sliced veal in cream sauce with hash browns (Swiss German: Züri-Gschnätzelts mit Röschti)) and a welcome note by Klaus Itten. At 23:28 the satisfied participants were able to catch the last train back to town.

Hilltop dinner table (from left: Tom Chrien (NASA), Tilman Bucher (DLR), Andrea Haushold (DLR), Daniel Schläpfer (Co-chairman), Barry Smith (LANL), Mary Kappus (NRL), Sigrid Roessner (GFZ), and Craig Trotter (Landcare Research)).

3.4 Conclusions and Outlook

The workshop was judged a complete success. Imaging spectroscopy seems to have evolved to a promising and interesting science also in Europe. It was the intention of the organisers to offer a podium to all researchers interested in imaging spectroscopy. Many excellent presentations were held during the course of the workshop and the organisers want to thank the participants for their adherence to the schedule. Based on the need of future workshops, four institutions (Andrew Skidmore, ITC; Franz Lanzl, DLR; Joachim Hill, University of Trier, and Eyal Ben Dor, University of Tel Aviv) expressed their willingness to consider to organise the 2nd EARSeL Workshop on Imaging Spectroscopy within the next two years. We are looking forward to supporting EARSeL and these organisers of the 2nd workshop, hoping to be able to introduce a continuation of this event.

3.5 Acknowledgements

The authors want to acknowledge the support of EARSeL in general and of Madeleine Godefroy in particular. Without her help and support, the event would not have taken place so easily. In addition the authors want to acknowledge the support of the local PhD and MSc students of RSL. They have been supporting all the activities with many after-hours over the course of the organisation: Anko Börner, Nina Dickerhof, Sandra Eckert, Rahel Fischer, Peter Keller, Mathias Kneubühler, Gabi Noser, Gaby Strub, and Francesco Wyss.

The Proceedings of the Workshop are now being prepared and it is hoped to publish by the end of the year if authors provide their papers promptly. Participants will receive their copy and others may be ordered through the EARSeL Secretariat (Fax: +33.1.45 56 73 61; Email: earsel@meteo.fr.

Michael Schaepman is now compiling a list of specifications of past, present and future airborne imaging spectrometers. He is interested in such information as SNR, smile, keystone, NEdL, NEdR, quantization rate, no. of bands, spectral sampling interval, spectral sampling width, calibration uncertainty, etc. If you could assist him in sending pointers to key persons, specifications, and links on the web, he would be very grateful. These will then be published. Michael may be contacted at : schaep@geo.unizh.ch

3.6 Internet Adresses

EARSeL	http://www-earsel.cma.fr
SIG-IS	send mail to: sig-is-request@geo.unizh.ch, subject: help, body text: help
Workshop programme	http://www.geo.unizh.ch/~schaep/earsel/earsel.html and related information
RSL	http://www.geo.unizh.ch/rsl
FIGOS	http://www.geo.unizh.ch/rsl/projects/figos.html
Sunphotometer	http://www.geo.unizh.ch/~dschlapf/sunphoto.html
Radiometer	http://www.geo.unizh.ch/rsl/projects/ger3700.html
Netcetera AG	http://www.netcetera.ch (see: http://www.esa-ao.org)
GER Corp.	info@ger.com
ASD Inc.	http://www.asdi.com
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Andreas Müller	andreas.mueller@dlr.de, http://www.dlr.de/dais/

4 NEWS FROM THE EC, ESA AND THE CEO

4.1 NEWS UPDATE FROM THE CEO PROGRAMME

INFEO ready soon for testing
Acceptance testing of the INFEO system will be taking place during November 1998. Once successfully tested, it then will go through an operational testing phase lasting a couple of weeks. It is foreseen that INFEO will be made publicly available at the end of 1998 or beginning of 1999.

INFEO will replace the CEO's current Earth observation information exchange system, the EWSE (http://ewse.ceo.org). In addition to all functionality currently offered by the EWSE, INFEO will for the first time allow online searching of major data collections.

CEO's 'Information from Space' CD-ROM now available
To further one of the key objectives of the CEO Programme, that of increasing the use of EO data and services, the CEO has produced a collection of application examples on CD-ROM. By means of this 'Information From Space' CD-ROM we hope to attract new customers to the use of such information and thus have assumed little or no knowledge of EO on the part of the target audience.

One hundred and sixty demonstration case studies have been included which show a range of diverse professional areas that have already benefited from using EO information. In order to make searching easier, each case study is indexed in three different ways; by economic sector, by geographic area and by thematic subject. In particular, indexing by 24 economic sectors, such as the fishing industry, insurance industry, public operational services and intergovernmental bodies, make it easier for a potential customer to find examples relevant to his or her profession.

This 'Information from Space' CD-ROM is reviewed elsewhere in this newsletter. If you would like to receive a copy of this CD-ROM, please contact the CEO Helpdesk via e-mail: ceo.helpdesk@jrc.it, or fax: +39 0332 785 461.

Customer segment reports now available
The Shipping industry, Water companies, Agribusiness and Land navigation and digital mapping industry were the customer sectors examined in the second round of CEO Programme's customer segments studies.

The final reports and the information papers produced by these studies are available for printing out or just for viewing from the CEO web site at http://www.ceo.org/docs.html.
A number of hard copies of the information papers are available directly from the CEO. If you are interested in receiving any of these, please contact Nina.Costa@jrc.it or via fax +39 0332 785 461.

5 REMOTE SENSING DATA, PRODUCTS AND PROJECT

5.1 Observations

Wim Bakker, *ITC, Enschede, The Netherlands*

Problems, problems, problems. Again the space industry has been troubled by a disturbing number of launch failures. Read about it in the section "Rocket failures". NASA has severe problems of getting their babies in the sky. Both Landsat 7 and EOS-AM1 suffer from considerable delays, not to mention the International Space Station. Every major deliverable of NASA projects scheduled for 1998 seem to have

slipped. When questioned, NASA appears to be awfully vague about the causes of these delays. Because of this already someone suggested to change the name of NASA to "Never A Straight Answer". Read about this, the demise of the JERS-1, and more in the section "Earth Observation". Meanwhile the drones (remember these unmanned flying objects?) set one record after another. NASA wants them to go "slower, higher, longer". Now don't they sound like sexy machines to you? Even the communication business is now showing interest in these oversized radio controlled model airplanes. Read about it in the section "Drones". Finally I take off with some ramblings about Life and the rest of the Universe in "Luck and Time".

Rocket failures

Titan - In one of the costliest failures in U.S. space history, a top-secret Pentagon Mercury spy satellite was destroyed when an Air Force rocket exploded shortly after launch from Cape Canaveral Air Station. That was on August 12, proving that even the mighty Titan may fail. Those who storm the heavens may end up in hell, and this Titan has certainly found its Tartarus. A power glitch seems to have confused its guidance system, the rocket began to pitch over and had to be destroyed by range safety officers 42 seconds after lift-off. The exact cause of the power glitch remains as yet unknown. The suspect guidance system was found in the Atlantic, but it is so badly damaged because of the explosion, the impact with the water, and the influence of salt water that it remains highly uncertain whether the real cause of the severe brain attack of the rocket can be determined. Meanwhile two other Titans are grounded until the cause of the problems is found.

Delta - On August 27 Boeing Co.'s new Delta 3 rocket exploded on its maiden flight, destroying the Galaxy 10 communications satellite. A 4 hertz roll mode that was not taken account by engineers is now identified as the cause of the problem. A rocket in flight exhibits a complex dynamic behaviour which is difficult to model because of changing velocity and attitude, and changing weight of the rocket. Engineers had taken into account 56 different roll modes caused by the vibration of various parts of the booster, but had ignored a 4 hertz vibration, because it was not significant with the previous Delta 2 model. The problem should be corrected with updated control system software, according to investigators. Anyway, the incident is a serious blow to Boeing's rocket launch service, which the aircraft giant hopes will compete with the European Space Agency for commercial payloads. Europe's success, by the way, was confirmed by another Ariane launch at August 25, that lofted the ST-1 communications satellite. And Europe's pride received another boost with the success of the Ariane 5 flight 503 on October 21.

Zenit - On September 10 once again the troubled Zenit rocket received a severe blow. Twelve Globalstar satellites were destroyed together with a Zenit 2 booster. As a result of two faults, that appeared in quick succession in the rocket's computer system, the rocket's control system sent an order to cut the engines about five minutes after launch. The resulting free fall back to Earth also caused a plunge of Globalstar shares on the Stock Market. The fall is thought to have set back the Globalstar global hand-held mobile satellite phone system by at least half a year. An embarrassing incident during the launch was that, at first instance, the launch was thought to be a success, because the Russian launch commentator was reading from a prepared script instead of actually delivering live information. This is not the first time this has happened. When Landsat 6 was launched, for a short time it was registered by the NORAD as being alive in space, while the satellite was actually submarine.

Commercial Space Act approved

Here's the good news: the US Senate approved the Commercial Space Act, meaning that a company now not only can launch space vehicles, but also is allowed to return them to Earth! In the previous situation you could launch,

but never re-enter. It's almost like telling a person "Sure you can smoke, just don't exhale!". The Space Act basically means that the commercial space industry can now develop reusable space transportation systems. The bill also mandates the use of commercial launch services for most government payloads, the purchase of space science data from private companies, a study on the commercialization of the International Space Station, and improved licensing regulations for remote sensing satellites.

Earth Observation

NASA's Earth Science - The renaming of NASA's Mission to Planet Earth to Earth Science hasn't worked any wonders. Yes, NASA's Earth Science team has produced a lot of good science over the past year: the prediction of El Niño, a new prediction of La Niña, radar measurements of Antarctica, and cloud measurements from recent hurricanes. However, the scientific data for this research actually comes from satellites built by other countries that are not part of the large, multi-satellite Earth Observing System effort, which stumbles blindly forward, with ever-increasing costs and ever-receding deadlines. Unfortunately, there's bad news across the range of Earth Science development programs. The AM-1 EOS platform did not make its June launch this year. Landsat did not launch in July. The EOSDIS Flight Operations Software, a seemingly straightforward flight software package, did not get delivered. The science processing software is still Missing In Action. The Lewis spacecraft failed and re-entered the atmosphere. And its companion, Clark, was finally cancelled after running over budget. None of these events would suggest anything resembling "faster, better, cheaper." And, unfortunately, NASA's ocean winds sensor, NSCAT, died when Japan's ADEOS-I satellite went "adios" in June of 1997. NASA is now struggling to get ready for launch a replacement satellite known as SeaWinds/QuikSCAT. QuikSCAT is currently scheduled for launch on November 24, 1998. Meanwhile, a small company, User Systems, Inc., came up with a creative way to combine data from three existing satellites that would match the original science specifications for the sensor that died on ADEOS-I. The point is that a dinosaur-like EOS program which gobbles up scarce resources, but produces limited results, is simply unacceptable. Of course, there have been successes as well, TRMM has exceeded expectations, SeaStar/SeaWiFS provides valuable images of oceans and land, NOAA-15 was successfully launched, but these successes do not take away any of the concerns about the way that NASA currently operates.

Software partnership Research Systems have announced a marketing alliance with Fortner Software. Under this alliance, Research Systems' flagship product, IDL (Interactive Data Language) will be integrated with Fortner's data access and visualization environment, Noesys. The new software will, amongst others, provide tools for viewing, and analyzing NASA EOS data.

JERS-1 dies - On October 11, 1998 a malfunction occurred in the Japanese Earth Resources Satellite JERS-1 (Fuyo-1), which was launched on February 11, 1992. After a problem with the gyros of the attitude control system, telemetry showed that the battery voltage had dropped to low values. It is assumed that the solar battery paddles had stopped in a place where the sunlight could not reach them. When no signals from the satellite were received anymore a command was sent to terminate the operation of the satellite. The mission of JERS-1 was to last only two years, but in the end it was possible to obtain observation data on the Earth from the satellite for approximately six-and-a-half years. Among its achievements it has successfully detected (using JERS-1 SAR interferometry) a surface deformation of the Mount Iwate and its vicinity that might be caused by the earthquake at Shizukuishi area of magnitude 6.1 on September 3 1998 and the volcanic activity which has been observed during last spring to summer. JERS-1 carried an L-band Synthetic Aperture Radar in HH polarization with a resolution of about 18 by 18 me-

tres, and the OPS optical sensor having 7 multi-spectral bands looking straight down and 1 band in 15.3 degrees looking forward direction for stereo images with a resolution of about 18 by 24 metres. The JERS-1 SAR instrument will be succeeded by the PALSAR (Phased Array L-band SAR) on board of the ALOS Japanese Advanced Land Observing Satellite to be launched in early 2003. The new SAR will have multiple resolutions 10 meter high-resolution and 100 meter ScanSAR mode, multiple polarization HH and VV, and a variable off-nadir pointing angle capabilities.

TMSAT images - TMSAT the first Thai MicroSATellite, launched together with Resurs-O1#4, constructed by Thai engineers with the help of engineers at Surrey Satellite Technology Ltd. at the University of Surrey in the United Kingdom is delivering excellent images. Take a peek at: http://www.ee.surrey.ac.uk/EE/CSER/UOSAT/amateur/tmsat/index. html for some examples.

OrbView-4's - Imaging Spectrometer in danger. A unique arrangement in which the U.S. Air Force is funding an enhancement to a commercial imaging satellite is in jeopardy because of opposition within the U.S. intelligence community. Some intelligence officials want to restrict commercial sales of the 200 channel hyperspectral imagery to be collected by Orbital Imaging Corp.'s OrbView-4 satellite. Orbital Imaging (Orbimage) is adding that capability to its satellite under a deal with the Air Force that would allow the company to sell the resulting imagery commercially. Restrictions on those sales could undermine the deal.

Iran and North Korea - Israel believes Iran is developing a spy satellite as part of its ballistic missile program. Officials said they came to their conclusion after analyzing Iranian television video shots of Iran's supreme leader Ayatollah Ali Khamenei visiting the missile development plant. In the video shots, the analysts spotted a satellite launcher and what could be the basis for a spy satellite that could cover the entire Middle East, including Israel. Iran recently tested a medium-range missile based on North Korean technology. Meanwhile, the United States and Japan accuse North Korea of test-firing a Taepo Dong 1 ballistic missile on August 31. The missile is supposed to have launched the Kwangmyungsung One (Bright Star 1) satellite, but no matter how hard the North-Koreans try to claim it is really out there, transmitting the melody of the immortal revolutionary hymns praising the late President Kim Il Sung and his heir and son Kim Jong Il, this fact remains unconfirmed by space organizations around the globe.

Brazil's SCD-2 launched - Orbital Sciences Corporation announced that it has launched Brazil's Satellite de Coleta de Dados-2 (SCD-2) at October 22. The launch represents the fifth Pegasus mission in 1998 and the 24th mission overall for the innovative airborne space launch system. This mission is the second Pegasus launch that Orbital has conducted for Brazil's national space agency. In February 1993, Orbital successfully launched Brazil's SCD-1 satellite, the predecessor spacecraft to SCD-2, in the third mission in the rocket program's history. The 110 kg SCD-2 satellite was built in Brazil by the Instituto Nacional de Pesquisas Espacial (INPE) of the country's Ministry of Space and Technology. Like its predecessor satellite, SCD-2 is designed to collect and relay environmental information gathered from ground sensors located in Brazil and other countries of the tropical belt within the Amazon River basin. The data will be used by scientists in studies of hydrology of the basin, the chemistry of atmosphere, oceanography and to improve weather and climate forecasting. A successful launch of SCD-2 was considered crucial for Brazil since the new satellite is to take over the duties of the aging SCD-1. Orbital's Pegasus rocket is the world's leading launch system for the deployment of small satellites into low-Earth orbit. Pegasus is carried aloft by the company-owned L-1011 "Stargazer" aircraft to a launch point approximately 12 km over open ocean areas, where it is released and then free-falls in a horizontal position for five seconds before igniting its first stage rocket motor.

Drones

Pathfinder and Centurion - On Aug. 6, 1998, AeroVironment's Pathfinder, a solar-powered, remotely piloted aircraft, flew to a record altitude of 24.5 km. The Pathfinder airplane is a technology demonstration platform proving the viability of solar-powered aircraft for high-altitude, long-endurance flight. Derivatives of this aircraft, incorporating energy storage for night-time flight, will be capable of continuous flight for weeks or months at a time at altitudes of more than 18 km. The successful record flight is one more milestone on the way to commercial solar-powered aircraft acting as low-cost complements to satellites. For some communications applications, Pathfinder and its descendants have critical advantages over satellites in distance, location, recovery and costs. Given these advantages and the success of the Pathfinder development, the commercial future for solar airplanes looks very promising. NASA has sponsored development of the Pathfinder under the Environmental Research Aircraft and Sensor Technology (ERAST) program. This flight marks the last for the Pathfinder as a testbed for the ERAST program and the focus of development now moves to a similar aircraft known as Centurion. With a wingspan of 63 meter, much longer than the current 37-meter Pathfinder, Centurion will be capable of reaching and sustaining an altitude of more than 30 km. Low-altitude flight testing of Centurion will begin in October, and high-altitude flights are planned to begin in the summer of 1999.

Altus - The Altus 2 aircraft, a remotely piloted science platform aircraft being developed at NASA's Dryden Flight Research Center, Edwards, Calif., has begun development flights aimed at reaching and sustaining altitudes above 18 km for many hours. The primary goal of the ALTUS 2 test flights is to get a piston-engine, turbocharged, propeller-driven airplane up to 18 km, and to sustain that for even days. The Altus 2 and its sister ship, the Altus 1, are variants of the Predator surveillance drone built by General Atomics/Aeronautical Systems Inc. Altus (the name is Latin for "high") is designed to carry up to 150 kilograms of atmospheric sampling and other scientific instruments in its forward fuselage payload compartment.

DarkStar - The DarkStar high-altitude unmanned aerial vehicle (UAV) has successfully completed its second flight in September. The DarkStar team will schedule more test flights to continue evaluation of the UAV's general flying characteristics and basic system performance, including the high-resolution synthetic aperture radar (SAR) and electro-optical (EO) payloads. DarkStar is a high-altitude, low-observable endurance UAV optimized for reconnaissance in highly defended areas. It will operate within the current military force structure and with the existing command, control, communications computer and intelligence equipment. It can operate at a range of 900 km and stay on station for eight hours at an altitude of about 14 km. The air vehicle will carry either the SAR or EO payload.

Proteus - On September 22 an oddly shaped aircraft took to the skies over the Mojave Desert in a demonstration of a new communications technology proposed for major cities. The High Altitude Long Operation-Proteus aircraft is designed to circle for hours some 15 km high, functioning much like a communications relay satellite does in space. Proteus is a manned aircraft flown by two-man crews on eight-hour shifts, the aircraft would fly fixed patterns providing coverage to an area 120 km in diameter. The communications industry has shown interest but no formal alliances have been made. The advantage of such a system is that it can be financed on a city-by-city basis. In my view a real breakthrough can be expected if the unmanned aerial vehicles like the ones mentioned above become operational. For the drones it doesn't really matter whether the payload is for Earth observation or communication. Next to the small satellite technology we may certainly expect to hear more about the drones in the near future.

Luck and Time

Heavenly fireworks - Just now that techniques emerge for building long-

life satellites with revolutionary rocket motors that use jets of ionized gas to keep spacecraft in their allotted orbit, satellites run the risk of getting sand-blasted by the Leonid meteor storm. The Leonids are a celestial river of rocky particles, most smaller than a grain of sand, left in the trail of Comet Temple-Tuttle each time it swings past the Sun. Although astronomers admit that it's hard to predict the real intensity of the Leonids, when they will strike around November 17, there will be an increased risk for satellites of getting hit. Satellite owners are concerned not just with a meteor blasting a gaping hole in a satellite. Meteor impacts also can vaporize aluminum and other material on the satellite's surface, creating plumes of plasma, electrically charged gas. These plasmas could induce stray electrical charges inside the satellite, zapping its circuitry. The Leonids are especially effective in creating these electrical charges because they are fast-moving, and strike a satellite surface with unusual energy. Some satellites will be reoriented so that sensitive components point away from the oncoming stream of particles. NASA, for instance, will reorient the Hubble Space Telescope so that its back is pointing toward the particles, rather than its delicate lens and solar panels. Meanwhile, just as you thought meteors were only the harbingers of disaster, meteor trails can be used as a cheap alternative to satellite communication systems. Amateur radio operators had noticed in the 1920s that they could bounce signals off these trails. Although the trails last only a few tenths of a second, there are so many that at any given time there are usually enough for a ground-based transmitter to work with. A Seattle-based company called StarCom Technologies has developed a communication system as a cheap alternative to satellite systems. StarCom transmitters continually send probe signals to test for reliable reflections. When a return signal is sensed, the transmitter sends out a rapid burst of digital data at frequencies between 40 and 50 megahertz that can be picked up over a wide area. A private ambulance company, American Medical Response (AMR), has now fitted their vehicles with StarCom transceivers. Talking about meteors and communications, while you're out there at night, watching the "shooting stars", also watch for the "Iridium flares". Each Iridium communication satellite has three mirror-like antennas about the size of a door. Unlike the surfaces of other satellites, which are concave or not very reflective, Iridium antennas are flat, silver-coated Teflon panels. When sunlight hits at a certain angle, an Iridium casts a brilliant reflection up to 30 times brighter than Venus, reaching a patch on Earth of about 50 square km. There are more than 70 Iridium satellites in orbit, and the satellites' orbits are so punctual that the flares can be predicted to the second. Watch the Visual Satellite Observer's Home Page, http://www.satellite.eu.org/sat/vsohp/satintro.html, for more information on satellite watching. Do something else for a change! Now you have the change of you watching the satellites instead of vice versa!

Life revisited - I keep coming back to the subject of "life". Right now there is a remarkable change among scientists from just 20 years ago. There has been a revival in the serious search for life in outer space. For instance, the Planetary Society, in cooperation with the University of California Berkeley, the SETI Institute and Arecibo Observatory, launched SERENDIP 4, its newest search for extraterrestrial intelligence (SETI), at Arecibo, Puerto Rico. The optimism is based partly on new knowledge. At least a dozen planets have been found in orbit of distant stars. Biologists now know life is more robust than once believed. Microscopic organisms have been found to thrive in extreme conditions. Scientist even discovered that streptococcus bacteria have travelled to the moon and back, hitchhiking totally unprotected on the Surveyor 3. The biomass deep beneath the Earth is now estimated to equal all the biomass living on the surface. The date at which the first organisms are thought to have appeared on Earth keeps being set back in time. And on

and on. Yet, even with new optimism that life is out there, many scientists believe the evolution of intelligent life remains highly uncertain. Even though life is believed to have started from the primordial soup in a mere 200 million years, it took another 4 billion years for some great big brains to emerge on this very innocent planet. Scientists remain uncertain as to the question of how and why intelligence develops. My guess is that the answer is already in Kurt Vonnegut's moving new novel "Timequake". He says the driving forces of the Universe are "Luck and Time". So it goes. Meanwhile, another event once again confirmed the notion that our lives are closely linked to the Universe. An intense wave of gamma rays, emanating from a mysterious star 20,000 light years away, struck the Earth's atmosphere on August 27, 1998. The wave hit the night side of the Earth and ionized the atoms in the upper atmosphere to a level usually seen only during daytime. It is extremely rare for an event occurring outside the solar system to have any measurable effect on the Earth, and it is amazing that such a burst could produce ionization levels similar to those produced by all the radiation coming from the Sun. Note that the Sun is only 8 light minutes from the Earth and thus the energy level from the star must have had an intensity at least 10 to the power 18 times that of the Sun! This all shows that the Earth does not exist in total isolation, and that its physical environment is affected not only by our own Sun but also by energy originating from distant parts of our Universe. Maybe a very similar event did zap the dinosaurs out of existence 65 million years ago! Hi ho! Food for thought, I guess.

References

The online version of this story, including selected references, can be found, as usual, under http://www.itc.nl/~bakker/earsel/.

5.2 ISPRS jobs directory installed

The jobs listing is provided by ISPRS as a service to the photogrammetric, remote sensing and spatial information industry. The listing is intended to be a register of opportunities for persons who are seeking employment. Employers are encouraged to submit advertisements which are appropriate and relevant to these disciplines. The link is the following:
http://www.sli.unimelb.edu.au/isprs/mail-archives/index.html

To advertise, employers simply send an email to the address "isprsjobs@ sunspot.sli.unimelb.edu.au" and the advertisement will appear automatically. The subject line of the email should describe the position title, for example "remote sensing scientist". The body of the message should include:

- a short position description
- minimum qualifications or experience required
- the duration of the employment contract
- the place of employment
- an indication of the remuneration package or salary
- who to contact for further information
- the closing date for applications
- an expiry date for the advertisement

5.3 ILWIS 2.2 for Windows, now shipping!

ITC has just released ILWIS 2.2 for Windows.

Next to new functionality, ILWIS version 2.2 contains a large number of improvements, emphasizing the unique characteristics of this PC-based GIS and Image Processing package unrivalled for its user friendliness. New features are:

- Orthophoto
- Kriging
- Interactive creation of colour composites
- improved representation for polygons, segments and points

- use of tie-points for transformation of co-ordinates on vector maps
- annotation of text layers
- table to point map conversion and
- many other innovations.

The documentation pack enables beginners and experts to easily manage the basic and advanced functionality of ILWIS 2.2 and shows how to use them in applications as land evaluation, urban surveys, natural hazards and environmental management.

Please contact:

PCI – ILWIS Nederland B.V.
Hengelosestraat 99
P.O. Box 6
7500 AA Enschede
The Netherlands
tel: +31 (0)53 4874337
fax: +31 (0)53 4874484
e-mail: ILWIS@ITC.NL
http: //www.itc.nl/ilwis

5.4 New Environmental Observatory

The U.S. National Science Foundation, in cooperation with the Danish Commission for Scientific Research in Greenland, has initiated planning for a new Environmental Observatory at the summit of the Greenland ice sheet. This would be a year-round, multidisciplinary facility, offering the opportunity for European and U.S. scientists to make observations, monitor and carry out experiments throughout the year. This proposal is a follow-up of a pilot project in which 4 scientists lived and worked at the summit from August 1997 until May 1998. They made measurements of atmospheric chemistry and energy balance, and collected samples for analysis in U.S. and European laboratories.

A plan has been drawn up for the new facility and was submitted in August 1998 to the National Science Foundation and the European Polar Board and has been well received. It can be consulted at:
http://www.hwr.arizona.edu/Alpine/Summit/observatory.html

6 REVIEWS, PUBLICATIONS AND REPORTS

REVIEW

6.1 Window on the World

Nick Kew, *WebThing Ltd, Callington, UK*

Window on the World

As an enthusiastic advocate of bringing Remote Sensing to a wider audience[1], I was delighted to learn that a giveaway CDROM on the subject had been included in the Sunday Times, a major UK national newspaper, on September 13th. The full title is "Window on the World", but I shall refer to it as "WOTW". In summary, I find WOTW to be a rich collection, with the potential to attract new readers to Remote Sensing and its applications, and distributed through one of the best possible channels available today short of a TV series. It is unfortunately let down by poor engineering.

Running the Disc

Following the instructions, I inserted the disc in my laptop computer - on which I run Linux - and opened "-launch.htm" from the CDROM. There's a Sunday Times logo, followed by some cover-page text introducing WOTW. The instructions actually specify "Netscape 3 or above": in fact I found that, having worked around the problems (below), it is essentially identical in several browsers including Netscape 2.02-4.05, HotJava 1.1.4 and ICE Browser 4.03. The design requirement is simply Frames support. However, there are serious problems, whose effect in practice depends more on the operating system than on the Web browser used. The first shock came when all of the links generate a file-not-found error! A quick look at the source reveals the

problem: the document specified a file "HTML/LAUNCH.HTM" when in fact it meant "html/launch.htm". It just happens that certain filesystems will correct this by virtue of being case-insensitive, and WOTW unintentionally relies on this. If the CD were editable, the fix would be a one-line Perl script, but since it isn't, fixing it is rather more involved: a complete workaround is described at my website[2]. Sadly, this serious error is typical of a complete absence of quality control evident throughout WOTW. A validator showed 18 HTML errors, some of them serious, over and above the bad links on "launch.htm" alone. The character set used is proprietary to the MS-Windows operating system family and is explicitly forbidden in HTML, leading to a number of glitches. The problem extends to the 'help' section of the CD itself, which I found at best unhelpful and at worst downright wrong. On Windows '95 it installed mostly smoothly, and using Microsoft Internet Explorer 4 (MSIE - for which WOTW is clearly designed) offers a smooth and comfortable viewing experience. I was not able to test the other systems supported (Mac and RiscOS), although I believe that Mac browsers at least offer bug-compatibility with Windows and therefore a 'working' installation. Indeed, if they had described WOTW honestly as being designed for use with MSIE and dispensed with the misleading claims (like "HTML"), I might have devoted this review to enthusing over what is undoubtedly a content-rich collection.

The Contents

WOTW is broadly divided into two sections, entitled "Learn about Earth Observation" and "Business Applications" respectively. The two sections are almost entirely unconnected, and each has its own distinctive character. Business Applications offers a structured approach that is friendly and easy to navigate, and informative. The education section is chaotic and frustrating to navigate, but offers buried treasures!

The "business" section comprises about 100 case studies, under 11 broad headings. Whilst not exactly comprehensive, it is nevertheless representative of a broad range of applications. As a UK CD made for a UK market, there is quite naturally an emphasis on UK case studies, but this is by no means exclusive and there is a good selection from around the world. Each case study is presented as a series of five bullet points, entitled "Problem", "Solution", "Cost/Benefit", "Methodology", and "References" (a minor criticism - I would have liked to see the References including material from the Education section of WOTW itself, thus offering relevant technical background to readers). Unsurprisingly some cases fit this presentation better than others, but many of the cases are genuinely interesting and should prove an excellent resource when we are called upon to explain the 'use' of Remote Sensing. Perhaps the best thing this section can accomplish is to reach decision-makers in the eleven industries represented.

The Education section offers an entirely different interface. Navigation is by a set of graphical icons, which are by no means intuitive (for example, a volcano icon leading to an image of an oil slick)! Many lessons have two different threads of navigation, with a series of icons to the left and a 'forward' button bottom-right. So, the link you are intended to follow is the last thing you see, while an alternative 'next' link presents itself. Confusing! This general design together with the 'random' problems of proprietary pseudo-HTML, and an intensely irritating animated globe in almost every page, mean that much of this material may be lost to all but the most determined reader. Thankfully the sound at least is optional and under the user's control!

The best overview (and navigation) is offered by a button labelled "introduction". This leads to a long Contents page with five sections: broadly Introduction, Geosciences, Human Geography, Satellites in general, and Image Processing/GIS/GPS. Each of them offers a satisfying breadth and depth of introductory material, and

many of them include a simple game or quiz designed to sustain interest (for Windows/MSIE users). In addition to the main contents, there is a Guided Tour, a set of Teachers Notes, an Address Database, and a search facility. The Guided Tour is basically a selection from the main contents, and may present an attractive introduction for some users. The teachers notes address the UK curriculum. The Address database is a letdown: there's no search option, and the display is an inconvenient graphical presentation that needlessly prevents the use of cut-and-paste to import an address into another program (such as an addressbook). The search facility is another example of gratuitous technology: although it is limited to single-word search, it is presented with an elaborate technical introduction. Like so much else on WOTW, it works on Windows but fails unnecessarily on Unix.

References

[1] See for example gopher://gopher.gis.umn.edu:70/0R82084-87891-1m/rsgis/lists/imagrsl/1996/imagrs-lJan1996.list
[2] http://www.webthing.com/review/WOTW/

REVIEW

6.2 Information from space, a collection of demonstration case studies

published by the CEO programme, EUR/18080EN. (see also chapter 4)

Paula Drakes, MSc-Student, *ITC, The Netherlands*

Having had the opportunity to browse through this CD on more than one occasion, I should like to share my opinion on its contents and practicability. So, what did I like about it? Definitely, the screen saver – very scientific-looking. After one day of using the screen saver, one is inclined to remember how useful and practical RS has become in certain aspects of our lives, which we otherwise would not really spare a thought for.

In the main (information) part of the CD, the introduction to remote sensing is quite clear. I think even high school students should get a basic understanding of RS. Even for me, some aspects which I never quite understood, now seemed clearer with the relative simplicity of the explanations. Although I know the emphasis was being placed on satellite technology, I thought perhaps that it could have been mentioned that aerial photography is also a form of remote sensing.

I also liked the alternative methods for selecting from among the more then 160 case studies. One can select according to discipline (keywords), economic sector, geographical area or alphabetic order. There are some sub-directories, as well as the option for combined searches (economic sector/discipline or geographic area/discipline), with the exception of economic sector/geographical area.

Having been initiated in Europe, the range of case studies on the CD was, overall, quite extensive but, for me having a Caribbean bias, I couldn't help noticing that there were only 2 case studies from the Caribbean. I also happened to be looking for a specific environmental hazard – hurricanes – and was pleasantly surprised that one of the 2 cases dealt with hurricanes. It was also a bit disappointing that there were barely any cases dealing with hazards affecting coastal areas, such as mass coastal erosion.

However, the CD lends itself to enjoyable browsing of all the contents; one can easily be carried away. There is much to be learnt from the operational examples of RS showcased on this medium. For me, the simplicity of expression of the complexity of satellite RS was perhaps the CD's most endearing feature.

Anyone wishing to receive this CD should contact the CEO Helpdesk:
fax: +39 0332 785461
email: ceo.helpdesk@jrc.it

REPORT

6.3 RSS '98 "Developing International Connections"

Condensed from a report written by Dr. Gérard Bégni, *Chairman of the French Society of Photogrammetry and Remote Sensing (SFPT)*

This 24th annual conference of The Remote Sensing Society (UK) was the second organised jointly with the SFPT, the first having been held in 1994 at Grignon, near Paris, organised by the National Institute of Agronomy (INA), when Dr. Colette Girard, well-known to EARSeL members, presided over the SFPT. The French Space Agency(CNES) lent its support to the meeting and Mr. Gérard Brachet, Director General, made a presentation at the Opening Session on the theme of the necessity to foster international cooperation, both in the development of Earth observation systems and in the implementation of applications. In particular, he outlined the activities of the CEOS, which France presided over in 1997.

The novelty of RSS'98, which was attended by nearly 300 people from several countries, was that for the first time it offered bi-lingual sessions, that it to say that authors presented their work in the language of their choice, either English or French. During the three bi-lingual sessions four papers were presented in French and the editors of the proceedings are to be praised for including an abstract of all papers in both languages.

These bi-lingual sessions illustrated very well the theme of the conference "Developing International Connections". For example, Mme. Michèle Chevrel, who is a member of the UNESCO Observatoire du Shara et du Sahel, gave a presentation on the contribution of remote sensing to the study and prevention of desertification. Other presentations covered national projects on themes such as forestry and hydrological modelling in such countries as Botswana, China, Paraguay and Morocco. Other topics covered in these bi-lingual sessions included the use of AVHRR imagery for agricultural applications, and space techniques as an aid in disaster management. The need was emphasised to develop products whose usefulness can be easily understood and used by decision makers in various fields, and to ensure that the local structures are adequate to adopt the new techniques and staff sufficiently trained to develop these to meet local needs.

Each year the RSS meetings enjoy the support of their corporate members with a well-attended commercial exhibition. Each year also the RSS organises their conference dinner in a prestigious venue and this year was no exception the venue being the historic and beautiful Leeds Castle in Kent, with minstrels evoking the shades of Henry VIII and Anne Boleyn, who used the castle as a hunting lodge. During the awards ceremony Lord Hesketh presented to Dr. Jean Meyer-Roux of JRC, Ispra, the Society's gold medal for his life-long contribution to furthering the applications of remote sensing techniques.

During the closing session Mme. M.J. Lefevre (CNES) outlined French activities in Earth observation and the importance attached to international cooperation both through the European Space Agency and with other national apace agencies. Industrial links are also strong between British and French companies. Mr. Peter Churchill of CEO, Ispra, enlarged upon the fact that in the near future space data will be available from 170 instruments but users, both public and private, are not sufficiently aware of how to use all these data. Scientists need to make a great effort to develop operational systems that allow users to extract useful information from these data.

A full report of the meeting written in French by Mr.Bégni will be published in the Bulletin of the SFPT, and the list of papers presented may be consulted on the server of the Remote Sensing Society. <http://www.the-rss.org>. The Proceedings are available from the Remote Sensing Society, Dept. of

Geography, University of Nottingham, Nottingham NG7 2RD, UK.
Email: rss@nottingham.ac.uk.

REPORT

6.4 PIERS Workshop on Advances in Radar Methods, Baveno. Italy

20 - 22 July 1998.
Report by Prof. (em.) Preben Gudmandsen, *Lyngby, Denmark*

When we were planning for the ERS SAR we were building on the limited experiences obtained during the short life of SEASAT in 1978. We foresaw a number of interesting applications related to the ocean, coastal areas, sea and land ice and glaciers. The all-weather capability and the possibility of observations during winter months at high latitudes were considered important. And we have not been disappointed. A very large number of scientific publications based on ERS SAR data - ESA says more than 6 000 - have appeared since the launch of ERS-1 in 1991 describing a wealth of applications of SAR data - and many way beyond expectations.
I think we have to admit that at that time nobody thought of the application of the data for interferometry for the simple reason that we did not believe that the stability of the system with respect to orbit and electronics would be sufficient. But we did get such system, and we have witnessed a fantastic development of this techniques which still finds new applications. What also surprised the present author is the speed by which these new techniques and applications developed.
Something similar seems to have happened within the last few years with the development of software to exploit fully polarimetric data to improve the interferometer techniques by what is called polarimetric optimisation of radar interferometry. Utilising all polarimetric channels the coherence of the data is enhanced so that interferometry may be useful in many more cases. Thus, it is shown that this techniques permits observation of targets embedded in vegetation, for instance, even at the high frequencies of C-band (ERS) and X-band (3 μm wavelength), and applications in forestry may be anticipated.
This was one of the main topics of the recent workshop at Baveno where a number of examples and new applications were presented. An initial presentation of the ideas at IGARSS'97 and a paper appearing in Electronics Letter in 1997 (S.R. Cloude and K.P. Papathanassiou, Polarimetric optimisation in radar interferometry, E.L. Vol. 33, No 13, pp. 1176-78) found a number of scientific teams that were ready to explore and develop this new possibility. And the development has gone very fast as it appeared from the workshop.
Another important topic of the workshop was related to bi-static radar applications. Some of us tend to consider bi-static radar techniques as something exotic and for feinschmeckers who study the interaction between an electromagnetic field and a target or surface at large. With the suggestion of using forthcoming wideband digital signals from geo-stationary television satellites as radar sources we may get a system that may be useful for target detection by way of bi-static radar techniques. If this materialises - with an acceptable signal-to- noise ratio - we shall have to dig out the signatures already investigated and we shall need a great number of additional signature studies. Just consider that a receiver installed in an aircraft or on a satellite - with beam-steering phased array - will see the Earth surface at a range of incidence angles determined by the orbit inclination and antenna look-angle, for instance, and we shall see a number of new electromagnetic scattering problems to be tackled by experiments and modelling. Bi-static polarisation features will be one subject. The necessary synchronisation between transmitter and receivers is likely to be obtained by means of the GPS system. It appeared that the principles are already applied for military purposes, detection of low-flying aircraft, for instance, and most likely a large data base of (classified) signatures have been accumulated. (For a person who is working in high-latitude research the idea is not so interesting

REPORT since the illumination from a geo-stationary satellite will arrive under very small grazing angles and beyond about 81° latitudes there will be no signal at all).

A third topic was the application of very wide-band signals for detection of targets embedded in the ground. Anti-personnel mines are obvious targets. A wide-band noise radar appears attractive because it is simple consisting only of a noise-modulated transmitter and a synchronised receiver with a correlator that could result in a very fine range resolution. However, for technical reasons the range is limited. Some results were presented at the workshop but the present writer was not convinced of the success of this technique. Dispersion may be a serious limitation and especially in moist soils. But one shall never say never. Signal processing has advanced very much as demonstrated and the development will most likely not stop at the present level of advanced signal processing - carried out in real time.

It was an interesting workshop with about 65 oral presentations and posters within five workshops to formulate conclusions and recommendations. The titles of these workshops may give a clue to the diverse subjects dealt with: Interferometry with regards to polarimetry, Dk, and wide band; Ultra wide band and multispectral radars; bi-static systems with emphasis on random and parasitic effects, polarimetry, 3-D imaging; Information fusion including navigating the model space and existing data sets; Unconventional new techniques and technologies for future radars.

The workshop was organised by the Space Applications Institute of the Joint Research Institute (JRC, Ispra, contact: Dr. Ann Franchois), and attended by about 100 scientists. Contributions and conclusions will be published in the workshop proceedings. A special issue of the Journal of Electromagnetic Waves and Applications is devoted to papers by participants reviewed in the normal way.

6.5 Report on ABDMAP Workshop in Crete

Iain Woodhouse, *University of Dundee, UK*

The Institute of Marine Biology of Crete, were hosts for the fifth workshop on Algal Bloom Detection, Monitoring and Prediction (ABDMAP) on 23/24 September 1998. ABDMAP in a CEO Concerted Action led by the University of Dundee, with the aim of holding a series of seven workshops bringing together the diversity of professionals interested in algal blooms. This workshop paid special attention to the value of remote sensing data for modelling of algal blooms, but also considered the research and monitoring activities taking place around the Eastern Mediterranean (including the Black Sea). Participants came from a number of Mediterranean countries, as well as from the UK, France, Italy and Germany.

A range of topics were discussed, but the main conclusion from the workshop was that there is a definite role for remote sensing information as input to biological models, but that the full use of such data is yet to be implemented on a regular basis. However, this workshop was successful in developing new collaborations between remote sensing scientists and modellers.

For a copy of the workshop report or for more information on future workshops, please contact Sheila Newcombe at the University of Dundee (s.k.newcombe@dundee.ac.uk). The University of Lille (France) will host the next workshop on 16-17th February 1999. The final meeting will take place in Bangor, Wales, in May 1999.

6.6 US-European Collaboration in Space Science

This study has been conducted jointly by the European Space Science Committee (ESSC) of the European Science Foundation and the Space Studies Board of the U.S. National Research Council.

The introduction to the chapter on the Earth Observing System explains how in the1980s the success of satellites such as Landsat, NOAA, METEOSAT, ERS and SPOT,and co-operative programmes such as UARS and TOPEX-POSEIDON, led to the decision to build a Space Station, to which Europe was invited to contribute. The convergence of interests led the agencies concerned to join in building a system that could meet their objectives by improving the monitoring capabilities of space systems and at the same time reducing their own financial contribution through cost sharing. The concept of permanent polar platforms for international global Earth observation was born.

The report goes on to outline the history of this collaboration, the developments on both sides of the Atlantic, the Announcements of Opportunity and the instruments proposed. It became evident after a while that the objectives of the U.S. and European science differed and no joint research programmes were proposed. From these difficulties, however, lessons have been learned and these are analysed in depth. The reasons for the lack of success appear to be that co-operation in Earth science (as opposed to Earth observation) between NASA and ESA is relatively recent, and the undercurrent of competitive forces still influences Earth observation programmes at these agencies. It should be noted, however, that scientific co-operation between the U.S. and Europe in Earth sciences has increased significantly in the past 15 years, thanks to the IGBP and WCRP and other similar programmes.

The report is available on-line of the ESSC Internet site (http://www.esf.org/essc). Hard copies can be order from Mr. Andrew Smith, Communications Officer at the European Science Foundation
1 Quai Lezay-Marnésia
67080 Strasbourg Cedex, France
Fax: +33 (0)3 88 37 05 32
http://www.esf.org

6.7 ISPRS Commission VII Symposium

Compiled by G.Remetey-Fülöpp and Peter Winkler

The Symposium (referred to also as ECO BP'98) was devoted to Resources and Environmental Monitoring, topics of the ISPRS Commission VII. Held in Budapest from 1-4 September 1998, it attracted 196 registered participants from 33 countries of 5 continents (35 from Hungary). 62 invited Hungarian senior decision-makers and additional 59 professional visitors who attended the open day devoted to commercial exhibition and presentations.

The venue of the event was arranged in the classical building of the Hungarian Academy of Sciences just in the centre of Budapest. Four members of the ISPRS Council and 13 of the 16 ISPRS Commission VII Working Group chairpersons and Secretaries participated in the Symposium and four of the six Advisory Board members were also present.
The Local Organising Committee was chaired by Commission VII Secretary Peter Winkler.

During the preparation period of the Symposia the incoming 186 papers (25 in digital form) were screened by the Scientific Programme Committee with direct involvement of Commission VII officers and WG chairpersons co-ordinated by György Büttner, a new member of the Advisory Board and editor of the Proceedings. Altogether 127 oral papers (15% submitted also in digital form) were presented in 26 thematic sessions including the EARSeL sessions. Special plenary sessions on UNISPACE III and the ISPRS Congress'2000 theme were also organised.

Opening and keynotes

Chaired by Ákos Detrekıi, President of the Hungarian Society of Surveying, Mapping and Remote Sensing, the audience was addressed by ISPRS President Lawrance Fritz, and prominent representatives of the Hungarian gov-

ernment and science including Understate Secretary of the Ministry of Transport, Communications and Water Management, President of the Hungarian Space Board Jenı Manninger, Managing Vice-president András Siegler of the National Committee for Technological Development as well as Iván Almár, President of the Scientific Council on Space Research.

As a tribute in memoriam of former Commission President Roberto Pereira da Cunha (U 1997), the first keynote address was given by Thelma Krug on the Monitoring Activities in the Brazilian Amazon, while Gottfried Konecny highlighted the operational applicability of remote sensing and GIS by a series of examples.

30 poster papers were displayed and 6 commercial exhibitors : Spot Image, Bentley, PCI, Erdas-Bekes, OMSz and FÖMI RSC presented their products.

In the UNISPACE III Plenary Session four presentations targeted the role of RS and space technology in the international community with special emphasis on international policy, education and development.
Sergio Camacho of the United Nations' Office of Outer Space Affairs made an overview of UNISPACE activities since 1982. He discussed the rapid advances in all fields of applications that provided social and economic benefits to the world populations and the increased role of the private sector. He emphasized how these changes, combined with the enormous shift in the world geopolitical situation since 1982 and the increased public awareness of environmental issues, are driving the agenda for UNISPACE III. He explained the goals of UNISPACE III and outlined two primary objectives: 1) To promote the use of space technology to assist in the solution of problems of regional and global significance, and 2) To strengthen the capabilities of UN member states, particularly developing countries, to use the applications of space research for economic, social and cultural development. He concluded by inviting organisations like ISPRS to join in helping to make recommendations for a "plan of action" (for using space technology) as a product of the UNISPACE III Conference which will be held in Vienna 1999. M. Laffaiteur of CNES focused on the challenges of bringing space technology (including RS) to developing countries and how the various space agencies of developed countries might better cooperate not only themselves but with the developing countries as well. He concluded with a discussion on the role of space agencies of developed counties and recommendations including: 1) the transfer of technical expertise 2) the inclusion of developing countries in research programmes on the environment in the context of global change, 3) space applications for the prevention and reduction of natural disasters, and 4) help develop pilot projects for Earth observation. ISPRS Secretary General John Trinder provided an overview of ISPRS stressed that its non-governmental status permits an enormous amount of freedom in action. He also discussed ISPRS's involvement in UNISPACE III indicating that the organisation has offered to participate in the Committee for the Peaceful Uses of Outer Space (COPUOS) III in the agenda item "The environment and natural resources and remote sensing". He further described the MoU between ISPRS and the UN Office of Outer Space Affairs where ISPRS would jointly sponsor events, seek financial support for UN led events and provide scientific and technical expertise where needed. Finally, W.-Balogh's talk featured the activities of the United Nations International Space University and the Youth Forum (-between age 12-18). ISU's growing Alumni organisation is over 1000 strong and covers 60 countries. The YF and ISU will be featured at the UNISPACE III Forum in Vienna in 1999.
After the plenary sessions the Symposium continued in 3 parallel sessions, according to the topics of working groups of Commission VII, which are the follows:

• WG VII/1 Fundamental physics and remote sensing (7 presentations)

• WG VII/2 Applications of RS and GIS for sustainable development (23 presentations!)
• WG VII/3 Application of high resolution satellite imagery (16 presentations)
• WG VII/4 Automated image interpretation and analysis (13 presentations)
• WG VII/5 Global monitoring (19 presentations)
• WG VII/6 Radar applications (13 presentations)
• WG VII/7 Non-renewable resources and geotechnical applications (8 presentations)

Special EARSeL Session

The well-attended session, chaired by EARSeL Chairman Robin Vaughan, had six presentations with lecturers including M.Buchroitner (Cartographic relief representations with DEM filtering techniques) and A.Spiteri. (The deign of a regional approach to combat disasters employing the logical framework methodology). The European proposal for Terms of Reference in data fusion was introduced by L.Wald. Effective applicability of remote sensing tools in forest fires prevention and assessment was demonstrated by E.Chuvieco. The EARSeL-SIG's activity related to the application of satellite data in meteorology and climate research was overviewed by E.Parlow. The European CORINE Land Cover database project was presented by G.Büttner.

Plenary session on "GI for all"

A special session was devoted to the theme of the next ISPRS "Congress Geoinformation for All". First Commission President highlighted the role and importance of resource and environmental monitoring in the implementation of the Global Spatial Data Infrastructure (NSDI), introduced the goals of the initiative improving the knowledge on it and stimulated multination implementation by stressing "think globally, act locally". The ISPRS Congress was promoted by the multimedia supported presentation of Congress Director Klaas Beek who invited the audience to come to Amsterdam in July 2000. A panel discussion chaired by Jan Clevers, Congress liaison officer to Commission VII was arranged with Working Group chairpersons serving as panellists. Working Group chairpersons presented their proposals and suggestions of subthemes for Commission VII technical sessions, workshops and tutorials relevant to the possible interpretations of the main topics of the Congress explained by J.Clevers.
In the Closing session secretary general J.Trinder gave a lecture on the future of ISPRS, the society dealing with information gathered from remotely sensed imagery.
Prizes offered by the Hungarian Military and Civilian Mapping Agencies were given for best papers and posters. In the poster competition, based on the jury led by ISPRS 2nd Vice President Marcio Barbosa, the prize winner was F.González-Alonso (Spain). The jury led by Commission VII President has evaluated the written remarks of session chairperson and the prize for the best oral paper was awarded to D.P.Rao (India) in the Closing Ceremony.
The Commission VII has sent 50 copies of its Archives to RICS Books for sale immediately after the Symposium. Suggested price was determined as 100 USD.

Summing up, the ECO BP'98 was obviously a success from the scientific point of view. Major application areas where novel research and technology development methodology were applied include hyperspectral sensing, environmental risk and/or site analysis, global, regional and local monitoring as well as assessments related to sustainable developments. The synergetic integrated use of RS and GIS technologies was the case in the majority of applications.

7 FORTHCOMING MEETINGS AND COURSES

9-11 February 1999
Seè, Eastern Bohemia,
Czech Republic

5th International Conference: Infosystems for Agriculture and Forestry within Europe and our country
Contact: Dr. Tomas Benes,UHUL Forest Management Institute
Nabrezni, 1326, 250 44 Branndys nad Labem, Czech Republic
Tel: +420 202 804 481; Fax: +420 202 803 371; Email: benes@uhul.cz

1-3 March 1999
Vancouver, BC

13th International Conference and Workshops on Applied Geologic Remote Sensing: Practical Solutions for Real-World Problems
Contact: ERIM Geologic Conferences, Box 134008, Ann Arbor, MI 48113-4008, USA
Fax: +1 734 994 5123

7-9 April 1999
Paris, France

ISPRS Working Group II/6 Workshop on:
3D Geospatial Data Production - Meeting Application Requirements"
Contact: Dr. David McKeown (Chair WG II/6)
Tel:+33 (0) 1-412-268-2626; Fax: +33 (0) 1-412-681-5576
Email: dmm@cs.cmu.edu; Http:/www.cs.cmu.edu/~MAPSLab/isprs.html

12-16 April 1999
Berlin, Germany

2nd IAA Symposium on: "Small Satellites for Earth Observation"
Contact: Bernd Kirchner
Tel: +49-30-67055-545; Fax: +49-30-67055-532; Email: iaa.symp@dlr.de

31 May - 2 June 1999
Valladolid, Spain

EARSeL General Assembly and 19th Symposium
Contact : EARSeL Secretariat (earsel@meteo.fr), and
Prof. J. L. Casanova, University of Valladolid
Fax: +34 83 423130; Email: jois@cpd.uva.es

3-4 June 1999
Valladolid, Spain

EARSeL/ISPRS Joint Workshop (WG III/V, WG IV/III, WG VII/4)
Contact: Dr. Manos Baltsavias
Email: manos@geod.ethz.ch

1-3 June 1999
Rogow, Poland

IUFRO Conference on Remote Sensing and Forest Monitoring
Faculty of Forestry, Rakowiecka 26/30, O2-528 Warsaw, Poland
Fax: +48 22 491375; Http: //giswitch.sggw.waw.pl/rogow99/

19-30 July 1999
Vienna, Austria

UNISPACE III
Office for Outer Space Affairs, United Nations Office, Room E-0952
Vienna International Centre, A-1400 Vienna, Austria
Fax: +43 1 21345 5830; Email: OOSA@unov.un.or.at

28 June- 2 July 1999
Hamburg, Germany

IGARSS'99
Contact: Prof. W. Alpers, University of Hamburg
Fax: +49 40 4123 5713
Email: alpers@ifm.uni-hamburg.de

8-10 September 1999
Cardiff, UK

RSS'99 : Earth Observation: from data to information
Contact: Mr. Paul Pan, University of Wales, Cardiff
Tel: +44 1222 874 271; Fax: +44 1222 874 301
Email: Pan@cardiff.ac.uk; Http://www.cf.ac.uk/rss99

16-23 July 2000
Amsterdam,
The Netherlands

19th ISPRS Congress - Geoinformation for All
Contact: Congress Director, Prof. Dr. K.-J. Beek
Email: isprs@itc.nl; Http: //www.itc.nl/~isprs