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1 EDITORIAL

This rather densely packed issue of the Newsletter – the first of 2001 – includes a report on the annual EARSeL Bureau and Council Meetings in Paris in January. At these meetings it is customary for national representatives from EARSeL member laboratories to report on remote sensing activities in their countries during the previous year, and the reports from the national representatives for 2000 are presented in this Newsletter.

At a European level, there have been significant recent developments that will undoubtedly present new opportunities for Europe's Earth Observation community in 2001 and beyond. In the rest of this Editorial I will dwell on the more interesting of these developments.

On 24th January 2001, the European Commission adopted a proposal (COM (2001) 31) for the Sixth Environment Action Plan (EAP) of the European Community. The proposed Sixth EAP, entitled "Environment 2010: Our Future, Our Choice", identifies four priority areas for the EU's environmental policy for 2001-2010: Climate Change; Nature and Biodiversity; Environment and Health; Natural Resources and Waste. The Sixth EAP follows (not surprisingly) the Fifth EAP ("Towards Sustainability"), which ran from 1992-2000 and which constituted the EU's first commitment to the concept of sustainable development. The Sixth EAP provides the environmental component of the Community's forthcoming strategy for sustainable development, and emphasises the need for new and innovative instruments for meeting the complex environmental challenges in each of the identified priority areas.

On 21st February 2001, the European Commission adopted a proposal (COM (2001) 94 final) outlining the EU's forthcoming Sixth Framework Programme for Research and Technological Development (RTD). The overall purpose of the Sixth RTD Framework Programme (covering 2002-2006) will be to realise the European Research Area (ERA) that was proposed by

the Commission on 18th January 2000 (COM (2000) 6), and that has since become the focus for research policy issues in Europe. The proposed Sixth RTD Framework Programme identifies seven priority thematic areas of research, selected based on "European Added Value" criteria. One of these priority research areas – "Aeronautics and Space" – will address the implementation of GMES (Global Monitoring for Environment and Security).

The proposed Sixth RTD Framework Programme also foresees major changes in the research focus of the Commission's Joint Research Centre (JRC). These changes are largely as a result of the above-mentioned ERA initiative, but are also due to various evaluations and reviews (both internal and external), and to the on-going reform of the Commission. In order to fulfil its mission of providing scientific and technical support for EU policies, during the Sixth RTD Framework Programme the JRC will concentrate on two main research themes: (a) Food, Chemical Products and Health; (b) Environment and Sustainability. (Activities in Nuclear Safety and Security are covered by the EURATOM Framework Programme). The JRC's remote sensing research activities – e.g. the provision of technical support for the objectives of GMES – will be carried out under "Environment and Sustainability".

Finally, progress is continuing towards implementing the EU's GMES (Global Monitoring for Environment and Security) initiative. The latest developments regarding GMES are described in Section 3.2.2 of this Newsletter. The work on GMES is one example of the growing collaboration between the Commission and the European Space Agency. Another example – namely, the transfer to ESA-ESRIN of the JRC's web-based INFEO system for accessing Earth Observation data world-wide – is described in Section 3.2.1 of this Newsletter.

All in all, 2001 promises to be another exciting year for remote sensing in Europe!

The Editor

2 NEWS FROM THE ASSOCIATION AND ITS MEMBERS

2.1 21st EARSeL Symposium and General Assembly

Preparations are continuing for the 21st EARSeL Annual Symposium and General Assembly, to be held from 14-16 May 2001 at the Ecole Nationale des Sciences Géographiques (ENSG) at Noisy-Champs, which is part of the new town of Marne-la-Vallée, just outside Paris and twenty-five minutes by Regional Express train (RER) from Châtelet-les-Halles, the hub of the Paris transport system. The station is Noisy-Champs, half-way between the centre of Paris and Euro-Disneyland, so that participants will have a choice of hotels: nearby in Noisy-Champs, or in Paris, or in the Euro-Disneyland complex. A block booking has been made at the IBIS Hotel, which is five minutes on foot from ENSG. Participants are invited to reserve early (phone: +33-1-64680083; fax: +33-1-64680260). The price is 310 FF/night for single or double occupancy. For more details see the EARSeL web-site: www.earsel.org/.

2.2 EARSeL Bureau and Council Meetings

The EARSeL Bureau and Council held their regular January meetings in Paris (11-12 January 2001). Countries represented included Austria, Belgium, the Czech Republic, Germany, Hungary, Italy, the Netherlands, Switzerland and the United Kingdom. At the January meeting, national representatives are invited to present a short report on remote sensing activities in their respective countries, forthcoming meetings, etc. The reports of those members who submitted a written report in time for this issue are published below.

The activities of the SIGs were also reviewed, and plans laid for future symposia and workshops. The main structure of the annual meeting to take place in Prague from 4-6 June 2002 has now been drawn up. The main theme will be "Geoinformation for European-Wide Integration", and a workshop will be organised on "The Role of Remote Sensing for Environmental Modelling", con-

vened by Prof. Jan Kolar of Prague. Prof. Paul Mather of Nottingham University has agreed to give a tutorial on "Advanced Classification Techniques for the Integration of Remote Sensing Data in GIS".

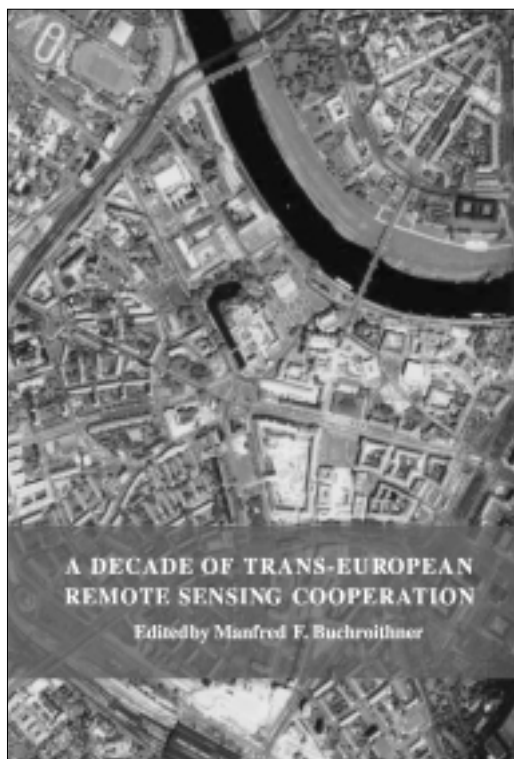
Copies of the proceedings of the 20th Annual EARSeL Symposium in Dresden (13-16 June 2000), edited by Dr. Manfred Buchroithner, will be sent shortly to all participants in the Symposium, and to the EARSeL member laboratories. The proceedings are being published by A.A. Balkema Publishers. The official publication date is April 2001.

Prof. Rudi Goossens of the University of Gent has kindly offered to organise our 2003 annual meeting at the Het Pand Conference Centre in Gent, where the recent workshop on "Remote Sensing for Developing Countries" was held, and where the facilities were much appreciated. The exact dates will be fixed shortly. More details will be given at the General Assembly.

Co-operation with other organisations was also discussed. In particular, it was decided that EARSeL would seek closer links with the various Commissions and Working Groups within ISPRS that deal with remote sensing techniques, in particular with Commission VII/WG4 ("Human Settlement and Impact Analysis"), whose aim is to create a GIS database of world heritage sites using remotely sensed data, in order to monitor urban environment and landscape changes. Three workshops would be held in Regensburg, Rome and Istanbul, which EARSeL would help to sponsor. General strategy issues were discussed and, in particular, ways of making EARSeL more visible among the remote sensing community. Concerning our Newsletter, it was decided that in future, once a new issue had been distributed, a full copy of the previous issue would be put on-line on the EARSeL web-site.

Announcement of Opportunity

During its January meeting, the Council indicated that there is an opportunity to create a new Special Interest Group (SIG),



Cover of the Proceedings of EARSel Symposium 2000 in Dresden. The cover shows an IKONOS satellite image of Dresden, taken on 4th June 2000. (c) Space Imaging Europe 2000; image processing by the Institute of Ecological and Regional Development, Dresde

which would deal with land use adopting an integrated approach regarding the exploitation of new instruments in conjunction with spatial data analysis, and the impact on current practices and the promotion of better ones. Experience has been gained in this area in recent years. The SIG would allow EARSel members to exchange information, to gain momentum by this gathering of expertise, and to make progress. This initiative has to be proposed by an EARSel member on a voluntary basis. The Bureau is willing to assist the promoter in establishing this new SIG.

2.3 Reports from National Representatives

The reports that were presented by the various national representatives at the EARSel Council Meeting in Paris on 12th January 2001, describing remote sensing activities in the respective countries during 2000, are presented below.

2.3.1 Activities during 2000: Austria

Dr. Erwin Mondre, Austrian Space Agency (ASA)

Austria participates in all of the Earth Observation (EO) Programmes of the European Space Agency (ESA) and Eumetsat. Preparatory activities for six study proposals to analyse data of the Envisat mission have started. These proposals have been selected by ESA peer groups, and data will be provided free of charge to the scientists. The funding of these activities is secured by the recently approved national space programme. Four of these projects – dealing with environmental research in the eastern Alps, studies of ice-climate interactions in Antarctica, geo-science applications of Envisat data, and atmospheric change analysis derived from Envisat sensors – have already started.

Discussions are going on in ESA and at national level for setting up an application-oriented Earth Watch Programme. Close co-operation is planned with the GMES (Global Monitoring for Environment and Security) initiative of the European Commission, and the integration of the value-added industry into this programme is considered essential. Bilateral discussions with national space organisations and industries are in progress. A Task Force has been set up at ESA level with the aim to define an Earth Watch Programme for the approval by the ESA Council at ministerial level, presently scheduled for November 2001. Several remote sensing projects are carried out in Austria under ESA contract, within the RTD framework programme of the European Commission, and with national funds.

The Austrian Meteorological Service, together with Eumetsat and with the support of ASA, organised a seminar on the future use of satellite data provided by the new Eumetsat satellites MSG and EPS, from 15-17 May 2000. Participants from Member States of Eumetsat and from the meteorological services from our eastern neighbouring countries discussed the use of satellite data in weather forecasting and climate research. A workshop on Advanced Techniques for the Assessment of Natural

Hazards in Mountain Areas was held in Igls, Austria, from 5-7 June 2000, organised by the Institute for Meteorology and Geophysics of the University of Innsbruck, and with the support of the European Commission (Space Applications Institute of the Joint Research Centre, Ispra) and the Federal Ministry of Education, Science and Culture, Vienna. This workshop covered natural hazards like avalanches, floods and landslides and included an excursion to a near-by area. More than 120 participants from twelve countries could exchange their knowledge. The proceedings of this event have been published. A national seminar on remote sensing is planned for later this year with main emphasis on the application of high resolution data and the utilisation of data from the new sensors of Envisat.

2.3.2 Activities during 2000: Belgium

Prof. Rudi Goossens, University of Gent

The Office of Scientific and Technical Cooperation (OSTC) coordinates research in Belgium. This Office has produced a very attractive CD-ROM for education in remote sensing techniques, which has been distributed to schools and universities. The TELSAT programme, which includes the use of IKONOS data for city planning, will be terminated at the end of the year. A new project, STEREO, will be launched in February. Belgium has many projects in developing countries, such as Morocco, the Belgian Congo, and Rwanda. Space auto-maps at small scale are being produced for the Democratic Republic of Congo using Landsat TM and IKONOS data. This is a long-term project, due to persistent cloud cover. The National Archaeological Museum in Brussels is working on mapping paleolithic sites along the Nile in Egypt. A project named Cupertino, between Flemish universities and the Walloon regional government, produces architectural photogrammetrical photographs in order to restore old buildings to their original state. The National Geographic Institute in Brussels has a database of old aerial photographs that can be freely consulted. The Belgian Remote Sensing and Photogrammetry Society will probably soon be re-activated.

2.3.3 Activities during 2000: Finland

Prof. Martti Hallikainen, Helsinki University of Technology

The three main sources of public funding for remote sensing activities in Finland are: national funding agencies; the European Space Agency (ESA); the European Union. The national remote sensing programme GLOBE-2000 of the Technology Development Centre (TEKES) supported research in 1996-2000. The total budget was about 10 M€, with approximately 50% coming from TEKES and 50% from participating institutes, universities and companies. The emphasis in GLOBE-2000 was on the development of operational remote sensing methods and sustainable remote sensing industry. Research in areas of national importance was favoured, including monitoring of the environment, forests, ozone and cryosphere.

A new national programme called Antares, for the period 2001-2004, will start in April 2001, with space research and remote sensing as the two main components. The total public funding is about 8.5 M€, with equal contributions by the Academy of Finland and TEKES. The following six categories of activities are emphasised in Antares (www.aka.fi): (a) large international instrument projects in ESA programmes; (b) development activities in international bilateral and multilateral research programmes; (c) large observation programmes based on operational or starting satellite and space-probe measurements; (d) research programmes that utilise large space data archives; (e) preparation of new research programmes; (f) development of spaceborne measurements and new techniques.

In addition to ESA's compulsory programmes, Finland participates in the GST Programme, Communications and Earth Observation. The contribution of Finland is about 5 M€ to the Earth Observation Programme. National industry and research institutes recently completed large hardware and software projects for the Envisat satellite, bringing the industrial return of Finland to a balance with payments for the first time. Several Finnish research institutes and

universities participate in projects funded by the EU and ESA. Numerous ESA Envisat Announcement of Opportunity (AO) projects are funded by TEKES. Data from ASAR, MERIS and AATSR sensors will be mostly used in these projects. Examples of Envisat AO projects, together with the websites of relevant institutes, are as follows: development of an operational system for monitoring water quality (www.vyh.fi, www.space.hut.fi); development of an Envisat-based system for sea-ice monitoring in the Baltic Sea (www.fimr.fi, www.space.hut.fi); development of methods to determine forest and surface characteristics in the Boreal forest zone (www.space.hut.fi, www.foto.hut.fi); monitoring of snow-melt using optical and microwave satellite data (www.vyh.fi, www.space.hut.fi). In airborne remote sensing, a two-dimensional interferometric radiometer for L-band (1.4 GHz) is under construction (www.space.hut.fi, www.ylin.en.fi).

The traditional annual Remote Sensing Symposium was held on 26-27 October in Espoo, with about one hundred participants, twenty-five oral presentations, and a technical exhibition.

2.3.4 Activities during 2000: France

Dr. Gérard Begni,¹ Médias-France, SFPT President

Introduction

French activities in the field of Earth Observation (EO) are mainly characterised by a huge scientific, industrial and financial effort for the conception, implementation and exploitation of systems in which the space component plays a major part. This effort aims at meeting research requirements through the development of observation systems, in accordance with the priorities of the major international IGBP, IHDP and WCRP programmes, and with the recommendations of national meetings on future scientific prospects, which are held every four years – the last one took place in Arcachon (France) in 1998. It also aims at developing the field of application of such systems in many socio-economic sectors likely to benefit by them, such as laboratories and scientific institutions in-

involved in various areas, or as in service and added-value industries which capitalise on the results of applied research. These activities are led quite systematically within the scope of international co-operation, inspired by CEOS initiatives, and shared among the programmes designed by the European Space Agency (of which France is a major partner) and those developed according to other scenarios.

Contribution to ESA Programmes

Co-operation within the scope of the European Space Agency convention is a priority for France, which takes an active part in the definition of the associated strategy and determines its own in a way complementary to ESA policy and to the national strategies of the other European countries. France is particularly involved in the main programmes of the European Space Agency, including the programmes implemented together with EUMETSAT.

Two "framework" missions, GOCE and EOLUS, are already planned within the scope of the Earth Explorer programme. Regarding the second part of the "envelope programme", a third mission should be selected during the Granada III Conference, to be held in November 2001. In response to the associated call for ideas (June 2000), ESA has received ten answers, including three French ones: CARBOSAT for the study of the carbon cycle; SPECTRA for the study of surface processes and ecosystem changes; LICODY for the study of the dynamics of the nucleus and oceans. ESAC has selected five missions, including SPECTRA. The PB/EO of the 20-21 November 2000 voted the start of the associated studies for the preliminary phase A. In addition a scientific group for the CARBOSAT mission has been created. Moreover, and still within the scope of this programme, the CRYOSAT (on which DORIS will be flown) and SMOS² opportunity missions are currently in phase A (joint and extended ESA/CNES/Spain phase A until the end of 2001 in this last case).

The framework of the Earth Watch missions is being actively elaborated. ESA issued a proposal called EEWI in September 2000. The reflection is mainly centred on

¹ Acknowledgements: Alain Baudoin (CNES), Hervé Le Men (IGN), Véronique Mariette (CNES), Alain Podaire (CNES), Didier Tanre (LOA), Pascale Ulte-Guerard (CNES), for their kind co-operation.

² This mission for the measurement of soil humidity and ocean salinity is scheduled for 2004; it had been proposed by French scientists (CESBIO) in line with the recommendations of the national seminar on future scientific prospects held in 1998.

the Anglo-German TERRASAR project, and its harmonisation with the national projects COSMO-SKYMED and Pléiades. France considers that GMES (Global Monitoring for Environment and Security) is an obvious reference to the Earth Watch programme. Decisions are expected to be made during the meeting of the ESA Council of Ministers in November 2001.

Regarding meteorological observation, in partnership with EUMETSAT and other European countries, CNES is developing the IASI sounder, to be flown on board the METOP satellites. It is a wide-field infrared interferometer, which mainly provides profiles of atmosphere temperature (1°K accuracy) and humidity (10% accuracy), with a kilometric vertical resolution. On 20 June 2000, CNES and ESA signed a charter regarding the supply of data and information in the scope of natural or technological disasters. The Canadian Space Agency (CSA) has joined this charter, and other institutions are about to do so.

Finally, it should be noted that the French scientific community is actively working out the exploitation of the Envisat satellite, to be launched in June 2001, and which constitutes one of the major events in European space history. It should also be noted that a consortium for the distribution of its products has been formed around the SPOT IMAGE Company.

SPOT and VEGETATION Programmes

In the field of high resolution, the constellation of three SPOT satellites (1, 2, 4) enables observation of the Earth's surface in panchromatic mode with a 10 metres resolution, and in multispectral mode with a 20 metres resolution, including the short-wave infrared wavelength (1.58-1.75 μm) for SPOT-4. Moreover, a forty minutes recording capacity onboard enables SPOT-4 to observe any part of the Earth's surface without being in direct view of receiving stations. SPOT IMAGE has signed partnerships to increase its offer of products and has simplified its pricing policy.

SPOT-4 also takes on board the VEGETATION-1 instrument, developed in co-operation with the European Commission, France, Belgium, Sweden, and Italy. This

system is exploited by a distributed ground segment whose production unit is located in Mol (Belgium). It enables observations of medium resolution (1.1 km), wide-field (2,200 km) and typically daily revisit cycles. The ground segment provides high-accuracy, elaborated products. The aims of VEGETATION-1 are both operational and scientific. The conclusions of the preparatory programme were presented during the Belgrate meeting (April 2000). They demonstrated the quality of the data and the various applications that can be derived. SPOT-4 also includes, among other "passengers", the high-precision location system DORIS (also on board SPOT-2, TOPEX-POSEIDON, and in the near future Envisat and CRYOSAT). This system provides a precision typically of one centimetre, thanks to a network of more than fifty ground beacons. Also on SPOT-4, the POAM III instrument (in co-operation with NRL, USA) measures ozone, nitrogen dioxide, water vapour, aerosols and stratospheric clouds in polar areas.

The construction of SPOT-5 is under way. The launching of this satellite is scheduled for the beginning of 2002. The two high-resolution instruments will include significant innovations compared with their predecessors (production of panchromatic data with three metres resolution, multispectral mode brought to ten metres). Moreover, SPOT-5 will carry the VEGETATION-2 instrument, which will ensure the continuity of observations over ten years. This is essential for many long-term analyses (e.g. evolution of vegetation cover, climate models). SPOT-5 will also carry the HRS instrument, dedicated to the operational collection of along-track stereoscopic couples (5x10 metres resolution). This instrument, partly achieved thanks to industrial investments, meets a strongly increasing market demand.

CNES is studying a new multi-sensor programme based on small satellites, Pléiades, which should include optical satellites and radar satellites with a one metre resolution, made possible by innovative technologies. It should also enable the continuity of wide-field observations after SPOT-5 ("superspectral" satellites with a typical daily revisit cycle). A defin-

ition phase of about one year should allow defining the conditions of implementation of this programme. Advanced negotiations are particularly developed with Italy, within the scope of the COSMO-SKYMED project. Pléiades should succeed SPOT and be operational in 2005. This programme could in particular bring a major contribution to the European GMES programme.

Finally, at the end of 1999, CNES established a procedure to supply SPOT products at marginal costs for the French research community. In 2000, this so-called ISIS programme enabled the delivery of over four hundred high-resolution products. Also in 2000, a programme of free distribution of global daily data was undertaken (VEGA2000 programme), among others, with the aim of providing maps of land cover and land use.

Solid Earth, Ocean, Atmosphere, Coupled Systems

Some systems intended for a more general use provide much information in the field of inner geophysics. This is true for the high-precision location DORIS system previously mentioned, and for interferometry by Synthetic Aperture Radar. The French scientific community is playing a leading part in both fields. Other systems have more dedicated purposes. France co-operates with Denmark for the OERSTED mission launched in February 1999, by providing a scale magnetometer; and with Germany, within the scope of the CHAMP mission, launched in July 2000, by providing a micro-accelerometer. French scientific teams also participate in the joint American and German GRACE project. These missions enable the measurement of the variation per century of the terrestrial magnetic field, and also of the gravity field, in a way completing ESA's GOCE mission.

The Franco-American TOPEX-POSEIDON system, launched in 1992, has enabled the determination of the ocean level with a precision of a centimetre, and to study its dynamics. This meets important scientific and application requirements. This field of research, including modelling and assimilation, that allow the full exploitation of these data, is actively pursued in France. The im-

plementation of JASON-1, the successor to TOPEX-POSEIDON, ensures the essential long-term continuity of the data. France is developing the MERCATOR³ project for operational oceanography (real-time assimilation of global data in complex high-resolution models). The first bulletins should be issued at the beginning of 2001. CNES ensures with OOPC the coordination of its international counterpart, the GODAE project.

Under the terms of a co-operation agreement signed on 21 November 1999, CNES and the Indian Space Agency (ISRO) have agreed to lead together the MEGHA TROPIQUES project, to be initiated in 2005. This mini-satellite is dedicated to the observation of seasonal variations in the water cycle and energy exchanges within the atmosphere-ocean-earth system in tropical areas. It will carry a hyperfrequency radiometer (MADRAS), the ScaRaB radiometer (described below), and a hyper-frequency humidity sounder that will enable to depict the meso-scale structure of water vapour profiles (SAPHIR).

In order to study the Earth's radiation budget, France has developed the ScaRaB visible / infrared radiometer, within the scope of a Franco-Russian co-operation. A first model was put into orbit in January 1994 and functioned until March 1995. A second model was put into orbit on the RESURS satellite in July 1998. As previously mentioned, ScaRaB will also fly on board the MEGHA-TROPIQUES Franco-Indian satellite.

NASA and CNES also agreed to develop together the PICASSO / CENA project. The aim of this mini-satellite, to be launched in 2003, is to study the radiative forcing due to clouds and aerosols, by coupling lidar backscattering measurements with passive radiometry measurements (visible and infrared imaging and spectrometry in the near infrared). France will supply an infrared imaging radiometer with microbolometers, as well as the PROTEUS platform and the satellite control centre.

The POLDER instrument, a wide-field imaging optical radiometer, was launched on board the Japanese ADEOS-1 satellite

³ The MERCATOR project is described by P. Bahurel in the 12th bilingual issue of the MEDIAS Newsletter, which also deals with basic principles of physics useful for the understanding of this system, and includes many articles regarding "El Niño".

(1996-1997). It enables multispectral, multi-angular and multipolarisation observations. This system makes possible innovative studies on aerosols (clouds-aerosols interactions, radiative forcing, remote sensing, modelling), clouds (properties, radiation budget, climate models), land masses (monitoring of vegetation, carbon cycle, climate models), and ocean colour (primary production, carbon cycle). The data produced have led to highly interesting results. The continuation of this programme is certain, as POLDER-2 was integrated in 1999 onto the Japanese ADEOS-II satellite, to be launched in February 2002. Moreover, it is planned to fly POLDER on board PARASOL, a mini-satellite intended for a joint mission with PICASSO-CENA and CLOUDSAT.

The PNTS Programme

The scientific PNTS programme (French National Programme for Space Remote Sensing) involves an important part of the community in operations lasting several years. It aims to develop methodologies designed to prepare the use of space data by the scientific community, to promote the implementation of operational methods, and the assessment and assimilation of space data into complex models. This programme includes many themes: Solid Earth, Ocean, Biosphere, Snow and Ice, Ground and Water, Atmosphere, Human and Social Sciences.

Among the major experiments recently supported by PNTS are Alpillles-ReSeDA (development of multisensor methodologies for the observation of agricultural areas) and FETCH (relationships between flows at sea level and current and future satellite measurements). PNTS has backed the following existing space programmes: POLDER, SeaWIFS, SPOT, VEGETATION; ERS (altimeter, windscatterometer, SAR); TOPEX / Poseidon in the field of hyperfrequencies. It also supported missions such as CHAMP, Envisat, GOCE, IASI, JASON, Lidar WIND, MSG, PICASSO-CENA and SMOS that are now scheduled and belong to new technologies of space measurements. PNTS also played an important part by supporting research groups regarding radar image processing (GDR / ISIS) and SAR interferometry (GDR / InSAR), as well

as the development of instruments such as the radar in the P-band (RAMSES).

In future, the PNTS contemplates to continue its actions by supporting the methodological developments of future missions – ESA Earth Explorer programme, EUMETSAT Second Generation METEOSAT (MSG), Envisat preparatory studies – by undertaking studies which use new concepts such as very high spatial resolution and high temporal repetitivity, as well as new measurement techniques: the P-band with the RAMSES radar, fluorescence in Fraunhofer lines, radar interferometry ("ALOS wheel"), hyperspectral data (CHRIS) or directionality in the thermal field.

2.3.5 Activities during 2000: Germany

Prof. (em.) Dr. Gottfried Konecny, Hannover

German Society for Photogrammetry and Remote Sensing

After ISPRS 2000 in Amsterdam in August, the German Society for Photogrammetry and Remote Sensing (DGPF) had its Annual Meeting during Intergeo 2000 in Berlin in September. Intergeo 2000 was a geoinformatics event with 10,000 participants and a huge commercial exhibition. During the meeting other geoinformation societies, such as the German Association of Surveyors (DVW) and the German Society of Cartography (DGKart), also had their annual meetings. Dr. K. Komp, director of EFTAS, Muenster, a successful remote sensing company was appointed as the new DGPF president, succeeding Prof. Joerg Albertz of the Technical University of Berlin, who was president since 1996.

The German Space Programme

The German Ministry of Education and Research (BMBF) is responsible for implementing and financing the German Space Programme. There is a strong commitment to ESA, both in the Earth Watch (Envisat) and Earth Explorer Programmes. The involvement of the Georesearch Center (GFZ), Potsdam (Prof. Reigber), in CHAMP and GRACE, is part of the science-oriented efforts. In the additional national programme industrial interests are strong. Daimler-Benz Aerospace (a former EARSel mem-

ber) has set priorities in the European Galileo Program for navigational and positional satellites. The remote sensing aspects play a relatively minor role. In remote sensing, priorities have been set for interferometric radar systems. The planned radar satellite Terrasat is a private initiative. Rapid-Eye is a proposed private optical stereo satellite, but its realisation is still not confirmed.

German Aerospace Agency (DLR)

DLR is the agency closest to the implementation of the German Space Programme. The DLR Headquarters are in Cologne, with a branch in Bonn. The principal remote sensing activities are carried out in Oberpfaffenhofen near Munich, except for the extra-terrestrial missions organised in Berlin-Adlershof. In Oberpfaffenhofen there has been a re-organisation of remote sensing activities. The institutes of Optoelectronics and of High Frequency Technology have been closed. A new institute for Methodology of Remote Sensing has been created (director Richard Bamler). It has ninety collaborators, and works together with the German Remote Sensing Data Center (DFD) (director Stefan Dech). Both units form a cluster of 220 employees. DFD archives images acquired over Germany (annual Landsat coverage) and Europe (IRS 1C/D), and from global space remote sensing missions (MOMS 02-P, SRTM X-band). The Institute for Methodology of Remote Sensing presently concentrates on processing SRTM X-band data. The SRTM mission covered in eleven days (February 11-22 2000), fifty million square kilometres of the Earth's surface. All these data are now in Germany, and are being processed into Digital Elevation Model grids at 30 metres intervals, with elevation accuracies of 6-10 metres. Data delivery will start in the second quarter of 2001.

Remote Sensing Data Reception

The private initiative of GAF (an EARSel member) together with DLR, to operate the Neustrelitz IRS 1C/D reception station for Europe, is a rather successful venture. IRS 1C/D data and images, and value-added products of Landsat, Spot, Ikonos and Russian satellites are marketed by GAF. The Institute for Meteorology of the Free University of Berlin (Dr. Eckardt) records,

processes and archives one-kilometre NOAA-AVHRR, TOVS, AMSU, and Meteosat PDUS data. At the same time homogenised and normalised data sets are produced for reflectivity and vegetation index for Central Europe and the Mediterranean since 1989, and a monthly ice coverage of the Arctic between Greenland and Novaja Semlaja since 1960.

Government-Supported Remote Sensing Projects by University Laboratories

The MOMS-2P evaluation projects have been completed by the following EARSel laboratories: University of Trier (Prof. Hill) in forest applications; University of Hanover (Prof. Heipke) in mapping potential. Radar Interferometry projects are being carried out by: The Institute for Navigation, University of Stuttgart (Dr. Thiel); The Institute for Cartography, Technical University Dresden (Prof. Buchroithner); The Institute for Photogrammetry and Engineering Surveys, University of Hanover (Prof. Heipke). For the ESA Mars Express mission the following institutes conduct preparatory work: The Institute for Photogrammetry and Cartography, Technical University of Berlin (Prof. Albertz); The Institute of Cartography, Technical University Dresden (Prof. Buchroithner); The Institute for Photogrammetry and Engineering Surveys, University of Hanover (Prof. Heipke).

News from EARSel Member Laboratories in Germany

The Institute for Cartography, Technical University of Dresden (Prof. Buchroithner) successfully organised the EARSel 2000 Symposium and General Assembly. It was also responsible for the organisation and publication of the NATO-Symposium on Remote Sensing in Tirana, Albania. The Geographic Institute of the University of Trier (Prof. Hill) is engaged in hyperspectral remote sensing, financed by the German Research Foundation (DFG) and in various European application projects (ecosystems in Crete and Israel; soil degradation in Spain; fire hazards in the Mediterranean area). The Institute of Photogrammetry of the Technical University Berlin (Prof. Albertz) is developing an interactive remote sensing training course on the Internet. The Institute of Physics of the

University of Oldenburg (Prof. Reuter) continues its activities on LIDAR Remote Sensing of Land and Ice. Prof. Reuter has in 2000 conducted a successful SIG-workshop on the subject in Dresden. The Institute of Geography at the Humboldt University, Berlin (Prof. Endlicher) conducts a number of projects (land use in the Carpathian Mountains; land degradation in Chilean Patagonia; ice cap changes in Devon Island, Canadian Arctic; urban climatic studies in Berlin). The Institute for Navigation, University of Stuttgart, carries out research and applications with laser altimetry (Taiwan; Swiss glaciers). The Institute for Photogrammetry and Engineering Surveys at the University of Hanover offers a software package for simple digital photogrammetry (SIDIP), covering semi-automated point measurement and aerial triangulation, image matching for digital elevation models and the production of ortho-images for digitised aerial photos and satellite images, including their tone-matched mosaicking. The GZA Remote Sensing Center in Potsdam (Prof. Marek) has remote sensing projects on off-shore oil exploration in the Ukraine, and co-operates with Infoterra, Canada in airborne SAR, and uses digital photogrammetry and satellite imaging in cadastral and mapping projects. The Geography Institute of the University Bonn (Dr. Richters) has conducted a workshop on "Progress in Classification Methods and Algorithms Using Satellite Data" in the summer 2000. No news have been communicated by the member laboratories in Munich and Freiburg, nor by governmental institutions.

2.3.6 Activities during 2000: Italy

Mario A. Gomasca, Italian Remote Sensing Association (www.asita.it/ait)

Introduction

Activities concerning remote sensing and Earth Observation in general are increasing in Italy, with many opportunities for obtaining financial support both for research and applications. Important financial support comes from research programmes, mainly application-oriented, financed by ASI and the National Research Council of Italy. The Ministry for Research, University

and Education has a budget devoted to financing national research projects, mainly to improve the competitiveness of Italian industry. Application programmes have been approved by various Italian Regions to study and control environmental problems mainly concerning risk management.

Italian Space Agency (ASI)

Earth Observation (EO) is one of the priority areas of the Italian Space Agency (ASI) five-year strategic plan, and the COSMO-SkyMed programme is the key initiative. COSMO-SkyMed is a dual-use space-borne programme that will provide products and services for Risk Management, Civil and Defence Applications. The main system design driver is the role of the COSMO-SkyMed mission in all phases (Knowledge and Prevention, Warning and Crisis and Post-Crisis) of Risk Management. It consists of a constellation of two high-resolution optical sensors (panchromatic and multispectral camera), and four high-resolution SAR (X band). The main operational system characteristics are: fast response time; high image resolution; all-weather, day-night, large-area acquisition; global accessibility; direct or deferred down-link. Launch of the first SAR satellite is planned for the second half of 2003.

The development of the system is currently planned in the frame of an agreement between Italy and France in EO, based on dual-use concept, optical and SAR complementarity, and public (scientific, institutional) and commercial users involvement. In this context Italy will develop the radar satellites and France will develop the optical ones. In order to optimise COSMO-SkyMed products and services developments, the users involvement in pilot projects and ASI participation in European initiatives (ESA DUP, GMES) are considered fundamental. On-going initiatives closely related to COSMO-SkyMed are the technological development of the Standard National Multi-Application Platform (PRIMA) and the high-resolution X band SAR instrument (SAR 2000), both in development phase, and the Hyperspectral demonstration mission (HypSEO), currently in design phase and due for launch in early 2003.

ASI has also financed various projects of the research community either for application purposes (agriculture, atmosphere, sea, etc.) or for development of new sensors. In fulfilling its role as promoter and co-ordinator of space-borne activities, including operative and commercial applications, ASI intends to utilise an experimental centre able to supply remote sensing products and services as support for monitoring and controlling the environment over the Mediterranean area. The centre is intended to assist various users: public entities and state administrations, whose tasks include territorial management and planning, prevention of natural or man-made disasters, and the programming and control of interventions in the event of a disaster. The users addressed by the Centre work at both at national and regional level.

Associations

The Fourth ASITA (Associazioni Scientifiche per l'Informazione Territoriale e Ambientale) National Conference, "Geographic Information and Environmental Hazards", was held in Genoa on 6-9 October 2000. There were over 1000 participants, and 330 papers were presented in thirty-three plenary, parallel and poster sessions. Proceedings of the Conference were distributed to all participants. The Conference included Cartographic (two hundred maps and charts) and Commercial (over fifty stands) Exhibitions. ASITA is a Federation of four scientific Associations: Italian Remote Sensing Association (AIT); Italian Association of Cartography (AIC); Italian Society of Photogrammetry and Topography (SIFET); AM/FM-GIS Italia. Several initiatives were sponsored by ASITA in collaboration with the four Associations (e.g. seminars, workshops, book and CD-ROM publications related to EO).

One important project, started by AIC and supported by AIT and ASITA - i.e. "Territory without Boundaries" - is becoming increasingly important, and is distributed to primary and secondary schools as a very simple and efficient system to teach to teachers and children (see web site: www.asita.it). The "Earth Observation" Co-ordination Group, constituted in March 1999, began its activities in 2000. The main

aims of the Group are to promote relationships among all the entities interested in EO data in Italy. EO is becoming more and more important at global level and in Europe. Some European Countries have already developed and are promoting homogeneous strategies. In Italy, co-ordination among all the actors (Italian Space Agency; scientific associations; researchers; research laboratories; private and public companies; central and regional administrations; users) is weak, and is often left to single initiatives. The EO researchers and their Institutes in the National Research Council of Italy have prepared the Constitutive Act and a three-year programme. For more information contact Mr. Stefano Baronti (e-mail: baronti@iroe.fi.cnr.it/).

Institutes and Laboratories

The Overseas Agronomic Institute (IAO) in Florence has concluded the 20th and started the 21st Annual International Post-Graduate Course on Remote Sensing and Natural Resources Evaluation. This Course is an important reference point for post-doctoral students in Italy, and for training personnel from Developing Countries. IAO is also involved in many GIS and remote sensing development projects worldwide, with special focus on Africa. Activities are on-going at national (Algeria, Lybia, Senegal, Eritrea, Angola) and regional scale (e.g. IGAD, Agrhymet, FAO-Africover). The IAO is actually carrying out the quality assessment of the results of the JRC's TREES project. (Visit the web-site: www.iao.florence.it/).

The Institute of Research on Microwaves (IROE) of the National Research Council of Italy is involved in several national and international project concerning the following: the global micro-physical and chemical processes of the atmosphere; ionospheric research, as part of the EGNOS programme, ESA and COST 251; Antarctic field measurements, BOOMERANG, APE GAIA, and evaluation of the results; analysis of the satellite MIPAS data; preliminary study for the development of an interferometer for measuring the radiative budget of the atmosphere; lidar research in different areas (micro-physics of the aerosol, simulation of the elastic scattering of the radiation, development of automatic Lidar

systems, development of instruments for in situ survey); active and passive microwaves – international projects (ESA/AO3, ESA Envisat, UE RESEDA, UE FLAUBERT, INTAS, ADEOS II / AMSR, NASDA, MAP / Mesoscale Alpine Project, ASI-SRTM) and national projects (ASI, CNR-GNDCI) projects; optical remote sensing (prominent international role in the field of modelling, sensors and instruments development, data fusion, information extraction); the Italian SkyMed/ Cosmo project; MIVIS and VIRS-200 spectro-radiometers; MOMS-2P and MSU-SK sensors on the MIR space-station. (Visit the web-site: www.iroe.fi.cnr.it/).

An innovative technology for detecting and monitoring ground displacement in urban and rocky areas has been developed and patented at the Department of Electronic Politechnics of Milan. After a validation period, this technology – "Permanent Scatterers Technique" (PS) – has been transferred to the company T.R.E. for commercial exploitation. This technology overcomes three of the main limiting factors of conventional Differential SAR Interferometry (DINSAR): atmospheric phase screen; loss of coherence; baseline-dependent revisiting time. The PS technique, as a ground deformation monitoring tool in urban areas, gives much more at a lower cost with respect to conventional techniques (line-levelling and GPS). The following applications of the PS technique have been tested and validated on several sites around the world (Ancona, Camaiore, Etna, Foggia, Milano, Napoli, Roma, Parigi, Innsbruck, Los Angeles): monitoring ground subsidence in scarcely vegetated areas (e.g. urban areas); monitoring of single-building stability; measuring preseismic fault deformations. (For an example, see the web-site: www-dsp.elet.polimi.it/andrea/www/sar/pomona.htm).

Research activity of the Aerial Laboratory for Environmental Research (LARA), with the MIVIS 102-band hyperspectral airborne scanner, supported by the National Research Council of Italy since 1992, and operative since 1994, was focused in the 2000 in several areas: (a) Oceanographic and coastal researches by remote sensing hyperspectral data for producing local and regional bio-optical models have been

started. An air, land and sea joint campaign was carried in June 2000 over Messina test area to study case 1 water. LARA research group are at present working on the atmospheric calibration of remote sensed data. (b) On the basis of MIVIS hyperspectral scanner campaign over the territory of Rome Province, carried out in 1998, five areas to be turned into regional protected natural areas, were closely investigated for producing land use maps at 1:10,000 scale. In particular vegetation of wooded test sites was classified on the basis of its spectral behaviour, thus producing eleven thematic maps for each site to be used for environmental monitoring of the relevant areas. (c) As previous researches conducted over Selinunte archaeological site have produced encouraging results in the application of airborne hyperspectral data for detecting superficial buried structures, the methodology used was further developed and generalised to be applied also to other sites with different spectral behaviour. (d) An additional research activity was conducted to further develop the software calibration tools available at Pomezia ground station, by producing new algorithms to geo-code MIVIS images and improve the atmospheric correction procedures. This research was partially funded by the Italian Space Agency (ASI). (e) Requests from other MIVIS data users gave rise to data acquisition campaigns by means of MIVIS airborne scanner. Contact Mr. Carlo Marino (e-mail: marino@unimi.it).

During 2000, CO.RI.S.T.A. (Consortium of Research on Remote Sensing Advanced Systems) has carried out different research programmes in the field of remote sensing. In particular it has almost completed the project ARCHEO, commissioned by the Italian Ministry of Scientific and Technological Research. It deals with innovative instruments and techniques for recognition and conservation of archaeological sites. ARCHEO is a research project for the realisation of an integrated system for archaeology. Its aim is to provide archaeologists with a technologically advanced aid for the identification of sites, sub-soil analysis and excavations management. Advanced aerial remote sensing allows to acquire images of large areas, which show physically complex parameters for identifying archaeological sites and for

the subsequent activities of ground prospecting. Therefore, ARCEO's objective has focused on the use of a remote sensing system that includes a SAR, a low frequency SAR on board an aircraft equipped for remote sensing missions, ground-based low-frequency geo-radar, and the realisation of a mobile unit equipped with hardware and software able to acquire, process and store on-site information useful during all stages of excavation.

CO.RI.S.T.A. has completed also another important research project for the realisation of a "Fully Autonomous Star Tracker". This prototype is an attitude sensor based on observation of the stars, which can be mounted on board small satellites. It has the innovative aspect of working autonomously, thereby able to operate in all stages of a space mission. It is also able to provide all useful information needed by the attitude control system, and can be the only attitude sensor on board. The prototype achieves high performances at a controlled cost and an easy engineering.

In addition CO.RI.S.T.A. has begun activities concerning three new research projects:

- (a) The project LAPMI (Atmospheric Pollutant Concentration Monitoring by Lidar), partially funded by MURST in co-operation with Kayser Italia srl and Quanta System srl., started in January 2000, and aims to improve the existing Lidar which is used in long-ray atmospheric monitoring. An innovative laser will be employed in order to achieve a measurement ray longer than one kilometre and a time resolution better than ten seconds.
- (b) The project INPUT (Innovation of Urban Processes by Satellite Remote Sensing), which started in July 2000, and in which CO.RI.S.T.A. is partnered by Consortium Tecnopolis and Technapoli, is a project funded by the Italian Space Agency for the transfer of space technologies to public bodies. The aim is to provide institutions with space technologies able continuously to gather data on the territory, in particular on urban development. The beneficiaries are Bari Municipality and the province of Naples.
- (c) In the project "Three-Dimensional Observation Systems in any Weather Conditions for the Management of Natural Disasters and the Protection of Territory", a new sensor for managing and monitoring the territory is being studied by CO.RI.S.T.A., with funding by MURST and in co-operation with TECHNAPOLI. The project aims to develop a prototype integrated system, made up of a SAR on board a small aircraft, and is targeted at two main applications: technical maps at a scale less than or equal to 1:25.000; monitoring the evolution of landslide events, assessment of their extension and of areas at risk. E-mail: corista@unina.it.

CO.RI.S.T.A. is organising, in collaboration with EARSel, an International Workshop on "Remote Sensing by Low-Frequency Radars", on 20-21 September 2001 in Naples, Italy. (See announcement at: www.earsel.org/earsel_events/corista_2001.pdf/).

IATA, of the National Research Council of Italy, in Florence, is developing research activities for deriving essential vegetation parameters from satellite remote sensing data (type, density, LAI, water conditions, etc.). The main objective is to integrate these parameter with conventional data (e.g. meteorological, morphological) within ecosystem simulation models which can estimate the main vegetation processes (e.g. transpiration, photosynthesis, primary productivity). Experiments are being carried out to calibrate and test these methodologies in various Tuscany study sites.

The Laboratory for Meteorology and Environmental Monitoring (LaMMA) of the Tuscany Region, which was set up about four years ago, is now active in several monitoring fields. The main focus of the remote sensing sector is the evaluation of high spatial, spectral and temporal resolution data as sources of environmental information. Assimilation techniques are presently under study operationally to process optical data for deriving information which can improve the performance of meteorological forecasting models. For more information contact Mr. Fabio Maselli (e-mail: maselli@iata.fi.cnr.it/).

At the University of Genoa, the Image Processing and Pattern Recognition for Remote Sensing (IPRS) Laboratory, is actively involved in the promotion of remote sensing technology for several applications related to Earth observation and monitoring. In particular, in recent years, the IPRS laboratory has contributed to several projects for the Italian Space Agency and the Italian Ministry of the University and Scientific Research dealing with applications like Disaster Risk Assessment and Agricultural Resource Management. This year the activity involved mainly the following topics for remote sensing image analysis: Contextual Classification; Multitemporal Analysis; Multi-Sensor Fusion; Feature Selection; Image Compression; Water Quality Analysis; SAR polarimetry; SAR interferometry; Flood damage assessment; Coastal monitoring. (Visit the web site: spt.dibe.unige.it/IPRS).

Telegis (Laboratory of Photo-Geology), involved in remote sensing since 1982, developed its work in the sectors of photo-interpretation and numeric cartography. Telegis has worked on applications of thematic cartography, carrying out several map publications. New methodologies, based on multiple research projects and contracts, are continuously studied, in order to unify different thematic cartography to national and international standard criteria, by analysing distinct data management and GIS systems, according to the exigency and dispositions of regional public or commercial offices and related programmes. Important experiences have been also gained by Telegis in the teaching of remote sensing, within the University activity, and for professional formation courses. (E-mail: telegis@unica.it/).

EURIMAGE, located in Rome, is continuing its activity as a European-wide distributor of satellite imagery. An updated website is available for more information: www.eurimage.com

2.3.7 Activities during 2000: The Netherlands

Prof. Dr. Freek van der Meer, ITC / Delft University of Technology

Space-oriented research governing remote sensing in the Netherlands is concentrated in the disciplines of astrophysics, microgravity research and Earth Observation.

The Netherlands astrophysics community participates, as sole European partner, in the important space telescopes that are currently operational or have been flying (Hubble Space Telescope, Gamma Ray Observatory, Infrared Space Observatory, XMM-Newton and Chandra). This field is also involved, through the National Science Foundation (NWO) Institute for Space Research (SRON), in the ESA mission FIRST. (There is the ambition to participate in the XEUS and IRSI/Darwin missions).

Microgravity research has been initiated in the Netherlands with the advent of the International Space Station (ISS). Now that the ISS is a fact, the microgravity research community is preparing experiments in outer space using the ISS. The focus of the Dutch research interests are on life sciences, mainly molecular and cell biology, and physical material sciences.

The science community in the Netherlands focusing on Earth Observation (EO) plays an important role in ESA and the European space research with core competence in the fields of atmospheric chemistry and composition, meteorology, ocean currents, climate research and global change, gravity field and geoid research, geokinematics, and a minor role in land degradation and erosion studies, geological studies, water quality and hydrological studies. Dutch researchers in the field of EO are involved in several of ESA's Earth Explorer Missions (core type). The GOCE and ADM missions have been selected, and the Netherlands is also involved in pre-phase A studies for ACE, EarthCARE and SPECTRA. SRON is the leader in the SCIAMACHY instrument to be part of Envisat as well as in its successor, GOME-2. The Netherlands, via OMI (Ozone Monitoring Instrument), participates in NASA's Chemsat programme.

The Netherlands has a strong institute in the field of space-oriented research - i.e. SRON - that resides under the National Science Foundation. SRON's core mission is on atmospheric chemistry and the Earth

gravity field. The institute collaborates with German partners in the ESA Envisat instrument SCIAMACHY, in the Global Ozone Monitoring Experiment (GOME), and supports OMI. In addition, SRON is involved in the preparation of various other future ESA missions, namely SFINX and ACE. The Gravity Field and Steady-State Ocean Circulation Explorer (GOCE) is part of the SRON profile in the field of gravity research. The Vening Meinesz research school of geodynamics (at Utrecht University), hosting the Delft Institute for Earth-Oriented Space Research (DEOS), form the core of the Netherlands scientific infrastructure in gravity field research linked to geodynamics. The Institute for Marine and Atmospheric Research (IMAU) based at the University of Utrecht is involved in many international studies in atmospheric chemistry and ocean current research. Studies on land degradation and land cover / use are embedded at the Wageningen University (WUR). Hydrology is the competence of the IVM of the Free University Amsterdam and the WUR. The DEOS institute based at the Delft University of Technology was already mentioned. TUD also has expertise on laser altimetry, and a new group on imaging spectrometry is presently being founded.

Several other institutes play an important role in EO in the Netherlands. The Dutch Meteorological Institute (KNMI) is our prime institute for atmospheric chemistry and processes research and meteorology. The Centre for Climate Research focuses on global change issues. The Institute for Public Health and Environment (RIVM) is specialised in environmental monitoring. The Survey Department of "Rijkswaterstaat" exploits airborne remote sensing techniques for vegetation studies, water quality assessment, and preparing and maintaining the actual DEM of the Netherlands. The Institute for Coastal Areas and Sea (RIKZ) is involved in EO-oriented coastal processes. The International Institute for Aerospace Surveys and Earth Sciences (ITC) is one of the largest institutes devoted to EO in the Netherlands. Its mission is knowledge transfer in the field of geoinformation, to educate students mainly from developing countries. This is done through a PM, M.Sc. and Ph.D. programme, and a strong research programme in EO.

The present position of the Netherlands in EO is characterised by strong cohesion between research groups and industry, and a link between fundamental research and application-oriented research, leading to a noticeable leading position in the operational use of EO. Many private companies and smaller consulting firms (e.g. Geodan, Argoss, Wageningen Radar Surveys) demonstrate this, as does the operational use of EO in governmental institutes such as the Survey Department. In the technology side of the space sector, TNO Space, Fokker space, and the Dutch Space Agency (NLR) play an important role, with fundamental research centres at the Delft University of Technology.

Over the last fifteen years, the Netherlands Remote Sensing Board (BCRS), as funding organisation of many remote sensing projects, played an important role in the shaping of the Dutch EO community. The User Support programme and the Netherlands Remote Sensing Programme of BCRS are excellent examples of the dedicated support for the science and user community of the Netherlands. The BCRS will cease to exist, but the programmes will continue in a different format. The Netherlands National Science Foundation (NWO) supports fundamental research in EO, through SRON (which it founded).

The professional society for EO in the Netherlands is the Netherlands Society for Earth Observation and Geoinformation (NSEOG). NSEOG has seven hundred members and three sections: remote sensing, GIS, and photogrammetry. The mission of NSEOG is dissemination of information in these fields through the organisation of regular meetings on specific topics. During 2000, the NSEOG organised one-day symposia on, for example, atmospheric science, multi-sensor data integration, JAVA GIS, and spatial statistics for remote sensing. NSEOG also hosted the ISPRS 2000 Congress, held in Amsterdam in July 2000.

2.3.8 Activities during 2000: Poland

Dr. Z. Bochenek, IGIK, Warsaw

Three research centres are the main contributors to remote sensing and GIS activi-

ty in Poland: (a) Remote Sensing and Spatial Information Centre, Institute of Geodesy and Cartography, Warsaw; (b) Department of Satellite Studies, Institute of Meteorology and Water Management, Cracow; (c) Department of Remote Sensing of Environment, Faculty of Geography and Regional Studies, University of Warsaw.

Activities of the Remote Sensing and Spatial Information Centre in 2000 were concentrated on land applications of satellite data. Special emphasis was put on the development and operational use of remote sensing systems for crop condition assessment and yield forecasting. The following works were carried out: daily NOAA AVHRR satellite data of Poland were acquired for the entire year; NOAA AVHRR archival database, covering 1992-2000, was created for the whole of Poland; INFOSAT database, containing vegetation and temperature indices derived from NOAA AVHRR data, was built for 1992-2000; information packages on crop condition assessment, containing maps and images derived from comparative analysis of NOAA AVHRR data, were operationally delivered to the Central Statistical Office throughout the vegetation period; a model of evaluation of soil-plant relations, based on analysis of radar satellite images collected in C and L bands, was prepared; a method of correction of microwave data due to terrain relief, was prepared; a method of soil moisture assessment using information derived from ERS satellite data, was created; satellite image maps, produced from high-resolution IRS-1C satellite data, were prepared for selected regions of Poland.

The Department of Satellite Studies, Institute of Meteorology and Water Management, carried out the following works in 2000: the operational acquisition of METEOSAT and NOAA data for meteorological purposes was continued; a database of meteorological satellite images was created for 1996-2000; a method of determining rainfall intensity using microwave AMSU / NOAA data, was prepared; software for accessing data on sounding the atmosphere via the internet was prepared; a method for estimating surface radiation using METEOSAT data was tested; work on forecasting UV-B radiation on the Earth's surface was continued. The Department was deeply

involved with EUMETSAT, which Poland joined in December 1999.

The Department of Remote Sensing of the Environment, University of Warsaw, was mainly involved in work on the application of multi-source satellite data and aerial images for the assessment of environmental changes in Poland, apart from its educational function within the Faculty of Geography and Regional Studies.

In July 2000 the COSPAR Congress was organised in Warsaw. Remote sensing sessions were part of this congress, with major contributions from the Remote Sensing Centre and the Department of Satellite Studies. In November 2000 the National Conference of Photointerpretation and Remote Sensing was organised by the Department of Remote Sensing of the Environment, University of Warsaw, with paper presentations from leading remote sensing centres in Poland. Five research proposals were submitted by the Remote Sensing and Spatial Information Centre to the latest edition of the EU's Fifth RTD Framework Programme.

2.3.9 Activities during 2000: United Kingdom

Mr. E. Wickens, Co-Chairman, Remote Sensing and Photogrammetry Society

I have been asked primarily to report on the situation with respect to the Remote Sensing Society (RSS) and the Photogrammetric Society (PSoc) in the UK. Following more than two years of negotiations, both Societies held Extraordinary General Meetings towards the end of 2000, at which the memberships voted to combine the membership, assets, liabilities and commitments of the two Societies, and to form the Remote Sensing and Photogrammetry Society (RSPSoc). RSPSoc is therefore now formed, and the new name has been used since 1 January 2001. It is planned to put all of our administrative procedures in place during an initial transitional period of three months. Elections for the first RSPSoc Council will take place in September 2001. Until then the two existing Councils will operate as one, and

Kathie Bowden (RSS Chairman) and myself (PSoc President) will act as Joint-Chairmen.

The catalyst which finally prompted the merger was the fact that technology advances have created a situation where it is difficult to draw a clear line between the interests of the two disciplines. It is felt that both communities have a great deal to learn from one another. The membership of RSPSoc is approximately 1,300. About one third of these are overseas members. We will continue to produce both the Photogrammetric Record and the International Journal of Remote Sensing. We hope that the larger and stronger Society will: have a stronger voice with which to attract the ears of those in power; become more active on national and international fronts; stimulate the use of remote sensing and photogrammetry in new areas; form new Special Interest Groups (e.g. in architectural, medical and underwater photogrammetry, and in image archiving); promote more and better quality training; strengthen the relationships between universities and commercial and government organisations. The first RSPSoc Annual Conference will be held at the Department of Trade and Industry in London on 12-14 September 2001. All are very welcome to attend.

I am not the best person to comment on remote sensing activities in the UK. However, from a photogrammetric viewpoint, the two projects which probably generated the most technical and commercial activity during the last year were the acceleration of the Ordnance Survey's database revision programme, and the millennium project to cover the whole of the UK with aerial photography one thousand years after the national inventory recorded in the Domesday Book. The Ordnance Survey has let revision contracts to a number of European (and other) mapping companies and plans to continue to do so on an annual basis. Two competing companies have each almost covered the UK with 1:10,000 aerial photography during the last two years (only some mountainous areas of Scotland and Wales remain to be completed). Getmapping.com is primarily selling its products on the web where a simple entry

of a postcode or grid coordinates will display the appropriate image that the customer may then choose to purchase by credit card. The parallel and competing project is being carried out by UK Perspectives, which is a partnership between Aerofilms (established in 1918) and the National Remote Sensing Centre (editor's note: now Infoterra Ltd., UK). The latter is targeting its products more at the local and national government market.

2.4 News from the Special Interest Groups

2.4.1 SIG Forest Fires

The Third International Workshop on "Remote Sensing and GIS Applications to Forest Fire Management - New Methods and Sensors", will take place in Paris on 17-18 May 2001, following the 21st EARSeL Symposium. The workshop is organised by the EARSeL SIG Forest Fires, and follows two previous technical workshops held in Thessaloniki (1993) and Alcalá de Henares (1995), and the Seminar organised in Coimbra (1998).

The main topic of the workshop will be the application of new sensors and technologies to fire prevention, detection and mapping. Special emphasis will be devoted to global and regional approaches and defining common standards for validating fire products. Potentials of VEGETATION, MODIS, and MERIS instruments will be reviewed, as well as the continued development of techniques to improve processing of AVHRR, ATSR and WiFs data. The integration of human factors in the analysis of risk will also be considered, in order to obtain a more comprehensive view of fire danger estimation.

The structure of the workshop is based on the analysis of potentials of current and future sensors for burned land mapping and fire risk assessment. Three lectures will be presented: (a) Current and future activities of ESA related to forest fires, including applications of ERS and Envisat, by Olivier Arino (ESA/ESRIN, Italy); (b) Review of the Terra program and presentation of future

activities of NASA related to forest fires, by Yoram Kaufman (Earth Observing System - "Terra" Project Scientist); (c) Review of User Needs in Operational Fire Danger Estimation: The Oklahoma Example, by J. D. Carlson (Oklahoma State University).

In order to leave as much time as possible for in-depth discussion of the themes raised, all contributions will be presented as posters. Authors will have the opportunity to give a brief oral presentation of their work before detailed explanations of their posters during the following poster session. Oral presentations will be restricted to the three keynote lectures.

For queries on technical aspects of the Workshop, please send an e-mail to: fire.workshop@uah.es. Practical details on the Workshop organisation may be obtained from the EARSeL Secretariat: Mrs. M. Godefroy, 2 avenue Rapp, F-75340 Paris Cedex 07, France. Phone: +33-1-45567360. Fax: +33-1-45567361. E-mail: earsel@meteo.fr. EARSeL web-site: www.earsel.org

2.4.2 SIG Geological Applications

Announcement of upcoming Workshop "Natural Hydrocarbon Seeps, Global Tectonics and Greenhouse Gas Emissions": A European Science Foundation Exploratory Workshop in Life and Environmental Sciences (August 2001 - date to be finalised)

Prof. Dr. F.D. van der Meer, Delft University of Technology, Faculty of Civil Engineering and Geosciences, The Netherlands

ESF Exploratory Workshops

The European Science Foundation (ESF) funds Exploratory Workshops that allow scientists working on a specific topic to come together and discuss how their research can be integrated to foster results in a certain scientific field. Exploratory Workshops may have as outcome the formulation of Scientific Programmes or Network Proposals to be funded by the ESF. This year an Exploratory Workshop on "Natural Hydrocarbon Seeps, Global Tectonics and Greenhouse Gas Emission" will be organised at the Department of Technical Earth Sciences of the Delft University

of Technology. The aim of the workshop is to bring together European scientists working on the above field. It is intended to make this a multi-disciplinary effort, not only inviting geologists and remote sensing researchers but also micro-meteorologists, atmospheric physicists and biologists etc., since all these fields play a profound role in the emission of gases and resulting global change problems. The outcome of the Workshop could be a proposal to the ESF for establishing either a Scientific Programme or a Network on the designated topic. Exact timing has not been decided upon, however we aim at two days in the last week of August 2001. Below, a detailed review of the designated problem is outlined. Please consult the web-site of the ESF at www.esf.org for more details on its mission and the rationale for Exploratory Workshops.

Workshop Theme

The occurrence of hydrocarbon seeps at the surface above oil and gas reservoirs suggests that reservoirs leak. Hydrocarbon macro-seepage refers to the visible presence of oil seeping to the surface, whereas hydrocarbon micro-seepages are invisible trace quantities of light hydrocarbons seeping to the surface. Seepage is perceived as a near vertical process resulting in hydrocarbons migrating along chimneys. However, more research is needed to be able to accurately model the buoyant flow of light hydrocarbons to the surface, and hence predict their expression at the surface.

Seeps (macro and micro) are important in prospecting for oil and gas. However seeps are also sources of gases, such as methane and carbon dioxide, that contribute to the greenhouse effect. Data of their emissions are potential inputs into global change models. However, the emission fluxes and quantities of emitted gases due to seeps is at present unknown, and no method exists to monitor emissions from these vents. Much research has been done on the detection and monitoring of offshore microseepages, whilst relatively little work has been done on the detection of onshore microseepages and monitoring of the related emissions. Hydrocarbon microseepage studies are relevant not only to the oil industry as a tool for exploration for oil, but

also from an environmental perspective: methane, one of the seeping gases, is a major contributor to the greenhouse effect. It is unclear at present what the global contribution of microseepage is to the natural methane production annually. However local estimates show that this must be significant, for example venting in the North Sea basin has been estimated to release 2.6×10^{12} g of methane per year into the water column.

Worldwide, there is a correlation between seeps and earthquake activity, where seeps occur predominantly in areas that are tectonically active. The amount of seepage (ppm methane / ethane) potentially is related to the pressure in reservoirs which is related to hydrostatic pressure and changes in lithospheric stress. Thus in natural seepages, a relation between the amount of seeping gas and stress could be envisaged.

Critical issues for studies of fluid seeps at continental margins and for research on offshore seep detection and monitoring are the following: more studies are needed to understand the relation between seeps and plate tectonics; research and simulation of fault pressures in relation to emission fluxes of ethane and methane; little is known about the rate of seepage, and the flux of hydrocarbons from seeps is difficult to measure because many seeps are small, episodic and ephemeral; quantifying the flux of fluids from the lithosphere into the atmosphere is one of the most important research goals; the connection of subsurface fluid flow to surface seepage is commonly missing in studies of seeps; flux measurements should be made in a small portion of the imaged area in combination with statistical models needed to extrapolate the measurements to global estimates of flux; although fluid-induced geomorphic features have been identified, we have little understanding of the processes that form them; a strategy for the study of seeps should include seep detection, characterisation of emission products, quantification of fluxes, and study of time variations.

Likely methods to study seeps are satellite remote sensing, sonar backscatter, geo-

chemical sniffer surveys, detecting anomalies in temperature and water chemistry and the study of anomalous biological communities. The Workshop aims at bringing together scientists working on the detection and monitoring of hydrocarbon emissions related to oil and gas reservoirs. Various groups of scientists are working independently of each other, and with very limited access to each other's data and understanding of their methods. Some groups focus on offshore, others on onshore seeps. Some use field surveying techniques, subsurface exploration methods, sonar and other remote sensing data, others use geochemical approaches. At present no forum exists where these research groups can interact and exchange and integrate data and results of their studies.

Workshops Aims and Objectives

The aims of the Workshop are: (a) to establish a platform for a world-wide global correlation programme on hydrocarbon seep management and monitoring; (b) to define a common area for testing and integrating various methods for seep detection and monitoring. The objective of the Workshop is to understand better the processes involved in seepage and the relation between hydrocarbon seeps and local and regional geology and tectonic setting in three dimensions.

Ultimately the Workshop should provide a means of extrapolating the aerial extent of seep affected areas and emissions to global estimates. The Workshop should answer very basic questions on seep distribution world-wide in relation to local, regional and global tectonics. Also we envisage that increased collaboration in this field leads to estimates of global ethane and methane production from leaking oil and gas reservoirs. At present no quantified numbers exist on methane production from hydrocarbon seeps. However it is known that various such sources exist that contribute a sizeable amount of emission to the global carbon cycle adding to global warming. Hence the integration of available data on seep-related gas emissions contributes to better global change models. New innovative research proposals will be generated that integrate surface and subsurface measurements of seep and gas emissions, and

correlate onshore and offshore data with regional and global tectonic and reservoir models.

For more information on the Workshop, contact:

Prof. Dr. F.D. van der Meer (Chairperson SIG-GEO and Workshop Convener), Delft University of Technology, Faculty of Civil Engineering and Geosciences, Mijnbouwstraat 120, P.O. Box 5028, 2600 GA Delft, The Netherlands. Phone: +31-15-2787940. Fax: +31-15-2781189. E-mail: f.d.vandermeer@ta.tudelft.nl. Other address: ITC, Division of Geological Survey, P.O. Box 6, 7500 AA Enschede, the Netherlands. Phone: +31-53-4874353. Fax: +31-53-4874336. E-mail: vdmeer@itc.nl.

Another piece of news on the SIG GEO, is that during 2000 it started discussions with the Geological Remote Sensing Group (GRSG) chaired by Dr. Stuart Marsh. The two groups have expressed interest in organising joint scientific events.

2.4.3 SIG Imaging Spectroscopy

As a follow-up to the Second EARSeL Workshop on Imaging Spectroscopy, which was held on 11-13 July 2000 at ITC in Enschede, in the Netherlands, two Special Issues will be published, containing selected papers from the proceedings. A special issue of the International Journal of Applied Earth Observation and Geoinformation (former ITC journal) will be devoted to highlight some practical applications of imaging spectrometry. The ISPRS Journal of Photogrammetry and Remote Sensing will dedicate one special issue to the Workshop. The theme of this issue will be on sensor calibration issues.

The Workshop in Enschede was co-organised by EARSeL's Special Interest Groups on Imaging Spectroscopy (chaired by Andreas Mueller from DLR) and Geological Applications (chaired by Freek van der Meer from ITC). ITC acted as host organisation, and the meeting was organised in collaboration with the DLR, RSL, and ESA.

3 NEWS FROM ESA, THE EC AND INTERNATIONAL ORGANISATIONS

3.1 News from ESA

3.1.1 ERS-Envisat Symposium in Gothenburg, Sweden

Gianna Calabresi, ESA/ESRIN

"Looking Down to Earth in the New Millennium", the title for the ERS-Envisat Symposium (16-20 October 2000), organised by ESA/ESRIN, proved to be well suited to the event. Studying the Earth with the help of ERS data had been indeed a challenging commitment for the over five hundred scientists who gathered in Gothenburg, Sweden, to report on the results of projects developed in the previous years. Those results proved meaningful not only when considered as the natural outcome of the opportunity campaigns and national investigation projects launched by ESA since ERS-1 entered into operation in the early

1990s, but also and especially in view of the forthcoming Envisat mission, due for launch in July 2001. Through the exploitation of a variety of instruments that form its payload, Envisat is meant to contribute to almost all issues related to global environmental monitoring. It was therefore also a main objective of the Symposium to present to the community of scientific users, as well as to the commercial, industrial and value-adding companies and service providers, plans and perspectives of post-launch activities, new EO data dissemination policy and ESA strategic programmes in the future.

Jointly hosted by ESA and the Chalmers University of Technology in Gothenburg, the Conference programme covered an entire week. Four daily parallel thematic sessions of oral presentations, together with a significant collection of posters, complemented by computer-assisted demonstrations, fully reflected the three main lines

that ESA continues to support within the EO development domain: Science and Methodology; Development of Applications / Public Services; Development of the Commercial Market for EO-based Services.

More in detail, the Programme offered a fair balance of land and sea application achievements such as: large-scale projects such as "Siberia" (Forestry); state-of-the-art of ERS SAR interferometry application to earthquakes, volcano monitoring, Earth motion and landslides; neural network and other techniques used in conjunction with GOME data to measure the ozone; coastal zone mapping with ERS alone or in synergy with RADARSAT for fishery, algal blooms detection, oil spill monitoring, estuary water monitoring; validation of sea state models through Altimeter wind / wave data; tropical cyclone tracking with Scatt data; the eight years constant monitoring, with ERS 1/2 data, of the Antarctica glaciers evolution; multi-sensor observations of internal waves and their effects in the Bay of Biscay; the online service for offshore-climate assessment based on satellite measurement; flood and storm monitoring in Asia, Europe and South America; new methods and algorithms to advances in operational cloud clearing of ATSR/AATSR; CAL / VAL activities progress in relation to Envisat instrumentation payload; innovative applications such as shrimp farm monitoring in Sri Lanka with radar; mapping sea ice thickness with combined space- and air-borne systems.

In the domain of atmosphere, the contribution provided by both verbal and poster presenters, in terms of project results and perspectives was highly significant. All sessions programmed to handle themes and sub-themes, such as ozone total column, profiles, clouds / aerosol, as well as calibration, assimilation etc., were attended by large groups representing the atmospheric community. This clearly indicates the worldwide concern for Earth's atmosphere status, and the ever increasing need for update and constant information flow from all possible sources, and specifically from the dedicated Envisat atmospheric payload.

In response to the intent to bring to Gothenburg all those parties whose in-

volvement in EO is manifold and includes value-added product generation, service provision, specific ERS/Envisat software packages, as well as commercial data distribution, Gothenburg saw the participation of twenty-five external exhibiting companies, who all complemented the programme by their presence. An additional valuable contribution was ensured by the six computer-assisted demonstrations. A slideshow featuring the highlights of application projects reported each day was set up in order to provide the audience with a quick "feeling and flavour" of the Session themes. A smooth and efficient development of the Symposium was ensured by the support of Svenska Massan Congress Centre, who, together with the hosting Institution of Chalmers Technical University made all participants feel comfortable and well assisted. The official Symposium Proceedings will be edited by the ESA Publications Division in January 2001.

3.1.2 Conference: Europe Enlarges Its Space

On 1-2 February 2001, a Conference entitled "Europe Enlarges its Space" was held at ESA's establishment ESRIN in Frascati, Italy. The Conference was convened by the Italian Parliamentary Space Group as a follow-up to the Second European Interparliamentary Space Conference, held in Italy in October 2000. The organisation of the event was supported by ESA and the Italian Space Agency (ASI) with additional contributions from the Italian civil aviation authority ENAV and the Italian space industry. Parliamentary Space Groups from Italy, France, Germany, Belgium and Spain were expected to attend, along with representatives of Space Agencies, the European Parliament and Commission, European space industry, and high level representatives of the Italian Government. The Conference was organised in round table discussions and covered issues relating to European space research activities, the European space programmes, particularly Galileo and GMES (Global Monitoring for Environment and Security), and commercial legislation relating to the export of European space products. An exhibit of the European Space Industry was organised in

conjunction with the Conference. For further information, contact: ESA Media Relations, ESA HQ, 8-10 rue Mario Nikis, F-75738 Paris Cedex 15, France. Phone: +33-1-53697155. Fax: +33-1-53697690

3.2 News from the EC

3.2.1 INFEO System Transferred to ESA-ESRIN

Michel Millot, DG-JRC, Space Applications Institute, SSSA Unit, Ispra, Italy

For four years, a web-based Earth Observation Information System called INFEO has been developed and operated by the Space Applications Institute, of the European Commission's Joint Research Centre (JRC). INFEO has now been transferred to the European Space Agency (ESA) for operation and further development. INFEO provides a unique and transparent access point to Earth Observation (EO) data distributed worldwide. The year 2000 served as a transitional period, to demonstrate that the system could be successfully operated and further developed. Also, the system was transferred to ESA to demonstrate that such a transition to an operational institution is feasible. The JRC reached an agreement with ESA (at its ESRIN site) to take over the operation, starting in February 2001.

INFEO allows users to query EO-related catalogues throughout the world, ranging from large inventories of space data to smaller data sets for particular areas on the Earth, with a resolution ranging from five metres to five kilometres or more. This idea of a one-stop shop for EO information was made possible because a common language was adopted, allowing users to query different remote data catalogues in a consistent manner. The system enables users simultaneously to query up to sixty catalogues. The catalogue search functionality of INFEO is based on the internationally recognised communication protocol called the Catalogue Interoperability Protocol (CIP), developed by the Committee on Earth Observation Satellites (CEOS), which is composed of major national and international space agencies.

At the beginning of 2000, talks commenced with ESA in order to prepare the potential take-over of this information system. ESA performed a technical evaluation of the system with the full co-operation and support of the JRC, with the result that ESA accepted to take over its further operation and development. This event is to be considered as a successful technology transfer from the JRC to another European institution. Moreover, this takeover is a concrete example of a joint venture between ESA and the European Commission according to the Commission's Space Communication. It is also an example of streamlining and co-ordinating European research within the European Research Area.

For more information contact Michel Millot, JRC-SAI (e-mail: michel.millot@jrc.it; phone: +39-0332-786146), or visit the INFEO web-site: www.infeo.org.

3.2.2 GMES – Towards an Implementation Proposal

Neil Hubbard and Volker Schumacher, DG-JRC, Space Applications Institute, SSSA Unit, Ispra, Italy

Europe's policy-makers increasingly recognise the need to have access to continuous independent information services on key issues in the field of environment and security. GMES (Global Monitoring for Environment and Security) is a European initiative to help implement those information services that require data from space observing systems. Full consultation with those responsible for particular policy areas will lead to concrete actions to achieve this goal. GMES forms a key element in an overall European Strategy for Space.

GMES embraces European and national policies on the environment, resource management, regional development, civil protection, and research, bearing in mind the political emphasis on sustainable development, and Europe's role on the international stage. It also includes issues such as crisis management and humanitarian aid that touch on the additional dimension of security. Currently, space data that are used for information on environment and security are

derived largely from experimental systems. GMES will exploit to the maximum extent Europe's existing and planned capabilities and infrastructures, but will also establish sustainable and consistent operational information-gathering and distribution chains.

The EU Research Council has requested that specific implementing proposals for GMES be made. The Council Resolution of the 2350th Council Meeting of the 16th November 2000, "calls on the Commission, together with ESA and the Member States, to complete the outline for this (GMES) initiative, starting from the needs of users and civil society, so that specific implementing proposals can be drawn up by the end of June 2001." This is in line with the European Strategy for Space, with the timetable for expected EU decisions on the European Research Area and the Sixth Framework Programme, and with decisions of the ESA Council. Building on the GMES meetings held in Baveno, and on the impetus provided by the Lille colloquium held in October 2000 under the auspices of the French presidency of the EU, the Commission will use the forum of the GMES Partnership and structured consultations with Stakeholders to meet this timetable.

Along the way to the June deadline, several events are scheduled in support of the proposals:

User Workshop on GMES in Stockholm, Sweden (21-22 March 2001):

This event is organised on an invitation only basis. The intention is to establish a clear statement of requirement at a high level within user organisations such as EC services and national public users (e.g. environment ministries). It is hosted by the Swedish Environmental Protection Agency and will carry the logo of the Swedish EU presidency.

GMES Consultation Meeting in Baveno, Italy (2-3 May 2001):

This event is organised by the Joint Research Centre's Space Applications Institute, and follows the tradition of the Annual SAI User Seminars. However, this year's event is planned as a consultation meeting, to discuss a draft of the GMES proposals with the Member States' repre-

sentatives from Government Departments, Industry and Research institutions.

This Consultation Meeting will be an important input for the Commission's proposals to be submitted to Council by June 2001. In the opening session, the draft proposals for the implementation of GMES will be presented. In the next session, invited speakers will provide their view on GMES from the perspectives of Science, Industry, Civil Society and Space Programmes. In the final session, a roundtable discussion will synthesise these views to determine a common forward view for the GMES initiative. The outcome of the meeting will be modifications to the proposals based on the consultation.

The meeting will take place at the Hotel Dino in Baveno at the Lake Maggiore. There is no registration fee and the meeting is open to all. However, as places are limited, those interested are kindly asked to register before 15 March 2001. All necessary information can be found at the GMES web-site: gmes.sai.jrc.it/Events/events.htm.

GMES Working Groups:

An important part of the GMES initiative is that comprising the three Working Groups (WGs) on Environmental Conventions, Natural Disasters, and Environmental Stress. These Working Groups have participation from a wide range of European organisations, from both public organisations (e.g. space agencies, EUMETSAT, ESA) as well as from industry. The work of the working groups is now converging towards providing a "Requirements Briefing" for the June proposal. Currently, contacts with users are in progress, looking at their needs, establishing the magnitude of these needs, and the ways of meeting them (with or without information from Earth Observation). These will be presented as a series of "Core Areas": examples are "Fires", "Oil Spills" and "Carbon Sinks".

The Working Groups are supported by a Thematic Network called EUFOREO (European Forum on Earth Observation use for Environment and Security). EUFOREO is a Thematic Network funded by DG RTD, that brings together European industry, space

and research organisations to support the GMES initiative. EUFOREO will establish a European forum containing organisations at both national and European levels and enable European organisations to support the GMES process in a co-ordinated manner. As a first part of its effort it will work to help to define the requirements for a range of core areas selected for each of the three Working Groups. The EUFOREO network has a European dimension involving participants from eighteen organisations, both public and private, co-ordinated by EARSC (European Association of Remote Sensing Companies).

3.3 OM&M (Sweden) Acquired by Nordpointer Group

OM&M, the Swedish private alternative for Earth Observation services in the Nordic and Baltic areas, has been acquired by the Nordpointer Group, and is now called Nordpointer Satellite Information Systems (NPSIS). NPSIS now employs twelve persons, expanding its provision of high-quality imagery and information products from several space-borne sensors, as well as aerial photographs and laser-scan data. The Nordpointer Group also includes the development of advanced forestry logistics systems and the recently established company Nordpointer Guidance Systems (NPGS), developing mobile Internet and location-based services. Amongst a number of projects currently being carried out by NPSIS are: a Landsat 7 ortho-coverage of Sweden for the National Forest Administration; updating road maps of Göteborg for Ericsson; mapping of urban and regional changes in the Malmö Region (within the MOLAND project for the JRC's Space Application Institute) using satellite and aerial images from today and from the 1980s. NPSIS distributes satellite data on behalf of Euromap, Eurimage, and Space Imaging Europe. This includes data sources such as IRS-1C/1D, Landsat, ERS-1/2 and IKONOS. In addition, NPSIS distributes the image compressor MrSID and the digital elevation model, MONA. For more information, contact Mr. Henrik Österlund, NPSIS Managing Director (phone: +46-707-333678), or send an e-mail to info@nordpointer.com, or visit the Nordpointer web-site: satellite.nordpointer.com.

3.4 NRSC Ltd. (UK) Becomes Infoterra Ltd. (UK)

A new geoinformation services company, Infoterra, has been formed from the former National Remote Sensing Centre (NRSC) in the UK, and the Earth Observation Services Department of Astrium, Germany. The new company will deliver geoinformation products and services globally. Infoterra comprises Infoterra Ltd. (UK) and Infoterra GmbH (Germany), both operated under a single management team headed by Mr. Dave Fox. Infoterra is a 100% owned subsidiary of Astrium, owned by EADS and BAE SYSTEMS. For more information visit the Infoterra web-site: www.infoterra-global.com.

3.5 CERCO Report

CERCO (Comité des Responsables de la Cartographie Officielle) and its commercial daughter MEGRIN continue to represent the national mapping agencies (NMAs) of the wider Europe. Currently thirty-seven European countries are represented by the Heads of their official mapping agencies. Twenty of these are also active in the creation of international geographical information through membership of MEGRIN. During its annual General Assembly in 2000, it was decided to merge the two organisations into a single registered Association called EuroGeographics. This will be created with effect from 1 January 2001, and will be based in Marne-la-Vallée on the outskirts of Paris. A web-site (www.eurogeographics.org) will be opened at that time to replace the existing cerco.org and megrin.org.

3.6 EURISY Programme 2001

A conference on "Use of Space Technology to Monitor Transport of Dangerous Substances and Relief Convoys" will be held in Naples, Italy, on 13-14 September 2001. The conference will deal with methods for monitoring the route for dangerous substances crossing Europe by road or by sea, and monitoring convoys in dangerous areas world-wide, such as lorries carrying

food for refugee camps, or medical supplies. A summer school on "Environmental Security", bringing together PhD students from eastern and western Europe, will be held in Budapest, Hungary, for one week in early September. The summer school will be coupled with a one-day conference for decision-makers in Hungary on the same theme. The Ninth Information Youth Forum, on "Climate Change: Past and Future", will take place in Granada, Spain, on 1-4 November 2001. A conference on "Use of Space Technology for Peace-Keeping" will be held in Geneva, Switzerland, in December 2001, in co-operation with the Swiss Government. The conference is the next in the series of security conferences which began in Moscow in December 1999, followed by the Humanitarian Conference in Varese, Italy, in September 2000. A conference on "Use of Space Technology for Archaeology" will take place at a World Heritage Site in January 2002. The conference, which will be co-sponsored by UNESCO, will focus on the use of remote sensing data to detect buried buildings, historical

sites, and monitoring of World Heritage Natural sites.

3.7 EUROGI Consultation Paper

In September 2000 EUROGI published a consultation paper that sets up a framework and outlines a number of measures that will bring into being a European Geographic Information (GI) strategy. (See www.eurogi.org/geoinfo/eurogiprojects/strategy.pdf). As a result of the publicity and positive feedback, the consultation paper was adopted into a EC-funded project called GINIE (Geographic Information Network in Europe). It will go on-line in June 2001, and will fund the Action Plan necessary to create a European GI strategy. For more information, contact: EUROGI Secretariat, EUROGI (European Umbrella Organisation for Geographic Information), P.O. Box 9046, 7300 GH Apeldoorn, The Netherlands. (Also: Jean Monnetpark 1, 7336 BA Apeldoorn, The Netherlands). Phone: +31-55-5285746. Fax: +31-55-3557362. E-mail: eurogi@euro.net.nl. Web: www.eurogi.org.

4 RS DATA, PRODUCTS AND PROJECTS

4.1 Observations

Wim Bakker, ITC, The Netherlands.

Envisat Ready

Europe's largest and most complex Earth observation satellite, the environmental satellite Envisat is currently completing its final tests at the technical centre of the European Space Agency (ESA) in Noordwijk, The Netherlands. The space-borne environmental Earth monitoring spacecraft will be shipped to the Kourou launch site in French Guyana in April. It is scheduled for launch into a Low-Earth Polar orbit by the end of July 2001 on an Ariane 5 rocket, the only launch vehicle capable of lifting this spacecraft, weighing approximately eight tons. The spacecraft is loaded with sensors and MERIS – the medium-resolution imaging spectrometer – and ASAR – the next generation ERS SAR system – are just two of the

multitude of sensors that cover a wide spectrum of wavelengths, resolutions, and applications. For more information see the Envisat web-site: Envisat.esa.int/.

EO-1

Civil hyperspectral remote sensing is finally on the way up, following the launch of NASA's Earth Observing-1 (EO-1) on 21 November 2000. EO-1 carries three sensors: the multispectral sensor called ALI (Advanced Land Imager), and two hyperspectral sensors called Hyperion and AC (LEISA Atmospheric Corrector). ALI is the experimental, modern version of the sensors on board the Landsat-5 and 7 satellites. ALI employs novel wide-angle optics and a highly integrated multispectral and panchromatic pushbroom sensors in ten spectral bands. EO-1 is a technology verification project designed to demonstrate comparable or improved Landsat spatial and spectral

resolution with substantial mass, volume, and cost savings. EO-1 will be placed in the same orbit as Landsat-7 and Terra. EO-1 will be flying one minute behind Landsat-7, while Terra flies ten minutes behind Landsat-7. This formation flying makes comparison of the data of these three satellites very easy. The launch of EO-1 was delayed considerably in order to add a hyperspectral instrument to replace the one lost in the failure of the Lewis satellite, which was launched and lost in August – September 1997. In the meantime, EO-1 has taken over four hundred images from its three instruments since its launch. For more information see the EO-1 web-site: eo1.gsfc.nasa.gov/.

EROS-A1

Civil high-resolution business is also on the way up with the launch of the EROS-A1 spacecraft. EROS-A1 is the first in a series of satellites in a multi-phase programme delivered to ImageSat International, a joint venture, in which the Israel Aircraft Industries (IAI), and American and European investors are partners. The satellite was launched 5 December 2000 into a sun-synchronous orbit, giving the satellite total coverage of the Earth for various imaging tasks. IAI successfully launched LEO-type (Low Earth Orbit) satellites in the early 1990s. These were the experimental Ofeq-1 and Ofeq-2 satellites. The Observation Ofeq-3 satellite was launched in April 1995. The launch of the Ofeq-4 failed in January 1998. These LEO-type satellites orbit the Earth at altitudes ranging from four hundred to one thousand kilometres, and circle the Earth approximately every one hundred minutes. They serve as platforms for observation, communication, and scientific purposes. The design of the EROS-A1 satellite is based on the design of the Ofeq-3. The second satellite, EROS-A2, will probably be launched later this year. In the meantime, EROS-A1 has begun transmitting images to the various ground stations. For more information see the ImageSat web-site: www.imagesatintl.com/.

QuickBird-1

The failure of the QuickBird satellite was a big blow for the high-resolution remote sensing business. We were all eagerly awaiting more players and more data in this field. The satellite was lost shortly

after its launch 20 November. Most probably the second stage of the Russian rocket failed to restart at the top of the Homan transfer orbit. The satellite came tumbling back to Earth and probably burned in the atmosphere. After the failure of the Early-Bird in December 1997, this was a further big blow for the EarthWatch company. Again, it has announced staff reductions of as much as twenty-five per cent.

Half-metre Licence

Three American companies have applied for a half-metre licence, which will allow these companies to operate a satellite capable of collecting images with half-metre resolution. Space Imaging (currently operating the Ikonos satellite), EarthWatch (that just lost its QuickBird satellite), and Orbital Imaging (to launch the OrbView satellites) have applied for such licences.

Eros

After a chase lasting one year, and another year of photo-sessions, NEAR-Shoemaker finally went down on Eros just before Valentines Day. Following the historic touchdown on the asteroid, the NEAR-Shoemaker spacecraft is still sending signals to the big and sensitive ears of the Deep Space Network (DSN web-site: deep-space.jpl.nasa.gov/dsn/) of NASA. For more information on the NEAR mission see the web-site: near.jhuapl.edu/.

MIR

The Russian space station MIR will finally be dumped early this year. The problem really will be to make it a controlled dump. No space agency in the world has experience in de-orbiting such a complex and bulky spacecraft. A top Russian space official warned there were no guarantees that falling debris would not fall on land. Can you imagine 130,000 kilos of spacecraft burning and disintegrating on re-entry somewhere over your head? The plunge into the Pacific Ocean will be spectacular indeed. A plunge anywhere else even more so...

4.2 New SPOT IMAGE Coherence Product

The Coherence Product is a new SPOT IMAGE product based on Synthetic Aper-

ture Radar (SAR) images. It provides a new source of information for mapping, thematic analyses, and change detection. Compared with traditional radar images, which convey information about signal amplitude, the Coherence Product provides radar data that are easier to analyse and interpret. SAR's all-weather capability makes it possible to map the entire globe night and day in all conditions. The Coherence Product is an objective source of information at global scales, and a superb cartographic and thematic analysis tool for a variety of applications.

Radar (Radio Detection and Ranging) is an "active" remote sensing system. This means that the radar emits a microwave signal and records the resulting signal reflected by a target surface. Radar is a source of information about physical and geometric characteristics of objects on the ground. Image-type radar products are mono-band, because the ERS-1, ERS-2, RADARSAT and JERS sensors are mono-frequency. The images are black-and-white, and of medium or high spatial resolution (25m for ERS, 10m for RADARSAT in fine mode) and radiometric low resolution. The salt and pepper effect, known as "speckle", significantly hinders visual interpretation of the product). The signals represented in these images are commonly called "amplitude", "intensity", or "backscatter coefficient" signals. Contrary to optical data, where only the signal amplitude information is usable, with remote sensing radar, we can measure both the amplitude and the phase of the signal reflected by the Earth's surface. The phase data under certain conditions provide the ability to generate a new source of information called a "coherence image". This image is derived from processing known as Interferometry by Synthetic Aperture Radar (INSAR). The product is a multi-band image (i.e. a colour image) combining layers of information that represent the amplitude of each of the images with the interferometric coherence between these images.

The coherence information gives you: an archived multi-band product that can replace SPOT optical imagery under certain conditions, and which can be used for applications in a tropical environment, for ex-

ample; access to additional valuable information. The benefits and use of the coherence channel and its complementarity with amplitude data have already been demonstrated for a wide variety of applications. A number of scientific references have confirmed the utility of the Coherence Product, which SPOT IMAGE is already using for its operational projects.

For further information, contact: SPOT IMAGE - Corporate Communications, Anne-Marie Bernard. Phone: +33-5-621 94 010. E-mail: Anne-Marie.Bernard@spotimage.fr.

4.3 Free Software Simulates Landscape Patterns

SIMMAP is a simple software that runs in a PC-Windows environment and generates categorical spatial patterns that are similar to those commonly found in real landscapes. SIMMAP can be used to obtain a wide range of spatial patterns with any number of classes, in which fragmentation and class abundances can be independently and systematically varied. It is also possible to obtain patterns with anisotropy and to control the minimum mapped unit (i.e. size of the smallest patch) of the artificially generated landscapes. SIMMAP is the result of implementing the Modified Random Clusters (MRC) method. This method provides more general and realistic results than other commonly used landscape models, and is described in detail in the following paper: Saura, S. and J. Martínez-Millán. 2000. Landscape patterns simulation with a modified random clusters method. *Landscape Ecology* 15 (7): 661-678.

Contact the author by e-mail (Santiago Saura Martínez de Toda – santisaura@montes.upm.es), if you are interested in obtaining a copy of the software along with the user manual.

4.4 ATCOR On-line Tutorial

Many years of experience in atmospheric modelling at DLR have led to the development of a set of software tools (ATCOR) for

atmospheric and topographic correction of optical imagery. An on-line introduction and information on commercially available packages for image data from airborne and satellite sensors, is available at: www.op.dlr.de/atcor/. For further information, send an e-mail to: r.richter@dlr.de.

4.5 New Interactive Arctic Environmental Atlas

Environmental information on the Arctic Region is presented in a new interactive map on the Internet. Any standard web browser can be used to browse and examine the situation in the Arctic, at the Arctic Environmental Atlas web-site (maps.grida.no/arctic). The themes in the map primarily concentrate on issues like biodiversity and conservation, where the Arctic has a special status, with vast expanses of still untouched nature, important fish stocks and large sea-bird colonies. Other environmental problems addressed are ecological footprints, land-based pollution, and climate change. For more information, please contact: Hugo Ahlenius (phone +47-370 35713, e-mail ahlenius@grida.no) or Lars Kullerud (phone +47-37035708, e-mail kullerud@grida.no). Web-sites: maps.grida.no/arctic/ and www.grida.no/.

4.6 Digital Map of the Baltic Sea Region

The National Mapping Agencies (NMAs) of the countries around the Baltic Sea have produced the Digital Map of the Baltic Sea Region (MapBSR 2000), which is a database at 1:1 million scale, with basic geographic information. The MapBSR 2000 database contains data from thirteen countries. The themes included are administrative boundaries, hydrography, transport network, elevation, settlements, names and nature. Each NMA is responsible for the data for its country, and data is made according to the MapBSR specifications for the whole region. The database will be regularly updated (next update in 2001). The MapBSR 2000 CD-ROM can be obtained from the NMAs. MapBSR received funding from the

EU's Interreg II C programme. For more information - including distributors, prices and user rights and examples of MapBSR data - visit the MapBSR website at www.mapbsr.nls.fi, or contact: Heli Ursin, MapBSR Project Manager, National Land Survey, P.O. Box 84, 00521 Helsinki, Finland (phone: +358-205-415564; fax: +358-205-415005; e-mail: heli.ursin@nls.fi; web: www.nls.fi).

4.7 EPA Global Change Web-site

The US Environmental Protection Agency's Global Change Research Programme is now publicly accessible on the web (www.epa.gov/globalresearch). The web-site is designed to provide a portal through which scientists, resource managers, and the public can access information about the EPA programme and partners. The goal is to make the programme completely transparent to the public, and to make products and data produced by the programme readily accessible, including products from EPA researchers in EPA laboratories and centres, as well as from grantees and collaborators. Through this web-site, the public can access data, documents, project descriptions and updates, workshop announcements and proceedings, presentations, and analytic tools. The web-site will evolve and grow over time. The focus will continue to be on data analysis and application. The web-site uses the Environmental Information Management System (EIMS), which allows scientists working inside and outside the agency to enter directly metadata descriptions of their own data sets and research findings. The long-term goal is to provide interactive tools and models at this web-site, to support the decision and analytic needs of planners, resource managers, and other data users. Comments on the web-site are welcome and it is hoped that it will become a valuable resource to the global change research community. For more information, contact: Joel D. Scheraga, PhD, National Programme Director, Global Change Research Programme, Office of Research and Development, US Environmental Protection Agency. Phone: +1-202-5643385, Fax: +1-202-5650066.

5 REVIEWS, PUBLICATIONS AND REPORTS

5.1 International Symposium: MARISY 2000

Report by Manfred Buchroithner, University of Dresden, Germany.

With more than two hundred and fifty registered participants, MARISY (Middle East and African Remote Sensing International Symposium) 2000, held on 26-27 October 2000 in Morocco, once again proved to be the leading annual remote sensing event in Africa and the Middle East. Not only its high political significance but also the advanced level of science and technology made this international symposium, held under the patronage of His Majesty King Mohamed VI, worth attending. Scientists and remote sensing managers from over forty countries gathered in the Rabat Hilton Hotel for four sessions and two round-table presentations / discussions. The symposium's theme was "The New Era of Earth Observation and Geoinformation". There were numerous sponsors, ranging from the Agence Spatiale Canadienne to UNESCO. Most of the sponsors, together with many commercial companies, authorities and other entities, also contributed to an international exhibition of high calibre.

Almost thirty poster papers complemented the oral presentations. The latter were made during the Opening Session, entitled "The New Era of Earth Observation: the Space Agencies' Vision and the Private Operators' Role": After a keynote address by Prof. Hubert Curien, EURISY President, representatives of CNES, NASA, ESA, the Canadian Space Agency, INTA (Spain) and ASI (Italy) dealt with this important topic. The session on "Very High Resolution Images and Geoinformation Development" included six high quality papers. In a second special session, six contributions covered the theme of "Geoinformation for Sustainable Land Management". Ten overviews of "Regional Programmes for Environment Protection and Risks Management" addressed this crucial field of application and presented concrete experiences. Four contributions on the important issue of "Space in the Service of Human-

tarian Operations" concluded the series of sessions.

Two Round Tables (rather in fact plenary statements) provided further essential contributions. The first, on "Cooperative Actions and Materialisation of UNISPACE III Recommendations in the African and Middle East Region", brought nine individuals to the podium. The second, with eleven contributors, covered "Education and Training". Here your reporter had the opportunity to speak on behalf of EARSeL and the newly launched association EURO-STRIM (Space Technologies for Risk Management). Due to time limits, in both Round Tables there was not enough space for extensive statements and actual discussions.

What remains to be reported is that, as usual, everything was translated simultaneously into English or French, and that the average level of the poster papers was impressively high, both in terms of scientific content, graphic design and quality of display material. The possibility to visit the Centre Royal de Télédétection Spatiale (CRTS) in Rabat led many a participant to this centre of excellence. Social contacts were facilitated through the donation of coffee breaks, lunches and dinners by some of the sponsors, the Hilton Hotel being a very pleasant venue. For MARISY 2001, Rabat is certainly a place well worth revisiting.

5.2 Book: Sea Ice Flow and Climate Change

Bischof, Jens. 2000. "Ice Drift, Ocean Circulation and Climate Change". Springer / Praxis Publishing, Chichester, UK. ISBN 1-85233-648-X. Pages: 232. Price: £70.

Reviewed by Prof. (em.) Preben Gudmandsen

An interesting book with a misleading title.

Some time in the 1980s I attended a progress meeting of the Programme of International Polar Oceans Research (PIPOR) where Jean Claude Gasgard of LODYC (Laboratoire d'Océanographie Dynamique et de Clima-

tologie, Paris), presented the latest results from a cruise to the Yermak Plateau, north of Svalbard. He reported that he encountered there a multitude of ice floes with a black surface. Immediately everybody began thinking of various kinds of fall-out of dust or pollution associated with special weather patterns. Several years later I learned from another presentation on a German-Russian programme in the Kara Sea that what Jean Claude observed is a natural phenomenon associated with ice formation in the shallow waters on the Siberian shelf (and elsewhere). Due to ice dynamics the ice takes up material from unconsolidated sediments that are later transported with the floes across the Arctic Ocean, which in this case met at the Yermak Plateau.

When the floes eventually melt the material is deposited on the sea-bed. This is also the case with icebergs that may take up material from great depths and transport material over large distances. What is of special interest is that by analysis of sediment samples from piston coring in the seabed it is possible to trace the migration of the floes and icebergs back to a shelf where the same material is present. Furthermore, from the sequence of layering in the samples a time sequence may be deduced and thereby the road is open for an analysis of the flow pattern of sea ice in the past, for instance, as a contribution to paleoclimate research.

This is in fact the subject of this well-written book - which may be characterised as a monograph - and the reason for the interest of the present reviewer. The book describes the methods applied and includes a great number of tables with measurements and many graphs of core results to justify the conclusions arrived at. By means of statistical tracing techniques previously presented in the scientific literature, it is demonstrated that it is possible to construct the track back to the origin, so that the flow patterns in the past may be estimated. This gives interesting information of the great variations that have occurred over thousands of years. With icebergs giving the same sort of information, it has been possible to study the situation in the Arctic Ocean during the last Ice Age, for instance, and to estimate the density of icebergs. This is a book

for generally-interested scientists but primarily for specialists dealing with paleoclimate research. Thus, the author assumes that the reader is familiar with the different periods of climate of the past periods of glaciation - the Pleistocene and late Weichselian (Wisconsin) glaciations, for instance.

Which brings me back to my opening sentence. Although formally correct, the title of the book leads to an understanding that it is dealing with climate change, one of the "politically correct" phrases of the day. The short description on the back of the book only mentions "paleoclimate" in the last lines. The only link to present-day climate is a chapter (written by Peter Lemke) on 'Sea Ice Motion' describing modelling of sea-ice drift in the Arctic Ocean, with examples from Winter 1994. Actually, it looks as if the editor has been afraid that a book with this limited scope could be sold - although it covers a subject that spans thousands of years. The book contains a number of excellent colour photos of icebergs and sediment-laden floes that may attract the buyer. These are not referred to in the text, and information about the time and place of the individual photos is missing, which is not acceptable in a book about geophysics. Many of the photos, however, are very attractive, and would be nice pictures to hang on the wall. In contrast it is found that a colour graph referred to in the text is not included.

Keywords: Sea ice drift. Paleoceanography. Paleoclimatology.

5.3 Book: Microwave Radiometry, Remote Sensing

Pampaloni, P. and S. Paloscia (Editors). 2000. "Microwave Radiometry and Remote Sensing of the Earth's Surface and the Atmosphere". Published by VSP Utrecht. ISBN : 90-6764-318-1. Price: NLG 399 / US\$ 222

Reviewed by Eberhard Parlow, MCR Laboratory, University of Basel, Switzerland

This book contains a selection of papers presented at the Sixth Specialist Meeting on Microwave Radiometry and Remote Sens-

ing of the Environment held in Florence, Italy, during March 1999.

Many years of observations with ground-based and satellite-borne sensors have made an important contribution to improving our knowledge in many geophysical processes of the Earth's environment. The technological development of many microwave sensors has increased steadily over recent years. They have made it possible to observe land and atmospheric features and to monitor even the smallest climatic changes. At the same time many studies have been carried out to improve the algorithms for the retrieval of geophysical parameters.

The book is divided into four main sections: three of these are devoted to the observation of the Earth's surface and atmosphere, the fourth one to future missions and new technologies. The first sections (thirteen papers) deal with the study of sea and land surfaces, and report recent developments in remote sensing of ocean wind, sea ice, soil moisture and vegetation. The next section (sixteen papers) is devoted to the measurement of atmospheric quantities, which are fundamental for climatology and meteorology, using ground-based and satellite observations. Chapter 3 deals with remote sensing of clouds and precipitation (twelve papers). It tackles problems of radiative transfer models and the use of satellite and ground-based observations. The last section (nine papers) presents an overview of new technologies like new microwave sensors and calibration and plans for future remote sensing missions.

The book gives an excellent and comprehensive overview of the state-of-the-art in microwave remote sensing of the atmosphere and land surface processes. It can be recommended for students and researchers in the field of remote sensing or environmental process studies.

5.4 FAO Land Cover Classification System

After several years in the making, FAO proudly announces the publication of its Land Cover Classification System:

Di Gregorio, A. and L.J.M Jansen. 2000. Land Cover Classification System (LCCS): Classification Concepts and User Manual. Environment and Natural Resource Service, GCP/RAF/287/ITA Africover - East Africa Project and Soil Resources, Management and Conservation Service. FAO. Rome. 179 pages, with CD-ROM. ISBN 92-5-104216-0.

This publication presents a new concept of land cover classification which uses a set of independent diagnostic classifiers rather than being nomenclature-based. This approach allows correlation with existing classifications and legends, so the system could serve as an internationally agreed reference base for land cover. The methodology is applicable at any scale, and is comprehensive in that any land cover identified anywhere in the world can be readily accommodated. The rearrangement of the land cover classes, based upon regrouping of used classifiers, facilitates the extensive use of the outputs by a wide variety of end-users.

The LCCS has been designed with two main phases: an initial dichotomous phase, in which eight major land cover types are defined, followed by a subsequent modular-hierarchical phase, in which land cover classes are created by the combination of sets of predefined classifiers, tailored to each major land cover type, in order to use the most appropriate classifiers and to reduce the likelihood of impractical combinations of classifiers.

A software program has been developed to assist in land cover interpretation, thus standardising the process and contributing to its consistency. Information on the software and the related manuals is available at www.africover.org/LCCS.htm.

The LCCS is the result of intense international collaboration as well as co-ordination amongst units of FAO. The Environment and Natural Resource Service of FAO encourages review and feedback on the publication and software. FAO looks forward to developing a new release version of the software, with your co-operation, early in 2002. To obtain a free copy, or for further information, contact: John Latham, SDNR, FAO of the United Na-

tions. Viale delle terme di Caracalla, 00100 Rome, Italy. E-mail:John.Latham@ fao.org.

5.5 New ITC Textbooks on Remote Sensing and GIS

A group of ITC staff, under the editorship of Rolf de By and Lucas Janssen, have written two introductory textbooks on the two core subjects taught at ITC: Remote Sensing and Geographic Information Systems. The books were developed to cater for the needs of all ITC students. ITC students typically have working experience and are active in a wide range of applications (from geological surveying to urban planning). We therefore think that these books can be of interest to many others interested in GIS and Remote Sensing: undergraduate students, graduate students and professionals.

De By, Rolf (Editor). 2000 (autumn). Principles of Remote Sensing - An Introductory Textbook. ITC Educational Textbook Series: ISSN 1567-5777. ISBN 90-6164-183-7. Full colour edition, 172 pages. Price: NLG 45 (Euro 20.42).

This textbook introduces remote sensing as a technique for data acquisition. The principle of remote sensing as well as a large number of sensor types are introduced. Aerial photography, multispectral scanning and radar are dealt with in more detail. General aspects related to geometry and visualisation of image data are intro-

duced. Finally, two processes of information extraction are explained: visual image interpretation and digital image classification. The book provided general concepts and principles.

Janssen, Lucas (Editor). 2000 (autumn). Principles of Geographic Information Systems - An Introductory Textbook. ITC Educational Textbook Series: ISSN 1567-5777. ISBN 90-6164-184-5. Full colour edition, 230 pages. Price: NLG 45 (Euro 20.42).

This textbook introduces geographic information systems as a tool for spatial data handling. The principles behind it are presented one by one: the identification of relevant geographic phenomena, the options of representing them in a GIS, the associated advantages and disadvantages of operating on these representations, the preparation of spatial data sets; the spatio-analytic functionality that comes with GIS, and the methods to visualise spatial data. Fundamental aspects such as spatial reference systems and spatial data quality are not left untouched. The book addresses all of these topics in a software-independent style.

Ordering information (for each book): Send a fax to "ITC Attn: Mrs. Joke Bunk", fax +31-53-4874400, or send an email to bunk@itc.nl, clearly indicating the title and the number of copies. VISA and MASTER-CARD are accepted.

6 FORTHCOMING MEETINGS AND COURSES

6.1 Forthcoming Remote Sensing Meetings

NEW

23-27 April 2001
St. Louis,
Missouri, USA

ASPRS (American Society for Photogrammetry and Remote Sensing) Annual Conference: 2001 - Gateway to the New Millennium.
To be held at the America's Centre / Adams Mark Hotel, St. Louis, Missouri. Contact: ASPRS, Bethesda, Maryland, USA. Web: www.asprs.org.

NEW

23 April 2001
St. Louis,
Missouri, USA

ERDAS Annual User Day 2001
Free one-day event, to be held in conjunction with the ASPRS Annual Conference, at the America's Center / Adams Mark Hotel, St. Louis, Missouri. Contact: ERDAS Inc., Atlanta, Georgia, USA. E-mail: info@erdas.com. Web: www.erdas.com.

NEW

- 2-3 May 2001
Baveno (Lago Maggiore), Italy
GMES (Global Monitoring for Environment and Security): A Consultation Meeting
Web: gmes.sai.jrc.it/download/Baveno2001-announcement.pdf.
- 14-16 May 2001
ENSG, Marne-la-Vallée (Paris), France
21st EARSel Symposium and General Assembly: Observing our Environment from Space - New Solutions for a New Millennium.
Co-sponsored by the SFPT and IGN. Details from EARSel Secretariat and www.earsel.org.
- 17-18 May 2001
ENSG, Marne-la-Vallée (Paris), France
3rd EARSel Workshop on Remote Sensing and GIS Applications to Forest Fire Management – New Methods and Sensors.
Details from EARSel Secretariat and www.earsel.org
- NEW**
- 6-8 June 2001
Turku, Finland
International Symposium: Climate Change and Variability in Northern Europe
Contact: Dr. Jaana Vormisto, Programme Secretary, FIGARE, University of Turku, FIN-20014 Turku, Finland.
Phone: +358-2-3336265. Fax: +358-2-3335730. Email: jaavor@utu.fi. Web: figare.utu.fi
- 18-20 June 2001
Atlanta, Georgia, USA
GeoSpatial World 2001: The Intergraph GeoSpatial Users Community Conference
Contact: Arlen Reimnitz, IGUC administrator, c/o Intergraph Corp., Huntsville, Alabama, USA. Phone: +1-256-7302510. Fax: +1-256-7302080.
E-mail: geospatialuserscommunity@ingr.com. Web: www.intergraph.com/gis/community/
- 22-23 June, 2001
Regensburg, Germany
2nd Symposium on Remote Sensing of Urban Areas
Organised in collaboration with ISPRS Commission VII/WG-4 "Human Settlements and Impact Analyses". Contact: Prof. Dr. C. Juergens. Fax: +49 941 943 4933.
E-mail: carsten.juergens@geographie.uni-regensburg.de
- 28-29 June 2001
University of Insubria, Varese, Italy
International Workshop on Geo-Spatial Knowledge Processing for Natural Resource Management
Organised by: European Commission's Joint Research Centre, Ispra, Italy; National Research Council, Milan, Italy; University of Insubria, Varese, Italy.
Web: proterra.itim.mi.cnr.it
E-mail (for paper submission): proterra-info@itim.mi.cnr.it
E-mail (for attendance): proterra-info@mal.crii.uninsubria.it
- 29 July - 3 August 2001
San Diego, CA, USA
IMAGING SPECTROMETRY VII
Part of SPIE's International Symposium on Optical Science and Technology.
Web: www.spie.org/info/am/
- 12-14 September 2001
London, UK
RSS2001
Contact: The RSS Office. E-mail: rspsoc@nottingham.ac.uk. Web: www.the-rss.org
- 10-13 September 2001
Toulouse, France
18th Symposium GRETSI'01 on Signal and Image Processing
Contact: Christine Correcher, CNES, Délégation à la Communication et à l'Education, 18 avenue Edouard Belin, 31401 Toulouse cedex 4, France. Web: www.cnes.fr/gretsi.
- 17-20 September 2001
San Francisco, CA, USA
5th International Airborne Remote Sensing Conference and Exhibition
Contact: Veridian / ERIM International Conferences: Fax: +1-734-9945123.
E-mail: wallman@erim-int.com

- 17-21 September 2001
Toulouse, France
- Remote Sensing for Environmental Monitoring, GIS Applications and Geology**
Part of SPIE's International Symposium on Remote Sensing
Contact: www.spie.org/info/rs/
- NEW**
- 20-21 September 2001
Naples, Italy
- EARSel / CORISTA Workshop on Remote Sensing by Low-Frequency Radar**
Contact: Anna Maria Esposito (CO.RLS.T.A.). Phone: +39-0815935101.
Fax: +39-081-5933576. E-Mail: corista@unina.it. Web: www.corista.unina.it
- NEW**
- 24-28 September 2001
Cukurova University, Adana, Turkey
- 4th International Turkish Geology Symposium**
Web: www.itgs.org
- NEW**
- 1-5 October 2001
Madrid, Spain
- First World Congress on Conservation Agriculture: A Worldwide Challenge**
Organised by FAO and the European Conservation Agriculture Federation. Contact: Proyectos, Incentivos y Congresos, S.L., Conde de Cárdenas 16 1º-2, 14002 Córdoba, Spain. Phone: +34-957-485848. Fax: +34-957-485849. E-mail: PIC_SYR@terra.es
- 1-3 October 2001
Vienna, Austria
- 5th Conference on Optical 3D Measurements Methods**
Contact: Heribert Kahman. Fax: +43 1 5880112 895.
info.tuwien.ac.at/ingeo/optical3d/o3d.htm
- NEW**
- 8-9 November 2001
Rome, Italy
- IEEE / ISPRS Joint Workshop on Remote Sensing and Data Fusion over Urban Areas**
General enquiries: Paolo Gamba, Dip. Di Elettronica, Università di Pavia, 27100 Pavia, Italy. E-mail: p.gamba@ele.unipv.it
Abstracts and Papers: Fabio Dell'Acqua. E-mail: f.dellacqua@ele.unipv.it
Web: tlc.unipv.it/urban_2001
- NEW**
- December 2001
Geneva, Switzerland
- EURISY Conference on Peacekeeping**
Contact: Ms. Valerie A. Hood, Secretary General, EURISY Association, 3-5 rue Mario Nikis, 75015 Paris, France. Phone: + 33-1-47340079. Fax: + 33-1-47340159. E-mail: eurisy@micronet.fr. Web: www.eurisy.asso.fr
- NEW**
- 23-25 January 2002
Sophia Antipolis, France
- Fusion Of Earth Data – Fourth International Conference (EARSel SIG Workshop)**
Web: www-datafusion.cma.fr/conf. Deadline for abstracts: 15 May 2001. E-mail abstracts to: fusion@cenerg.cma.fr
- 4-6 June 2002
Prague, Czech Republic
- 22nd EARSel Symposium and General Assembly: Geoinformation for European-Wide Integration.**
Contact: Dr. Tomas Benes, UHUL Forest Management Institute, Czech Republic. Phone: +420202800121. Fax: +420202803371. E-mail: benes@uhul.cz. Web: www.uhul.cz
- 24-28 June 2002
Toronto, Canada
- IGARSS 2002**
Contact: Tammy Stein, IEEE Geoscience and Remote Sensing Society.
Phone: +1-281-2516067. Fax: +1-281-2516068.
Email: tstein@phoenix.net. Web: www.igrss.org