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1 EDITORIAL BY THE CHAIRMAN

I was very happy to accept the invitation from the Editor, Lucas Janssen, to write an editorial for this edition of the Newsletter, since it gives me an opportunity to let members know what we, their representatives, are doing. Apart from Bureau member's reports in the Annual Report, which I doubt many people read, and perhaps meeting a few of you at our annual Symposium and workshops, there is little direct contact between you and us, so it is a good idea to outline some of the things which are going on.

The official channel of communication is between your elected national representatives on Council and the member laboratories. Those representatives who do attend Council meetings usually give fairly full reports of the activities in their countries. If you find that they are not reporting Council's activities to you, you should ask them! In the meantime, however, I would just like to highlight a few of our activities which, I hope, will prove that we are doing something positive for you, the members. Some of these activities will have been mentioned in our Annual Report or in the Newsletter.

One very important development is that we have forged close links with National Remote Sensing Societies. For several years, we have been inviting the chairmen of such societies to attend our Council meetings, but on the initiative of the Italian Remote Sensing Society (AIT), we have set up a Federation of European Remote Sensing Associations (FERSA) as a special interest group. This group has recently submitted a proposal to the EC called "ATENEO" – Associations Towards a European Network for Earth Observation Education and Training. If successful, this will enable members of the societies to meet and co-ordinate their activities throughout Europe. This fits exactly with EARSeL's education and training brief and is a follow-on from a number of earlier initiatives – workshops, summer schools, specialist meetings etc.

A second development has been that of improving our working relationship with ISPRS. We have been, for a number of

years, a Regional Member of ISPRS. Recently we have participated in joint sessions at, for example, UNISPACE meetings, and we held a joint workshop on data fusion in Valladolid last year. We are now looking at ways in which we can be more proactive, and get more involved in the various commissions of ISPRS. We will keep you informed through the Newsletter of any developments.

In the last Newsletter, I wrote a report of our involvement in the setting up of a new association, EURO-STRIM (European Association of Higher Education in Space Sciences and Technologies for Risk Management). EARSeL is well represented on the Bureau and Council of this organisation, which is now seeking funding in order to begin its activities in setting up Euro-Master and Euro-Doctorate degrees. Again this will be fully reported as appropriate.

The last item I want to report is about our involvement with the European Space Agency. As members will know, we are greatly indebted to ESA for real sponsorship to enable us to perform our activities. But also, in return, they value our input to their decision making. For a number of years now, we have been invited to send a representative to meetings of their Earth Science Advisory Committee (ESAC). Usually the Chairman attends, but in his absence, Preben Gudmandsen has valiantly stood in on a number of occasions. Over the past few years, the major item that this committee has been considering is ESA's Living Planet Programme – its main EO programme for the next decade and well into the century. This committee, which comprises eminent scientists and representatives of several interested bodies such as EARSeL, had a great deal of input to the formulation of the elements of the programme, and, more recently, to the choice of instruments to be flown. Two Earth Explorer Core Missions were chosen at a consultative workshop in Granada in October last year, and two Opportunity Missions were chosen at an earlier meeting in Paris, later endorsed by the ESA Earth Observation Programme Board as parts of the Earth

Envelope Programme. But prior to those meeting a great deal of spadework had been done by members of ESA and by ESAC. Readers may be interested, and delighted, to know that the scientific community, and in particular the EARSeL community, has been intimately involved in these deliberations and decisions – perhaps this is the first example of such a «bottom up» approach being adopted in the choice of space missions!

I hope that this just gives a flavour of the work that is going on on your behalf. I can assure you that we are working on a num-

ber of other ideas for ways in which we can serve our member laboratories and promote their interests in Europe. We would be very happy to hear from members who have suggestions for the future, or comments on our present activities. If you have read this far, I thank you profusely.

Robin Vaughan.

2 NEWS FROM THE ASSOCIATION AND ITS MEMBERS

2.1 EARSeL Bureau and Council meetings

The EARSeL Bureau and Council held their regular January meetings on 13th and 14th January at the European Space Agency in Paris. Apart from the Bureau members, representatives from Austria, Belgium, the Czech Republic, Denmark, Finland, Germany, Hungary, Italy, Spain, the Netherlands and the United Kingdom were present. The epidemic of influenza prevented one or two others from attending.

At each of these January meetings, apart from the Chairman's and Treasurer's reports, the national representatives present a brief report on the outstanding projects and events that have taken place during the previous year and plans for the immediate future. These reports are presented below. The status of activities within the Special Interest Groups are also reviewed, as well as the calendar of events, including meetings being organised by EARSeL and those in which we are participating. Our co-operation with national remote sensing societies and international organisations, such as ISPRS, was reviewed and, following recent meetings that Bureau members had attended in these countries, ways of supporting co-operation with Turkey and Albania were also discussed.

2.2 News from the Special Interest Groups

2.2.1 SIG Image Fusion

Chairperson: L. Wald, Ecole des Mines de Paris, Sophia Antipolis, France

The third international conference "Fusion of Earth Data" was held successfully in Sophia Antipolis, from 26 to 28 January 2000. The series of Conferences was initiated in 1996 by the European Association of the Remote Sensing Laboratories (EARSeL), the French Society of Electricity and Electronics (SEE, the French affiliate of IEEE) and the Ecole des Mines de Paris (EMP). It is conceived as a forum and aims to help in understanding what "data fusion" means by providing a clear description of concepts, applications, tools and benefits of data fusion.

This series is characterised by a strong interactivity between participants, authors and exhibitors in a warm and friendly atmosphere. This year, the Scientific Committee selected the communications on an anonymous basis by keeping only extended abstracts of good to excellent quality. Accordingly the presentations given during this Conference represented the latest methodologies and advanced applications. They were all of high quality, contributing to lively discussions and to the success of the conference.

The discussion held in the plenary session as well as the working meeting on Friday dealt with quality in data fusion. The European (CEN) and international (ISO) standards in geographical data quality were discussed with respect to the fusion aspects and were proposed as a basis for further work. Some progresses have been made that will be presented on the data fusion Web server: www-datafusion.cma.fr, and will be further discussed on this server.

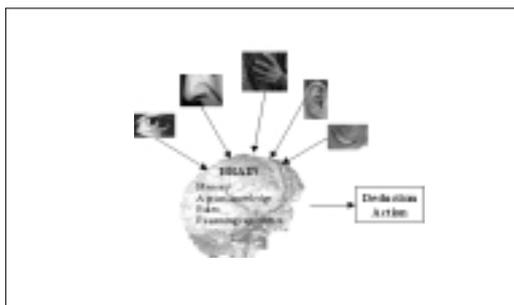
The "Fusion of Earth Data" Prize of 200 Euros was awarded to Olaf Hellwich and Christian Wiedemann, from the Technical University of Munich. This prize is offered by the Scientific Committee and rewards the best paper appearing in the Proceedings.

The Proceedings were available at the Conference as usual, and can be ordered through the data fusion Web server.

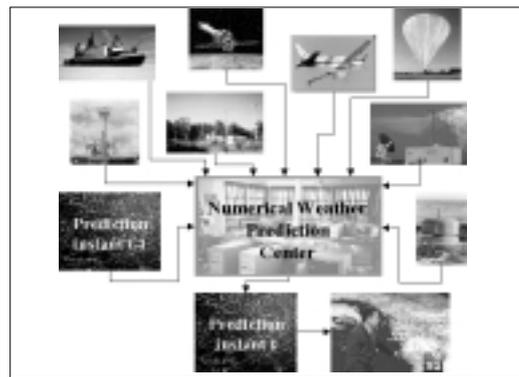
The organisers have made use of all the resources of their extraordinary region to attract and entertain participants: warm air, blue skies, sun and sea, snowy mountains in the distance, mimosas in flower, friendly atmosphere and gourmet cuisine. All attendees enjoyed these moments and said they were looking forward January 2002, for the 4th edition.

But what is Image Fusion?

Data fusion is a recent word. It means an approach to information extraction spontaneously adopted in several domains. Data fusion is exploited by a large number of biological systems. An illustration is given by the human system, which calls upon its different senses to perceive its environment. Human sensors acquire information by means of sight, smell, touch, sound, and taste. This information is fused within the brain, which will use its memory, its experience, a priori knowledge and its reason-



The human brain and perception system as an example of fusion process



Weather forecast is an excellent example of fusion process

ing capabilities to perform deductions, thus producing a representation of the environment and order action.

Weather forecasting is another well-known example of data fusion. Information is acquired by several sensors located in space, atmosphere, and ocean or at ground level, measuring several different parameters with various supports of information in space and time. This information is ingested by numerical models through data assimilation techniques, which produce weather forecasts that are presented on TV news and other media.

Apart the Defence activities, one of the most productive in data fusion is Earth observation, taken in a broad sense, that is including all means for observing the Earth, whether they are space-borne, airborne, or at ground level. The ensemble of sensors for Earth observation is very wealthy with respect to:

- spatial scales: from millimetres to hundreds of kilometres
- time scales: from milliseconds to daily sums
- spatial sampling: pixel of image (i.e. a surface from square meters to square kilometres), pinpoint measurements, vertical profiles of pinpoint measurements or pixels of images
- temporal sampling: instantaneous or averaged measurements, daily extreme
- means of acquisition: from thermometer to radiometer measuring emitted radiation in thermal infrared or millimetric wave.

Such a wealth of information offers many opportunities and benefits to the pro-

gresses in data fusion, which is at the crossings of the physics of the measurements, physics of the environmental processes, and sciences of information and communication.

Data fusion is a subject becoming increasingly relevant as we try to extract more and more information from these measurements. The operation by itself is not new in remote sensing: classification procedures are performed since long and are obviously relevant to data fusion. Indeed, it is generally correct to assume that improvements in terms of classification error probability, rejection rate, and interpretation robustness, can only be achieved at the expenses of additional independent data delivered by more sensors that are separate. Data fusion allows formalising the combination of these measurements, as well as to monitor the quality of information in the course of the fusion process. The formal framework for data fusion established within the series of conferences in Sophia Antipolis allows a better understanding of data fusion fundamentals and of its properties. It permits a better description and formalisation of the potentials of synergy between the remote sensing data, and accordingly, a better exploitation of these data.

The following definition was adopted in January 1998: "data fusion is a formal framework in which are expressed means and tools for the alliance of data originating from different sources. It aims at obtaining information of greater quality; the exact definition of 'greater quality' will depend upon the application". (in French: la fusion de données constitue un cadre formel dans lequel s'expriment les moyens et techniques permettant l'alliance des données provenant de sources diverses. Elle vise à l'obtention d'information de plus grande qualité; la définition exacte de "plus grande qualité" dépendra de l'application.)

This definition is clearly putting an emphasis on the framework and on the fundamentals in remote sensing underlying data fusion instead of on the tools and means themselves, as is done usually. The latter have obviously strong importance but they are only means not principles.

Secondly, it is also putting an emphasis on the quality. This is certainly the aspect

missing in most of the literature about data fusion, but one of the most delicate. Here quality has not a very specific meaning. It is a generic word denoting that the resulting information is more satisfactory for the 'customer' when performing the fusion process than without it. For example, a better quality may be an increase in accuracy of a geophysical parameter or of a classification. It may also be related to the production of a more relevant information of increased utility, or to the robustness in operational procedures. Greater quality may also mean a better coverage of the area of interest, or a better use of financial or human resources allotted to a project. In this definition, spectral channels of a same sensor are to be considered as different sources, as well as images taken at different instants. Hence, any processing of images acquired by the same sensor is relevant to the data fusion domain, such as classification of multispectral imagery, or computation of the NDVI (normalised difference vegetation index), or atmospheric correction of spectral bands using other bands of the same sensor. Any processing of time-series of data acquired by the same sensor or different sensors, is a fusion process.

Other definitions and terms of reference are found on the Web server, or in Wald L., Some terms of reference in data fusion. *IEEE Transactions on Geosciences and Remote Sensing*, 37, 3, 1190-1193, 1999.

L. Wald, Ecole des Mines de Paris, Sophia Antipolis, France

2.2.2 SIG Developing Countries

Chairman: Prof. Dr. Rudi Goossens, Dept. of Geography, University of Gent, Belgium

The first EARSel Workshop on Remote Sensing for Developing Countries will be hosted by the University of Gent, Belgium from 13–15 September 2000

Aim of the SIG for Developing Countries and this workshop

Many European scientists working in the field of remote sensing and GIS are undertaking projects that are concerned with developing countries. Remote sensing is

rapidly becoming accepted in many of these countries as an excellent tool for mapping purposes since often up-to-date maps and topographical information is not available. Working in these countries often brings up problems which are different to the ones which are faced by scientists working on topics in developed countries. Therefore a European contact group is established in order to bring together these scientists to exchange experiences and results of research programmes more easily. This workshop is an attempt to achieve these goals. The workshop language is English. The workshop will take place in "Het Pand", a former Dominican Abbey, presently property of the University of Gent and full equipped for scientific meetings. It is located in the historical centre of the city.

Topics

Adapted methods for mapping in developing countries using remote sensing for

- geology
- topography
- vegetation
- archaeology
- soil
- geomorphology
- hydrology
-

Monitoring processes of

- erosion
- desertification
- urbanisation
- sedimentation
- land use planning
-

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2.2.3 SIG Forestry and Land Use Planning

Chairperson: Prof. Dr. Barbara Koch, Remote Sensing and Landscape Information Systems, University of Freiburg, Germany

The activities of the SIG in 1999 have focused on two events, the joint ISPRS/EARSel workshop on "Fusion of Sensor Data, Knowledge Sources and Algorithms" which took place after the 19th EARSel Symposium from 3rd to 4th of June 1999 in Valladolid, Spain and the conference on

Remote Sensing and Forest Monitoring from 1st to 3rd of June in Rogow, Poland.

The technical programme of the workshop on "Fusion of Sensor Data, Knowledge Sources and Algorithms" was focused towards data fusion techniques, therefore the presentations were not explicitly oriented towards Forestry and Landuse Planning. Nevertheless the application-oriented presentations were dominated by forestry. All participants agreed that the workshop was most innovative and was excellently organised by Manos Baltasavias from ETH Zürich in co-operation with Lucien Wald from Ecole des Mines de Paris. An output from the discussion for the SIG "Forestry and Remote Sensing" is that there is need to test the data fusion algorithms for application in the field of Forestry and Landuse. This might be a discussion topic for the next SIG meeting during the 20th EARSel Symposium in Dresden.

The meeting in Rogow Poland was very well organised by Dr. Tomasz Zawila-Niedzwiecki from the Institute of Geodesy and Cartography in Warsaw. The IUFRO conference was co-organised by EARSel SIG "Forestry and Landuse Planning" as well as other groups. The speakers presented work in the field of remote sensing and forestry from all over the world. It was a meeting between some of the world's best researchers with end users integrating remote sensing data in their daily tasks. End users were provided with new results and methods and research taking into account the needs of the end-users. An output of the meeting was that in the field of forestry a lot of successful research is going on with remote sensing data and the products are in many cases useable for the tasks of the end user. But it also showed that there is still a big gap between what is possible and what is really used in public or private forestry. The SIG might in future put more emphasis on the transfer of research results into practice.

2.2.4 SIG Forest Fires

Chairman: Dr. Emilio Chuvieco, Dept. of Geography, Univeristy Alcalà de Hénarès, Spain

The basic activity of this group during 1999 have been to maintain scientific and personal contacts among researchers in the field by the maintenance of a special web page for dissemination of news on projects and activities related to remote sensing and fires http://www.geogra.alcala.es/earsel/SIG_group.htm

Members of the group have attended the special seminar on Fire Management held in Boise, Idaho (USA): "Crossing the Millennium: Integrating Spatial Technologies and Ecological Principles for a New Age in Fire Management".

At this conference and workshop, scientists and wildland fire specialists explored and shared the latest in fire science research and technology. Information was analysed about a variety of topics including fuel and vegetation mapping, Geographic Information Systems and remote sensing technologies, modelling fire behaviour, fire hazard and risk, and fuel treatment technologies. The main conclusions were the following:

Better understanding of the ecological issues to be able to understand the causes of fires.

Focus on fire ecological severity/risk/hazard.

Extending the current knowledge to develop future scenarios for modelling.

Considering fire manager's perspective.

Collaborative approaches.

Technology transfer and better communication.

Better data:

Ground references.

Accuracy.

Quality.

Accessibility through Internet.

Real time data.

Standardisation.

Scale/scope. Choose the right scale.

The main initiative for the following months will be the organisation of a workshop on the advances of remote sensing techniques for fire risk determination, fire detection and fire effects assessment. This workshop will be held in Paris, following the EARSel general assembly in 2001.

2.2.5 SIG Geological Applications (SIG-GEO)

Chairman: Prof. Dr. Freek van der Meer, ITC and Delft University of Technology

EARSel's Special Interest Group "Geological Applications" is a new Special Interest Group formed recently to act as a forum for international discussion amongst Earth scientists. The SIG-GEO promotes geologic remote sensing and Earth observation and tries to bridge the gap between technology and applications by bringing together experts from universities, institutes and commercial enterprises at scientific meetings. Furthermore, the SIG-GEO supports exchange of views through in-depth workshops and tutorials on topics related to geological remote sensing.

Objectives of the SIG-GEO are:

- The SIG-GEO intends to organise workshops, tutorials and special conference sessions to disseminate geologic remote sensing knowledge
- The SIG-GEO aims at bringing together experts from the various remote sensing agencies (institutes, universities and commercial enterprises) in Europe
- The SIG-GEO aims at creating a forum for international discussion to better prepare the geologic remote sensing community for new developments in technology and application-oriented research

The SIG-GEO has just started its mission in January 1999! As a consequence, there are no events that can be listed here. We do hope that in the coming years the SIG-GEO will contribute to major scientific meetings promoting its activities in-line with the objectives. Initiatives and suggestions for topics of future events are strongly encouraged. At present, the SIG-GEO is constructing its webpages which will be posted on the EARSel general homepage shortly. Thereafter by means of a mailing and a announcement in the EARSel Newsletter the SIG-GEO will start to promote its activities and solicit members to join the group. For more information or to register as a member of the Special Interest Group please contact your chairperson or the EARSel secretariat.

The SIG-GEO has a webpage that can be found under the EARSel general pages.

Currently, the SIG-GEO is involved in the organisation of the second EARSel workshop on Imaging Spectroscopy that will be hosted by ITC in Enschede from 11-13 July 2000. Details on this event can be found at <http://www.itc.nl/is2/>. Inquiries should be directed towards Email: is2@itc.nl

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2.3 National Reports from EARSel Council members

At each January Council meeting, our national representatives are invited to present a short report concerning ongoing projects in their country, important meetings that have taken place during the previous year and ones planned for the coming months. The reports from those who have submitted a written version are reproduced below.

2.3.1 Remote Sensing Activities in Austria - 1999

E. Mondre, Austrian Space Agency

One major event in 1999 was Unispace III, the third United Nations Conference on Outer Space Affairs, held in Vienna from July 19 – 30th together with an exhibition of most major space organisations and space industries. For the first time space industry was invited to actively participate in a UN conference and this was highlighted by a great number of seminars, workshops and round table discussions covering different themes of space research and application. This Technical Forum consisted of 33 scheduled events supported by ad-hoc technical presentations of individual firms and research in-

stitutes. The space exhibition was open to the public and many interested people took the chance to have a look on space hardware and to learn about the benefit of space technology.

This year's session of the Committee on Peaceful Uses of Outer Space is scheduled for June 7 – 16; the Scientific and Technical Subcommittee meets from February 7 – 18, the Legal Subcommittee from March 27 – April 7; all events take place in Vienna. These will be the first committee meetings under the newly appointed director of the Office of Outer Space Affairs, Prof. Maclan Othman (Malaysia).

On November 15, 1999 a workshop on remote sensing was organised at the Technical University in Vienna with the aim to inform on the currently in Austria ongoing data evaluation projects in the framework of the ESA and EUMETSAT programs.

In addition to the running projects supported by the European Commission several nationally funded remote sensing projects have been initiated. In reply to the ESA Announcement of Opportunity for data utilisation of Envisat six proposals from Austrian research groups have been selected, provided that the financial support is secured at national level. At present all effort is placed to guarantee this funding for the coming years.

At the ESA Council on Ministerial Level in Brussels (summer 1999) Austria joined the Earth Observation Envelope Programme with a contribution of 2% which is close to our GNP-level. The selection for the forthcoming Earth observation explorer missions (core- and opportunity missions GOCE, ADM, CRYOSAT and SMOS) is fully supported by Austria.

In co-operation with Eumetsat the Austrian Meteorological Service supported by ASA is organising a seminar on the future use of satellite data within the new Eumetsat programs MSG and EPS to which one representative of the meteorological services of our eastern neighbouring countries have been invited. This event has been rescheduled for May 15 - 17, 2000.

2.3.2 Remote Sensing Activities in the Czech Republic - 1999

T. Benes, UHUL Forest Management Institute, Brandys-nad-Labem

International Projects

Two international projects incorporating the use of remote sensing were carried out in the Czech Republic. The first - GIS for Kamchatka (Russian Far East) - was completed in 1999 and was considered very successful by Russian colleagues and was recommended to be continued over a wider territory. Currently, the continuation of this project is in the preparatory stages. Secondly, the use of GIS for forest management and the protection of wild animals in Morocco, was carried out by the Forest Management Institute in Brandys in co-operation with FAO in Rome. The second phase of this three year project was completed in 1999. In this case Czech technology for forestry has been applied in an environment other than that found in Central Europe. This project will be completed by the end of the year 2000 and, according to current results and consultations with colleagues from Morocco, it will be brought to a successful conclusion. The latest information we have is that this project will also be continued for the next few years.

More generally, another five project proposals submitted by the Forest Management Institute have been granted funding by the EC for realisation within the next three years. These are based mainly on the use of remote sensing and GIS for nature protection.

Domestic Projects

Two significant projects were carried out within the boundaries of our country - a flood water protection project, where image data from Radarsat and GIS modelling of catastrophic situations were performed, and a new phenomenon in forest management, regional planning for forest development. This latter project contains new types of thematic maps (topological, ecological phenomena, protection phenomena, etc.) and is moving towards increasing the quality of sustainable development of forests in our country.

In spite of these new projects, a relatively

old one for the monitoring of forest diseases, based over a two year period, with full digital classification of Landsat-TM images using our special technology, will be continued. During this year preparatory work for synchronous ground measurements and the selection of test areas was carried out.

Main events/meetings

As was reported in our last annual report, most of the potential utilisation of remote sensing data is applied to the creation and application of GIS systems. From this point of view, there has been a very important development - the establishment of a special experts forum, the Nemoforum, whose members are all experts in the application of GIS technology in the Czech Republic. It will co-operate with the State office for Geoinformation, the Czech Association for Geoinformation, etc. Several new activities were undertaken by new members of our Czech Society for Photogrammetry and Remote Sensing, which has been established for a long time, but whose activity has not been very effective in the past. The author of this report hopes that with the big changes taking place in society, "new times" will be coming along.

We have held three major annual events in our country and one that takes place every two or three years. The first of these, traditionally organised with the sponsorship of EARSeL, is the international conference "Information Systems for Agriculture and Forestry". This event is organised traditionally each February at Seč Juniorcentre, that is outside Prague. The second, GIS Ostrava, is held each January and is oriented towards GIS applications incorporating remote sensing data. The third, which is very important and, from my point of view, can be recommended to any other country going through a transition period, is GIS in State administration, which is traditionally held in Seč each June. It has a very positive influence for Ministries and other state offices at various levels, especially for the information it provides about the potential of GIS and its utilisation.

The most important conference organised in our country, although not every year, is the GIS Brno. It is organised by the Laboratory for Geoinformatics of Masaryk University and is the one which draws the

largest international participation dealing with GIS.

Apart from these events, that are organised on a regular basis, the next very important meeting will be held in Prague 22-27 May 2000, the Federation of International Surveyors (FIG) Working Week 2000, which is organised by the Czech geodetic community under the authority of the FIG.

2.3.3 Remote Sensing Activities in Denmark - 1999

P. Gudmandsen, EARSeL Honorary President

Three societies have decided to join efforts, namely the Danish Cartographic Society, the Danish Society of Photogrammetry and the Academy for Geographical Information Systems. None of the societies have a great activity in remote sensing, but the new organisation may support such activities in the future.

Based on aerial photography, Danish survey companies are developing orthomaps of most of Denmark at very fine spatial resolution (40 cm 1:25 000. and 15 cm, 1:15 000 for urban areas). They are now for sale.

The Danish 60-kg small-satellite «Ørsted» designed for measuring the magnetic field of the Earth and by inverse methods to determine the current inside the Earth was finally launched in February 1999 after more than three years awaiting a free ride. After a Commissioning phase of a few months very exact data are being disseminated to an international user community. The data form the basis for the International Geomagnetic Reference Field 2000 and will be used for correcting the magnetic deviation maps of the Earth. It has been observed that the Earth's magnetic field has decreased by about 10% at some places on the Earth since the MAGSAT mission in 1979-80. The 14-month mission will continue until the end of 2000.

The Danish Research Foundations have granted funds to four projects that involve application of remote sensing data with development of new and/or improved methods of data utilisation. The projects began in 1996 and will continue to the end of 2000 with Final Reports being available by March 2001. The four projects that involve

a number of Danish research entities have the following titles:

- Remote Sensing based Crop Simulation and Soil-Vegetation-Atmospheric-Transport modelling
- Integration of Earth Observation Data in Distributed Agrohydrological Models (with special regard to the Senegal River basin)
- Danish Environmental Monitoring of Coastal Waters
- Geoid and Sea Level of the North Atlantic Region (sea level and gravity field)

The National Survey and Cadastre and the Geophysical Department of Copenhagen University are participating in the Earth Gravity Core Mission (GOCE) of the ESA Earth Observation Envelope Programme. They have contributed to the preparatory work presented in the report that formed the basis for the selection of this mission at the ESA Earth Sciences consultative workshop in Granada in October 1999.

The Geophysical Department of Copenhagen University is participating in one of the Earth Observation Opportunity Missions of the Earth Observation Envelope Programme: the Cryosat Mission. It is a special radar altimeter mission for determining the mass balance of the large ice sheets in the world, first of all in Greenland and Antarctica, and sea thickness from freeboard measurements.

The Danish Remote Sensing Centre (DCRS) of the Technical University of Denmark is participating in another of the Earth Observation Opportunity Missions of the Earth Observation Envelope Programme: the SMOS mission. It is designed around a low-frequency Microwave Imaging Radiometer with Aperture Synthesis (MIRAS) for measurement of Soil Moisture and Ocean surface Salinity.

A third proposal for an Earth Observation Opportunity Mission was presented by the Danish Meteorological Institute (DMI) and accepted by ESA as a stand-by project should one of the two above-mentioned selected missions not materialise due to lack of funding or otherwise. DMI is heading a European consortium on this atmospheric profiling mission. The system is proposed to consist of a number of small satellites with radio navigation signal receivers (exploiting GPS and GLONASS systems) from which profiles are deduced

by inversion of Earth-limb received signals. DMI who is responsible for remote sensing of Greenland waters has - after a number of investigations including those carried out in connection with the ESA Announcement of Opportunity programmes - undertaken routine applications of RADARSAT data in the ScanSAR Wide mode. Data are transmitted from Tromsø Satellite Station and analysed at DMI with ice maps being transmitted to ships in Greenland waters. The same Ice Branch of DMI is participating in the IMSI project under the Fifth framework project of the European Community (Integrated use of new Microwave satellite data for improved Sea Ice observation). NOAA AVHRR and RADARSAT ScanSAR data are contributed to the programme.

DCRS is participating in the above-mentioned IMSI project that may be regarded a follow-on to the EC ESOP-2 project under the MAST III (European Subpolar Ocean Project). SSM/I microwave radiometer data are acquired and injected in a system together with data acquired by the other partners. The data form the basis for ice maps of all 'eastern ocean areas' that are presented daily on a web page: (<http://www.dcrs.dk/DCRS/latest-ice.html>). In a parallel EC project (SEALION) radiometer data are used for determining ice drift and concentration in Antarctic waters (SEa ice in the Antarctic LINKed with Ocean-atmosphere forcing).

DCRS has for a number of years exploited data acquired by the airborne EMISAR, a fully polarimetric dual-frequency (L- and C-band) synthetic aperture radar developed by the institute. The applications include ice formed in leads of a sea ice canopy, vegetation and soil studies including surface roughness measurements as well as geology and migrating sand dunes. Interferometric studies of glaciers in Greenland with EMISAR data and the Greenland ice sheet based on ERS SAR are other research topics.

In 1999 DCRS began a technological programme of development of the 'Next Generation SAR'. The programme called SAR++ (short for a very long title) will develop very wideband electronics for analogue and digital systems including wideband, multi-frequency antennas with a view to versatile future radars. The first part of the programme runs until 2003.

A remote sensing study of the ice dynamics in the Arctic Ocean in the areas north of Greenland and Ellesmere Island and including Nares Strait is being carried out within the ERS AO3 programme utilising ERS SAR and other freely available data. (Should the reader be interested in further information about the projects above addresses of key persons may be obtained from the author of these notes at pg@emi.dtu.dk).

2.3.4 Remote Sensing Activities in Finland - 1999

Prof. Dr. Martti Hallikainen, Helsinki University of Technology, Finland

The three main sources of public funding for remote sensing activities in Finland are presently the national R & D programme GLOBE-2000, the European Space Agency and European Union.

GLOBE-2000 was started in 1996 and it will end in December 2000. The total budget is about 10 Meuro, with approximately 50 % coming from the Technology Development Centre (TEKES) and 50 % from participating institutes, universities and companies. The emphasis in GLOBE-2000 is on development of operational remote sensing methods and sustainable remote sensing industry. Research in areas of national importance is favoured, including monitoring of the environment, forests, ozone and cryosphere.

Finland participates in several ESA Earth Observation programmes including EOEP, ENVISAT, MSG, METOP, EOPP, ERS and GSTP. The total contribution to ESA programmes in 1999 was 5 Meuro; this is identical to the level of national funding in GLOBE-2000 and other programmes with the OMI ozone instrument as the biggest project.

Several Finnish research institutes and universities participate in projects funded by EU and ESA. Numerous ESA ENVISAT Announcement of Opportunity projects received national funding, but they are presently waiting for the delayed ENVISAT launch. Data from ASAR, MERIS and AATSR sensors will be mostly used in these projects.

Finnish Remote Sensing Projects

- OMI-EOS (Ozone Monitoring Instrument) developed by Netherlands-Finnish consortium for flight on EOS-Chem in December 2002. Nadir-viewing, wide-swath imaging spectrograph tuned to measure ozone and related species. www.eos-chem.gsfc.nasa.gov/instruments
- EUMETSAT Ozone SAF (Satellite Application Facility). Development of a data center to use data from GOME-2 on METOP series to produce global ozone and UVB field maps for EUMETSAT member institutes. www.ozone.fmi.fi/o3group/o3saf
- GOMOS (Global Ozone Monitoring by Occultation of Stars). ESA-developed instrument to fly on ENVISAT in late 2001 www.geo.fmi.fi/AERON/gomos
- COALA (Calibration for Ozone through Atmospheric Limb Acquisitions): like GOMOS a limb-viewing imaging spectrograph using stellar occultations, but building on GOMOS, GOME, SCIAMACHY, and OSIRIS experience to be much lighter. Global measurements of ozone and related constituents in the upper troposphere and stratosphere. Now proposed for inclusion in Japanese GCOM program, 2005-2006. www.geo.fmi.fi
- Generation of land cover information for the Baltic Sea Drainage Basin using medium resolution satellite data (BALANS). www.vyh.fi, www.banans.satellus.se
- Multi-source national forest inventory. Produces forest resource information based on field data, remote sensing data and digital map data. The operative method produces both statistics and maps. The second national inventory is in progress. www.metla.fi
- Scale dependent monitoring of non-timber forest resources based on indicator assessed in various scales. The goal is to develop a method for assessing non-timber forestry utilities by means of field data and remote sensing data (EU MNTFR) www.metla.fi
- Forest monitoring in Europe by means of remote sensing. Methods were developed for estimating forest tree stem volume and biomass by means of field data and remote sensing (EU FMERS-II, ended in 1999) www.metla.fi
- Assessing forest stand attributes by integrated use of high-resolution satellite imagery and laserscanner (HIGH-SCAN, 1998-2001) www.space.hut.fi, www.foto.hut.fi, www.fm-karta.fi
- Forest environmental monitoring and management system (EU FOREMMS, 2000-2002) www.space.hut.fi
- Fuzzy land information (EU FLIERS, 1997-1999) www.vtt.fi
- Siberian forest mapping (EU SIBERIA, 1998-2000) www.vtt.fi
- Forest change (EU ENFORMA, 1998-2000) www.vtt.fi
- Forest fire operative (ESA FF-Operat, 1999-2000) www.vtt.fi
- Research and development of remote sensing methods with main focus on snow hydrology (EU SNOWTOOLS, 1996-1999) www.space.hut.fi
- Monitoring of snow melt using optical and microwave satellite data www.vyh.fi, www.fgi.fi
- Satellite remote sensing for lake monitoring (EU SALMON, 1996-1999) www.vyh.fi, www.space.hut.fi
- Operative system for water quality monitoring (ended in 1999) www.vyh.fi, www.space.hut.fi
- Coastal oceanography and sea ice conditions in the Baltic Sea. Examination of ocean dynamics and sea ice mechanics using satellite remote sensing data www.helsinki.fi
- Integrated use of new microwave satellite data for improved sea ice observations (EU IMSI, 1997-1999) www.fimr.fi, www.space.hut.fi
- Integrated use of ENVISAT and sea ice properties (ESSI, 1999-2003) www.fimr.fi
- Image processing and pattern recognition methods for interpreting remote sensing radar data (1996-2000) foto.hut.fi
- Development of software for automated processing of NOAA AVHRR data. Images were calibrated, rectified and processed into snow cover and sea surface temperature maps (ended in 1999) www.vyh.fi
- Development of airborne interferometric L-band radiometer (1998-2000) www.space.hut.fi, www.ylinen.fi
- MIRAS demonstrator pilot project (ESA, 1998-2001) www.ylinen.fi, www.space.hut.fi

Examples of research projects in progress in 1999 and 2000 are listed below together with the www home page address of either the participating institute or the project.

The traditional annual Remote Sensing Symposium was organised on 21-22 October in Espoo with more than 100 participants and 40 presentations.

2.3.5 Remote Sensing Activities in France - 1999

Dr. Gérard Bégni, Chairman Société Française de Photogrammetrie et Télédétection (SFPT)

Introduction

French activities in the field of Earth study

and observation 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 and WCRP programmes, and with the recommendations of the national meetings - held periodically - on future scientific prospects. It also aims at developing the field of application of such systems in many socio-economic sectors likely to benefit by them, in laboratories and scientific institutions working in various fields, as well as in service and added-value industries using the results of applied research.

This activity is led quite systematically in the scope of international co-operation, inspired by CEOS initiatives of co-ordination, and shared between the programmes designed by the European Space Agency (of which France is a major partner) and those developed according to other scenarios. Please note that SFPT issued in 1999 a special bulletin (n° 154) dedicated to CNES (French Space Agency). Our French-speaking readers who would like to know more about some subjects presented in our report shall refer to this bulletin.

Conclusions from the 1998 meeting on future scientific prospects

French scientists involved in Earth and Universe sciences meet every four years to review the progress in the current understanding as well as the part played by space programmes. They also issue recommendations about the implementation of new programmes according to research priorities in the various fields involved. Such a seminar on future scientific prospects was held in Arcachon (France) in 1998. It enabled the analysis of the future programmes to be implemented, particularly taking account of technological developments, existing scientific and commercial programmes, similar programmes under development, programmes elsewhere defined (particularly in synergy with the ESA 'Earth Explorer' programme) and realistic programme hypotheses stated by CNES. This seminar adopted several recommendations within the priority sets of themes: inner geophysics; atmosphere, ocean and climate; continental biosphere. These recommendations either concern the follow-up of innovative programmes such as JASON-2, VEGETATION-2, a new generation of wide field observation systems, either aim at designing new missions. To achieve this objective, it has been recommended to implement a programme of mini-satellites, at a pace of one every two or three years (JASON-1 is the first element of such a programme); and a programme of micro-satellites, at a pace of approximately two per year. For instance, in the field of continental biosphere, beyond VEGETATION-2, two kinds of studies have been highlighted: water and carbon cycles and local plant productivity

on the one hand; water and carbon cycles and global evolution of ecosystems (including ground humidity content) on the other hand. The actions led in 1999 follow up the guidelines resulting from this seminar.

Contribution to ESA programmes

Co-operation in 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 one in a way complementary to ESA and other European countries strategies. France is particularly involved in the main programmes of the European Space Agency, including the programmes implemented together with EUMETSAT: exploitation of ERS satellites, development of ENVISAT, MSG, EPS/METOP, EOP and EARTHNET programmes, definition of the future programme 'live planet' and its components EOEP and 'Earth Watch' (see 'EARSel newsletter' n° 35, §3.1).

The European Space Agency made important decisions in 1999, in particular during the Minister Conference (May 11th and 12th, 1999) and the Granada Conference (October 12th-15th: selection of the GOCE and ADM programmes in the scope of the main missions of the 'Earth exploration' programme, as proposed by ESAC – see 'EARSel Newsletter' n° 39, §3.1). This decision has been confirmed by the PB-EO on November 17th/18th. Besides, the CRYOSAT and SMOS opportunity missions, selected by the PB-EO on May 26th/27th, have obtained a favourable decision on September 21st/22nd.

For a global overview, our reader shall refer to the information made available by ESA. However, two points regarding France are worth mentioning. In partnership with EUMETSAT and other European countries, CNES is developing the IASI sounder, to be placed onboard the METOP satellites. It is a wide field infrared interferometer, which mainly allows to provide profiles of atmosphere temperature (1°K accuracy) and humidity (10% accuracy), with a kilometric vertical resolution. Besides, we have already mentioned the decision to implement the A/B phase of the SMOS mission. This mission

to measure ground humidity and ocean salinity (formerly named RAMSES), nominally scheduled for 2004, was proposed by French scientists (CESBIO), in line with the recommendations of the 1998 national seminar on future scientific prospects.

The SPOT and VEGETATION programmes

A description of the SPOT programme situation in 1997 has been redacted by the author in 'EARSel Newsletter' n° 31, §4.1; the SFPT bulletin above mentioned gives the latest update. The successful launching of SPOT-4 on March 23rd, 1998, has considerably enhanced the system. In the field of high resolution, in 1999, three satellites enable to observe the Earth surface in panchromatic mode with a 10-metre resolution, and in multispectral mode with a 20-metre resolution. SPOT-4 includes the wavelength said 'short wave infrared' (SWIR: 1.58-1.75 μm). Moreover, a 40-minute recording capacity onboard enables SPOT-4 to observe any part of the Earth surface without views from direct receiving stations – SPOT-1 and 2 no longer offer this capacity. It is worth mentioning that, in order to develop the use of SPOT images by the national scientists, CNES has decided together with SPOT IMAGE to grant them special rates.

Besides, SPOT-4 takes onboard the VEGETATION-1 instrument, developed in cooperation with the European Commission, France, Belgium, Sweden, and Italy. This system is exploited by a ground segment whose production unit is located in Mol (Belgium); it enables observations of medium resolution (1.1 km), wide field (2200 km) and typically daily high repetitiveness.

2.3.6 Remote Sensing Activities in Germany - 1999

Prof. (em.) Dr. Gottfried Konecny, University of Hannover, Germany

In Germany there are 23 member laboratories. In preparation for this report, all were contacted by e-mail or fax to submit an input. Only 10 have responded with a specific contribution. Of the other 13, 8 have listed Web-pages in the directory. However,

only 5 could be accessed: The other 3: Dornier (www.eds.dofn.de), Optimare (www.optimare.de) and UVE Remote Sensing Centre (www.fez.uve.de) are no longer valid.

Specific reports from the 10 laboratories which have responded and the news compiled from the accessible Web pages are as follows:

BGR, the Federal Agency of Geosciences and Resources, Hanover (Prof. Bannert) works on the following projects:

- Surface processes over abandoned underground mines in Germany
- Use of the airborne Hymap Scanner over urban areas.
- Photogeological studies in Namibia
- Mapping of salt structures with MOMS-02-P data in Thailand
- Environmental geology in Uruguay, Paraguay and Argentina
- Use of radar data over hydrocarbon prospecting areas in Pakistan
- Study of mineral deposits in Yunnan Province of China with Landsat-TM

At BGR Dr. Hoppe is retiring for health reasons

Technical University of Dresden, Institute of Cartography (Prof. Buchroithner)

Prof. Buchroithner organised a remarkable NATO Workshop with the support of EARSel participants, in conjunction with Dr. Samimi in Tirana, Albania, on remote sensing for the country (Prof. Parlow, Dr. Benes, Dr. Büttner and the reporter were present).

- Design of a spaceborne system for mobile objects. Validation for traffic surveys on roads using aerial photos has been carried out.
- Editorship for remote sensing within an encyclopaedia on geosciences has been assumed.
- SAR use for production of topographic and thematic maps has been tested in Bavaria.
- A digital surface model has been compiled from aerial and terrestrial photos for the Eiger north face in Switzerland.
- A GIS including its mapping has been completed for a part of the Altai region in Siberia with multi-sensor data.

The Federal Institute for Applied Geodesy

(IFAG), Frankfurt, has changed its name to Federal Agency for Cartography and Geodesy (BKG). Prof. Gruenreich is the new president.

- The BGK integrates remote sensing data into the federal mapping program at small and medium scales.

The Department of Remote Sensing and Land Information in the Faculty of Forest Science, University of Freiburg (Prof. Barbara Koch), has analysed forest stands. Prof. Koch heads up Earsel's SIG on Land Applications.

The Department of Geography, University of Trier (Dr. Hostert) undertook the following projects:

- Monitoring of desertification in the Mediterranean Basin including ecological monitoring.
- Flood risk reduction identifying critical areas via Landsat-TM, GIS and hydrological models in Rhineland-Palatinate.
- Land use changes following fires in Mediterranean areas (Spain and Greece) using Landsat-TM.
- Mediterranean Ecosystem Dynamics Modelling.
- Recovery Processes of Disturbed Arid Ecosystems in Israel using land cover changes via aerial photos and satellite imagery.
- MOMS-2-P and IRS-1C for forest condition in Rhineland-Palatinate.
- Establishment of an Environmental Regional Research Centre to tackle forest management, precision agriculture, and climatological modelling of air pollutants

German Aerospace Research Establishment DLR

The DLR has been reorganised with old Institute heads retiring

- The old Institute of Optoelectronics has completed the MOMS-02-P three-year mission, in which 65M km² of the Earth's surface were imaged. While no proper marketing of the data is carried out, the data are available at low cost via the Web address:

<http://www.nz.dlr.de/moms.2p/>

- The MERIS sensor is to be placed on Envisat. DLR is making preparations for its use.

- DLR undertakes an Envisat oceanography project combining optical and microwave data.

Institute of Photogrammetry and Cartography, Technical University of Berlin (Prof. Albertz)

The Institute engages in preparations for the high resolution stereo camera mission (HRSC) for Mars Express Orbiter (2003) to generate image maps. Together with DLR-Adlershof a project is undertaken to develop remote sensing uses in a Gigabitnet.

Faculty of Physics, University of Oldenburg (Dr. Reuter)

Information is contained on the Web page: www.bis.uni-oldenburg/de/forschungsbericht/

Dr. Reuter co-ordinates the EARSel SIG on Lidar Remote Sensing of Land and Sea.

Federal Agency for Nature Protection, Bonn (Dr. Arnold)

Risk analyses are carried out for biotopes concerning fauna and flora in Germany.

GAF, Company for Applied Remote Sensing, Munich

For many years, GAF has been the major remote sensing company in Germany. In collaboration with DLR it manages the Neustrelitz reception station for European coverage of IRS-1C/D data and provides browser facilities for other German territory satellite data.

The Institute for Meteorology, Free University of Berlin (Dr. Eckardt) engages in the following projects:

- NDVI with 1 km resolution for Central Europe and the Mediterranean area since 1989.
- Radiation flux determination at ground level from half-hour Meteosat data over the Mediterranean region.
- Monthly determination of sea ice limits over the Atlantic Arctic since 1966.

The Institute of Navigation, University of Stuttgart (Prof. Kleusberg), carries out the following projects:

- X-SAR/SRTM validation
- The use of satellite data for soil utilisation and yield determination in Baden-Wuerttemberg

- Land use classification for agricultural fields with ERS-1/SAR and optical remote sensing data

The Institute for Photogrammetry and Engineering Surveys, University of Hanover, carried out the following projects:

- Software development for orthophoto and DEM generation from optical satellite stereo images (MOMS-02-P, IRS-1C/P, Ikonos-2)
- SRTM-DTM generation and validation
- Knowledge-based updating of GIS via satellite images

The Institute of Physical Geography, University of Freiburg, works on the following projects:

- Radarsat and ERS-1/2 data for Antarctic regions to determine snow depths
- Utilisation of optical airborne and satellite data, in combination with radar data, to study glaciology and climatology in King George Island (Antarctica)
- Use of balloon photographs for the study of geomorphodynamic processes in Northern Spain
- Data compression of radar images via wavelets (Antarctica)
- Use of TM and thermal aerial images for climate analysis in East Germany in combination with GIS.

The Institute of Land use and Nature Preservation, University of Munich (Prof. Ammer, Dr. T. Schneider) monitors:

- protected forest areas in the Bavarian Alps with MOMS-02-P data,
- Alpine relevant environmental parameters by satellite data
- investigates bi-directional reflectances of agricultural areas.
- forest ecosystems
- maps inundation dynamics in Croatia
- investigates erosion in the Shaanxi province of China

The Remote Sensing Group, Geographic Institute, University of Bonn (Prof. Menz) engages in the following projects:

- Modelling of vegetation dynamics in semi-arid ecosystems in East Africa via multi-sensor approaches (Envisat and other sensors)
- SRTM evaluation preparations for East Africa and the Bonn region

- Participation in the Global Land Cover Working Group for Europe and North Africa

No reports have been obtainable from the following institutions:

- Working Group Remote Sensing, Institute of General and Applied Geology, University of Munich (Prof. Boedechtel).
- Daimler Benz Aerospace (Dr. Lutz)
- Dornier Satellite Systems (Dr. Ensslin)
- Institute for Geography, University of Munich (Prof. Mauser)
- Max Planck Institute for Meteorology, Hamburg (Prof. Hasselmann)
- Optimare GmbH, Wilhelmshaven (Dr. Hengstermann)
- UVE Remote Sensing Centre, Potsdam (Prof. Marek)

General Remarks

Research in remote sensing has been severely cut by the curtailment of government expenditures in the field.

Governmental Space Budget The Federal Ministry for Science and Research (BMBF) has agreed to participate in ESA's Science Program (Earth Explorers). However, with commitments to Ariane-5, the Space Station and to industrial ventures (Galileo, Terrasar and Rapid-Eye) next to no funding is left for new projects.

DLR commitments DLR is committed to supply a yearly Landsat-7 coverage to German scientific users. DLR is committed to the SRTM mission and its uses and the utilisation of Envisat sensors (MERIS). Support for the utilisation of past space missions (MOMS-02-P) has ceased. The intended Indian collaboration with CARTOSAT has been frozen due to political reasons. The one-time intended SPOT-5 collaboration with CNES has been stopped.

Industrial Developments Terrasar (DASA) and Rapid-Eye (Kayser-Threde) are planned commercial missions requiring further governmental funding.

2.3.7 Remote Sensing/GIS Activities in Poland - 1999

Dr. Z. Bochenek, Remote Sensing and Spatial Information Centre, Warsaw, Poland

Use of ERS, JERS and RADARSAT SAR data for soil moisture assessment

Information from different satellites has been applied to detect soil moisture during vegetation growth within this research project. Vegetation monitoring has been carried out applying high resolution data from ERS-1/2 SAR, ATSR, JERS and RADARSAT. The different soil moisture indices have been calculated, which were based on evapotranspiration values calculated from ERS-2 ATSR using surface temperature and meteorological data. The new index was developed on the basis of backscattering coefficients calculated from ERS2, JERS and RADARSAT, using different wavelengths and polarisations. The research has been conducted for various crops and validated through detailed ground measurements.

Remote sensing based system for crop condition assessment and yield forecasting

The project was aimed at creation of the system for crop condition assessment and yield forecasting, incorporating remotely sensed data. The system is based on operational use of NOAA AVHRR images, to produce vegetation indices characterising crop growth conditions. It is supported by meteorological information and other relevant data influencing potential yield of crops. The multisource database of the system, which includes various information layers, enables to make yield modelling for the main crops in Poland, which incorporates remotely sensed information.

Assessment of areas with excessive soil moisture during the flood using ERS-2 images.

The project is aimed at preparation of effective method of assessing soil moisture content for areas with high flood risk. ERS-2 satellite image has been used for the study area located in western Poland, which was heavily flooded in July 1997. As ERS-2 SAR images proved to be the only effective tool for rapid assessment of extent of flood in 1997, these data have been selected for the work within the project. The research has been undertaken in 1998. In July 1998 and 1999 the ground observations have been carried out in order to develop the method of soil moisture estimates. The measurements of soil moisture and vegeta-

tion parameters have been done for the area of 100x100 km² covering the whole ERS scene.

Land use detailed mapping for the selected regions in Poland aimed at determination of Level 4 of CORINE nomenclature

The works on extending number of land use classes delineated with CORINE Land Cover Programme were carried out within this project. Aerial photographs and new generation, high-resolution satellite images were used to distinguish the detailed categories. As a result of the works 97 land use/land cover classes were determined, which form Level 4 of CORINE nomenclature.

Integrated Spatial Information System for Agriculture

The work on creating an integrated spatial information system for agriculture was started in 1999. The system is built in close co-operation with the agricultural institutes and organisations in Poland. There are four main modules of the system:

- soil module, including model of potential erosion in local scale
- agroclimate module
- model of real erosion assessed in regional/country scale
- yield forecast model using remote sensing methods

Creation of the Land Cover database for the Odra river catchment

The aim of this project, conducted jointly with Joint Research Centre, Ispra, was to create land cover database for Odra river catchment, corresponding to base year 1975 and compatible with the existing CORINE Land Cover Database. This kind of information is indispensable for studying the impact of human activity on flooding conditions. Landsat MSS images were used for producing 1975 land cover map; this map was then compared with the 1992 CORINE land cover map in order to prepare a change detection map for the study area.

Land Cover map of southern region of Poland – Malopolskie voivodship

The aim of the work was to produce a colour land cover map at a scale of 1:200 000 for the Malopolskie voivodship. The

map has been prepared on the basis of data stored at the CORINE Land Cover database. 1997 Landsat TM data and images collected by Indian IRS satellite were used for updating contents of the map.

Map of natural sites in Poland

The map of natural sites in Poland in the scale of 1:750 000 has been prepared with in CORINE Biotopes programme. It includes the following thematic layers:

- land use/land cover according to CORINE Land Cover database
- natural sites in Poland of European importance
- boundaries of national and landscape parks.

Regional Spatial Information System for Wielkopolska

The work on creating regional spatial information system for Wielkopolska – a region located in western Poland - began in 1999. The system will collect spatial information contained in large-scale, medium-scale and small-scale maps. The model of data management will be open to the other information systems. The main modules of the system are:

- database with spatial information
- metadata module
- input module for acquiring and updating spatial information stored in database
- output module for graphic presentation of spatial information
- analytical module

2.3.8 Remote Sensing Activities in Spain - 1999

Prof. Dr. J. L. Casanova, Chairman, Spanish Remote Sensing Association

The Telenet network has been consolidated as the means of communication in Spanish between users and members of remote sensing, now reaching 340 members.

Issues 10 and 11 of the Remote Sensing Journal (in Spanish) have been published. The Association web-site has been created, which also includes the A.E.S.I.G. (Spanish Association of Geographic Information Systems) as well as the S.E.C.F.T. (Spanish Society of Cartography, Photogrammetry and Remote Sensing), the most significant

being the interactive data base "Who's Who". The number of members has increased 15%, and currently stands at 226.

The association has been involved in the following courses and conferences:

- VIII National Conference on Remote Sensing, Albacete, September 1999.
- Course on Forest Fires in collaboration with the Central Office for Civil Protection. Madrid, February 1999.
- Course on Coastal Water Management, Valladolid, March 1999.
- 19th EARSel Symposium, Valladolid, May-June 1999.
- Joint ISPRS-EARSel Workshop on Data Fusion, held in June 1999 in Valladolid.

Editing of a methodological document on the Seminar 'Legal Relevance of Remote Sensing'.

Publication of the directory "Who's Who in Remote Sensing". An advertising campaign has been launched in various specialised journals to attract new members.

2.3.9 Remote Sensing Activities in The Netherlands - 1999

Dr. L. L. F. Janssen, I.T.C., Enschede, The Netherlands

In The Netherlands there is one organisation dealing with both photogrammetry, remote sensing and geoinformatics professionals: Netherlands Society for Earth Observation and Geoinformatics (NSEOG). It is an active society which organises regular meetings. NSEOG, together with ITC, is responsible for the organisation of the XIX ISPRS Congress which will be held in Amsterdam (16-23 July, 2000).

Our National Remote Sensing Programme, which co-finances R&D activities in the field of RS (including airborne remote sensing) will end in 2000. In 1999, a study has been carried out to investigate if there should be a continuing role for the government to initiate/co-ordinate activities in this field. Decisions will be taken by the end of the year.

At the same moment, the User Support programme is under evaluation. This is a

specific programme that aims to help Dutch institutes and organisations in preparing for future ESA missions. This study might also give new directions towards the way in which Earth Observation research is stimulated in The Netherlands.

It must have been the 'fin de siècle' atmosphere since the Ministry of Public Works, Water Management and Transportation has also been evaluating in 1999: it has made an inventory of the operational methods which include RS technology (study: INVENT). My conclusion from this report: there is success in the field of meteorology and climate. In other fields hardly any operational RS-based applications have been developed apart from laser scanning and digital photogrammetry; technologies for which hardly any government financed R&D has been carried out.

2.3.10 Remote Sensing Activities in the United Kingdom

Dr. Kathie Bowden, Chairman of The Remote Sensing Society

1999 has been notable for the increased cooperation between the various entities involved in Earth Observation in the UK, and, but to a lesser extent, internationally. This has occurred because of the close contacts and relationships that have developed between the Remote Sensing Society,

the British Association of Remote Sensing Companies, British National Space Centre and the Association for Geographic Information. It culminated in a successful Seminar Programme and Demonstration Exhibit at the GIS'99 Conference and Exhibition, where the partners were able to showcase Earth Observation data in action to a wide variety of industry sectors.

The negotiations towards merger of the Remote Sensing Society and the Photogrammetric Society continue, and are expected to come to conclusion with a vote at the respective Annual General Meetings in the autumn of 2000.

A number of successful meetings were held over the year, addressing particular topics, possibly the most successful of which was on SAR Interferometry hosted by the Environmental Systems Science Centre at Reading on behalf of the RSS. The Society's annual meeting, held at Cardiff, was stimulating and well attended.

BNSC published the United Kingdom Space Strategy for 1999-2002 early in the year and the Remote Sensing Society, among others, have been invited to comment on the document. The UK has been closely involved with ESA's Living Planet programme which was launched in London. Updates on other ESA programmes have been well attended, particularly those addressing the Envisat Exploitation Programme, which have been very well supported.

2.4 Forthcoming EARSel events

later in 2000: Int. Conference: RISK 2000 – Space Techniques for the Management of Major Risks and Their Consequences.

Initiatives in the Euro-Mediterranean Region and world-wide.
Venue: UNESCO Hq. Paris

13-16 June 2000: 20th Symposium: A Decade of Trans-European Collaboration in Remote Sensing

Venue: University of Dresden, Germany, and two associated Workshops

16/17 June: Remote Sensing of Land Ice and Snow and LIDAR Remote Sensing of Land and Sea

The address of the EARSel 2000 home page is: <http://www.tu-dresden.de/fghgik/aktuell/earsel.htm>

11-13 July 2000: Symposium organised jointly by the SIG "Imaging Spectroscopy" and the SIG "Geological Applications", to

be held at the ITC, Enschede, The Netherlands, celebrating the 50th anniversary of this Institute and linked to the ISPRS 2000 to be held in Amsterdam.

13-15 September 2000: 1st EARSel Workshop on Remote Sensing for Developing Countries.

Venue: Gent, Belgium

15 - 18 May 2001: 21st EARSel Symposium

Organised in collaboration with the Société Française de Photogrammetrie et de Télédétection (SFPT).

Venue: Marne-la-Vallée (Paris), France

4-6 June 2002: 22nd EARSel Symposium

Invitation received from Czech national representative, T. Benes, of the UHUL Forest Management Institute.

Venue: Prague, Czech Republic

For more details on all these events, please contact the EARSel Secretariat

Delegates from the UK have attended UNISPACE III and EURISY, both as representatives of the Society and as national representatives. RSS also fully supports the ATENEO proposal being submitted to the EC for Concerted Action Funding under FPV.

Within the UK a number of initiatives for education and training are being followed and promoted. There is continuing use of the 'Window on the World' CD-ROM within the UK and it has been requested for and

used in some 60 other countries around the globe. The Society or BNSC can still provide copies of the CD to anyone wishing to use them for educational purposes. The Remote Sensing Society been invited to participate in a second CD-ROM project for BNSC, entitled 'Window on the World – UK 2000'. This product will, once again, be distributed nationally by a Sunday newspaper, free of charge and the Society and BNSC will have copies for distribution to other interested people.

3 3 NEWS FROM ESA, THE EC AND THE COUNCIL OF EUROPE

3.1 European Space Agency

Guy Duchossois, Günther Kohlhammer

As in previous years, we should like to take advantage of the New Year to bring you up-to-date with the most significant aspects and current status of the ERS and ENVISAT Programmes, together with our objectives for the year 2000.

Mission and Satellite Status

ERS-2 is currently providing the operational services while ERS-1 is maintained as backup. Both satellites are still in excellent technical condition, especially considering that ERS-1 has been in orbit since 1991 (43900 orbits have been completed since then) and ERS-2 since 1995 (with a total number of 24000 orbits completed). The ERS data archives now contain 8 years of global LBR data; 2.2 million SAR scenes have been collected all over the world and are available for distribution. Last autumn, Member States approved, through the Earth Observation Programme Board, the Envelope Programme, thereby funding the ERS operations and services for the next three years.

ENVISAT is now planned for launch by end of June 2001. The Envisat Satellite Flight Model has successfully passed Thermal Balance and Vacuum Tests last summer. All FM instruments have been delivered and integrated except ASAR and SCIAMACHY, which are planned to be delivered in Janu-

ary/February 2000. The Payload Data Segment (PDS) is currently under acceptance testing, with the complete ESRIN and Kiruna configurations.

The Flight Operations Segment (FOS) integration is progressing according to schedule.

Updated information regarding the Envisat mission and system, can be found on the web site <http://envisat.estec.esa.nl> or obtained via the EO help: eohelp@esrin.esa.i

Events

During 1999, ESA contributed to several workshops and meetings: the EuroGOOS Conference, the 19th EARSeL symposium, IGARSS'99, the 50th IAF Congress, UNISPACE III, Le Bourget/Paris Air Show '99, etc.

In addition, ESA organised dedicated workshops on:

ESA Earth Observation Supply Chain Workshop, 8-9 April 1999 - ESRIN - Frascati (Italy) http://earth.esa.int/esa_eo_supply

International Workshop on Applications of the ERS Along Track Scanning Radiometer, 23-25 June 1999 - ESRIN - Frascati (Italy) <http://www.esa.int/atrsconf/>)

CEOS SAR Workshop - ESA/CNES - Toulouse (France) 26-29 October 1999 <http://www.estec.esa.nl/CONFAN-NOUN/99b02/index.html>

Second International Workshop on ERS

SAR Interferometry - FRINGE '99, 10-12 November 1999, Liège (Belgium) <http://www.esa.int/fringe99>

For further information on these and other ESA supported workshops, please refer to the web site <http://earth.esa.int> and then click on Library, Software and Events.

ERS data acquisition

Global coverage with ERS-1/ERS-2 tandem pairs has been further complemented within the ERS-1 acquisition constraints (2 passes per day for a maximum of 4 minutes of acquisition) for the coverage of Cotopaxi (Equador), Cordoba (Argentina), Singapore, Libreville (Gabon) and Kitab (Uzbekistan) stations. Two O'Higgins campaigns have also been carried out. Special ERS-2 acquisitions have been made to monitor recent earthquakes in Colombia, Turkey, Iran, Mexico, Greece and United States. Flooding events over Europe have also been monitored. Special acquisitions have been scheduled to observe volcanic activity all over the world. For full details on available data, please consult the ERS catalogue, DESCW or the Earthnet-Online web Pages <http://earth.esa.int>

Data Exploitation

ESA has recently consolidated its organisation to support and promote EO exploitation and applications development. A new division composed of four small groups has been set-up in ESRIN, Frascati. This covers:

User Support (mainly ESA AOs and International Scientific programmes), Support to Market Development (Data Distributors and Value Adding Companies), 3. Projects (Institutional Users and applications development programmes), EO Promotion and Training. An ESA EO Promotion Plan is being finalised in agreement with representatives from ESA Member States.

Announcements of Opportunity

Some 1400 ERS science and applications projects have been given support in past years.

The first and second series of Pilot Projects and Announcement of Opportunity have been closed.

Some of the AOs for the utilisation of data acquired by the German transportable station in Libreville/Gabon (AOL), and the

AOs for the utilisation of ERS Tandem data (AOT) are still active. The 283 proposals accepted in summer 1998 within the framework of the Third Announcement of Opportunity (AO3) are still ongoing. The procedure for monitoring and presentation of these proposals has been improved in order to maintain closer and more effective interaction with and amongst Principal Investigators and to prepare technical recommendations. An ESA correspondent has been assigned to each proposal and a web site <http://ers.esa-ao.org> has been set up to give the PIs the opportunity to publish the projects' achievements and give greater visibility of the AO Program-me inside and outside of ESA.

Furthermore, the web site provides a standard tool for submitting reports and other related information. The evaluation of the proposals received in response to the First ENVISAT Announcement of Opportunity, released at the end of 1997, has been completed. More than 732 proposals were submitted, of which 674 were accepted. 183 proposals also asked for ERS data and 27 of them, mainly in the area of cal/val activity, have already placed orders.

A similar monitoring procedure and web site, as for the AO3 projects, will be implemented for the Envisat AO proposals.

The joint ESA and EUMETSAT MSG Research Announcement of Opportunity (Meteosat Second Generation due to be launched at the end of 2000) was issued in February 1999. More than 50 proposals were submitted; after evaluation and interaction with users, 43 of them have now been accepted, some also requesting ERS and ENVISAT data.

In line with the Space Charter Announcement made at UNISPACE III, in July, shortly after the Izmit earthquake (Turkey, 17 Aug. 99), ESA decided to make available a well-defined set of ERS SAR data over the area to expert groups upon presentation of a project proposal. A total of 26 projects were accepted and received the same ERS SAR data set covering pre-seismic and post-seismic acquisitions. The first results obtained by these groups were presented at a special session during the Fringe'99 workshop.

The main result is a surface deformation map, which indicates with centimetric ac-

curacy the magnitude and extent of the surface deformation. Further investigation and conclusions are on-going.

Data policy

Following approval of a new ERS data policy which is now aligned to the Envisat data policy, the contract procedure for appointing ERS and Envisat Distributing Entities for at least the coming four years has been initiated. These Distributing Entities are expected to start offering their services in Spring 2000 for all operational and commercial use (category-2 use) with a much higher degree of flexibility and responsibility.

Data for scientific use (category-1 use) will still be distributed by ESA, subsequent to peer review.

Forthcoming Events for 2000

The main event planned for the year 2000 is the ERS / ENVISAT SYMPOSIUM to be held in Gothenburg (Sweden) from the 16 to 20 October 2000. A first announcement and a call for papers has already been issued.

Information regarding this event can be found on the web site <http://www.esa.int/sympo2000/>. The Symposium is open to all interested parties from scientists to operational and commercial users and service providers. ERS and Envisat Distributing Entities, Value Adding Companies and Service Providers are strongly encouraged to participate to illustrate their contribution in an active EO market. We expect some 200 ? 300 presentations of results from the ESA Principal Investigators, in particular those working on the Third Announcement of Opportunity for ERS Data (AO3). Also the projects carrying out preliminary cal/val activities on Envisat, are welcome to present the status of their investigation.

In conclusion, we feel that 1999 has been another eventful and successful year for the ERS mission; we are confident that 2000 will see its continued success and a smooth transition to the Envisat-1 mission in the coming year.

3.2 European Commission

3.2.1 Earth Observation Data Policy and Europe (EOPOLE)

The EC DGXII has sponsored a concerted action project under Framework IV/Earth-Observation Data Policy and Europe (EO-POLE). Europe has a diversity of opinions on EO data policy because of the differing national objectives of its Member States. Opinions are often divided and are poorly developed from the user side. The primary objectives of the EOPOLE concerted action project are therefore:

to review and co-ordinate relevant European national research in EO data policy with a strong user perspective, to identify and recommend improvements to EO data policy with a distinctly European perspective in order to provide better conditions for the expansion of the EO sector, and so to contribute to the objectives of the Centre for Earth Observation (CEO).

Prof. Ray Harris of University College London, and Frans G. von der Dunk of the University of Leiden have written articles on this topic in the ECSL News No. 20, dated December 1999.

The EOPOLE project web site acts as the centre for the collation of information about EO data policy. It can be consulted at: www.geog.ucl.ac.uk/eopole/

3.2.2 THESEO 2000

On 22 January 2000, in the Arctic Research Centre of Esrange, Kiruna in Sweden, EC Research Commissioner Philippe Busquin introduced a press briefing to present the Theseo 2000 campaign (Third European Stratospheric Experiment on Ozone), a major part of the biggest field campaign ever studying the ozone loss over the Northern Hemisphere. Together with the US NASA-sponsored Solve project (SAGE III Ozone Loss and Validation Experiment) and a number of national agencies around the world, the Theseo 2000-Solve campaign brings together more than 350 scientists measuring ozone and other stratospheric gases using aircraft, large and long-duration balloons, ozonesondes, ground-based instruments and satellites.

The Theseo presentation marked the beginning of a decisive period in the development of the Arctic stratosphere. Over the last ten years or so, cold winters have been

a prerequisite for maximum ozone depletion, and scientists now understand the chemical processes in the stratosphere that cause the phenomenon. It has been very cold during December 1999 and the first half of January 2000. For most days in this period the temperatures at altitudes around 21 km were close to, or lower than, the lowest in the long-term records from 1966 to 1997. According to current understanding, the conditions for chemical ozone destruction are in place in the Arctic vortex. On the basis of preliminary data, substantial depletion may take place. How much ozone will be lost depends on the evolution of the stratosphere in the coming weeks.

'The Theseo 2000 campaign is an excellent example of EU-funded research. It addresses an issue which is important to all European citizens, for, to avoid the increased UV radiation caused by ozone decline impairing our health and well-being, it is vital to understand what is happening in our atmosphere,' Research Commissioner Philippe Busquin explains. 'The campaign is closely co-ordinated with national

research programmes, thus maximising the added value at European level. And beyond that, Theseo contributes to international research and efforts to phase out ozone-depleting substances, in line with the aim of the Montreal Protocol.'

Further information, including a list of participating institutions, can be found at the Theseo 2000 and Solve web sites:

<http://www.ozone-sec.ch.cam.ac.uk>

<http://www.nilu.no/projects/theseo2000>

or <http://cloud1.arc.nasa.gov/solve>

Information can also be obtained from:

- Dr Georgios Amanatidis, Scientific Officer, Environment and Sustainable Development Programme, Research DG, at georgios.amanatidis@cec.eu

- Piia Huusela, Press and Information Officer, Research DG at piia.huusela@cec.eu.int

Information on the Research DG is available from: <http://europa.eu.int/comm/research>

4 4 RS DATA, PRODUCTS AND PROJECTS

4.1 Observations

*Wim Bakker, ITC, The Netherlands
4 February 2000*

1999/2000 Last year 1999 was a good year for Remote Sensing. About 20 civil imaging satellites were launched of which 2 failed. ROCSAT-1, SunSat, INSAT-2E, Landsat-7, UoSAT-12, Fengyun-1C, Oceansat, KitSat-3, DLR-Tubsat, QuikSCAT, Okean-O#1, Ikonos-2, RESURS-O1#5 (-O2?), CBERS-1, Terra, and KOMPSAT made it safely into space. Only Ikonos-1 and MTSAT didn't make it. This should be good news to investors and insurance companies that have grown wary after the many failures in, especially, the communication satellite business. Also the year 2000 promises to be a good year for Remote Sensing. Many inter-

esting projects are scheduled for launch this year. Commercial RS will get another boost with the launch of the OrbView, EROS and QuickBird satellites. NASA will fly their Space Imaging Radar again onboard the Shuttle; this time on an Interferometry mission. Later, the Shuttle will be used carrying the VCL (Vegetation Canopy Lidar). The NASA will launch some new experimental sensors onboard the EO-1 satellite. Europe will launch its "Battlestar Galactica" among the satellites, the Envisat-1. Etc. etc.. The following launches are planned for the first quarter of this year: 7 Jan ASUSAT (launched), 31 Jan Shuttle/SRTM, 20 Feb MTI (MS thermal imager), 24 Feb EROS-A1, Feb ARTEMIS (OK, not RS, but an important sat-to-sat laser relay communications experiment at 50Mb/s), 30 Apr OrbView-3, QuickBird, 13

April NMP/EO-1. An updated list of scheduled launches of Remote Sensing satellites can be found on my pages <http://www.itc.nl/~bakker/launch-table.html>.

Ikonos-2 The IKONOS commercial remote sensing satellite was awarded one of the most coveted prizes for technological achievement in the space industry - The Industry Innovation Award in the Technology Category - from the Society of Space Professionals International.

MTSAT Japanese launch-control authorities destroyed an H2 rocket carrying a dual-mission weather and navigation satellite after a shutdown of the rocket's first-stage engine about four minutes after liftoff 15 November. Leaking fuel might have caused the accident. Japan must review its space program after being forced to explode the 24-billion-yen rocket and satellite by remote control. The H-2 rocket and MTSAT satellite were exploded when it veered off course after liftoff. From its geostationary orbit, the Multifunctional Transport Satellite (MTSAT), would have served two different missions. The satellite would have tested communications and navigation technologies to improve the quality of links between Japanese aircraft and air traffic controllers. In addition, a camera on the 2,900-kg spacecraft would have returned visible and infrared weather images, replacing the existing GMS-5 satellite.

Helios-1B Europe's second operational spy satellite, Helios-1B, was launched Dec. 3. The Helios satellites are equipped with optical imagers that have a ground resolution of about 1 meter. France is moving forward with a \$2 billion second-generation Helios system, which like Helios 1 will include two satellites but with sharper resolution and infrared imagers. It is unclear whether the current partners, Italy and Spain, will also join in Helios-2.

DMSP-F15 The U.S. Air Force launched the first of a new generation of military weather satellites 12 December. The new DMSP Block 5D-3 series can accommodate larger sensor payloads than earlier generations. They also feature a larger power supply; a

more powerful on-board computer with increased memory, allowing greater spacecraft autonomy, and increased battery power that will extend the mean mission duration. The DMSP satellites are operated by NOAA. Early in the next century, DMSP and NOAA polar-orbiting satellites will converge into a combined system, known as the National Polar-orbiting Operational Environmental Satellite System, or NPOESS. NPOESS launches should begin in about 2008, after NOAA and the Air Force have both exhausted the satellites currently in the "pipeline."

Terra was finally launched 18 December. Currently, all its instruments are activated on one by one. Everything seems to be going well. A possible problem with one of the thrusters for orbit manoeuvres will be investigated. Terra, formerly known as EOS AM-1, is the first in a series of ten spacecraft to be launched in the next decade to study the Earth and its environment from orbit as part of NASA's Earth Observing System. Terra carries five instruments that will study various aspects of the Earth's land and water masses and its atmosphere.

Insat-2E India's weather satellite program suffered a setback with the failure of the main meteorological sensor on the Insat-2E spacecraft. The failed instrument is Insat-2E's enhanced very high-resolution radiometer (VHRR), which was designed to image clouds and measure their water vapor content. Insat-2E, launched April 3 by an Ariane rocket, has not been sending VHRR images since problems surfaced with the instrument in September 1999.

CBERS-1 The recently launched China-Brazil remote sensing satellite has a clean bill of health reports the official Chinese news agency Xinhua. The China-Brazil Earth Resources Satellite (CBERS-1), also called Ziyuan-1 (ZY-1), was launched on 14 October last year from the Taiyuan Satellite Launch Centre in the northern Shanxi Province. According to the Chinese Academy of Space Technology, the Chinese partner in the project, CBERS-1 has completed all on-orbit tests and will go into operation soon. The First image obtained through the Wide Field Imager (WFI) camera from the

CBERS-1 satellite can be found on the Net: <http://www.inpe.br/programas/cbers/english/imagens.html>

The replacement of this satellite, CBERS-2, is planned for a 2001 launch. The second attempt to lift a satellite into orbit with a Brazilian VLS-1 also failed. The rocket veered off course and had to be destroyed just 200 seconds after lift-off. In November 1997, an earlier incarnation of the VLS-1 carrying a small scientific satellite had to be destroyed after it, too, flew out of control shortly after lift-off.

SRTM The launch of the Shuttle Endeavour, carrying the SRTM (Shuttle Radar Topography Mission) was delayed to 11 February. The 11-day Shuttle Radar Topography Mission (SRTM) will employ a measurement technique called inter-ferometry to gather images of a large majority of the Earth's surface. In order to gather these images, two Radar-antennae will be used, including one on a 60-meter mast that will be the largest fixed structure ever flown in space.



Radarsat-2 After being severely frustrated by US bureaucracy the Canadians have decided to drop the main American contractor, the Orbital Sciences Corporation, on the Radarsat-2 program. It was the only rational thing Canada could do given the US government's inability to guarantee that some future bureaucratic snag would not prevent timely launch of their space craft. Instead, Canada has selected Alenia Aerospazio, Italy, to build the Radarsat-2.

RapidEye AG of Munich, Germany, announced an agreement with Surrey Satellite Technology Ltd. (SSTL) based at the Surrey Space Centre, UK, to become the prime contractor and spacecraft platform supplier for the \$100M USD RapidEye constellation of four advanced Earth Observation minisatellites. To strengthen the partnership SSTL plans an equity investment in RapidEye. RapidEye Inc., incorporated in December 1998, is a new satellite-based GEO-information service company. The RapidEye Earth Observation system, to be launched in 2002, will provide 6.5-meter resolution wide-swath multispectral imaging with a daily revisit and

is targeted primarily at agricultural applications. The 380-kg RapidEye minisatellites will use the SSTL minisatellite platform whose capability has been demonstrated in orbit by the SSTL UoSAT-12 mission, launched in April 1999.

ROCSAT-2 Taiwan is to award French company Matra-Marconi Space a contract for building the second ROCSAT, after the German government refused to issue the required export license. Taiwan's first fully owned science and imaging satellite ROCSAT-1 was put into orbit in January 1999.

4.2 CEOS CD-ROM 'Resources in Earth Observation'

CD-ROM included in this Newsletter

The French Space Agency (CNES) is happy to provide EARSel Newsletter readers with a copy of the 1998 edition of the CEOS CD-ROM prepared by the CNES on behalf of the Committee on Earth Observation Satellites (CEOS), which aims at contributing to the better knowledge of Space technologies applied to the observation of our planet.

While initially conceived to meet the needs of developing countries, we rapidly discovered that this CD was highly appreciated and requested by all kinds of RS users, including many working in education. This CEOS CD-ROM is the third edition, but it has kept the original features that have made it very popular and quite unique.

Firstly, it covers a very wide range of techniques and applications. Secondly, its contents may be used or reproduced quite freely for promotional or educational purposes, as long as reference is made to the source being the CEOS CD-ROM. Last and by no means least, it is extremely easy to use (no fancy animations, no exotic side list eating up your screen, just as simple as a book. In fact, no need to explain anything, just take a look at it by putting it into your CD reader and use your usual Internet browser (since the CD is prepared as a local Internet service). Furthermore, most of the technical matters connected with remote sensing have been grouped together,

so you may easily switch from basic physics to crop yield monitoring, from descriptions of satellites to examples of images, from theory to applications and so on.

Topics covered include:

- Education
- A presentation of remote sensing satellite systems
- Applications
- References and much more.

We should like to stress the specificity of this CD-ROM which is its simplicity:

- simplicity because it relies on standardised HTML,
- simplicity because you may use it without installing anything on your machine (even a local browser is provided if you do not have one),
- simplicity because it is based on simple presentations and choices,
- simplicity because you may reproduce part of it for a presentation or even a short information document.

In short, this ought to be the CD you carry in your pocket when travelling in case you may need to convince or introduce RS to those who are unaware of its potential (from schoolboys in developing countries to top managers in developed ones).

Today, it is not the best training CD-ROM I have ever seen, it is not the best promotional CD ever made, it does not include the most striking image presentations tool, nor the best technical database, but it is just the best "Swiss knife" I have ever found for my day-to-day business!

The new millennium version is now under way and we hope it will become more and more popular thanks to your contributions. So please do not hesitate to forward any comments or even propose some of the contents of your site and become a CEOS CD-ROM 2000 estimated contributor.

Further copies may be made available, as long as they are used for education and promotional purposes. Your local CEOS representative is supposed to carry out the distribution, but in case he might be short of copies, send your request to:

Jean-Pierre Antikidis
CNES Programme Directorate

Earth Observation
CEOS CD-ROM task leader
Tel: +33 5 61 282747
Fax: +33 5 61 274013
Email: antikidis@cnes.fr

4.3 BILKO Module 9: 'Coastal Erosion'

About UNESCO BILKO

The UNESCO BILKO project has over the last 10 years developed a resource for the International Community by furnishing individuals and institutions with learning materials, free of charge, to enhance knowledge and interpretation of digital image data from airborne, satellite and in situ sensors. The pedagogical materials have evolved over a decade in support of human resources and infrastructure development, especially in economically less favoured countries. UNESCO continues to support the BILKO project under the Environment and development in coastal regions and small islands (CSI) which is concerned with the encouragement of intersectoral actions that assist member states towards environmentally sustainable, socially equitable and culturally appropriate development in their coastal regions. There is a web site dedicated to the project where you may download a copy of the software and lesson materials free of charge after registering your interest at <http://www.ncl.ac.uk/tcmweb/bilko/bilko.htm>. The BILKO project co-ordination office is hosted by ITC's Division of Applied Geomorphological Surveys in Enschede, The Netherlands.

Upcoming modules for distance learning

The BILKO project is now co-ordinating the development of new modules on various applications of remote sensing to coastal areas. Upcoming modules will deal with remote sensing for e.g.: Fisheries, Coastal Erosion, Global Vulnerability, The Baltic Region, Integrated Coastal Zone Management in India and Natural Hazards. This announcement of opportunity is directed to earth scientists willing to contribute structured lessons to the BILKO project, free of charge, that focus on the use of remote sensing data sets (satellite and/or airborne images) for studying the

dynamic processes of coastal erosion and accretion. These lessons will be accompanied by a multimedia tutorial on the subject in the new Module 9.

Aims and objectives of Module 9

The aim of BILKO for Windows Module 9 is *To demonstrate the use of multi-sensor, multi-temporal remote sensing data sets for monitoring dynamic coastal processes of erosion and accretion.*

The specific objectives of Module 9 are:

- to provide an overview of coastal landforms and development over time;
- to relate image features to processes that cause sedimentation and erosion;
- to highlight the synergy benefits of adopting a multi-sensor and multi-temporal remote sensing approach for monitoring changing coastal environments;
- to demonstrate analysis strategies, tools and techniques appropriate to operational use of remote sensing for coastal management

BILKO activities on Internet

It is foreseen to provide both hard copy and electronic versions of Module 9 and follow-ups. Authors are encouraged to use Microsoft Word or if possible, the Adobe portable document format (pdf) to submit lesson material. Lesson examples, templates and guidance is readily available from the BILKO project co-ordination office at ITC. A 'Handbook for Authors' is currently being prepared by the members of the International Executive Steering Committee. The BILKO discussion board for authors and users of the upcoming BILKO modules, and for discussing software issues, will be operational on the worldwide web by early 2000. FTP-sites are being set up on every continent around the globe to make downloading of the BILKO modules more easy. Feel free to check the BILKO website for the nearest site to you and for other recent developments.

Software requirements

The UNESCO BILKO project is an evolving project. If an author has a particular need for a function or analysis tool not currently supported by the BILKO for Windows software that would be of use in general sense (e.g. widespread data formats, multi-sensor, multi-temporal, geo-referencing or

classification analysis tools) there may be a possibility to have particular functionality implemented into the BILKO for Windows software. For this, authors should contact the module co-ordinator who is responsible for the structure, contents and pedagogical aspects of a series of lessons on one of the upcoming themes. Your BILKO Module 9 co-ordinator is Dr.Ir. Tjeerd W. Hobma from ITC, Enschede, The Netherlands (see contact below).

Although there is no dedicated funding available to authors in support of their contributions, UNESCO will produce a CD-ROM containing the module together with a bound hard-copy of Module 9 material. These will be made available and distributed, free of charge, to interested individuals or institutions under the UNESCO CSI mandate.

Tentative timetable

- | | |
|----------------|---|
| July, 1 2000: | Deadline for submitting draft lessons by authors; Interim report to Steering Committee, Edinburgh, Scotland |
| December 2000: | Complete draft of the multi-media tutorial and lessons available for testing |
| February 2001: | Final revision of lessons taking input from testing phase |
| June 2001: | Production of Module workbook and CD package |
| August 2001: | Distribution and release of BILKO Module 9: "Coastal erosion" |

Foreseen lesson topics

- Monitoring Yellow river delta
- Rapid delta formation in Laguna de Tacarigua, Venezuela
- RS for CZM of Caribbean coast of Belize
- RS of the Mauretania coast
- Morphodynamics of coastal barrier island of Ameland, The Netherlands
- Maintaining the seaway of Port of Banjarmasin, South-Kalimantan, Indonesia
- Coastal morphology of Western Scheldt river, The Netherlands
- Beach erosion in Mexico
- Physiography and vegetation of dry coastal dunes in Central Patagonia, Argentina
- Multi-scale approach at dynamics of coastal dune vegetation on island of Ame-

- land
- RS in Gulf of Cambay, India
 - RS for CZM in Banten Bay, Indonesia
 - RS for CZM in Golfo Morresquillo, Colombia
 - RS of Bankulu coast in Southwest Sumatra, Indonesia

Contact

If you are interested in contributing to Module 9 there are still possibilities. Please contact the BILKO for Windows Module 9 co-ordinator:

Dr. Ir. Tjeerd Willem Hobma
International Institute for Aerospace Survey & Earth Sciences (ITC)
P.O. Box 6, 7500 AA Enschede, The Netherlands
Phone: +31 53 487 42 85
Fax: +31 53 487 43 36
Email: hobma@itc.nl
[Http://www.itc.nl/ags/](http://www.itc.nl/ags/)

4.4 HySens - DAIS7915/ROSIS and Processing Facility

Call for Proposals - Deadline 15 March 2000

DLR's imaging spectrometers DAIS 7915 and ROSIS and their hyperspectral processing facilities have been selected in the Framework of the EC Programme "Improving Human Potential & the Socio-economic Knowledge base - Access to Research Infrastructures" to be supported in the period from 2000 - 2002.

Access to the two airborne imaging spectrometers of DLR, DAIS 7915 and ROSIS, operated on board DLR's Do228 research aircraft, will be offered to the European remote sensing community.

Imaging spectrometer data sets acquired over test areas proposed by the individual user groups will be system corrected and calibrated to at-sensor radiance. For radiometric and spectral calibration of the instruments a Laboratory Calibration Facility is available. It is intended to operate the sensors over 5 target areas in Europe during each year of the project.

Upon request part of the data may also be geo-coded and atmospherically corrected using DLR's hyperspectral processing facility. Training and access will be provided to

researchers by means of workshops and individual training courses.

An information package including a detailed description of the facility and a guide for the preparation of proposals is available for download at the HySens-Web page at: [Http://www.op.dlr.de/dais/hysens.htm](http://www.op.dlr.de/dais/hysens.htm) or may be requested from:

Andrea Hausold
DLR, German Remote Sensing Data Center
D-82234 Wessling, GERMANY
Fax: +49 8153 28 1458
Email: Andrea.Hausold@dlr.de

The deadline for the first Call for Proposals in 2000 is 15 March 2000. The proposals received will be evaluated by an independent User Selection Panel. The outcome of this evaluation will be communicated to the proposers by the end of March. The first airborne flight campaign is scheduled for the period between 19 June 2000 and 7 July 2000. Further Calls will be launched for the flight periods 2001 and 2002.

The following general eligibility criteria are given by the Commission of the European Communities regulating the Access to Research Infrastructures: Only research teams (User Groups) conducting their research in the Member States of the Community and Associated States are eligible to access the research infrastructure. The researchers must be entitled to publish the results of their work at the Facility in the open literature. Proprietary research shall not be supported. Priority should always be given to users that have not already benefited under the Access to Research Infrastructures Programme and those coming from countries where similar facilities do not exist. Individual researchers within the selected User Groups are eligible to receive reimbursement of travel and subsistence expenses. User groups from Germany may not benefit from the HySens funding.

In case you may require additional information please do not hesitate to contact the HySens-Team at DLR:

Andreas Mueller
DLR, German Remote Sensing Data Center
D-82234 Wessling, Germany
Phone: +49-8153-28-1533
Fax: +49-8153-28-1458

Email: Andreas.Mueller@dlr.de

4.5 EFISCEN

EFISCEN is a large-scale forest scenario model in use at the European Forest Institute (EFI), to produce projections of the European forest resources into the future under different scenarios. In the EEFR database the European forests are divided in 2689 forest types, distinguished by country, region, owner, structure, site class and tree species. For each forest type, the area, mean volume and current increment by age class are used as input for the model. The aim of the EEFR database is to make these data available to a wider user community. For most of the European countries the data are freely accessible, for a small number of countries access is restricted to EFI and its members. Together with the requested data, the user will receive contact information of the original data provider, links to the responsible national forest institutes home pages, information on the source of the data and definitions used for the forest inventories. The database can be found at http://www.efi.fi/information_services, then follow the link to the EFISCEN European Forest Resource Database.

4.6 European Energy and Water Balance Monitoring System (EWBMS)

Free products available for testing

A system for monitoring of the earth surface energy and water balance has been developed by EARS Remote Sensing, Delft, Netherlands. On the basis of hourly Meteosat reception, image maps of rainfall, net radiation and actual evapotranspiration are generated. Also crop yield and desertification related products are produced. The system covers the Euro-Mediterranean region and Africa. Products are on a 10 daily, monthly or yearly time scale and have the full Meteosat resolution (5 km sub-satellite). Their timeliness is 1-2 days. A Meteosat database to generate products retrospectively is available from 1993 on.

In the 4th Framework project 'European Energy and Water Balance Monitoring Sys-

tem', the use of the rainfall and actual evapotranspiration data for near real time water management is investigated. The European Topic Centre on Inland Waters (ETC-IW) is testing the data for run-off modelling of the Donau Basin. The 'Centro de Estudio Hidrograficos' (CEDEX) is doing the same for the Spanish river catchments.

There are many other applications. The EWBMS data may be used for regional water balance studies and water distribution planning, or in studies of the fate of agro-chemicals. The satellite data products are also suitable for drought and desertification monitoring, locust early warning and crop yield forecasting. Interested users and researchers may apply for free EWBMS data products during the next half year for evaluation and testing.

Please visit the EWBMS web-site for more information:

<http://www.ears.nl/ewbms/> or contact:

Andries Rosema or Erik van Putten

Phone: +31-15-2562404

Fax: +31-15-2623857

Email: andries.rosema@ears.nl

4.7 Flood Warning System for Vietnam

RADARSAT International (RSI) has signed a contract with the Canadian International Development Agency (CIDA) to develop an operational monitoring system that will track floods and storm activities in Vietnam. The aim is to improve emergency preparedness in Vietnam and improve the lives of the thousands of people affected by flooding annually.

Under the project, Rsi will provide the Disaster Management Unit (DMU) and Vietnam's Standing Office of the Central Committee for Flood and Storm control (SOCCFSC) with satellite imagery and flood data, data treatment software, and training courses to ensure full technology transfer to Vietnamese flood authorities. In addition, RSI will map historical flood and storm data to determine areas most vulnerable to storms and rising waters. From this, a flood mitigation system will be de-

veloped and incorporated into the existing emergency warning and disaster damage reporting network.

The project is a unique test bed for the integration of remote sensing technology with meteorological prediction systems, and will have a significant impact on how flood prone areas are monitored, assessed and managed. It will include flood prediction, flood response, monitoring and damage assessment systems. The focal areas of the project are the Day River diversion basin, Hong (Red) River, and Thai Bihh River, all located in the Red River delta. This region is heavily populated and most susceptible to typhoons, river floods, and storm surges.

The Disaster Management Unit (DMU)

Established jointly by the United National Development Program and the SOCCFSC, the DMU is the official channel for conveying disaster damage assessments from each of Vietnam's 61 provincial offices to the SOCCFSC. It includes a computer

based emergency warning and disaster damage reporting system (DMUnet), a GIS-based information system of disaster management and relief needs data (DMUgis), a web-based public information system (DMUweb), and modern strategies for decision making to better deliver emergency relief and allocate scarce resources for rehabilitation.

More information may be obtained from:
 Cory Rossignol
 Director, Communications
 RADARSAT International
 Email: crossignol@rsi.ca
<http://www.rsi.ca>

**XIXth CONGRESS OF THE INTERNATIONAL SOCIETY
 FOR PHOTOGRAMMETRY AND REMOTE SENSING (ISPRS)**

**GEOINFORMATION FOR ALL
 Amsterdam, The Netherlands
 16-23 July 2000**

MEET IN AMSTERDAM

For registration, call for papers and information about the exhibits, contact:



Secretariat: ISPRS Organizing Committee
 Attn Ms Saskia Tempelman, c/o ITC
 P.O. Box 6, 7500 AA ENSCHEDE, The Netherlands
 Telephone: +31-53-4874358, Fax: +31-53-4874335
 E-mail: ISPRS@ITC.NL, WWW: <http://www.itc.nl/~isprs>



5 REVIEWS, PUBLICATIONS AND REPORTS

5.1 A New Force at a New Frontier

Special offer to readers of the EARSel Newsletter

With reference to the review published in our December 1999 issue, page 37, of the book 'A New Force at a New Frontier' by Dr. Kevin Madders, we have received a special offer from the publishers of a 50 percent reduction on the sales price of this book (normally UKL 95.00; USD 150) that is a price of UKL 47.50 or USD 75.00 valid until 31 July 2000.

To order the book, please contact:
International Telecommunications & Space Systems SprL
Rue Langeveld 101
B-1180 Brussels, Belgium
Tel: +32 2 375 31 75
Fax: +32 2 375 71 09
Email: itss.sni@euronet.be

5.2 Valladolid Proceedings Published

The Proceedings of the 19th EARSel Symposium, which was held at the University of Valladolid in June 1999, have now been published by Messrs. Balkema of Rotterdam. All principal authors of papers should have received their copy, as well as all paid-up members of EARSel.

The volume entitled: Remote Sensing in the 21st century: Economic and Environmental Applications, edited by Prof; J.L. Casanova, has 610 pages including 14 pages of colour plates - ISBN: 90 5809 096 5

Any enquiries should be addressed to the EARSel Secretariat in Paris.

5.3 Télédétection

A new journal, published in French, covering research and applications in remote sensing has been launched in 1999, edited by Jean-Marie Dubois, of CARTEL, Sherbrooke University, Quebec, with the assistance of an editorial committee, several of whom come from EARSel member labora-

tories. The journal is published by Gordon and Breach.

Details may be found on:
[Http://gbhap.com/Teledetection/](http://gbhap.com/Teledetection/)
or requested from:
Email: info@gbhap.com

5.4 Marine and Coastal Geographical Information Systems

This new book by Dawn J. Wright and Darius J. Bartlett (eds.), published by Taylor & Francis is now available.

It is the first book of its kind to address basic and applied scientific problems in deep sea and coastal science using GIS and remote sensing technologies. There are contributions from leading academics in the field and it presents a timely compilation of ongoing GIS research and innovation, on the heels of the U.N. International Year of the Ocean.

More information and table of contents is also available at:

[Http://dusk.geo.orst.edu/book](http://dusk.geo.orst.edu/book)

5.5 ISPRS Workshop: 'Sensors and Mapping from Space'

University of Hannover - 27-30 September 1999

Prof. (em.) Dr. G. Konecny

From 27-30 September, 1999, the Institute for Photogrammetry and Engineering surveys (Director, Ch. Heipke) hosted an ISPRS Workshop on 'Sensors and Mapping from Space'. It was organised by three ISPRS Working Groups; I/1 (Sensor Calibration, Chair: M. Schroeder), I/3 (Sensors for Mapping from Space, Chair: K. Jacobsen), and IV/4 (Mapping from High Resolution Satellites, Chair: G. Konecny).

The Conference was opened by ISPRS Commission President of Comm. IV, Dieter Fritsch, with a keynote paper by the Director of the Western European Union Satellite Centre, F. Davara.

In the first technical session, new satellite

REPORT

systems were presented by A. Baudoin and C. Rouzies of CNES (SPOT-5). G. Strumz of DLR reported on the first images received from Landsat 7 with 15m panchromatic resolution. Scherer and Krischke presented the Rapideye proposal for a German optical satellite.

The high resolution (1m) systems development at Orbimage were presented by M. Faintich. J. Thurgood of Space Imaging had been prevented from coming to the Workshop due to the success of the launch of IKONOS-2 a few days before the meeting. However, the participants witnessed the Internet report of the launch.

New, commercial digital aerial sensors to be ready for delivery in mid-2000 were shown by P. Fricker of L H Systems, Switzerland, and by H. Heier and A. Hinz from Z/I Imaging, Germany. F. Scholten of DLR and V. Spreckels of DSK reported on the use of the 3-D image scanner built by the DLR and marketed for world-wide use by Istar, France.

With the airborne digital scanning systems, the integration of positional information from in-flight GPS and from inertial measuring units (IMU) is of prime importance. Three papers from Alamus (Spain), Jacobsen (Germany) and Grimm (Germany) covered the topic. Wang of Erdas (USA) presented automated aerial triangulation software for scanner imagery.

The topic of sensor calibration was presented by T. Westin (Sweden) rectifying old MSS imagery, by G. Buyuksalih and G. Petrie (UK) for infrared video imagers and by M. Schroeder and H. Schwarzer for MOMS, SPOT and MOS.

In separate sessions for geometric and radiometric modelling, papers were presented on epipolar resampling of high resolution images (T. Ono, Japan) and on the use of spectral and angular signatures by J. Cierniewski (Poland) and T. Schneider (Germany).

For the topic of Image Analysis, R. de Kok (Munich) discussed an object-based analysis approach. W. Wiedemann of Munich

showed automatic road extraction, T. Yoon of Korea discussed segmentation approaches, and B. Straub and C. Heipke treated automatic extraction of vegetation areas by knowledge-based semantic networks.

On the last day of the meeting a comprehensive presentation of the MOMS-02-P mission and its results was given by D. Fritsch (Stuttgart), P. Seige (DLR, Oberpfaffenhofen), H. Bettac (DLR Neustrelitz) and W. Kornus (DLR Oberpfaffenhofen). Specific presentations on MOMS-02 techniques were made by W. Kornus on block adjustment, by M. Lehner on band to band registration, by R. Müller on the use of multispectral information for digital elevation models.

B. Petzold and P. Walter reported on the revision of topographic data bases by MOMS and IRS data.

The meeting concluded with a number of papers on the topographic use of satellite data. S. Kim (Korea) spoke on DEM extraction from SPOT, M. Mittal (India) on the effect of data compression on digital elevation model accuracy; T. Ohlhof (Munich) on actualisation of Vmap 1 data using satellite imagery. H. Wegmann and K. Jacobsen reported on topographic mapping tests with various satellite sensors.

With respect to thematic mapping, contributions were made by R. Blaschke stating German forestry requirements, by S. Singh (India) on vegetation classification with the WIFS, by H. Netzel on geological uses in Ethiopia. C. Pohl of ITC Netherlands presented a multimedia tutorial on mapping from space.

The meeting served as preparation for the relevant sessions of the International Congress for Photogrammetry and Remote Sensing to be held in Amsterdam, Netherlands, from 16-23 July, 2000.

The complete proceedings of the workshop are available on CD-ROM. They can be ordered for a price of DM.49.- via <http://www.ipi.uni-hannover.de> (goto Table of Contents)

6 FORTHCOMING REMOTE SENSING MEETINGS

30 March - 1 April
2000
Rudolfshuette,
Austria

Workshop: HIGH MOUNTAIN CARTOGRAPHY 2000

Contact: Manfred Buchroithner, Dresden University of Technology, Institute for Cartography, D-01062 Dresden, Germany
Tel: +49 351 463 4809
Fax: +49 351 463 7028
Email: buc@karst9.geo.tu-dresden.de
<http://www.tu-dresden.de/fghgik/aktuell/high.htm>

3-5 April 2000
Strasbourg, France

IAF Specialists Symposium: Bringing Space into Education.

Complete updated information may be found on the IAF web site at:
<http://www.iafastro.com> or by Email: iaf@wandoo.fr

POSTPONED

later in 2000
UNESCO
Hq.Paris France

RISK 2000 - SPACE TECHNIQUES FOR THE MANAGEMENT OF MAJOR RISKS AND THEIR CONSEQUENCES.

Organised by EARSeL, Prospective 2100 and the Ecole des Mines de Paris
Contact: EARSeL Secretariat, 2 avenue Rapp, 75340 Paris Cedex 07, France
Tel: +33 (0)1 45 56 73 60
Fax: +33 (0)1 45 56 73 61
E-mail: earsel@meteo.fr
<http://2100.org>

1-3 May 2000
Charleston, SC,
USA

6th ERIM International Conference: REMOTE SENSING FOR MARINE AND COASTAL ENVIRONMENTS

Contact: <http://www.erim-int.com/CONF/marine/MARINE.html>

MODIFIED

14-17 June 2000
Dresden, Ger-
many
16-17 June 2000
Dresden, Ger-
many

20th EARSeL Symposium and General Assembly: A DECADE OF TRANS-EUROPEAN COLLABORATION IN REMOTE SENSING

Workshop EARSeL SIG: REMOTE SENSING OF LAND ICE AND SNOW
Workshop EARSeL SIG: LIDAR REMOTE SENSING OF LAND AND SEA
Contact: EARSeL Secretariat - Email: earsel@meteo.fr
<http://www.tu-dresden.de/fghgik/aktuell/earsel.htm>

18-24 June 2000
Fairbanks, Alaska,
USA

Symposium: Sea Ice and its Interactions with the Ocean, Atmosphere and Biosphere Organised by the International Glaciological Society.

Contact: Simon Ommanney, IGS Secretary General at :
email: Int_Glaciol_Soc@compuserve.com or at the Web site:
<http://www.gi.alaska.edu/seaicesymposium>

NEW

3-7 July 2000
Bilbao, Spain

31st Annual Symposium of the Estuarine and Coastal Sciences Association

Managing eutrophication in estuaries and nearshore waters: a challenge for the new millennium.
Deadline for submission of the preliminary registration form: December 20, 1999.
Contact: ecsabilbao@lg.ehu.es
Web site: <http://www.ehu.es/ecsabilbao>

NEW

- 11-13 July 2000
ITC, Enschede,
The Netherlands
- Symposium organised jointly by EARSel SIG "GEOLOGICAL APPLICATIONS" and EARSel SIG "IMAGING SPECTROSCOPY"**
Contact: M. Godefroy, EARSel Secretariat earsel@meteo.fr and Frank van der Meer, ITC - vdmeer@itc.nl
- 12-14 July 2000
Amsterdam, The
Netherlands
- ACCURACY 2000 - 4th International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Sciences**
The aim of this Symposium is to bring together experts from environmental science, spatial statistics and geographic information science to further develop theory and practical application of methods for handling spatial uncertainty in the environmental sciences. Organised by:
Institute for Biodiversity and Ecosystem Dynamics University of Amsterdam
Nieuwe Prinsengracht 130, 1018 VZ Amsterdam, Netherlands
Tel: +31(0)20-525 7448
Fax: +31(0)20-525 7431
Email: accuracy@frw.uva.nl
Up-to-date information can also be obtained at <http://www.gis.wau.nl/Accuracy2000>
- 16-23 July 2000
Amsterdam, The
Netherlands
- GEOINFORMATION FOR ALL - XIX Congress of the International Society for Photogrammetry and Remote Sensing (ISPRS)**
Contact : Ms Saskia Tempelman
ITC
PO Box 6
7500 AA Enschede, The Netherlands
Fax: +31 53 48 74 335
Email: isprs@itc.nl
<http://www.itc.nl/~isprs>
- 30 July - 4 August
2000
San Diego, CA
USA
- 45th annual meeting SPIE**
Contact: <http://www.spie.org/info/annualmeeting/>
- 21-25 August 2000
Adelaide, Aus-
tralia
- 10th Australasian Remote Sensing and Photogrammetry Conference**
Contact: <http://www.adelaide.edu.au/10arspc>
- 26 Aug.-1 Septem-
ber
2000
Rudolfshuette,
Austria
- Course on High Alpine Geodata Processing/Glaciology**
Contact: Manfred Buchroithner, Dresden University of Technology, Institute for Cartography, D-01062 Dresden, Germany
Tel: +49 351 463 4809
Fax: +49 351 463 7028
Email: buc@karst9.geo.tu-dresden.de
<http://www.tu-dresden.de/fghgik/aktuell/highalp.htm>
- 11-14 September
2000
Menemen, Turkey
- 2nd Int. Conf. "GIS for Earth Science Applications"**
Contact: Anadolu University
Space & Satellite Sciences Research Institute
Tel: +90 222 322 2071 Ext. 6805

Fax: +90 222 323 9129
 Email: icgesa@anadolu.edu.tr
<http://icgesa.anadolu.edu.tr>

12-14 September
 2000
 Leicester, UK

RSS2000 - Adding Value to Remotely Sensed Information
 26th annual Conference of the Remote Sensing Society
 Contact: RSS2000 Office: Fax: +44 116 252 3854
 E-mail: RSS-2000@leicester.ac.uk

17-22 September
 2000
 New Brunswick,
 Canada

COASTAL ZONE CANADA 2000:
 The goal of the Conference is to develop a collective vision and identify products, policies and research which will further integrate coastal zone management. The foundation for discussion will be a review document on the current worldwide status of coastal zone management entitled "Baseline 2000", which will be distributed to participants prior to the conference.
 Contact: URL: www.gov.nb.ca/dfa/czc-zcc2000.htm or by email from czc2000@gov.nb.ca

2-6 October 2000
 Rio de Janeiro,
 Brazil

51st International Astronautical Congress (IAF): Space: A Tool for the Environment and Development
 Contact: Email: iaf@wanadoo.fr

9-13 October 2000
 Venice, Italy

OCEANS FROM SPACE ; 20 years of progress in satellite oceanography
 Organised by Jim Gower, IOS, BC, Canada, Luigi Alberotanza, ISDGM, Venice Italy and Vittorio Barale, JRC, EC, Ispra (Va), Italy.
 Contact : vittorio.barale@jrc.it

16-20 October
 2000
 Gothenburg, Sweden

ERS-ENVISAT SYMPOSIUM: Looking at our Earth in the New Millennium
 Contact: <http://www.esa.int/sympo2000>

DEADLINES FOR SUBMITTING MATERIAL TO EARSel NEWSLETTER

Issue	Deadline	Publication date
June	25th April	30th May
September	31st July	05th September
December	23rd October	28th November

If you wish to submit illustrations, please make sure that digital illustrations have a resolution of 300 dpi at reproduction size (118 dots per cm).