

EARSel



December 2012
No. 92

NEWSLETTER



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Front Cover – Matera, Italy, the Symposium and Workshops' venue for the 33rd EARSeL Symposium.

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Source: <http://whc.unesco.org/en/list/670/gallery>

EARSeL Newsletter

ISSN 0257-0521

Bulletin of the European Association of
Remote Sensing Laboratories<http://www.earsel.org>

December 2012 – Number 92

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University of Thessaly, 38334, Volos, Greece**Printed by:**Form Innovation Shahed
Hirtenweg 8
30163 Hannover, Germany**Subscription Rates**Members receive the Newsletter as part of the
annual membership fee. For non-members, the
annual rates (four issues) are as follows:

Within Europe	80€
Outside Europe	88€
Personal subscription from members	30€

EARSeL Annual Membership Fee

Individual observer	330€
Laboratory/Company with fewer than 10 researchers	330€
Laboratory/Company with 10 or more members	500€

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Editorial

Dear members,

The 33rd EARSeL Symposium entitled “Towards Horizon 2020: Earth Observation and Social Perspectives” will take place in Matera, Italy, in early June, accompanied by four workshops; the 4th Workshop on Education and Training, the 5th Workshop on Remote Sensing for Developing Countries, the 6th Workshop on Remote Sensing of the Coastal Zone and the 4th Workshop on Cultural and Natural Heritage. A special reference on this big event has been made in this issue, with special reports of the SIG Chairmen, the call for papers with useful information such as the thematic topics of each, the registration process and the important dates.

Eberhard Parlow’s 60th birthday reminds us that we should not forget round birthdays of outstanding EARSeL members. A report on the occasion has been included in this issue.

A report on EARSeL past events has been made such as the 1st Workshop on 4D Radar Applications for Young Researchers, that took place in Prague last June, as well as on the forthcoming EARSeL events such as the 8th EARSeL Workshop on Imaging Spectroscopy and the 9th EARSeL Forest Fire Special Interest Group Workshop on 'Quantifying the environmental impact of forest fires'.

The Workshop proceedings of the 1st Workshop on Temporal Analysis of Satellite Images and the 4th Workshop on Geological Applications in the framework of the 32nd EARSeL Symposium, last May in Mykonos Island, are now available via the EARSeL website.

You’ll also find in this issue a number of reports of events of national and international organisations such as conferences and meetings. These are the highlights of the XXII ISPRS Congress, a report on the International Society for Digital Earth (ISDE), the 9th International Conference of the African Association of Remote Sensing of the Environment (AARSE), the RSPSoc Annual Conference 2012, the 2nd Strategy Forum Remote Sensing & GMES Theme Days in Germany, the 4th Remote Sensing and GIS Symposium (UZAL-CBS 2012) and the 8th Scientific Conference with International Participation "Space Ecology Safety".

A very interesting science article by Karsten Jacobsen, a reprint from the 32nd EARSeL Symposium is also included, entitled “Airborne or Spaceborne Images for Topographic Mapping”. Moreover, four recently published research articles in EARSeL e-Proceedings also appear in the respective section of this EARSeL newsletter.

The last part of this issue includes a list of conferences and training courses to attend in the near future.

Your feedback on the EARSeL Newsletter is critical to us. We will be pleased to hear your comments and suggestions. Moreover, you are more than welcome to contribute with a science article or a report for the forthcoming issues.

We send our warmest wishes for a very Happy Christmas and a prosperous New Year.

Enjoy reading this December issue!

The Editors

News from EARSeL

1st Workshop on 4D Radar Applications for Young Researchers, 26-28 June 2012, Prague

The [1st Workshop on 4D Radar Applications for Young Researchers](#) took place at the Faculty of Civil Engineering of the Czech Technical University in Prague between 26th and 28th June, 2012. The workshop was the first of this type organised by EARSeL.

The idea of the workshop was to have a platform focused not only on the presentation of research results, but on detailed presentations of projects, their goal, individual steps, problems, suitable and unsuitable or erroneous solution steps, partial results, planned future steps, etc. The duration of each presentation was about one hour. Discussion between participants was the second part of an individual paper presentation. The final part summarising each presentation was formed by the supervisors. The workshop was supervised by two professors – **Karsten Jacobsen** from Institut für Photogrammetrie und GeoInformation (IPI) and **Daniele Riccio** from the Faculty of Engineering of the University of Napoli Federico II. Both professors fulfilled very well their role, which was new for them. The workshop programme comprised only 9 papers, maximum of four per full day. The final part of the program was a complete overview and recommendations of both supervisors including additional information they are able to offer and send after their arrival home.



The participants of the 1st Workshop on 4D Radar Applications for Young Researchers, Prague 2012.

Thanks to a small group of participants, the workshop was a friendly meeting of people working with 4D radar data used for different purposes. Mutual discussion can be compared to a discussion of a team undertaking a project. 90 minutes proved to be well chosen for real discussion without any time stress, which can occur at workshops and conferences with 2 or 5 minutes for questions.

The participants chose a common program during the evenings, having dinner together or walking through Prague.

Any recommendations for the future are more than welcome. The idea of the organisers is to repeat this type of workshop in the future.

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33rd EARSeL Symposium, 3-6 June 2013, Matera, Italy

Call for Papers

The 33rd EARSeL Symposium entitled **“Towards Horizon 2020: Earth Observation and Social Perspectives”** will be held in Matera, Italy from 3rd to 6th June 2013. All scientists, professionals and researchers involved or interested in the field of the symposium are strongly encouraged to present their research papers. According to the symposium theme “Earth Observation and Social Perspectives” contributions are particularly welcome in the following areas:

- EO for improving Smart City management
- Monitoring and protecting biodiversity
- Support of regenerative energy production and transport
- Improving climate observations
- Improving agriculture, water and fisheries management
- Supporting disaster management

Other contributions are invited on one of the following topics:

- Scientific applications of remote sensing, emerging methods and technologies
- Capacity building for organisations and authorities involved in environmental monitoring and protection
- Remote sensing for archaeology
- Land use and land cover, degradation and desertification
- Urban remote sensing
- Open ocean remote sensing
- Natural and man-made disasters
- Forestry and forest fires
- Remote sensing and its associated support to the understanding of climate change
- Hydrological applications: water management, underground water sources, land ice and snow
- 3D remote sensing, Radar, Lidar, Thermal Remote Sensing
- New instruments and methods, including ground truth

Important Dates

- | | |
|--|-------------------------|
| ➤ Due date for abstract submission (Symposium only) | 04 January 2013 |
| ➤ Notification of authors (Symposium only) | 21 February 2013 |
| ➤ Due date for the Symposium fee payment by authors* | 08 April 2013 |
| ➤ Submission due date for full papers (Symposium only) | 20 May 2013 |

* Early registration with reduced fees before 8th April, 2013 is mandatory for authors of oral and poster contributions

For more detailed information regarding the Symposium, please visit the Symposium website at:
<http://www.earsel.org/symposia/2013-symposium-Matera>

4th EARSel Workshop on Education and Training, 4 June 2013, Matera, Italy



Remote sensing of the earth covers many topics that are significant for natural science disciplines within the school and university curricula. Satellite imagery and data derived from satellite sensors enable studies ranging from local phenomena around schools, up to large-scale perspectives showing the diversity of nature in the various climatic regions on earth. This allows us to point out the dependence between local and global scales. Remote sensing data are used to observe and understand actual conditions on earth, but they also ingested into models allowing the prediction of future developments (e.g., of the climate).

Presentations on the current use of Earth Observation as a support tool for education, training and capacity building, with emphasis on the following topics:

- Earth Observation for kids
- Earth Observation and its associated use to support science education in schools, high schools and universities
- Environmental science as a tool in cooperative learning and teaching, in enquiry-based learning and in other educational practices for tomorrow's schools
- Earth Observation and its use as educational support in areas like biology, chemistry, geography, physics and mathematics curricula in the classroom but also in continuous individual learning
- Training activities in GMES, with a focus on the environment, climate change and natural disasters, in GEOSS, and other international programmes
- Earth Observation and its use for public outreach of Environmental Sciences and Global Change

All relevant institutions and interested individuals are invited to participate. In particular the workshop is also addressing

- **the Global Environment and Security (GMES)** programme of the European Commission and the European Space Agency.

The success of GMES services and information products, especially in the fields of environment, climate change and natural disasters depends on specific training activities which include remote sensing for Earth Observation as a core element. Moreover, the workshop will focus on the planned foundation of

- **the International Remote Sensing Academy (IRSA),**

initiated by EARSel and proposed to international remote sensing organisations in early 2012. The goal will be to discuss the strategic framework of the Academy. The concept of IRSA has been published in [Issue 91 of the EARSel Newsletter](#).

EARSel members interested in the subject of education and training in remote sensing are strongly encouraged to participate in the workshop and to actively contribute with their ideas and suggestions to the concept of the International Remote Sensing Academy.

The Call for Papers is available on the internet: <http://www.earsel.org/SIG/ET/4th-workshop>

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5th EARSeL Workshop on Remote Sensing for Developing Countries 5 June 2013, Matera, Italy

The 5th Workshop on Remote Sensing for Developing Countries of the EARSeL's Special Interest Group "Developing Countries" will take place on 5th June 2012 in Matera, Italy, in the framework of the 33rd EARSeL Symposium.

Call for Papers

Remote sensing is an excellent tool for mapping, monitoring and modelling of environmental variables and processes. Especially in developing countries, remote sensing offers unique access to primary data about the status of land surfaces. There is a high demand for studies on education and public interest in developing countries, hydrology and coastal applications, vegetation and land cover, geology and geomorphology, landscape survey, soils and soil salinisation, etc. This workshop concentrates on identifying and solving these problems, bringing together scientists from all over the world to exchange their experiences and expertise. All scientists, professionals and researchers involved or interested in the field of the Workshop are strongly encouraged to present their research papers.

For more detailed information regarding the Workshop, please visit the Developing Countries SIG Website: <http://www.earsel.org/SIG/DC>

6th EARSeL Workshop on Remote Sensing of the Coastal Zone 6-7 June 2013, Matera, Italy

The 6th EARSeL Workshop on Remote Sensing of the Coastal Zone will take place in Matera (Italy) at the University of Basilicata. The Workshop will provide an interdisciplinary forum for presentations and discussions on our current state of knowledge on remote sensing of the coastal zone environment in terms of algorithm accuracy, time series analysis of environmental indices based on remote sensing data and new technologies. These topics will emphasise the impact of the climate variability on the European Sea with particular emphasis on coastal zones and inland waters, highlighting the importance of measuring essential climate variables which can exhaustively describe the status of the coastal environment.

The global implementation of the strategic plan for Coastal GOOS (Global Ocean Observing System) and the Panel for Integrated Coastal Ocean Observations (PICO) (http://www.ioos.gov/global/final_coastal_goos_pico_report.pdf) suggested adoption of an adaptive, Ecosystem-Based Approach (EBA) for sustainable development, including marine spatial planning and management. In this context EBA requires the sustained provision of multidisciplinary data (biogeochemical and ecological as well as geophysical) and information on ecosystems states, especially in the coastal zone where goods and services are most concentrated. The identified priority indicators of the ecosystem state (health) are:

- Surface phytoplankton biomass and subsurface oxygen fields
- Distribution and abundance of waterborne pathogens and toxic phytoplankton
- Spatial extent of living benthic habitats (coral reefs, seagrass beds, mangrove forests and tidal marshes) and ecological buffers to coastal flooding
- Distribution and condition of calcareous organisms (cold and warm water corals, coccolithophores and pteropods)
- Distribution and abundance of exploitable fish stocks

Essential variables to be monitored include both ecosystem state variables and external pressures, as listed in the above mentioned PICO report:

External Pressure:

- Atmospheric (ocean surface vector winds, heat flux, precipitation, incident solar radiation);
- Land-based inputs (freshwater, sediments, nutrients, pathogens, chemical contaminants)
- Extraction of living marine resources (e.g. fishing)
- Sea level rise, ocean warming and acidification
- Coastal flooding
- Natural ocean-atmospheric climate modes
- Basin scale migrations of large pelagic predators

Ecosystem States:

- Geophysical (fields of temperature, salinity, suspended matter, sea surface roughness, waves, and currents, sea level, shoreline position)
- Chemical (fields of dissolved nutrients, dissolved oxygen, pH, fCO₂, total alkalinity, aragonite saturation state, and colored dissolved organic matter)
- Biological (fields of phytoplankton biomass, toxic phytoplankton, waterborne pathogens, calcareous plankton, copepod indicator species, fish eggs and larvae extent of living benthic habitats, coral skeletal density, species diversity, abundance and diet of exploitable fish stocks, bycatch, abundance and size of apex predators)
- Biophysical (water leaving radiances and downwelling irradiance)

Remote sensing methodologies represent a real opportunity for estimating at least some of these essential variables with increasing precision, starting from basic measured variables such as remote sensing reflectance, emitted radiation, or radar backscattering.

Current literature proposes a large variety of (often empirical) algorithms for estimation of environmental parameters from basic remotely sensed variables, but in most cases their quality is still far from meeting quality requirements for monitoring environmental parameters of the coastal zone, both in terms of accuracy as well as temporal or spatial resolution. This means that specific efforts must be devoted to investigation of remote sensing capabilities for coastal zone applications aimed at the detection of key coastal environmental parameters and to propose new ideas to achieve better results in terms of accuracy requirements.

Considering this general framework and future challenges for the coastal zone remote sensing community, the 6th Workshop represents an ideal opportunity for discussing these themes and tracing the route for forthcoming projects and collaborations. Themes proposed for discussions are:

- changing terrestrial run-off into coastal waters
- escalation of extreme coastal events: floods, storms, high tides
- hydrology and water budget evolution of rivers and lakes
- temperature variations in inland and coastal waters
- phytoplankton biomass and Phytoplankton Functional Types (PFTs)
- impact of varying physical forcing on morph dynamics and ecosystems
- new developments of habitats, biodiversity and alien invaders
- fluxes and fate of seawater constituents, including pollutants and sediments
- role of Coastal Zone Management in adapting to climate change

and their investigation with **Remote Sensing:**

- active and passive methods in all spectral ranges, sensor combinations
- satellite, airborne and ground-based methods including ground truth

- modeling of radiative transfer, image processing and related aspects
- interaction of physical, biological and chemical conditions and processes
- Ocean Colour Remote Sensing for Coastal and Inland Waters

The Call for Papers is available on the internet: <http://www.earsel.org/SIG/CZ/6th-workshop>

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4th EARSel Workshop on Cultural and Natural Heritage 6-7 June 2013, Matera, Italy

The 1st Workshop on Advances in Remote Sensing for Archaeology and Cultural Heritage Management took place in Rome on 30 September - 4 October 2008, organised by the chairmen of the EARSel SIG Remote Sensing for Natural and Cultural Heritage (ReSeArCH). A large scientific community composed of archaeologists, geophysicists, experts in aerial archaeology, remote sensing and geomatics, gave rise to a lively debate on the potential, limitations and overlook of traditional and novel Earth Observation Technologies for archaeology and cultural heritage management applications.

The interest of the scientific community has increased over the years, thus pushing the SIG ReSeArCH to organise yearly dedicated sessions on Cultural Heritage within EARSel Symposia (Chania 2009, Paris 2010, Prague 2011), a joint conference with AARG in Poznan (21-23 September 2011) and the most recent Workshop in Ghent (19-22 September 2012).

Call for Papers

Five years from the Rome Workshop, the scientific interest for Remote Sensing and Cultural Heritage has strongly increased. The available technologies as well as methodological approaches have improved thus facilitating a larger use, mainly for archaeological purposes. In this lively cultural and scientific context, the 4th Workshop will take place on 6-7 June 2013 in Matera.

The cultural and practical interconnections between Environment, Culture and Territory are the framework of this event. The scientific committee selected some priority themes related to:

- **fields of application** such as the use of remote sensing for risk management and cultural and natural heritage, interconnection between environmental, climatic changes and dynamics of human frequentation, the aware fruition of material and immaterial witnesses of ancient civilizations
- **methodologies** such as development of ad hoc semiautomatic and automatic approach for extracting cultural information, integration and fusion of passive and active remotely sensed data, remote sensing and geospatial analysis for preventive archaeology, palaeoenvironmental investigation and risk management
- **co-operation strategies** for the creation of a permanent platform for data and knowledge sharing.

In particularly, the 4th workshop focuses on the following topics:

- From aerial photos to declassified satellite images: the study of landscape over time by means of historical data sources
- From visual data interpretation to semiautomatic and automatic procedures in an archaeological perspective
- Remote Sensing, GIS and Geospatial analysis for the risk monitoring and management of cultural resources
- Integration of space/air borne and ground remote sensing in archaeogeophysics
- The "LiDAR revolution"
- SAR applications for Archaeology and palaeoenvironmental studies
- Interactions between the environment and human civilizations in the past: which approach using remote sensing?
- Geographic information and Earth Observation technologies for the protection and management of cultural resources in emerging countries of Asia, Africa and Latin America
- Low cost technologies
- From remote sensing to virtual reconstruction: the study of human past

Important dates

- Submission of abstracts: **30 January, 2013**
- Notification of acceptance: **28 February, 2013**
- Submission of full papers: **30 April, 2013**

Presenting authors of workshop contributions, oral and poster, are requested to transfer the registration fee **before 08 April 2013**. Otherwise contributions will be removed from the final programme.

For more detailed information regarding the Workshop, please visit the Workshop website: <http://www.earsel.org/SIG/NCH/4th-workshop>.

Proceedings of the 1st Workshop on Temporal Analysis of Satellite Images and the 4th Workshop on Geological Applications, May 2012, Mykonos Island, Greece

The **1st Workshop on Temporal Analysis of Satellite Images** of the EARSel's Special Interest Group "Temporal Analysis of Satellite Images" took place on 23-25 May 2012 in Mykonos Island in the framework of the 32nd EARSel Symposium. Several thematic sessions related to temporal analysis using Remote Sensing techniques have been presented at the Workshop, such as: Agriculture, Climate, Urban, Change Detection with Optical Data, Change Detection with SAR Data, Forest, Vegetation Stress & Drought, Vegetation Dynamics, Hazards and Risks, Coastal Zones and Aquatic Environment.

The proceedings of the Workshop have been edited by Yifang Ban, the Workshop Chairman, are available for free, via the following link:

<http://www.earsel.org/SIG/timeseries/proceedings.php>

The **4th Workshop of the EARSel Special Interest Group on Geological Applications**, entitled Remote Sensing and Geology, took place on 24-25 May 2012 in Mykonos Island in the framework of the 32nd EARSel Symposium. Interesting thematic sessions related to geological applications have been presented at the Workshop, such as: Hydrology-Hydrogeology, Remote Sensing and GIS applications in Geology, Geohazards, Geological Mapping, Tectonic Geology, Hyperspectral Remote Sensing and Mine Monitoring.

The proceedings of the Workshop have been edited by Konstantinos Nikolakopoulos, the Workshop Chairman, are available for free via the following link:

<http://www.earsel.org/SIG/Geology/pdf/2012-remote-sensing-and-geology.pdf>

Eberhard Parlow's 60th Birthday

Eberhard Parlow, Professor at the University of Basle has been the EARSel's Chairman from 2001 to 2005 and EARSel's Vice Chairman from 1997 to 2001, celebrated his 60th birthday on June 8, 2012. This was a good reason for his faculty to arrange for him a birthday symposium on Friday, September 28, 2012 at his University, at the Institute of Meteorology in Basle. The master of the ceremony was his colleague Vogt from Basle. The selected speakers all were partners in Eberhard's curriculum.

Wilfried Endlicher of the Humboldt University, Berlin, gave an outline of Eberhard's career:

- Born in 1952, Schleswig Holstein
- Education and training in school, university, and public life
- Studies at the University of Freiburg in Geography and Mathematics, doctoral dissertation and employment in physical Geography in Freiburg. His dissertation involved a heat capacity mapping mission of the Bad Krotzingen Vineyards
- Scientific applications of remote sensing, emerging methods and technologies
- Co-author on a book on remote sensing and landscape geology together with Endlicher, Gossmann and Mauer
- German research funding for a land surface climatological study using satellite data in Lapland, in which he used early models of image processing hardware with 500 Mb storage. This led to a University habilitation, qualifying for a University appointment
- In 1989 he accepted an Associate Professorship at the University of Basle
- When he received offers for full professorship in Jena, 1992 and in Bonn, 1996, which he declined, his students convinced the University President of Basle to grant him full professorship at his own University
- Since that time he used his network with French, German and Swiss colleagues to undertake important meteorological research projects

Dieter Scherer recapitulated Eberhard Parlow's 25 years preoccupation with projects in Northern Sweden. It all began with an excursion in 1985 followed by field campaigns in 1987, 1995 to 2001.

Heinz Wanner, University of Bern gave a review of the long history of the University of Basle starting in 1459 and of its meteorology tradition, which accurately recorded spring and summer temperatures between 1774 and 1900, and meteorology professors since 1910 with Parlow and his RECLIP project the last in the list.

The conference concluded with contributions from Michael Schaepmann, Zurich and Christen, UTSC wishing Eberhard continued success, with Eberhard Parlow giving thanks to the presenters and the about 60 to 70 attendees.

The event reminds us that at EARSeL that we should not forget round birthdays of outstanding EARSeL members in the future. While this is not essential, this could add a broad international flavour to such events. We should not forget Eberhard's 65th birthday.

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News from Other Organisations

Highlights of the XXII Congress of the International Society for Photogrammetry and Remote Sensing (ISPRS), Melbourne, Australia

Can you imagine organising a conference where 75 percent of the attendees will suffer from jet lag, an economic downturn will result in the withdrawal of over 40 percent of submitted abstracts and 292 manuscripts, the equivalent of three years of articles that typically appear in a journal, require a double-blind review? Most would answer an unequivocal and heart-felt, “No.” In spite of these challenges, however, Congress Director, Professor Cliff Ogleby, Technical Program Chair, Professor Mark Shortis, the Council, Technical Commission Presidents and Working Group officers of the International Society for Photogrammetry and Remote Sensing (ISPRS) and the Local Organizing Committee of Melbourne, Australia, managed to organize and host an extremely successful XXII ISPRS Congress to finish their 2008-2012 quadrennial term. Held in the spacious and newly opened Melbourne Convention and Exhibition Center, over 1,950 participants from 74 countries were welcomed to Australia by ISPRS President, Professor Orhan Altan, during the Opening Ceremony. A Welcome Reception followed with participants having direct access to Australian animals such as a meter-long crocodile, koala, dingo puppies and various cream-colored pythons being displayed by animal handlers of the Melbourne Zoo.



View from the Melbourne Convention and Exhibition Centre, the venue for the XXII Congress of the International Society for Photogrammetry and Remote Sensing (ISPRS) held 25 August to 1 September, 2012.

From 25 August to 1 September, 2012, over 1,000 papers were presented in Oral Technical, Theme and Special Sessions, along with 11 Plenary presentations, 30 Invited Papers and 95 Short + Interactive digital posters. These presentations focused on the Congress theme, “Imaging a Sustainable Future” and covered the topics of eight ISPRS Commissions: I) image data acquisition, sensors and platforms; II) theory and concepts of spatial information science; III) photogrammetric computer vision and image analysis; IV) geodatabases and digital mapping; V) close-range sensing: analysis and applications; VI) education and outreach; VII) thematic processing, modeling and analysis of remotely sensed data; and VIII) remote sensing applications and policies. The introduction of a Congress App operational on cell phones, tablets, laptops and kiosks located throughout the Convention Center greatly facilitated the participants’ Congress experience of the Technical Program

and direct access to all Congress documents. Seventy eight exhibitors, noting especially Congress Platinum Sponsor, Hexagon, Silver Sponsor, Esri, and a number of Chinese geospatial companies, offered state-of-the-art services and hardware/software solutions for data collection, processing, display and feature extraction. Highlights of the exhibits included the display of unmanned aerial vehicles (UAVs), complete systems for 3D data capture and latest high-resolution digital cameras and laser scanning sensors.

Delegates from nearly 40 Ordinary Member countries met in four General Assemblies to address Society policies and elect Council members and Technical Commission Presidents for the next term. Technical Commission Presidents and Council for the period 2012 to 2014 include the following.

New Technical Commission Presidents:

TC 1: Charles Toth, United States

TC 2: Songnian Li, Canada

TC 3: Konrad Schindler, Switzerland

TC 4: Jiang Jie, China

TC 5: Fabio Remondino, Italy

TC 6: Jianya Gong, China

TC 7: Filiz Sunar, Turkey

TC 8: Vinay K. Dadhwal, India

Incoming ISPRS Council:

President: Chen Jun, China

Secretary General: Christian Heipke, Germany

1st Vice President: Orhan Altan, Turkey

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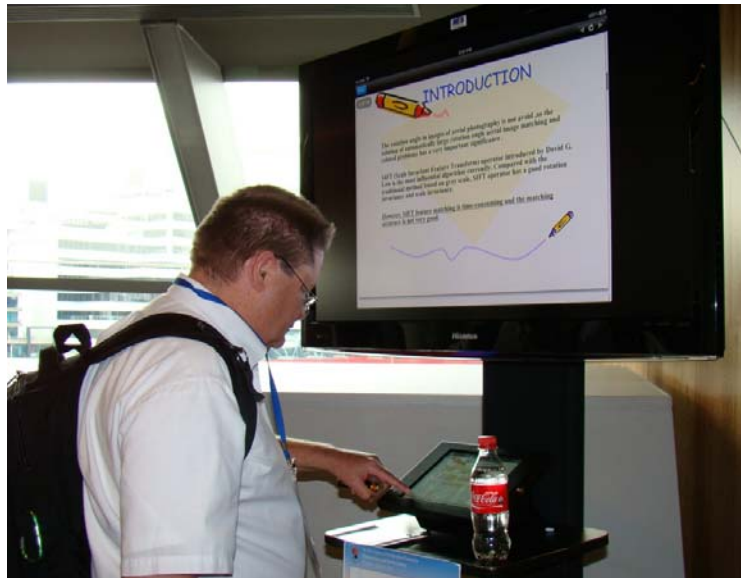
Congress Director: Lena Halounova, Czech Republic

The Melbourne Congress ended with a Gala Dinner held at the world famous Flemington Racecourse. Participants enjoyed a splendid meal, live entertainment and the presentation of prestigious awards including the inaugural Frederick J. Doyle Award to Christian Heipke, Eduard Dolezal Award to George Sithole, Willem Schermerhorn Award to Cemal Olgur Kivilcum, Samuel Gamble Award to Kohei Cho, Wang Zhizuo Award to John Shi, Schwidersky Medal to George Vosselman, Giuseppe Inghilleri Award to Yun Zhang and the Karl Kraus Medal to George Vosselman and Hans-Gerd Mass for their text book entitled, *"Airborne and Terrestrial Laser Scanning."* Additional awards presented at the Opening Ceremony included the Otto von Gruber Award to Jan-Henrick Haurert and the U.V. Helava Award to Konrad Schindler, Andreas Ess, Bastian Leibe and Luc Van Gool for their paper entitled, "Automatic detection and tracking of pedestrians from a moving stereo rig" published in 2010 in the *ISPRS Journal of Photogrammetry and Remote Sensing*. The Brock Gold Medal Award was presented to Franz Leberl for his landmark developments over the past 30 years in the fields of photogrammetry and remote sensing. Two individuals, Ian Dowman and Li Deren, were elected as Honorary Members of ISPRS for their life-long and distinguished services to the Society. Finally, Dieter Fritsch, Martien Molenaar, Shailesh Nayak, Heinz Rüther and Paul Newby also were elected as ISPRS Fellows at the Congress in recognition of their sustained and excellent service to ISPRS.

All participants were given the opportunity to network and enjoy Australian hospitality at coffee breaks that served traditional scones, muffins and cookies. A full social program also launched the inaugural soccer tournament of ISPRS held at an indoor Melbourne soccer facility. Six teams competed in the tournament with Team UnMelb Geomatics as overall Gold Medal winner, Team Australia winning Silver, Team Elinger (Austria-Germany) winning Bronze and Team Rest of the World winning the Wooden Spoon final.

In four years time, the XXIII ISPRS Congress will be held 12-19, July, 2016 in the beautiful and historic city of Prague in the Czech Republic. According to Lena Halounova, the first woman Congress Director in the 100-year history of ISPRS, the theme of the 2016 Prague Congress will be "From Human History to the Future with Spatial Information."

For more information about the ISPRS XXII Congress please visit: <http://www.isprs2012.org>



ISPRS Melbourne Congress participant, Michael Finn, displays a digital poster on a Congress kiosk following the Short + Interactive Session on Mapping from High Resolution Data.



Coffee break at the ISPRS Melbourne Congress.

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The International Society for Digital Earth (ISDE)

The International Society for Digital Earth (ISDE) was founded in May 2006 in China, headquartered at the Center for Earth Observation and Digital Earth, Chinese Academy of Sciences, on the principles of the 1999 Beijing Declaration on Digital Earth. In 2009, ISDE was accepted by Group on Earth Observations as a participating organisation. The Society promotes international cooperation in the Digital Earth Vision, and facilitates Digital Earth technologies to play key roles in, inter alia, economic and socially-sustainable development, environmental protection, early warning and disaster mitigation, natural resources conservation, education and improvement of the well-being of the society in general. The Mission of the Society is to provide a framework for understanding evolving society-beneficial geospatial technologies, current and newly emerging, and to revise the Digital Earth Vision in light of new developments.



Since the advent of the Digital Earth concept in 1998, hot discussions were made at various levels, especially at the first International Symposium on Digital Earth with release of Beijing Declaration on Digital Earth in 1999. Under the leadership of the International Steering Committee for the symposium established in 2000, the 2nd to the 4th International Symposia on Digital Earth were conducted in Canada, Czech Republic, and Japan respectively; and after the establishment of ISDE, it was conducted in the USA, China, and Australia from 2007 to 2011. In addition to the symposium, more topic focused Digital Earth Summits were convened in New Zealand (Auckland), Germany, Bulgaria, and New Zealand (Wellington) again from 2006 to 2012 in every even year. The 8th International Symposium on Digital Earth (<http://isde2013.utm.my>) will be held in Kuching, Sarawak, Malaysia from 26th–29th August 2013. The theme “Transforming Knowledge into Sustainable Practice” aims to enable digital earth modeller and experts in the field of geospatial science and technology to provide a brand new opportunity to share their ideas and insights on how we share knowledge and act together globally. All accepted papers of this symposium will be published online in the IOP conference Series: Earth and environmental science with high visibility and indexed in Scopus, EI Compendex and Inspect. Selected papers will be invited for review for special issue in the International Journal of Digital Earth.



In March 2008, ISDE cooperated with Taylor & Francis launched its official publication, the **International Journal of Digital Earth (IJDE)**. It was then soon accepted for coverage in the Science Citation Index Expanded (SCI-E) in August 2009 and 7 index databases, and gained impact factor 1.453 for 2010, ranking it 7th in the remote sensing category. Although the rank was not as good as before for 2011, it is still very promising for a healthy and growing development in the coming years.

ISDE has provided a very good platform for driving academic discussions on digital earth, especially for a modern evolving world with high-resolution Earth Observation imagery and easy to use geospatial information.

To examine the achievement of Digital Earth in the past 10 years and look forward its future development, ISDE organised meetings to discuss the vision of Digital Earth toward 2020. Two papers have been published, one is the Next Generation Digital Earth published in the Proceedings of the National Academy of Sciences of the United States of America (June 2012), and another one on the International Journal of Digital Earth (Vol. 5, Issue 1). These papers outlined the future perspective of Digital Earth.

The society is currently led by Prof. John Richards from Australia. It aims to develop into one of the leading international organisations in the geospatial information field. ISDE is happy to conducted collaborations with other organisations to benefit for each other. For example, under the MOU framework, ISDE organised a session on “Digital Earth in Data-Intensive Era” in the 23rd Codata

conference in Taipei. It will be good to explore potential cooperation of ISDE with EARSeL, so as to strengthen each society for a better future.

For more information about the ISDE please visit: <http://www.digitalearth-isde.org>

Changlin WANG

Executive Director

International Society for Digital Earth

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The 9th International Conference of the African Association of Remote Sensing of the Environment (AARSE)-The El Jadida Declaration



During the 9th International Conference of the African Association of Remote Sensing of the Environment (AARSE) on Earth Observation and Geoinformation Sciences for Environment and Development in Africa: Global Vision and Local Action Synergy, the **El Jadida Declaration** was signed on 2nd November 2012.

Delegates from 40 countries were present at the 9th International AARSE Conference held at El Jadida, Morocco from 29th October to 2nd November 2012:

- Recognising the role of Earth Observation in developing accurate geospatial datasets, information and knowledge to support the efforts of nations in achieving their development agenda;
- Noting the importance of Earth Observation and Geospatial Science and Technology products and services in attaining the Millennium Development Goals (MDG), the World Summit on Sustainable Development (WSSD) objectives, African Union (AU) priorities, and other key national development and poverty alleviation strategies;
- Recognising the importance of Africa's participation and contribution to the implementation of the Global Earth Observation System of Systems (GEOSS) and noting an increase in a number of African countries and organisations participating in GEO;
- Noting that Africa is making major strides in space science and technology development with several countries such as Algeria, Egypt, Morocco, Nigeria, and South Africa developing successful space programs, including acquiring their own Earth Observation satellites;
- Recognising the meetings and resolutions of the biennial African Space Leadership Conference (ALC) on Space Science and Technology;
- Welcoming the input from international scientific societies including the IEEE Geoscience and Remote Sensing Society (IEEE GRSS) and the International Society for Photogrammetry and Remote Sensing (ISPRS) that support the building of the science base in Africa;
- Recognising the progress made on the African Resource Management (ARM) satellite constellation by the current members of the constellation;
- Recognising the need to establish an African space coordinating mechanism to ensure that Africa's interests are represented in international space programs collaboration and partnerships; and to develop a coherent policy and strategy for utilising space technology for development;
- Recognising the work of AARSE and the Environmental Information System Africa (EIS Africa) over the past 20 years as major points of contact and facilitators of Earth Observation and Geospatial Information activities in Africa;

- Recognising the role and contribution of the African Union and the United Nations Agencies such as the UN Economic Commission for Africa (UN-ECA) and building on previous declarations and multilateral coordination initiatives in space science and technology for sustainable development in Africa such as the UNESCO/AARSE/AU High-Level Scientific Workshop in 2007;
- Recognising the importance of the protection of marine and coastal environments of Africa and the progress made by the UNESCO Global Ocean Observation System (GOOS) programme in Africa;
- Recognising the importance and success of continued long term collaboration between European Space Agency and African scientists within the TIGER initiative on Earth Observation techniques related to water resources management; and
- Recognising the importance of land demarcation and surveying as the foundation of sound governance.

Hereby declare and call on the African Union and African Governments:

1. To ensure that the benefits of space science and technology in regional initiatives are realized;
2. To support a coordination office on space affairs at the African regional inter-governmental level, comprising representatives of all space agencies, regional organisations such as AARSE, and other African stakeholders;
3. To support the space coordination office to represent Africa's space science and technology capability in relation to existing and future international programs and partnerships;
4. To develop the African space policy and programmes for the eventual establishment of an African Space Agency;
5. To encourage and support African universities and other institutions of higher education through adequate funding for fundamental and applied research and teaching in Earth Observation and geoinformation sciences;
6. To strengthen and harmonise human resource development and institutional capacity in the fields of Earth Observation and geoinformation sciences by supporting organisations such as AARSE as well as existing and new regional training programmes at tertiary institutions in partnership with United Nation Agencies such as UNECA, UNESCO, UNEP, UNOOSA, FAO, UNDP and UNU;
7. To recognise specialised institutions in geoinformation and Earth Observation, notably Regional Centre for Training in Aerospace Surveys (RECTAS), Regional Centre for Mapping of Resources for Development (RCMRD), the UNOOSA Regional Centres in Africa and national institutions of higher learning as the primary vehicles for capacity development in space science and technology development and applications in Africa;
8. To inspire Africa's youth through space based education and outreach programs;
9. To engage actively at all levels of GEO and GEOSS and the implementation of AfriGEOSS to bridge the digital divide and to build an Africa-wide knowledge-based economy using the Group on Earth Observations (GEO) networks and emerging GEOSS infrastructure;
10. To support the development of the African Resource Management Constellation and the dedicated African Earth observation satellites and to serve the sustainable development needs of Africa;
11. To support the dedicated activities in the TIGER Capacity Building Facility and, within the new TIGER-NET project as an essential component, to prepare African water resources experts for the exploitation of African national satellites and the upcoming SENTINEL satellite fleet of the European Space Agency;

12. To support new initiatives such as Bridging Actions for Global Monitoring for Environment and Security and Africa (BRAGMA) for addressing broad-based cooperation in thematic areas, such as marine and coastal protection, to be addressed by Earth observation services in Africa;
13. To support efforts of agencies, national survey departments and UN ECA initiatives (such as the African Regional Spatial Data Infrastructure – ARSDI, Mapping Africa for Africa – MAFA and African Reference Frame - AFREF) to use modern Earth Observation techniques to update, consolidate and implement accurate land demarcation of national and regional boundaries, public and private cadastral systems to record land custody or ownership.

Signed by

Professor Olajide Kufoniyi
President of AARSE

Professor Boumediene Tanouti
President, Chouaib Doukkali University
El Jadida, Morocco

The Remote Sensing and Photogrammetry Society (RSPSoc) Annual Conference 2012, The University of Greenwich



RSPSoc Annual conference 2012 was hosted this year at the designated World Heritage site of the Old Royal Naval College, currently home to the University of Greenwich in London. The beautiful weather, historic architecture and the banks of the river Thames with Olympian cheers still suspended in the air provided an exciting location for the conference. The conference was also part of the London Mapping Festival organised by the Geoinformation Group.

The proceedings started with pre-conference activities leading up to an evening public lecture given by Professor David Maguire on the fallacy of postcode lottery, entitled Why there is no such thing as a postcode lottery: GIS and the New Geography. The lecture brought together more than seventy five attendees from various backgrounds, who went away with a deep insight into the world of spatial patterns and GIS. Earlier in the day a pre-conference football match attracted many flamboyant (and some just buoyant...) players. The match turned out to be a goal galore with pretty much everybody scoring a hat trick. The match finished with an injury to a valued exhibitor of the conference; sadly the player lost his toe nail. The pre-conference activities also included a Landmap data workshop and a visit to the on campus micro-brewery.

The main conference was inaugurated by the deputy Vice-Chancellor of the University of Greenwich, Professor Tom Barnes, followed by an exciting keynote by Dr Tony Freeman from JPL, NASA. Dr Freeman led the keynotes by enlightening the audience about NASA's future remote sensing missions until 2025. A commonly adopted conference model of two parallel sessions worked out very well as delegates rushed to and from various talks. The first day's session covered the interesting topics of Hyperspectral RS, SAR, Disaster Mapping, GMES and Land Cover and Vegetation. The day also saw Dr Paul Aplin chair a strong session associated with Technical/Operational Procedures SIG. A perfect end to the first day of the conference brought everybody together on an Ordnance Survey sponsored boat trip to enjoy the scenic waters of the river Thames. The cruise included Blackwell Wiley's drinks reception, and after the cruise passed Tower Bridge, brushed the Shard and headed back to the Royal Naval College, delegates were then greeted by a couple of Indian Dhol 'drum' beaters leading them to the Queen Anne's courtyard for a meaty BBQ. A lovely Bajan girl introduced

few to the taste of Barbadian Rum, putting a smile on many thirsty faces, thank you Renee Babb for your Barbadian hospitality. The rain only brought all the delegates closer under the historic architecture, apart from the BBQ chefs who gallantly marched on despite the pouring rain.

The start of the second day was very well attended considering 'the Rain and Rum' the night before. Dr Ioannis Manakos, chairman of EARSeL, opened the day with his keynote revealing the role and vision of EARSeL in Europe and beyond. Other sessions in the day included talks on the topics of EO Technology, Habitat Assessment, RADAR and Urban Environment. The day also saw a very well attended SIG workshop on FTIR/Thermal Remote Sensing chaired by Dr Graham Ferrier.

After the conclusion to the AGM, the Taylor & Francis sponsored drink reception invited delegates to experience the awe of the Painted Hall. The candle lit artwork with well dressed waitresses in black holding glittering Champagne on the staircase of the entrance to the hall was a sight that many will remember. Through a 'secret passage' delegates were led to the dinner hall at the Queen Mary Undercroft which was suitably dressed to match the occasion. The end of the night was enriched by a stunning performance of Tango followed by a slightly less stunning but equally entertaining presentation of Chacarera performed by enthusiastic delegates of the conference. The Argentinean courtship dance was made even more charming by an imbalanced ratio of male to female!

The last day of the conference saw an inspiring keynote by Mr Andrew Newman from DEFRA, who enlightened all of us about the issues associated with the applicability of the INSPIRE initiative in Europe. The final day also covered session on the topics of Methods and Algorithms and Environmental Monitoring.

The conference was concluded with a strong Chairman's half hour with positive feedback to take forward to Glasgow next year. The strong technical sessions supported the conference theme of 'Changing how we view the world' and gave attendees an insight in to what lies ahead for remote sensing and photogrammetry research. A big 'thank you' goes to all the delegates, presenters, sponsors and exhibitors for making this conference a success. We hope to see you all at Glasgow next year.



Delegates enjoying the Boat Trip.



Delegates arriving at the Painted Hall.



The President, Prof. Paul Curran, speaking to delegates after the Annual Dinner.

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Acknowledgements: The article herein was first published in the October 2012, Issue Number 46 of "SENSED", the RSPSoc Newsletter.

2nd Strategy Forum Remote Sensing & GMES Theme Days in Germany



The 2nd Strategy Forum Remote Sensing and GMES Theme Days were held on 14-15 November 2012 in Düsseldorf at the Ministry of the Interior of North Rhine-Westphalia. The major topic of the symposium which attracted about 100 participants from research institutes, administration and industry was **Earth Observation in Support of Energy Turnaround and Adaptation to Climate Change**. The goals were:

- to present the actual use of remote sensing data and GMES Services in public authorities and to evaluate their future needs
- to inform about new developments in the GMES programmer
- to discuss the general framework for an improved application of remote sensing data and geo-information
- to initiate a dialogue between data providers and users in public authorities.

The symposium started with several **keynotes from GMES experts**.

Cornelia Rogall-Grothe, Secretary of State at the Federal Ministry of the Interior reported on GDI-DE, an initiative of federal, state and municipal agencies providing an interoperable data base for geo-information in Germany with open access, published on the internet since October 2012 (www.geoportal.de), and by the Centre for Satellite Based Crisis Information (<http://www.zki.dlr.de>) at the DLR Earth Observation Centre which will be regularly operating in January 2013.

Paul Becker, Vice President of Deutscher Wetterdienst (DWD), pointed out that *in situ* weather data are still the core information for weather forecast, and remote sensing is of merely supplementary relevance. However, DWD's network of 16 ground-based **C-band radar instruments**, which are in use for rain detection since 2008, provides data on extreme rain which cannot be conventionally obtained. Satellite-based remote sensing shall be further developed for regional and local weather forecast, but only few time series are available until today.

Petra Mahrenholz from the Competence Centre Climate Impact and Adaptation KomPass (www.anpassung.net) at the Federal Environment Agency (UBA) addressed an adaptation action plan entitled *Deutsche Anpassungsstrategie an den Klimawandel (DAS)* which creates a framework for adaptation to climate change in Germany. It is aimed at reducing the vulnerability to the consequences of climate change, and to maintain or to improve the adaptability of natural, social and economic systems. At present there are 110 indicators proposed for estimating the impact of climate change and this number will be reduced in future. The indicators are based on *in situ* data and model projections; an integration of remote sensing is in discussion.

Stefan Dech, Director of the DLR Earth Observation Centre (<http://www.dlr.de/eoc>) presented many examples of the progress made in Earth observation with remote sensing. State-of-the-art is the evaluation of photovoltaic solar energy conversion for buildings. But also net primary production data are available today for local bioenergy yield estimates, for short-term forecasting power plant operation as well as for potential analyses for building heat grids in large cities. Nowadays, the satellite-based analysis of atmospheric pollutants such as NO₂ and ozone is possible with high accuracy even on regional scales through the GMES project Myair (<http://www.myair.eu>). It was also worth mentioning that the accuracy of weather forecast has made much progress due to improved atmospheric predictability which is mostly based on better numerical models and the use of satellite data. Indeed, remote sensing has become a tool for providing instructions on how to act in our daily life.

Holger Lilienthal from the Bundesforschungsinstitut für Kulturpflanzen (<http://www.jki.bund.de>) informed about agriculture in the context of climate change. The growing season has increased by 10 to 40 days in Brandenburg since 1951. This is due to a shorter winter time and a longer autumn. Consequently, sowing is done earlier in spring, but with the risk of damage due to frost. In general, extreme weather events turn out to be a higher risk for agriculture than small trends due to climate change. Large-scale production estimates are not yet available; therefore damage predictions due to potentially extreme weather cannot be performed. However, in the near future this will be made operationally available twice per year based on remote sensing with a resolution of about 20 m.

Rudolf Seitz from Bayerische Landesanstalt für Wald und Forstwirtschaft (<http://www.lwf.bayern.de>) and Andreas Müller from the DLR Earth Observation Centre (chairman of the EARSeL Special Interest Group on Imaging Spectroscopy) reported on projects aiming at forestry monitoring using World-View-2 satellite images. The goal is to evaluate the vitality of individual trees in large scales using hyperspectral data, including private forests which otherwise cannot be monitored.

The symposium continued with a series of **specialist workshops** on various themes, to name but a few:

- adaptation to extreme weather events and civil protection
- best practice of GMES services in the federal states
- changing landscapes and resources management at times of energy turnaround
- remote sensing for disaster management
- use of remote sensing for grid integration of solar and wind energy
- real time services for maritime protection and maritime safety
- industrial use of GMES services
- remote sensing of soil displacement due to mining and geology

Summaries of presentations and discussions held at these workshops are announced to be published online at <http://www.d-gmes.de/Programm-2012>.

Conclusions drawn in the closing session pointed at the increasing relevance of GMES for public administration as well as in the industrial sector. In fact, a change of information flow is being observed: previously driven by data suppliers it is now driven by user-based requests. Currently Service Centres are in preparation to meet the requirements of GMES users.

On the other hand many municipalities still have a reserved attitude towards these services. They should be encouraged to contact GMES representatives at state and federal ministries where information and assistance will be provided. Legal aspects have been solved and financial budgets are available. Hence, improved coordination will help making the GMES Services a success.

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Read more about GMES on the internet:

<http://gmes.info>

<http://ec.europa.eu/gmes>

<http://www.d-gmes.de>

4th Remote Sensing and GIS Symposium (UZAL-CBS 2012) Zonguldak, Turkey

The biennially 'UZAL-CBS symposium' series is the most popular symposium event in Turkey on combining the areas of remote sensing and GIS with the main objective to bring together national experts in multidisciplinary technologies, both from the governmental and private sectors to disseminate knowledge and to share their expertise and experiences in present and future applications and development of remote sensing and GIS. This event has been started in 2006 by Prof.Dr. Derya Maktav from Istanbul Technical University (ITU), who is also the national representative of Turkey by EARSeL. The first UZAL-CBS started in ITU in 2006, and continued by the second and third in Erciyes University in 2008 and Gebze Institute of Technology in 2010, respectively. The fourth UZAL-CBS was organised in Bulent Ecevit University (BEU) in Zonguldak on October 16-19, 2012 with the cooperation of BEU Geomatics Engineering Department, ITU Geomatics Engineering Department and the Turkish Chamber of Survey and Cadastre Engineers (HKMO). 348 participants from various national academic, governmental and business institutions attended the meeting.



Participants of the 4.UZAL-CBS.

The opening ceremony has been performed by the speeches of Asst. Prof.Dr. H. Topan (BEU, co-chair) and Prof.Dr. D. Maktav (ITU, co-chair), M. Erdoğan (HKMO), Prof.Dr. Ş. Kuşçu (Head of BEU Geomatics Dept.), Prof.Dr. Y. Yıldırım (Dean), Dr. E. Bank (TUBITAK Space), Asst. Prof. Dr. H. Bayraktar (General Directorate of GIS), Prof. Dr. M. Bağdigen (BEU Vice-rector) and M. Akdemir (Mayor of Zonguldak). Dr. Ioannis Manakos (Chair of EARSeL), Dr. Rosa Lasaponara (EARSeL Secretary General) and Prof. Mag. Dr. Wolfgang Sulzer (Graz Karl Franzens University, Austria) were the invited speakers of UZAL-CBS.



Left to right: Prof. Dr. Derya Maktav (Co-chair of UZAL-CBS 2012, ITU), Dr. Ioannis Manakos (EARSeL Chair, ITI-CERTH, Greece), Dr. Rosa Lasaponara (EARSeL Secretary General, IMAA-CNR, Italy), Assist. Prof. Dr. Hüseyin Topan (Co-chair of UZAL-CBS 2012, BEU).

89 oral and 11 poster presentations were performed in totally 24 oral and 1 poster sessions within 12 parallel sessions, subjecting remote sensing and GIS applications mainly on agriculture, forestry, geology, risk and hazard monitoring and management, city and regional planning, meteorology, coastal management, protection areas, 3D modelling and visualization, erosion, land cover and land use etc. In addition to the proceedings, the selected papers were planned to be published in a special issue of the Journal of Aeronautics and Space Technologies in 2013.

A panel session on “Use of RS and GIS Technologies in Public and Business Sectors: Problems and Solutions” chaired by Prof. Maktav, has been organized by contribution of the panellists representing universities, military, governmental and private agencies.

In closing ceremony, traditionally, best oral presentation on “3D Quality Estimation of High Resolution Terrasar-X Data - A Case Study on Barcelona” by Umut Güneş Sefercik, Alexander Schunert, Uwe Soergel and Kinichiro Watanabe and best poster presentation on “Determining Horizontal Displacements by Aerial Photos and Satellite Images” by Tarık Türk were selected. EARSel supported the event with some EARSel publications as best poster/oral presentation awards.

The UZAL-CBS 2012 was enlivened by an ice breaker party, gala dinner, Gökgöl Cave visits and the sightseeing into Historical City of Safranbolu, one of UNESCO World Heritage Centre and historic Amasra city, found in BC 12th century.



Safranbolu visit.



A group of organizers.

The UZAL-CBS has been sponsored by various private companies and also Zonguldak Government, Zonguldak Municipality, TUBITAK and EARSel, and organized by 18 organising committee members, 25 scientific committee members, and 35 supporter staffs.

Yıldız Technical University, Istanbul was selected as the next organizer in 2014.

On behalf of the Organising Committee,

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The 8th Scientific Conference with International Participation "Space Ecology Safety" - SES, Bulgaria

Between 4th and 6th December 2012, the 8th Scientific Conference with International Participation "Space, Ecology, Safety" (SES) took Place at Russian Culture and Information Centre in Sofia, Bulgaria. The event is organised on an annual basis by the Space Research and Technology Institute at the Bulgarian Academy of Sciences (SRTI-BAS) and the Bulgarian Astronautical Society (the BAS). The 8th edition of the conference was dedicated to "Bulgaria - Forty Years Space Country" commemorating the first Bulgarian instrument in space P-1 and its scientific programme. The conference was not only remarkable by this occasion, but also for its high-profile due to numerous greetings and addresses sent by the President of the Bulgarian Academy of Sciences (BAS), the President of Russian Academy of Sciences (RAS), and special guests from Bulgarian ministries and universities, as well as the first Bulgarian astronaut - Dr. Georgi Ivanov. It was also the first time in the history record of space research in Bulgaria, to have the Chairman of the EARSeL - Dr. Ioannis Manakos - as a special guest.



EARSeL's Chairman, Dr. Ioannis Manakos, during his keynote speech at the 8th Scientific Conference "Space Ecology Safety", Bulgaria 2012.

The Bulgarian EARSeL members and the EARSeL Chairman conferred for a meeting before the official conference opening. The meeting was used to report and discuss the activities of the members for the period 2011-2012.

During the opening session of SES 2012, a presentation of the track record of the Bulgarian space instrumentation and the latest space instruments on board of the International Space Station (ISS) was made by Assoc. Prof. Dr. Tanya Ivanova. Then, the institute's past, present, and future activities in space research and technologies have been presented by Prof. DSc Petar Getsov - the Director of SRTI-BAS. The keynote 'European activities towards an operational land monitoring service' was presented by Dr. Ioannis Manakos - the EARSeL Chairman. He made the links to and shown the directions towards co-operation with Bulgarian scientists. It was stressed that closer co-operation in a European context and participation of Bulgarian scientists in GMES after the end of geoland2 is possible through algorithm development of new-products and services and satellite product validation. The last presentation was for the 55th anniversary of the BAS delivered by Sen. Res. Dr. Plamen Angelov - Vice Chairman of BAS governing body. The opening session was closed with a presentation of the publishing activities of the SRTI-BAS.

At the end of opening session, the official start of the conference was announced. By the end of the conference, a total of 93 presentations and posters from Bulgaria, Russia, Ukraine, Former Yugoslavian Republic of Macedonia, and Egypt were presented in the following panels: Space Physics; Ecology and Risk Management; Remote Sensing and GIS; Aerospace Technologies and Biotechnologies. At the conference closing, a round-table has been set up, dedicated to the micro-satellite Balkansat-1.

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Science Article - 32nd EARSel Symposium Reprint

Airborne or Spaceborne Images for Topographic Mapping

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Abstract New airborne optical cameras as well as new very high resolution satellites are available now. With 50cm ground sampling distance (GSD) images from optical satellites are competing with images from airborne digital cameras which may have a GSD of up to approximately 1m GSD. Analog aerial cameras nearly disappeared from the market as it was the case for analog imaging satellites years before. The capacity of large format digital aerial frame cameras has been extended to 250 up to 260 mega pixels as well as the swath width of the very high resolution satellites up to 40 000 pixels. In addition the imaging capacity of the optical satellites strongly improved. The partially very high satellite slewing speed enables now stereo combinations from the same orbit without former restrictions. So the economic conditions and also the availability of actual images are better as before. For special projects of limited size in addition to traditional photo flights unmanned aerial vehicles (UAV) also named unmanned aerial systems (UAS) got a growing share. With the exception of countries or areas where restrictions for the use of aerial images exist, there is the question if airborne or spaceborne imagery should be preferred. Topographic line maps as well as digital elevation models (DEM) are specified by the GSD; the origin of the images - aerial or space - is not important for the quality and accuracy. Aerial image flights for some applications have the advantage of simpler higher overlap by more as two images, but the dominating aspects are the simple access to imagery and the financial conditions.

Keywords. Spaceborne, airborne, optical images, topographic mapping, DEM generation.

1. Introduction

With optical satellite images, now available with up to 0.5m GSD, an overlapping range to digital aerial images exists. The decision for use of aerial or space images for mapping application today is dominated by economic aspects and depends on size and requirements of projects. Because of the increased number of very high resolution satellites and especially the increased imaging capacity today, it is quite simpler to get useful images from the archives or via imaging order. The high imaging capacity as well as the improved slewing speed of the satellites allows the acquisition of stereo pairs which was expensive and time consuming before the launch of WorldView-1 in September 2007. Also digital aerial cameras recently strongly improved the capacity. With mid-format cameras and configurations of such cameras new applications exist. The extended hardware, but also software solutions made the decision for choosing the optimal configuration of projects more difficult.

2. Airborne and spaceborne systems

2.1. Airborne camera systems

Airborne cameras and camera systems are categorised in large format frame cameras, mid-format frame cameras and camera systems, small format cameras and line scan cameras. Analog aerial cameras should not be used any more, their information content corresponds just to the newest digital mid-format cameras, it's geometric accuracy is limited, the spectral range is not well defined, film is not as sensitive as CCD-arrays or CCD-lines, film is expensive and the film development is

becoming difficult. Only cameras useful for photogrammetric purposes are respected in following. They must have a fixed focus and a stable camera body to guarantee a stable inner orientation.

Table 1. Specification of large format digital frame cameras.

camera	Pixels (camera)		Pixel size [μm]	f [mm]	Δt [sec]	Image size [mm]		b/h for p=60%	Mega- pixels
	x	y				x	y		
DMC (1 st version)	7680	13824	12.0	120	2	49.15	86.02	1:6.1	106
DMCII 140	11200	12096	7.2	92	2	80.64	87.09	1:2.8	135
DMCII 230	14144	15556	5.6	92	1.7	79.21	87.11	1:2.9	220
DMCII 250	14656	17216	5.6	112	2,3	82.41	96.41	1:3.4	249
UC D	7500	11500	9.0	101.4	1	67.50	105.5	1:3.8	86
UC X	9420	14430	7.2	100.5	1.4	67.82	103.9	1:3.7	136
UC Xp	11310	17310	6.0	100	2	67.86	103.9	1:3.7	196
UC Eagle	13080	20010	5.2	80 / 210	1.8	68.02	104.1	1:2.9 1:7.7	261

Large format digital photogrammetric frame cameras are only produced by Z/I Imaging as DMC and by Vexcel Imaging as Ultracam (UC) (Table 1). Both companies recently extended strongly the capacity. Z/I Imaging changed the concept of four slightly convergent sub-cameras for the panchromatic image to one monolithic very large CCD, produced by DALSA, while the pixel size of the UltraCam continuously was reduced now to 5.2 μm . This extended the capacity now to nominally 249 respectively 261 megapixels. The reduction of the pixel size caused by the progress of CCD-arrays, used also for mid-format cameras, is not without problems. Smaller pixels are closer to diaphragm limited resolution, requiring good optical systems and longer exposure time. For smaller pixels a difference between nominal and effective resolution may exist.

The effective resolution can be determined by edge analysis, leading to the point spread function [1]. The width of the point spread function gives the factor for effective resolution which multiplied with the pixel size or GSD leads to the effective resolution in the image or object. An edge analysis was leading to following factors: DMC II 230: 0.98, DMC II 250: 0.87 and UC Eagle: 1.02. That means that the effective capacity for the UC Eagle is 250 megapixels instead of the nominal 261 megapixels. For the DMC II 230 and 250 it is even extending the effective capacity against the nominal.

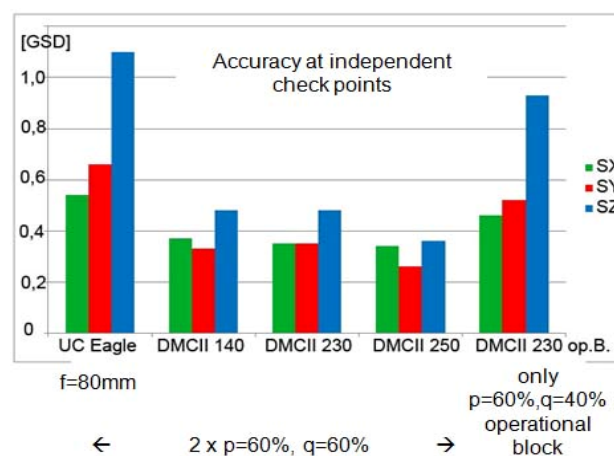


Figure 1: Accuracy at independent check points of block adjustments.

An accuracy analysis of images taken with the UC Eagle and the three DMC II-versions is shown in Figure 1. With the three test blocks taken with the DMC II-versions, having 60% end lap and 60% side lap together with crossing flight lines the accuracy at independent check points is below 0.5 GSD for all coordinate components. For the UC Eagle the root mean square differences are a little larger, which may be caused in X and Y also by the limited accuracy of the check points in the used test area. The accuracy of the operational block flown with the DMC II 230 with just 60% end lap and 40% side lap even under the non optimal conditions of an operational block is below 1.0 GSD for Z and below 0.5 GSD for X and Y. This confirms the good accuracy of the large format frame cameras.

Instead of digital frame cameras, also digital line scan cameras as the Leica ADS 80, the Jena-Optronik JAS 150s and the Wehrli 3-DAS-1 and 3DAS-2 can be used. Within the German camera test [2] these cameras were resulting in the same accuracy as the frame cameras, but operationally the line scan cameras are usually used only for the generation of ortho images and they are not really accepted for topographic mapping.

Several photogrammetric mid-format cameras are on the market. They are not system cameras as the large format cameras, they are just single lens cameras equipped with one CCD-array. All mid-format cameras are using similar or the same CCD-arrays. With the development of the CCD-arrays the pixel size has been reduced as shown also for the UltraCam in table 1 from $9\mu\text{m}$ over 7.2 and 6.0 to now to $5.2\mu\text{m}$, corresponding to 26, 41, 60 respectively 80 megapixels. Most mid-format cameras are available with a sequence of focal lengths from wide angle up to small angle. The colour information is from a Bayer pattern, a regular filter matrix in front of the individual pixels. 50% of the pixels have a filter not eliminating the green band, 25% for the blue band and 25% for the red band. Based on the colour pattern, the grey values are interpolated for all three bands for all pixels. The Bayer pattern has the disadvantage that a forward motion compensation (FMC) is only possible with a mechanical movement of the CCD and not as for the system cameras with a transfer (or time) delay and integration (TDI), moving the charge in the CCD with the speed of the forward motion. On the internet, one mid format camera producer talks about a "FMC by BCM, Blur Control Management: a high shutter speed plus extended radiometric CCD range is operated to compensate motion blur" – this is just the information, that the camera has no FMC. The forward motion is not so much dependent upon the shutter speed as from the exposure time. An extended radiometric range is nonsense for a colour camera, where the three bands are limited by the physics and finally no FMC is possible by a short exposure time, only the influence of the forward motion can be limited. So BCM is misleading information. With reduced pixel size, the FMC became more important because smaller pixels cannot collect so much energy.

Also combinations of two, three, four and five mid-format cameras are available. These combinations are not on the same accuracy level as large format digital cameras – the cameras partially have some problems with systematic image errors and the cameras are not so rigid fixed together as in the case of the DMC and UC. Partially, no virtual images are generated from the combination of single images, so the user has to handle quite more images. An exception is the combination of five cameras which is in use, for example by Pictometry. In this case, a vertical and four oblique images are generated. In systems as from Pictometry such images are handled separately, but the object geometry has a limited accuracy.

Photogrammetric applications based on unmanned aerial vehicles (UAV), also named–systems (UAS), are booming caused by the reduced price of small UAVs. In several countries the total weight of UAVs is limited to 5kg and usually limited to a flying height of 300m above ground. The small size makes it sensitive to wind, so larger crab angles cannot be avoided, requiring a high overlap to cover the whole project area without gaps. Because of small size and weight partially mobile phone cameras are used with just $1.5\mu\text{m}$ pixel size. This is below the diaphragm limited resolution, so the factor for the effective resolution may be in the range of 2.3 corresponding to effective pixel size of $1.5\mu\text{m} * 2.3 = 3.4\mu\text{m}$ – even if the image may have a size of 10 megapixels this corresponds just to the information contents of $10 \text{ megapixels} / 2.3^2 = 1.9 \text{ megapixels}$ because of the limited image quality. If possible, cameras with larger pixels should be preferred.

2.2. Spaceborne imaging systems

For mapping applications, high and very high resolution optical satellite images are useful. As the rule of thumb for 0.1mm GSD in the map scale is required for topographic mapping corresponding to 1m GSD for 1:10000 or 0.5m GSD for 1:5000 map scales. At least 5m GSD is required to identify objects which have to be shown also in smaller map scale. Of course today topographic mapping is a data acquisition for a digital database and the map scale is the presentation scale. The real breakthrough for topographic mapping came with the 1m GSD of IKONOS. Now with the higher number of very high resolution optical satellite systems, with strongly improved imaging capacity (Table 2) and better slewing speed, the conditions for getting actual space images are quite better as before.

Table 2. Existing and **planned** very high resolution optical satellite sensors ($\leq 1\text{m}$ GSD for pan).

Sensor	launch	Altitude [km]	GSD pan [m]	Swath in nadir view	Pan/ms channels	Imaging capacity [km ² /day]
IKONOS 2	1999	681	0.82	11.3 km	Pan, 4ms	150 000
QuickBird	2001	450	0.61	16.5 km	Pan, 4ms	135 000
EROS B	2006	508	0.7	7 km	Pan	
KOMPSAT-2	2006	685	1.0	15 km	Pan, 4ms	
WorldView-1	2007	494	0.45	17.6 km	Pan	750 000
WorldView-2	2009	770	0.46	16.4 km	Pan, 8ms	975 000
GeoEye 1	2008	681	0.41	15.2 km	Pan, 4ms	700 000
Cartosat-2, 2A, 2B	2007-10	631	0.82	9.6 km	Pan	528 000
Pleiades 1	2011	694	0.50	20 km	Pan, 4ms	1000 000
Kompsat-3	2012	670	0.70	16.8km	Pan, 4ms	
Pleiades 2	2012	694	0.50	20 km	Pan, 4ms	1000 000
Cartosat-2C,2D	2012	630	<1.0	10 km	Pan, 3ms	
GeoEye-2	2013	670	0.34	14.3 km	Pan, 4ms	
WorldView-3	2014	620	0.31	13.2 km	Pan, 8ms	676 000
Cartosat-3A,3B	2014	450	0.25	16 km	Pan, 4ms	
DMC-3 (3 satellites)	2014	630	1.0	22.6 km	Pan, 4ms	100 000

11 very high resolution optical satellites, available for the commercial market, are currently active. In addition, there are several military satellites from which the images are restricted to military use. Up to 2014, eleven more systems are announced. GeoEye-2, WorldView-3 and Cartosat-3 at first have been specified with 0.25m GSD, but it seems that they will now fly on higher orbits, reducing the GSD to approximately 0.32m and extending the swath width. USA currently has a legal restriction for US companies to deliver just satellite images with 0.5m GSD; if this will not be changed, 0.25m GSD for GeoEye-2 and WorldView-3 would not have advantages for civilian applications against GeoEye-2 respectively WorldView-3.

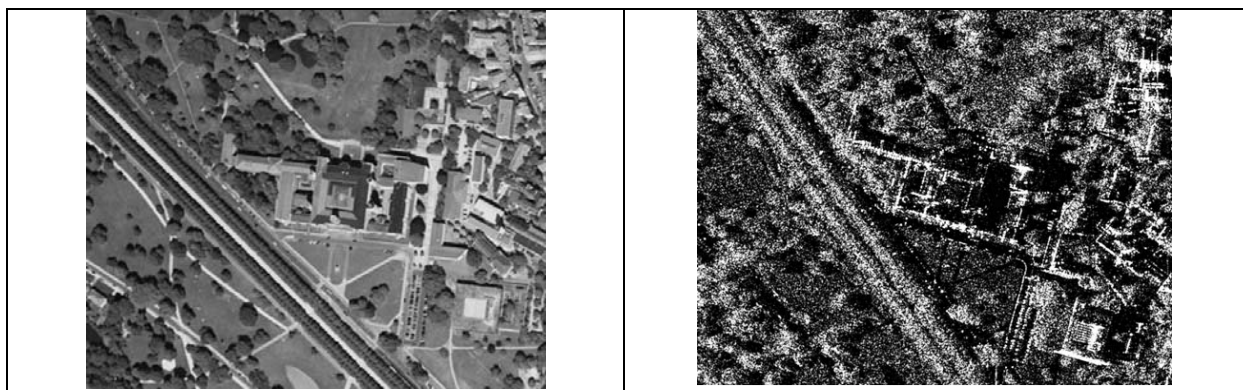


Figure 2: left: Optical image with 1m GSD, right: TerraSAR-X-image with 1m GSD
(main building of Leibniz University Hannover).

In addition to optical satellites, there are also Synthetic Aperture Radar (SAR) satellites with up to 1m GSD available for civilian application as TerraSAR-X, TanDEM-X and CosmoSkymed. SAR is not restricted by cloud coverage, but the information content of SAR images is not the same as for optical images as obvious in Figure 2. Nevertheless, a trained operator is able to identify in SAR-images approximately 80% of the elements as in optical images with same GSD [3].

3. Comparison of airborne and spaceborne topographic mapping

Images taken by UAV –cameras cannot be compared with satellite images– caused by the limited range of civilian UAVs, they can be used apart from very small projects which cannot be compared with the size covered by a space image. In addition, the chosen GSD in most cases is quite smaller.

Mid-format cameras can be used for smaller projects. Very often, the camera geometry is not on a comparable level to large format aerial cameras. The generation of accurate height models with mid-format cameras cannot be recommended, so finally only digital large format aerial cameras can be compared with the use of space images for topographic mapping.

Table 3. GSD by large format aerial cameras from 10 000m flying height.

camera	DMC	DMCII 140	DMCII 230	DMCII 250	UC D	UC X	UC Xp	UC Eagle	UC Eagle
f [mm]	120	92	92	112	100	100	100	80	210
GSD	1.0m	0.78m	0.61m	0.50m	0.90m	0.72m	0.60m	0.65m	0.25m

Only few civilian aircrafts can operate in a flying elevation of 10 000m – this is usually approximately the limit. The GSD of images taken from this height are shown in Table 3. The older digital aerial frame cameras are reaching up to 1.0m GSD – the same as IKONOS and KOMPSAT-2. The newer cameras are in the range of 0.50m up to 0.60m GSD as GeoEye-1, WorldView and Pleiades. The smaller GSD of the newer cameras is mainly caused by smaller pixels (Table 1), keeping the footprint from the same flying height constant.

The information content of optical airborne and spaceborne images is just depending upon the ground resolution. The rule of thumb of required 0.1mm GSD in the map scale has been confirmed for both image types [4]. The image quality of original digital aerial images is the same as for space images. Only analog aerial images are not as good [1]. So the determination of a 3D-building model was possible by semi global matching with IKONOS and GeoEye-1 images, but it failed with the limited quality of analog images scanned with 16µm pixel size, corresponding to 0.7m GSD [5], [6].

The orientation of optical satellite images can be done without any problem by bias corrected RPC-solution or geometric reconstruction with a standard deviation determined at independent check points of 1 GSD and better. The accuracy limit is dominated by the identification of the points in the images and not by the scene geometry. Of course the bundle block adjustment with aerial images even can reach 0.25 GSD in X and Y at independent check points [2] but only if they are targeted and available in several images. For single models, as for the space images and not targeted control and check points, the standard deviation is also in the range of 1.0 GSD. That means the orientation accuracy for aerial and space images are on a similar level.

For the standard deviation of the height component we have the relation: $SZ = \frac{h}{b} \cdot S_{px}$ (Formula 1) with h as flying height, b as base (distance of projection centers) and S_{px} as standard deviation of the x-parallax (image coordinates $x'' - x'$ in the base direction). The height to base ratio h/b for aerial images is determined by the field of view and the end lap. For the standard end lap of 60% it is as shown in Table 1. With the DMC II 230 and the UC Eagle it is 2.9, a value quite larger as the 1.6 dominantly used for satellite stereo pairs. That means the angle of convergence for space images is usually larger as for digital aerial large format images. Under the condition of the same standard deviation of the x-parallax, satellite images should have an advantage for point height

determination, but for automatic image matching the situation is more complex – Spx itself depends upon the height to base ration. With a small angle of convergence, images for matching are more similar as for a large angle of convergence, leading to the fact, that the vertical accuracy of digital height models is not so much dependent upon the height to base ratio.

A configuration of three WorldView-2 stereo scenes taken from the same orbit (Figure 3) has been analysed for its potential of digital height model determination by automatic image matching. The 50cm GSD of WorldView-2 corresponds to small scale aerial images as well as the height to base ratio in the average of 1:1.6 to analog wide angle images. Wide angle digital images as DMCI 230 and UC Eagle have with 1:2.9 a smaller angle of convergence.

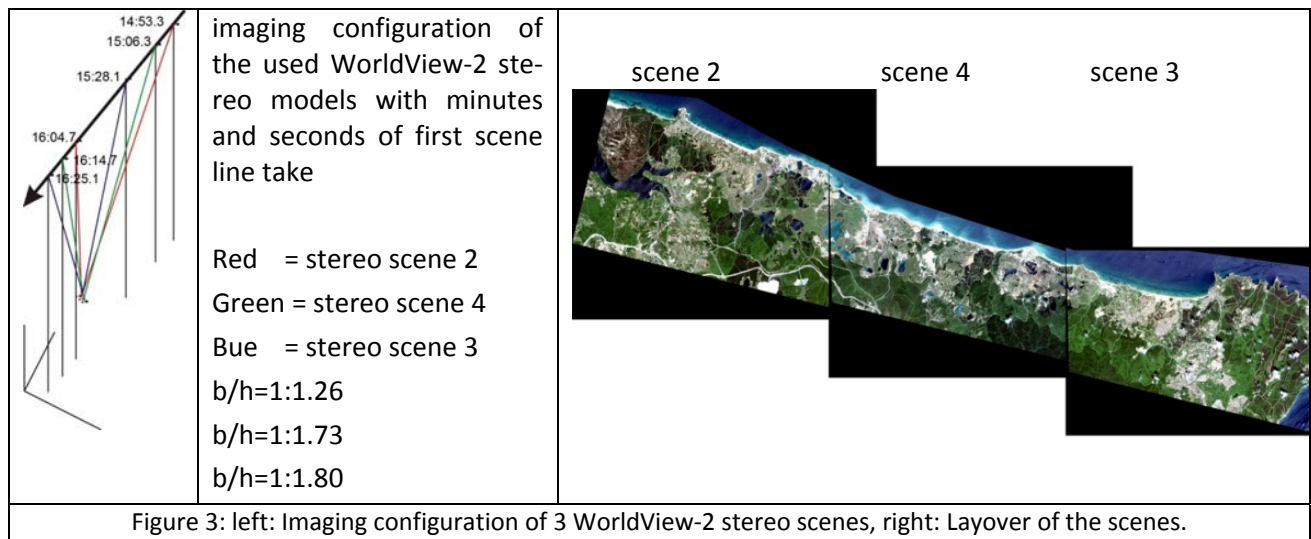


Figure 3: left: Imaging configuration of 3 WorldView-2 stereo scenes, right: Layover of the scenes.

By area based matching of the WV-2 stereo scenes with least squares, usual results have been reached. The matching failed in water bodies and some problems also exist in forest areas. The frequency distribution of the correlation coefficients (Figure 4) has a clear maximum at the highest correlation coefficients which are concentrated to the open areas (Figure 5 - red colour), but smaller values occur in forest areas.

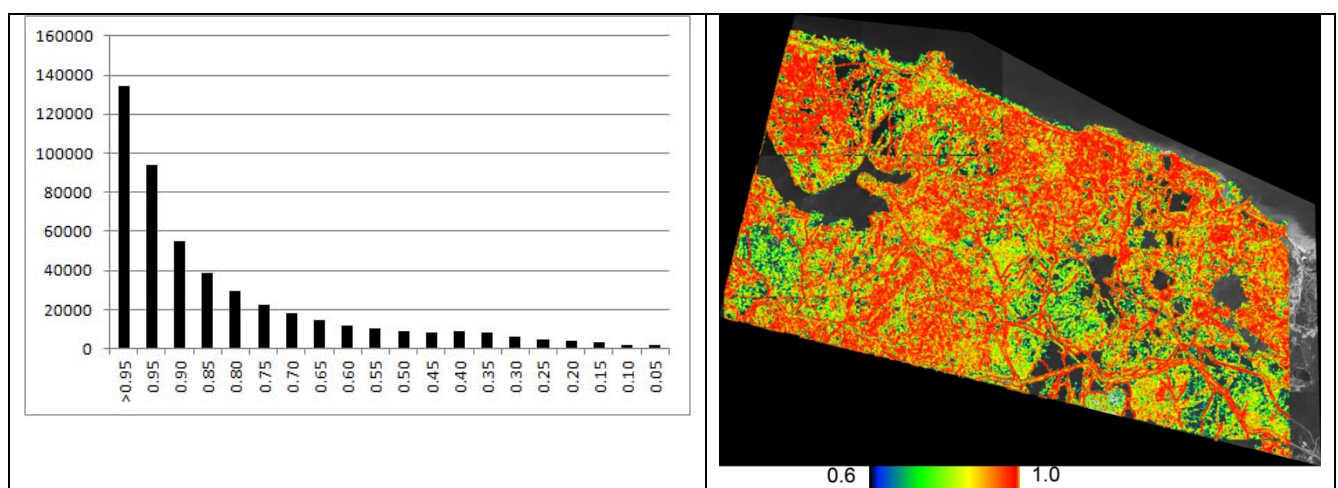


Figure 4: Frequency distribution of correlation coefficient.

Figure 5: Colour coded correlation coefficient.

For the area of the stereo model scene 2, a reference height model exists determined by large scale aerial photogrammetry with a vertical accuracy between 10cm and 1.0m. The WorldView-2 height model has been compared with this one. The height model determined by area based image matching is a digital surface model (DSM) with the height of the visible vegetation and buildings. A comparison with a DEM including the height of the bare ground shows the influence of the vegetation and building height. A part of this can be removed by a filtering of elements not belonging to the bare ground. This is possible if some points of the bare ground are included, but it has some limitation in closed forest areas. In addition, not the same accuracy can be expected for all land cover types. A special problem in this area is caused by quarries and sandpits with large size because of the closely located city of Istanbul. Here the reference DEM does not include actual height data.

Table 4. Accuracy analysis of the WorldView-2 height model against reference DEM.

Original DSM							
	RMS	bias	SD	NMAD	F(slope) – no bias	relative	Positive part
Whole area	3.80	-3.23	3.08	1.86	$2.85+0.26*\tan(\text{slope})$	1.39	2.06
Open area	2.72	-1.81	2.03	1.70	$1.72+0.93*\tan(\text{slope})$	0.86	2.32
Forest	4.02	-2.82	2.86	2.17	$2.37+1.31*\tan(\text{slope})$	1.26	1.90
quarries	5.80	-2.13	5.39	2.56	$4.30+1.70*\tan(\text{slope})$	2.32	2.95
Filtered DEM							
Whole area	3.43	-1.88	2.87	1.64	$2.28+1.48*\tan(\text{slope})$	0.82	1.92
Open area	2.33	-1.58	1.72	1.60	$1.44+0.85*\tan(\text{slope})$	0.57	1.72
Forest	3.41	-2.14	2.66	1.70	$2.12+1.54*\tan(\text{slope})$	1.17	1.91
quarries	5.71	-2.28	5.28	2.23	$3.80+3.00*\tan(\text{slope})$	1.14	2.70

Table 4 includes the root mean square height differences (RMS), the systematic errors (bias), the standard deviation (SD) the normalized mean absolute deviation (NMAD) which should be close to SD. This is the case only if the height discrepancies are normal distributed, the accuracy as a function of the tangent of the terrain inclination, the relative SD in relation to the directly neighboured points and the standard deviation just computed by the positive part of the frequency distribution which should be independent upon the vegetation and buildings. After filtering the standard deviation of the flat part of the open area is 1.44m, corresponding to a standard deviation of the x-parallax of 1.1m for the base to height relation 1/1.26. Of course this is influenced by the accuracy of the reference DEM, so an additional analysis has been made with the overlapping area of the stereo models 3 and 4. The comparison of the independent determined DSM has the same influence by the land cover to both, so the difference of both DSM should result in the system accuracy.

The comparison of the overlapping height models is based on 411356 points. The root mean square height difference is 1.06m with the same probability for deviations from both DSMs, so for a single DEM the accuracy can be estimated with $\frac{1.06}{\sqrt{2}} = 0.75m$. Corresponding to the average height to base ratio of 1:1.5, a root mean square difference for the x-parallax of 0.5m or 1.0 pixel can be estimated. A small bias of 0.12m between both overlapping DSM has just 1cm influence to the root mean square Z-difference. The discrepancies are not normal distributed as it can be seen at the normalized medium absolute deviation (NMAD) of 0.83m, being clearly below the root mean square differences. The frequency distribution of the height differences is slightly wider as a normal distribution and includes also some larger height differences, influencing the root mean square more as the NMAD.

The standard deviation of 1.0 pixel for the x-parallax is also an operational accuracy for height models determined by digital aerial cameras [7]. Therefore, in general no difference in accuracy and the same information content is available with optical aerial as with space images having similar ground resolution. This means the decision of taking aerial or space images is based on other reasons.

In some countries the use of aerial images is restricted; in such a case, space images have to be used. Reverse Russia has with Resurs-DK1 also a very high resolution optical satellite which is not included in Table 2 because Russia does not like to sell space images with a higher ground resolution as 2m. If no restrictions for the use of aerial and space images exist, the selection is just based on economic conditions. If images from archives are available, it is just a financial question. In Germany, aerial images from archives of the survey administrations are quite less expensive as space images from archives, so in Germany optical space images are not used as standard for topographic mapping. If no aerial images exist or actual images have to be taken, a photo flight for smaller areas is more expensive compared to space images. In reverse, for very large areas the acquisition of optical stereo pairs from space may take more time as a photo flight and the space images may be more expensive. In some developing countries, no aircrafts with aerial cameras are available and the photo flights are slowed down by bureaucratic administrations, leading to the use of space images. The limits between economic use of aerial and space images are different from country to country, so only the general trend can be mentioned. In Europe, price reductions have been made for aerial photo flights over the last years, but with the improved imaging capacity of the satellites too, the conditions have been improved.

4. Conclusions

The conditions for aerial images have been improved by digital cameras and their extended capacity. With the increased number of very high resolution satellites, the improved imaging capacity and slewing speed, the conditions for getting actual stereo pairs are quite better as before. In general, the same accuracy and information content is available for aerial as well as for space images. It is just a question of the ground sampling distance and this overlaps between both. Finally, it is also a question of financial and organizational conditions if optical space or aerial images shall be used. The answer to this question depends upon the size and location of the project area and restrictions which still exist in some countries, even if there is no justification for this to exist anymore.

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New Publications in Vol. 11(2), 2012

Effect of variations in salinity and nitrogen concentration on photophysical parameters of phytoplankton obtained with fluorescence spectroscopy

Timofey Gostev, Fedor Kouzminov, Maxim Gorbunov, Elena Voronova, and Victor Fadeev

Abstract

Read full paper online: <http://www.eproceedings.org>

Variations in salinity and nitrogen concentration in the aquatic environment are among the observed effects of global climate change. They affect the structure of phytoplankton communities and the physiological state of algae and cyanobacteria. Results of laboratory studies of these effects are presented. A combination of Nonlinear Laser Fluorimetry (NLF) and Fluorescence Induction and Relaxation (FIRe) fluorimetry is used to evaluate the photophysical parameters of photosystem II and Chlorophyll a in native samples of the diatom algae *Thalassiosira weissflogii*, the zooxanthellae *Symbiodinium sp. CCMP 2467*, and the cyanobacteria *Synechococcus sp. CCMP 1379*, grown under different salinity (40, 18, and 5 psu) and nitrogen concentration (normal, $\times 0.5$, $\times 2$).

Cyanobacteria are shown to be most resistant to these variations, while zooxanthellae are the most sensitive species. This suggests that an effect of global climate change on the phytoplankton community might be the transformation of its structure towards an increasing role of cyanobacteria. Another alarming outlook is the negative impact of climate change on the physiological state of corals, which live in symbiotic relationship with zooxanthellae. This suggests that the reasons for the degradation of coral reefs are not entirely anthropogenic. It is suggested that coral reef monitoring of variations in the photophysical characteristics of zooxanthellae might be one of the most effective ways for detecting the influence of global climate change on marine biota in early stages. It is advisable to monitor coral reefs in the oceanic areas with lowest anthropogenic impact as "background stations" for climate change monitoring.

Comparative analysis of land cover mapping techniques on a Mediterranean landscape using FORMOSAT-2

Montasser Jarraya, Ioannis Manakos, Chariton Kalaitzidis, and George Vozikis

Abstract

Read full paper online: <http://www.eproceedings.org>

Landscape fragmentation is quite dominant in Mediterranean regions and poses significant problems in semi-automatic satellite image classification methods. The issue is somewhat alleviated when high spatial resolution data are used, allowing the production of detailed classification schemes, using either pixel- or object-based classification methods.

The main objective of this research is the comparison of classification methods for Land Use/Land Cover (LU/LC) mapping using high spatial resolution data provided by the FORMOSAT-2 satellite. Three pixel-based and an object-based classification approaches are evaluated; the pixel-based methods employing the Support Vector Machine (SVM), Maximum Likelihood (ML), and Artificial Neural Network (ANN) algorithms, and the object-based classification using the Nearest Neighbour classifier.

All three methods were assessed and compared to each other with respect to the overall and individual accuracy of their classification results, in order to determine the most efficient method. The comparison was made both in terms of overall classification accuracy as well as in terms of individual class identification accuracy. The differences in the performance of each classification method are discussed.

Reconstruction of cloud-free time series satellite observations of land surface temperature

Hamid Reza Ghafarian, Massimo Menenti, Li Jia, and Hendrik den Ouden

Abstract

Read full paper online: <http://www.eproceedings.org>

Time series satellite observations of land surface properties, like Land Surface Temperature (*LST*), often feature missing data or data with anomalous values due to cloud coverage, malfunction of sensor, atmospheric aerosols, defective cloud masking and retrieval algorithms. Preprocessing procedures are needed to identify anomalous observations resulting in gaps and outliers and then reconstruct the time series by filling the gaps. Hourly *LST* observations, estimated from radiometric data acquired by the Single channel Visible and Infrared Spin Scan Radiometer (S-VISSR) sensor onboard the Fengyun-2C (FY-2C) Chinese geostationary satellite have been used in this study which cover the whole Tibetan Plateau from 2008 through 2010 with a 5×5 km² spatial resolution. Multi-channel Singular Spectrum Analysis (M-SSA), an advanced methodology of time series analysis, has been utilized to reconstruct *LST* time series. The results show that this methodology has the ability to fill the gaps and also remove the outliers (both positive and negative). To validate the methodology, we employed *LST* ground measurements and created artificial gaps. The results indicated with 63% of hourly gaps in the time series, the Mean Absolute Error (MAE) reached 2.25 Kelvin (K) with $R^2 = 0.83$. This study shows the ability of M-SSA that uses temporal and spatio-temporal correlation to fill the gaps to reconstruct *LST* time series.

Agricultural crop change detection by means of hybrid classification and high resolution images

Eva Savina Malinverni, Michele Rinaldi³, and Sergio Ruggieri

Abstract

Read full paper online: <http://www.eproceedings.org>

The most widespread application of remote sensing technology is regarding Land Use/Land Cover (LULC) automatic map production to optimize land monitoring and management. These tasks represent new challenges. The improved performances of automatic classification approaches become a fast and accurate tool for a reliable GIS decision support system.

The main aims of this work were i) to test the ability of using multispectral variability and high spatial information from different remote sensing images to recognize land use changes by means of a new hybrid classification method and ii) to quantify and evaluate the temporal variation of main crop rotations.

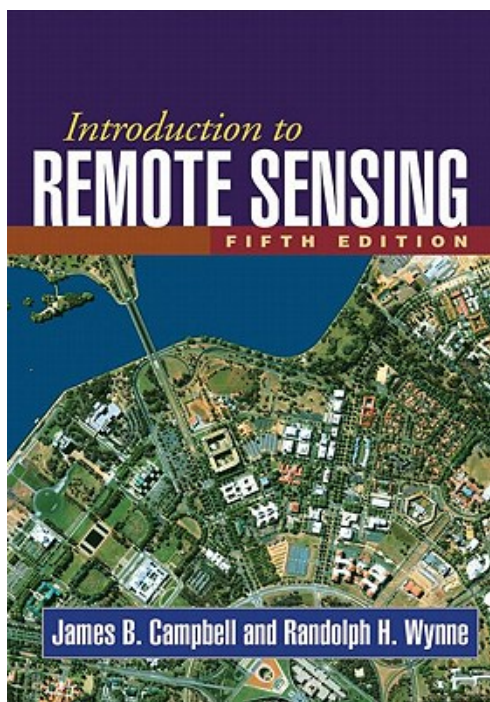
The test area covered the 132 square kilometres of the Capitanata plain in Southern Italy (Apulia Region), including mostly agricultural landscape (wheat, sugar beet, asparagus, vineyard, olive grove). The comparison was made between a land use classification with a series of SPOT 5 images acquired in May 2007 and a set of WorldView-2 images acquired in April and July 2010. This new data set underlined better performances in terms of ground (2 m) and spectral resolution (eight bands: Blue, Coastal (blue), Green, Yellow, Red, Red edge, NIR 1, NIR 2).

The approach was based on a hybrid classification implemented in T-Map software by the spin-off company SI2G. The results showed an overall accuracy of more than 82%, were displayed on maps and used to calculate some indicators of crop sequences: This allowed of a quantification of more frequent rotation types (monoculture, rotations every 2 or 3 years) to promote ways of managing crop sequences compatible with environmental protection. Another indicator was the water requirement. According to the crops and the fields cropped, the total yearly average irrigation requirement was evaluated to correctly plan the irrigation water distribution.

Book Releases

Remote Sensing and Global Environmental Change is available from Wiley-Blackwell written by Sam J. Purkis and Victor V. Klemas.

Remote Sensing plays a key role in monitoring the various manifestations of global climate change. It is used routinely in the assessment and mapping of biodiversity over large areas, in the monitoring of changes to the physical environment, in assessing threats to various components of natural systems, and in the identification of priority areas for conservation. This book presents the fundamentals of remote sensing technology, but rather than containing lengthy explanations of sensor specifications and operation, it concentrates instead on the application of the technology to key environmental systems. Each system forms the basis of a separate chapter, and each is illustrated by real world case studies and examples.



Introduction to Remote Sensing (fifth edition) is available from Guilford Publications written by James B. Campbell and Randolph H. Wynne.

A leading text for undergraduate and graduate level courses, this book introduces widely used forms of remote sensing imagery and their applications in plant sciences, hydrology, earth sciences, and land use analysis. The text provides comprehensive coverage of principal topics and serves as a framework for organizing the vast amount of remote sensing information available on the Web. Including case studies and review questions, the book's four sections and 21 chapters are carefully designed as independent units that instructors can select from as needed for their courses. Illustrations include 29 colour plates and over 400 black-and-white figures. New to this Edition: reflects significant technological and methodological advances, chapter on aerial photography now emphasizes digital rather than analog systems, updated discussions on accuracy assessment, multitemporal change detection, and digital

preprocessing, links to recommended online videos and tutorials.

Forthcoming EARSeL Conferences

8th EARSeL Workshop on Imaging Spectroscopy

At La Cité Nantes Events Center

8 – 10 April 2013, Nantes, France

[More info](#)



Call for Papers

EARSeL's Special Interest Group on Imaging Spectroscopy is a forum whose aim is to encourage international discussions among specialists working with this innovative Earth Observation technology. The forum was founded by EARSeL at the University of Zurich in 1999, led by RSL, who conducted the first workshop. Since then, five more very successful workshops were held at ITC Enschede, the Netherlands (2001), DLR Herrsching, Germany (2003), the University of Warsaw, Warsaw, Poland (2005), VITO, Brugge, Belgium (2007), Tel Aviv, Israël (2009) and University of Edinburgh, U.K. (2011). The next workshop will take place in Nantes, France, from April 8th to 10th 2013. We invite you to mark your calendar for this important meeting.

The meeting will cover all themes related to imaging spectroscopy. As several spaceborne missions are scheduled for the near future, this workshop is particularly important and will provide a unique opportunity to discuss recent developments in imaging and related spectroscopic methods for environmental research, learn about recent developments in imaging science and thematic / environmental applications at ground, airborne and spaceborne levels, exploring the integration of spatial and temporal coverage afforded by imaging instruments with the high spectral resolution data obtained for every pixel, discuss ground-based spectroscopic techniques, such as field spectroscopy and related hyperspectral sensing methods, learn and discuss how these methods can address key environmental issues and new areas of environmental science.

The deadline for submission of abstracts for the meeting is the **17th December 2012**.

All scientists, professionals and researchers involved or interested in the field of the workshop are strongly encouraged to present papers according to the following topics:

- Existing and future orbital IS sensors
- Existing and future airborne IS sensors
- Image processing methods and tools
- New analytical techniques
- Calibration and validation
- Application to terrestrial ecosystems
- Coastal and marine ecosystems

- Inland waters
- Urban environment
- Geology and soils
- Risk management
- Climate change
- Commercial applications

Important Dates

- | | |
|--------------------------------|-------------------------|
| ➤ Abstract submission deadline | 17 December 2012 |
| ➤ Notification of acceptance | 15 January 2013 |
| ➤ Submission of papers | 10 April 2013 |
| | |
| ➤ Early bird registration ends | 28 February 2013 |
| ➤ Deadline for registration | 8 April 2013 |

For more detailed information please visit the Workshop website at:
<http://www.sciences.univ-nantes.fr/lpgnantes>.

33rd EARSel Symposium, 2013

“Towards Horizon 2020: Earth Observation and social perspectives”
3-6 June 2013 Matera, Italy

[More info](#)



Call for Papers

The 33rd EARSel Symposium entitled “Towards Horizon 2020: Earth Observation and social perspectives” will be held in Matera, Italy from 3 to 6 June 2013. All scientists, professionals and researchers involved or interested in the field of the Symposium are strongly encouraged to present their research papers. Authors are requested to submit their abstracts by **4 January 2013**.

For more detailed information regarding the topics of the Symposium, important dates as well as other useful information, please refer to the “**News from EARSel**” section of this issue and in the Symposium website at: <http://www.earsel.org/symposia/2013-symposium-Matera>.

4th EARSel Workshop on Education and Training

4 June 2013 Matera, Italy

[More info](#)

Organised by the "Remote Sensing in Education and Training" EARSel SIG



Call for Papers

The 4th Workshop on Education and Training will be held in the framework of the 33rd EARSel Symposium on 4 June 2013 in Matera, Italy. All scientists, professionals and researchers involved or interested in the field of the Workshop are strongly encouraged to present their research papers. Authors are requested to submit their abstracts by **15 February 2013**.

For more detailed information regarding the Workshop, please refer to the "News from EARSel" section of this issue. The call for papers, important dates, the registration process, as well as other useful information can be found in the Workshop website at: <http://www.earsel.org/SIG/ET/4th-workshop>.

5th EARSel Workshop on Remote Sensing for Developing Countries

5 June 2013 Matera, Italy

[More info](#)

Organised by the "Developing Countries" EARSel SIG



Call for Papers

The 5th Workshop on Remote Sensing for Developing Countries will be held in the framework of the 33rd EARSel Symposium on 5 June 2013 in Matera, Italy. All scientists, professionals and researchers involved or interested in the field of the Workshop are strongly encouraged to present their research papers.

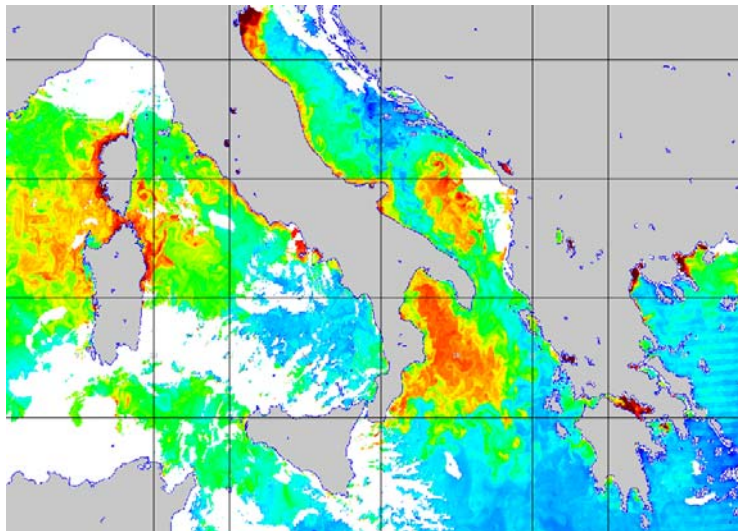
For more detailed information regarding the Workshop, please visit the Developing Countries SIG Website at: <http://www.earsel.org/SIG/DC>.

6th EARSel Workshop on Remote Sensing of the Coastal Zone

6-7 June 2013 Matera, Italy

[More info](#)

Organised by the "Remote Sensing of the Coastal Zone" EARSel SIG



Call for Papers

The 6th Workshop on Remote Sensing of the Coastal Zone will be held in the framework of the 33rd EARSel Symposium on 6-7 June 2013 in Matera, Italy. All scientists, professionals and researchers involved or interested in the field of the Workshop are strongly encouraged to present their research papers. Authors are requested to submit their abstracts by **15 February 2013**.

For more detailed information regarding the Workshop, please refer to the "News from EARSel" section of this issue. The call for papers, important dates, the registration process, as well as other useful information can be found in the Workshop website at: <http://www.earsel.org/SIG/CZ/6th-workshop>.

4th EARSel Workshop on Cultural and Natural Heritage

6-7 June 2013 Matera, Italy

[More info](#)

Organised by the "Remote Sensing for Archaeology, Cultural and natural Heritage (ReSeArCH)"
EARSel SIG



Call for Papers

The 4th Workshop on Cultural and Natural Heritage will be held in the framework of the 33rd EARSel Symposium on 6-7 June 2013 in Matera, Italy. All scientists, professionals and researchers involved or interested in the field of the Workshop are strongly encouraged to present their research papers. Authors are requested to submit their abstracts by **30 January 2013**.

For more detailed information regarding the topics of the Workshop, important dates as well as the registration process, please refer to the "**News from EARSel**" section of this issue and to the Workshop website at: <http://www.earsel.org/SIG/NCH/4th-workshop>.

9th EARSel Workshop on Forest Fires

'Quantifying the environmental impact of forest fires'

15 - 17 October 2013 Coombe Abbey, Warwickshire, UK

[More info](#)



European Association of
Remote Sensing Laboratories



University of
Leicester

Call for Papers

As we attempt to model the Earth System it is important that the impact of forest fires on the Earth System is fully understood and quantified. These impacts can be on climate, the biosphere, ecosystem functioning, society and livelihood. Fire disturbance has been identified by climate modellers as an Essential Climate Variable. Forest disturbance and the associated carbon flux needs to be measured and reported under the United Nations REDD+ programme. Furthermore, we have been very good at understanding the short term impacts of fire on forests, but less good at

understanding the response of vegetation under different fire frequency and severity scenarios. The workshop will draw out the state of the art research being undertaken to identify and quantify these impacts.

All relevant institutions and interested individuals are invited to participate.

The deadline for submission of abstracts for the meeting is the **1 March 2013**.

All scientists, professionals and researchers involved or interested in the field of the Workshop are strongly encouraged to present papers according to the following topics:

- Existing and future orbital IS sensors
- Characterising the impact of fire severity and fire frequency across vegetation types
- Validation methods for burned area mapping
- Monitoring and modelling vegetation recovery after fire disturbance
- Scaling from regional to global burned area maps
- Mapping forest fires for REDD+ MRV
- Using active fire mapping and fire radiative energy to inform on fire severity and impact

Important Dates

- | | |
|---|---------------------|
| ➤ Abstract submission deadline | 1 March 2013 |
| ➤ Notification of acceptance | 15 May 2013 |
| ➤ Submission of Extended Illustrated Abstract (4 pages) | 15 July 2013 |
| ➤ Compulsory presenting author registration | 15 July 2013 |

For more detailed information please visit the Workshop website at:
<http://www.earsel.org/SIG/FF/9th-workshop>.

Other Conferences

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13-16 December, 2012: [8th International Conference on Geo-Information for Disaster Management](#).
 Enschede, The Netherlands.
- 

16-18 December, 2012: [Computer Vision in Remote Sensing](#).
 Xiamen, China.
- 

5-7 March, 2013: [17th ISU Annual International Symposium](#).
 Strasbourg, France.
- 

11-13 March, 2013: [RSPSoc Wavelength Conference](#).
 Glasgow, United Kingdom.
- 

18-20 March, 2013: [3rd EOS Topical Meeting on Blue Photonics - Optics in the Sea](#).
 Texel, The Netherlands.
- 

8-10 April, 2013: [First International Conference on Remote Sensing and Geo-information of Environment](#).
 Pafos, Cyprus.
- 

22-26 April, 2013: [35th International Symposium on Remote Sensing of Environment \(ISRSE35\)](#).
 Beijing, China.
- 

12-15 May, 2013: [6th International Workshop on Information Fusion and Geographic Information Systems: Environmental and Urban Challenges \(IF & GIS' 2013\)](#).
 St. Petersburg, Russia.
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13-16 May, 2013: [Geospatial World Forum](#).
 Rotterdam, The Netherlands.
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30 May -1 June, 2013: [8th International Symposium on Spatial Data Quality](#).
 Hong Kong, China.
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12-14 June, 2013: [6th International Conference on Recent Advances in Space Technologies \(RAST 2013\)](#).
 Istanbul, Turkey.
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17-21 June, 2013: [13th Conference on Electromagnetic and Light Scattering](#).
 Lille, France.



2-5 July, 2013: [GI_Forum 2013](#).
Salzburg, Austria.



25-30 August, 2013: [26th International Cartographic Conference](#).
Dresden, Germany.



9-13 September, 2013: [ESA Living Planet Symposium 2013](#).
Edinburgh, United Kingdom.



22-24 October, 2013: [XV Congreso de la Asociación Española de Teledetección](#).
Madrid, Spain.



2-10 August, 2014: [40th Scientific Assembly of the Committee on Space Research \(COSPAR\)](#)
Moscow, Russian Federation.

Summer Schools and Advanced Courses



Applied Remote Sensing Training “Water Resource Management”.

15 January - 5 February, 2013, each Tuesday

For registration please contact Ana.I.Prados@nasa.gov



Hyperspectral Remote Sensing

28 January 2013 - six weeks, ITC Faculty of Geo-Information Science and Earth Observation,
University of Twente, The Netherlands

Registration due date is **20 December 2012**



4th Advanced Training Course in Land Remote Sensing

1 - 5 July 2013, ESA, Harokopio University, Athens, Greece

Application submission opening: **01 January 2013**

Back Cover – Matera by night, Italy.

Credits: Valerio Li Vigni

Source: <http://whc.unesco.org/en/list/670/gallery>



EARSeL Sponsoring Agencies:



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