

EARSeL



June 2010

N° 82

NEWSLETTER



European Association of Remote Sensing Laboratories

Front Cover –Pictures from the 30th EARSeL Symposium 2010 at UNESCO in Paris.

EARSeL Newsletter

ISSN 0257-0521

Bulletin of the European Association of Remote Sensing Laboratories, <http://www.earsel.org>
December 2009 – Number 80

EARSeL Newsletter Editors

Rosa Lasaponara Antonio Lanorte
lasaponara@imaa.cnr.it alanorte@imaa.cnr.it

Rosa Coluzzi Nicola Afflitto
coluzzi@imaa.cnr.it afflitto@imaa.cnr.it

Institute of Methodologies for Environmental Analysis (IMAA), Italian National Research Council (CNR)
Tel: +39 0971 427111
Fax: +39 0971 427271



Editorial Assistance

EARSeL Secretariat
Gesine Boettcher
Nienburger Strasse 1,
30167 Hannover, Germany
Tel: +49 511 7622482
Fax: +49 511 7622483
Email: secretariat@earsel.org

Published by:

Institute of Methodologies for Environmental Analysis (IMAA), Italian National Research Council (CNR)
Printing by: Cromotema, V.N. Gaia, Portugal
(www.cromotema.pt)

Subscription Rates, 2010

Members receive the Newsletter as part of the annual membership fee. For non-members, the annual rates (4 issues) are as follows:

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

EARSeL membership fees, 2010

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

CONTENTS

1. EDITORIAL	5
2. NEWS FROM EARSeL	6
2.1 New EARSeL bureau elected	6
2.2 The annual Symposium 2010 at UNESCO in Paris	7
2.3 The new period of the EARSeL Special Interest Group on Forestry	9
3. NEWS ITEMS	
3.1 Announcements	11
4. FEATURE ARTICLE: EARLINET: the European LiDAR network for aerosol study at continental scale	13
5. FUTURE EVENTS	
5.1 EARSeL Events	19
5.2 Forthcoming Conferences	22

The Newsletter is a forum for an exchange of news and views among the members of the Association. The opinions expressed in the Newsletter do not necessarily reflect the views of the editor, the EARSeL Bureau or the other members of the Association.

Articles published in the Newsletter may be reproduced as long as the source of the article is acknowledged.

EARSel Bureau	<p>CHAIRMAN Dr Rainer Reuter Institute of Physics University of Oldenburg 26111 Oldenburg, Germany Tel: +49 441 798 3522 Fax: +49 441 798 3201 Email: rainer.reuter@earsel.org</p> <p>VICE-CHAIRMAN Lena Halounova, Ph.D. Remote Sensing Laboratory Department of Mapping and Cartography Faculty of Civil Engineering Czech Technical University in Prague Thakurova 7 166 29 Prague 6 Czech Republic Tel: +420 22435 4952 Fax: +420 22435 5419 Email: lena.halounova@earsel.org</p> <p>SECRETARY-GENERAL Dr. Ioannis Manakos Department of Geoinformation in Environmental Management Mediterranean Agronomic Institute of Chania 73100 Chania, Greece Tel: +30 28210 35040 Fax: +30 28210 35001 Email: manakos.earsel@earsel.org</p>	<p>TREASURER Dr Rosa Lasaponara Institute of Methodologies for Environmental Analysis (IMAA-CNR) 85050 Tito Scalo (PZ), Italy Tel: +39 0971 427214 Fax: +39 0971 427271 Email : lasaponara@imaa.cnr.it</p> <p>EARSel SECRETARIAT Gesine Boettcher Nienburger Strasse 1, 30167 Hannover, Germany Tel: +49 511 7622482 Fax: +49 511 7622483 Email: secretariat@earsel.org</p> <p>INTERNATIONAL RELATIONS Dr Mario Hernandez Chief Remote Sensing UNESCO 1 Rue Miollis 75732 Paris cedex 15 France Tel: +33 1 45 68 4052 Fax: +33 1 45 68 55 70 Email: ma.hernandez@unesco.org</p>
--------------------------	--	---

1. EDITORIAL

Dear members,

The 30th EARSel Symposium: "*Remote Sensing for Science, Education and Culture*" was held in Paris, at the UNESCO headquarters, with enormous success, high participation and with numerous presentations made by young scientists.

We would like to thank you very much for your contributions, presentations and participation. Those of you who did not manage to attend the Symposium will have the opportunity to see what went on by reading the report from our President, Rainer Reuter, and a brief programme resumé by the editorial staff.

We recommend that you do not miss the Symposium Proceedings, which will collect outstanding papers in different fields of remote sensing, among them archaeology, urban areas, climate and climate change, instruments and methods, land use and change detection, natural disaster management, educational and training, and others. As in previous years, these publications will be available on the internet by the end of the year. Already today the presentations held at the symposium are available for download on the programme page of the symposium website.

We also inform you about changes to the Bureau, following the results of the elections in the EARSel Council meeting held in Paris on 2 June 2010.

Special thanks go to our friend and colleague André Marçal, former vice-

Chairman, for the great efforts he devoted to the Association over the past few years.

We are pleased to invite you to attend the forthcoming Joint SIG Workshop: Urban - 3D - Radar - Thermal Remote Sensing and Developing Countries, which will be held in September 22-24, 2010 in Ghent, Belgium, organized by Ghent University.

In this issue you will find a paper focused on EARLINET: the European LiDAR network for aerosol study at continental scale. This network has been recently used by the European scientific community to monitor the Iceland volcano activity which caused big chaos and significant economic losses across the Europe.

We are pleasure to invite all of you to send us your contributions to be considered for the next EARSel NEWSLETTER and submit your papers to the EARSel on-line open access journals.

Best Wishes for a relaxing and pleasant summer.

Sincerely

The Editorial Team

2. NEWS FROM EARSeL

2.1 NEW EARSeL BUREAU ELECTED

On June 2010 in Paris, EARSeL Council elected the Vice Chairman, Secretary General and Treasurer of the EARSeL Bureau. The President, Preben Gudmandsen, reminded the members of the terms of office of the Bureau according to EARSeL statutes.

The Council Members are:



On the left: Chairman, Rainer Reuter, University of Oldenburg, Germany;



on the right: Vice Chairman: Lena Halounová, Czech Technical University in Prague, Czech Republic



On the left: Secretary General: Ioannis Manakos, Mediterranean Agronomic Institute of Chania, Crete, Greece;



On the right: Treasurer: Rosa Lasaponara Institute of Methodologies for Environmental Analysis (IMAA-CNR), Tito Scalo (PZ), Italy.

The new Bureau was approved by the General Assembly during its meeting in Paris on June 2010, which was held within the framework of the 30th Annual Symposium.

Rainer Reuter has been a Bureau member since 2001, fulfilling various functions, in-

cluding being treasurer, Secretary General and then Vice-Chairman from 2005-2009. He is co-chairman of the EARSeL Special Interest Group on Remote Sensing of the Coastal Zone, and chairman of the Special Interest Group on Education and Training. In addition, he is the editor of the open access journal EARSeL eProceedings.

Lena Halounová is the national representative of the Czech Republic in the EARSeL Council. She has been a Bureau Member as EARSeL Treasurer until June 2009.

Ioannis Manakos represents Greece in the EARSeL Council, and he hosted the Annual Symposium in 2009 at his institute in Chania, Crete. He has been an editor of the Newsletter for two years.

Rosa Lasaponara is Chairman of the Special Interest Group on Remote Sensing for Archeology and Cultural Heritage (Re.Se.Ar.C.H.). Since September 2009 she is editor of the EARSeL Newsletter. She hosted: (i) the 1st Re.Se.Ar.C.H SIG International Workshop "Advances in Remote Sensing for Archaeology and Cultural Heritage Management" in Rome, and (ii) the VII FF-SIG EARSeL Workshop 2009 in Matera (Italy).

During the forthcoming term of office, the new Bureau's activities will be: (i) addressed to increase EARSeL relevance among the scientific community as well as on the political level, and (ii) focused on the improvement of:

- EARSeL's efficiency;
- cooperation with other remote sensing societies;
- EARSeL's publication policy;
- cooperation with ESA, as well as with National Space Agencies at the working level and in activities related to developing countries, in Europe and beyond.

Moreover all Bureau members will be strongly involved in:

- intensifying externally funded projects under the umbrella of EARSeL;
- educational initiatives.

All these activities will be monitored and reviewed regularly in order to check their efficiency and address them step by step.

2.2 THE SYMPOSIUM 2010 AT UNESCO IN PARIS

Remote Sensing a stone's throw away from the Eiffel Tower

This years' symposium held in Paris from 31 May to 3 June 2010 has been an exceptional event for a number of reasons:

First, being the 30th EARSel Symposium, the conference rounded out a series of symposia covering three decades. Second, with more than 260 submitted contributions, it was probably the most recognised event in the series, making it necessary to organise sessions in four parallel tracks for the first time.

Moreover, the symposium was held at UNESCO, the United Nations Educational, Scientific and Cultural Organisation, which accentuated the symposiums' guiding title Remote Sensing for Science, Education, and Natural and Cultural Heritage.



UNESCO Headquarters in Paris, the venue of the symposium.

The topics of the symposium covered all themes which are in the research focus of EARSel members. Hardly surprising, an exceptional number of contributions were presented within the topics of UNESCO and Space Partners Assisting World Heritage and Remote Sensing for Archaeology.

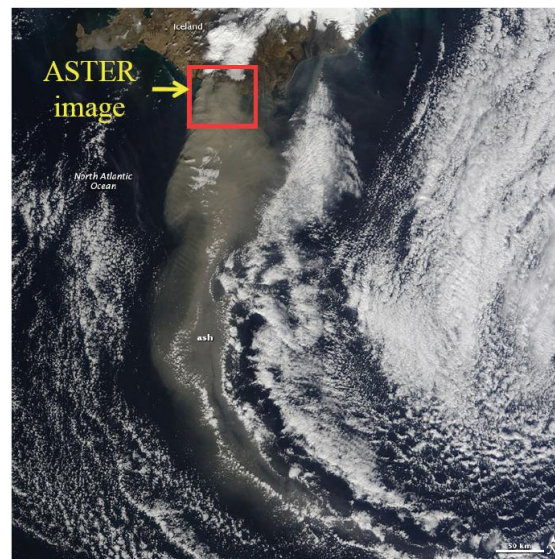
Other themes with remarkably many contributions were Land Use, Land Cover and Change Detection, Education and Train-

ing, and Disaster Monitoring and Response, to mention only a few. In the two sessions on Land Use Change Detection, first results of the GMES project Geoland II, in which EARSel is a partner, were presented.

A highlight of the session on disaster monitoring was the presentation on the use of ASTER by Michael Abrams from NASA Jet Propulsion Laboratory.

In the last 10 years, this instrument has been used with great success to monitor severe floods from space, e.g. those caused by hurricanes like Katrina (Aug 2005) in the Gulf of Mexico and by tsunamis in Sumatra (Dec 2004) and Samoa (Sept 2009), to survey the evolution of large forest fires in California and Montana, and to map damage from earthquake-induced landslides in China. Of actual interest were the images showing the Eyjafjallajökull volcano eruption in Iceland.

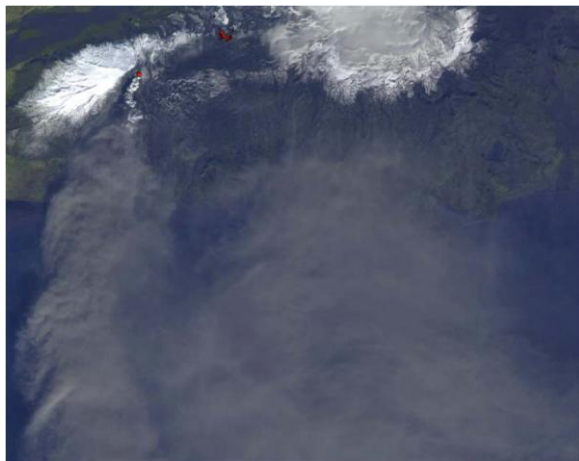
Fortunately, participants were not affected by its ash plume in their travel to Paris.



April 19 MODIS image of ash plume. Courtesy: Michael Abrams, NASA JPL.

Particularly welcomed were two extended sessions on *Remote Sensing in Forestry*, organised by Filip Hájek, the new chairman of the Special Interest Group (SIG) on Forestry. Another subject which earned much interest was *Understanding Climate and Climate Change*. Contributions to these sessions presented ways of using remote sensing to identify temperature-

related trends in our environment, such as the evidence of decreasing seasonal snow cover in mountainous regions as reported by Eberhard Parlow from the University of Basel, for example. As the new chairman of the SIG on Temporal Analysis of Image Data, Eberhard will help to better understand climate-induced trends with time series of remotely sensed information.



April 19 ASTER image of ash plume. Red is the thermal infrared signature of active vent and earlier flows. Courtesy Michael Abrams, NASA JPL.

Several invited contributions on actual themes brought the audience together in three extended keynote sessions. The symposium opening keynote was given by Mario Hernandez from UNESCO, presenting the efforts of his organisation in the preservation of natural and cultural heritage worldwide by using remote sensing data. Pascale Ultré-Guérard from CNES (Toulouse) reported on the present highlights and the challenging plans for earth observation in France. Michael Rast from ESA-ESRIN gave an insight into the agency's next generation satellites and sensors, emphasizing ESA's interest in providing an open access to its remote sensing data for users. Louis François Guerre (SPOT Image, Toulouse) presented the *Planet Action* Initiative, which makes high-resolution SPOT images available to universities and institutes for their research.

Themes around education and training have always been an important subject in EARSel. Teaching remote sensing methods, applications and results with the help of the internet was therefore the focus of a keynote from Francesco Sarti (ESA ES-

RIN). Besides information for the public on spacecraft and earth observation, ESA's educational programme includes a series of tutorials entitled *EduSpace* (http://www.esa.int/SPECIALS/Eduspace_EN/) for use in schools. Moreover, ESA offers *LEOWorks*, an advanced but easy-to-use image processing software which is particularly suitable for educational purposes. It enables the simple interpretation of high-resolution satellite images available in the EduSpace Image Catalogue on school computers.

In another keynote, the results of EARSel's project on *Science Education through Earth Observation for High Schools* (SEOS) were presented. In this initiative funded by the European Commission, EARSel member laboratories realised 17 tutorials for science educational curricula in high schools whereby remote sensing images and data were employed to involve students in different aspects of current environmental research and monitoring. The tutorials demonstrate how information from satellites can be directly relevant to everyday life, and emphasise the importance of environmental awareness. Themes cover a broad range of topics, from daily weather data to long-term climatic conditions, landcover changes, marine pollution and environmental hazards, ocean currents, coral reefs and coastal water quality, natural and cultural heritage and conservation, time series analysis and modelling, to name but a few. They are a core element of the *SEOS Learning Management System* (<http://lms.seos-project.eu>).



List of tutorial themes in the SEOS Learning Management System, <http://lms.seos-project.eu>. Most tutorials are also available in

French, German, Dutch, Greek and Arabic languages.

All in all, it was a fully-packed, well attended, and stimulating symposium. With regards to organisational aspects, UNESCO's assistance was indispensable. Thanks to the people behind the scenes, everything went smoothly. The city of Paris and the venue itself imparted some amount of glamour to the event. A glance at the Eiffel-Tower should serve as an inspiration for the next symposium in Prague. It reminds us that great things are not accomplished by individuals alone but by many hands and minds working together towards a goal.

Rainer Reuter

2.3 A NEW PERIOD FOR THE EARSeL SPECIAL INTEREST GROUP ON FORESTRY

More than one third of the Europe is covered by forests. Remote sensing is a powerful tool for the assessment and monitoring of forest resources, and consequently serves as a unique source of information in the context of topics such as landuse/landcover change, climate change, biodiversity and landscape ecology.

At the moment there are a number of different research platforms on remote sensing in forestry such as IUFRO Remote sensing/ GIS, and World forestry groups, ISPRS Forestry group, and the ForestSat symposium events. In this context, the EARSeL Forestry SIG defines its role as a rather application oriented group. The main goal is to set up a platform for co-operation and information exchange among people interested in development of forest mapping methods, assessment of biophysical parameters, monitoring of the human and natural impacts (insects, wind), change detection, etc. The results are periodically presented at SIG workshops, which are often organised in co-operation with the mentioned groups of IUFRO and ISPRS. The SIG topics are also proposed within the annual EARSeL Symposium. Other activities include

searching for joint funding, arranging free sensor datasets or ground truth reference data for algorithm testing.

The actual forestry topics were reflected also during the two technical sessions at the 30th EARSeL Symposium 2010 in Paris. In the first session *Forestry 1, Vegetation*, we had several very relevant presentations dealing with the Assessment of European forest cover maps (Lucia Seebach from JRC Ispra), Tree species classification from Hyperspectral images (Petra Krahwinkel from the Institute of Man-Machine Interaction in Germany), Estimation of continuous forest variables (Mathias Schardt from Joanneum Research in Graz) and Classification of Amazon tropical forests using TerraSAR-X images (João Roberto dos Santos from the National Institute for Space Research in Brazil).

The following session *Forestry 2* was chaired by Prof. Schardt, and included topics such as Digital photogrammetry in the national forest inventory (Filip Hajek from the Forest Management Institute in Czech Republic), Deforestation in Uganda using multi-temporal Landsat images (Eva S. Malinverni from Università Politecnica Delle Marche in Italy), Estimation of Acacia tree parameters in Senegal (Hassan Elonur Adam), Analysis of vegetation parameters from MODIS data (Vanya Naydenova from Bulgaria), and the use of LiDAR in forest management in Scotland (Chue Poh Tan from the University of Edinburgh)

1st EARSeL SIG Forestry workshop: Operational remote sensing in forest management

The 1st International Workshop of the Forestry SIG will be held in the framework of the next EARSeL symposium, 2 – 3 June 2011 in Prague, Czech Republic. It will be organized by the Forest Management Institute in collaboration with the Czech Technical University (CTU) Prague as a first meeting of the new EARSeL SIG Forestry series. However, there were several relevant and very successful predecessor events such as ScandLaser in Umeå 2003, ForestSat in Borås 2005, 3D Remote Sensing in Vienna 2006, and ForestSat in Montpellier 2007, initiated or (co)organised by the previous SIG chairman Håkan Olsson from Sweden.

The event aims at setting up a common forum for the research community and people from the forestry sector, where both the operational techniques as well as developing methodologies can be presented and understood in order to improve the forest management and protection practices in Europe.

Main topics will include:

- forest resource mapping, biomass estimation and change detection
- forest inventories, biophysical parameters
- REDD, forest damage/ degradation related to climate change
- biodiversity, protected forests, mountain forestry
- acquisition of reference field data

The 2 day programme will consist of technical speaker sessions, poster sessions, as well as the forum for open discussions between both academic and practical forestry participants.

Please register and submit your abstract via the EARSel conference management system.

For more information about the event, please visit the SIG Forestry website: <http://www.earsel.org/SIG/Forestry/call.php>

If there are any question, please send an email to: hajek.filip@uhul.cz

Contact:

Dr. Filip Hájek
(*chairman of the SIG*)

Forest Management Institute (FMI)
ÚHÚL branch Frýdek-Místek
Nádražní 2811
738 25 Frýdek-Místek
Czech Republic
phone: +420-724-935-916
e-mail: hajek.filip[at]uhul.cz

Dr. Piotr Wężyk
(*Co-chairman of the SIG*)

Lab GIS&RS KEkL
WL UR w Krakowie
Al. 29 Listopada 46
314 25 Kraków
Poland
phone. +48-12-662-5082
email: rlwezyk[at]cyf-kr.edu.pl

3. NEWS ITEMS

Announcements

Special Issue of Photo-Interpretation European Journal of Applied Remote Sensing (PIEJARS)

Aerial archaeology: from the historical photographs to lidar

Edited by Rosa Lasaponara, Mario Hernandez, Nicola Masini and Jean-Paul Deroin

This volume is one of the four special issues linked to the first international workshop EARSel ARCH-SIG on "*Advances in Remote Sensing for Archaeology and Cultural Heritage Management*", which was held in Rome, from 30 September to 4 October 2008. The workshop was organised by the Institute of Methodologies for Environmental Analysis (IMAA) and the Institute for Architectural and Archaeological Heritage (IBAM) of National Research Council (CNR), in collaboration with the Earth and Environmental Department and the Cultural Heritage Department of National Research Council, with patronage of CNR, UNESCO, MiBAC (Italian Ministry of Cultural Heritage and Activities), University of Bari and sponsored by the European Space Agency (ESA) and BELSPO (Belgian Science Policy).

PIEJARS Issues 2009-4 and 2010-1 contain papers from this workshop illustrating remote sensing applied to archaeology in Europe, the Middle East, and India.

Articles:

Riccardo SALVINI, Francesco Matteo MARTINO, Attilio GALIBERTI & Massimo TARANTINI.
Airborne remote sensing for archaeological application: pre-historical landscapes in Gargano area (Italy).

Mandyam B. RAJANI & Sumanta K. PATRA

Application of satellite image processing techniques for Talakadu, a unique archaeological landscape in India

Giuseppe SCARDOZZI

Multitemporal satellite high resolution images for the knowledge and the monitoring of the Iraqi archaeological sites: the case of Seleucia on the Tigris

William S. HANSON

The future of aerial archaeology in Europe

Giuseppe CERAUDO

Aerial archaeology in Italy

Nicola MASINI, Rosa COLUZZI & Rosa LASAPONARA

Contribution d'un système LIDAR pour la reconstruction de la trame urbaine d'un village médiéval abandonné.

Announcements : PhD position at the Katholieke Universiteit Leuven

PhD position: A four-year funded research position (full fellowship) to obtain a PhD degree in Bioscience Engineering at the Katholieke Universiteit Leuven.

Domain: “Quantification of canopy structural effects on hyperspectral forest canopy signals”.

Project description and tasks:

This PhD project aims at identifying and quantifying forest canopies structural components that significantly impact the hyperspectral reflectance as captured by airborne sensors. Using detailed reference canopy structure data derived from terrestrial LiDAR from the frog's and bird's eye perspectives in combination with radiative transfer models, the standard two-dimensional character of hyperspectral imagery will be complemented by a third depth or vertical dimension to allow for improved feature extraction.

Tasks include among others (i) the design and testing of a LiDAR measurement set-up and data collection protocol under and above the canopy, (ii) the generation of algorithms to extract the relevant 3D vegetation structural parameters from the LiDAR data sets, (iii) the incorporation of those structural parameters in virtual canopy models implementing rendering techniques, and (iv) the identification of the canopy structural parameters that most influence the hyperspectral forest canopy signal. Based on the results of these tasks, a framework for extrapolating the findings from terrestrial to airborne LiDAR will be conceptualized.

Requirements:

The candidates must have a master's degree in a scientific and/or engineering discipline with strong interests in quantitative modeling, plant production systems and innovative technology.

He/She is motivated to obtain a PhD degree in the field of remote sensing of bio-responses. A major task is reporting the project results in international peer reviewed journals.

He/She must be able to speak and write English fluently. Working knowledge of the MATLAB programming environment is an advantage.

He/She is willing to perform field measurements and to travel abroad for scientific activities such as measurement campaigns, workshops, congresses, etc.

The starting date is as early as possible. For wages and more information on obtaining a PhD degree is referred to the K.U.Leuven websites: <http://www.kuleuven.be/phd/> and <http://www.kuleuven.be/personnel/jobsite/benefits.html>

Advisor: pol.coppin@biw.kuleuven.be

Day-to-day supervisor: willem.verstraeten@biw.kuleuven.be

This PhD project focuses on the understanding of the interaction of solar radiation with structure elements of forest canopies and how this affects the hyperspectral reflectance captured by airborne sensors.

This PhD will be conducted in the framework of the HYPERFOREST project, funded by STEREOII programme of Belspo. The project partners are: VITO, University of Ghent, INBO, University of Zurich and the Gabriel Lippmann Institute of Luxemburg.

The academic promoter of this PhD project is Prof. Pol Coppin, K.U.Leuven.

4. FEATURE ARTICLE

EARLINET: the European Lidar network for aerosol study at continental scale

Introduction

Atmospheric aerosols influence the Earth's environment and climate, and human health. The present knowledge of the atmospheric aerosol distribution is far from sufficient to properly estimate the role of aerosols in changes of the global and regional environmental conditions and climate. This is mainly related to the high inhomogeneity and variability of the aerosol in the atmosphere. Aerosols originate from several natural and anthropogenic sources such as desert, forest fires, volcanoes, sea spray or combustion of fossil fuels and thereby they have different size distribution and different chemical and physical properties.

Aerosols are mainly concentrated within the Planetary Boundary Layer (PBL), the lowest part of the atmosphere directly influenced by the Earth's surface. In case of strong convective activity, like during Saharan dust outbreaks or during volcanic eruptions episodes, the aerosols are directly injected into the free troposphere, above the PBL, and transported over long distances from their source region. The Sahara regions, for example, are considered as a major source of mineral dust with billions of tons transported every year worldwide.

In view of the great importance of aerosols for many key processes governing, e.g., the atmospheric radiation budget, water cycle, and chemistry, which in turn affect human health, traffic systems, and development of ecosystems, it is of vital interest to improve observational capabilities for aerosol properties and distribution. To fully characterize aerosol particles it is necessary to measure their optical properties, size, morphology and composition as a function of time and space in both domains with high resolution to account for the large variability. The interaction of particles with radiation can be derived from the fundamental optical and microphysical properties, or can be measured directly. It depends strongly on the scientific objective which aerosol parameter must be observed and which resolution and accuracy are required. For example, for radiative studies it is useful to determine the extinction coefficient of tropospheric aerosol, but for investigations of the atmospheric chemistry, the distributions of particle number, mass and surface, and the chemical composition are the most relevant. It is recognized that the uncertainty in the atmospheric aerosol distribution can be reduced only with a climatological analysis based on high accuracy aerosol measurements carried out with continuity and on long time period. Since it is in particular the information on the aerosol vertical distribution that is lacking, advanced laser remote sensing is the most appropriate tool to close the observational gap.

Lidar technique

Lidar (light detection and ranging) is the most powerful remote sensing technique because of its capability to provide information on several atmospheric parameters with very high spatial and temporal resolutions [1]. For example, at present, lidar technique is the only technique able to provide base and top height of a cloud of volcanic origin.

The basic lidar principle is the following: a laser pulse is transmitted into the atmosphere where it encounters gas molecules and particles; a small amount of this energy is backscattered in the direction of the receiver system, typically a telescope, and transferred to a photodetector as a photo-multiplier. The resulting electrical signal is proportional to the optical power received, which depends on the presence, range and concentration of atmospheric scatterers and absorbers.

Lidar techniques are needed in order to characterize atmospheric aerosols in terms of vertical profiles of extinction and backscatter coefficients, lidar ratio, optical depth and microphysical properties such as shape, refractive index and size distribution. Multiwavelength lidars, able

to measure elastic, Raman shifted and depolarized radiation, allow a fully aerosol characterization.

The increasing interest of the scientific community in lidar applications for atmospheric studies is attested by the tendency to establish lidar networks at continental scale in order to improve the knowledge of the aerosol effects on climate.

EARLINET

At European scale it is operational the first aerosol lidar network, established in the frame of the EARLINET project (European Aerosol Research Lidar NETwork) [2]. EARLINET was established in February 2000 with the main objective to establish a qualitatively and quantitatively significant database for the horizontal, vertical and temporal distribution of atmospheric aerosol over Europe.

At present, EARLINET consists of 26 lidar stations distributed over Europe as illustrated in the map (Figure 1): 9 Raman lidar stations with the UV Raman channel for independent measurements of aerosol extinction and backscatter, 10 multiwavelength Raman lidar stations (elastic channel at 1064 nm, 532 nm, 355 nm, Raman channels at 532 nm and 355 nm, plus depolarization channel at 532 nm) for the retrieval of aerosol microphysical properties, and 7 single backscatter lidar stations.

The network performs measurements systematically on the base of a fixed scheduling. A rigorous quality assurance programme is applied both for instruments and evaluation algorithms, and a standardised data exchange format is used.

All the network stations perform measurements at three fixed dates a week, allowing the collection of unbiased data. Lidar observations are performed on a regular schedule of one daytime measurement per week around noon, when the boundary layer is usually well developed, and two night time measurements per week, in low background light conditions, in order to perform Raman extinction measurements. Further observations are addressed to monitor special events such as Saharan dust outbreaks, forest fires, photochemical smog and volcano eruptions.

EARLINET measurements started in May 2000 and are still continuing; up to now the EARLINET database represents the largest database for the aerosol distribution on a continental scale.

Actually the network is supported by the European Research Infrastructure Project EARLINET-ASOS (European Aerosol Research Lidar Network: Advanced Sustainable Observation System), funded under the EC 6th Framework Programme) [3].

EARLINET-ASOS will help to improve observations and methodological developments that are urgently needed to provide the multi-year, continental-scale dataset required for assessing the impact of aerosols on the European and global environment and to support future satellite missions. Improving 4-dimensional spatial and temporal coverage of aerosol observation will contribute to almost all areas of societal benefits listed in the Group on Earth Observation System of Systems' (GEOSS) 10-year implementation plan adopted in 2005. The EARLINET-ASOS project that kicked off in March 2006, will play a leading role in developing a global observation network for vertical distribution of aerosols as a major innovative element of GEOSS, by setting the standards for instruments, methodology, and organization in this area.

More specifically, it will enhance the capacity of existing lidar infrastructure to foster aerosol-related process studies, validation of satellite sensors, model development and validation, assimilation of aerosol data into operational models, and to build a comprehensive climatology of aerosol distribution. All the activities will feed into a platform for cooperation and coordination with the relevant observation and user communities, and will serve as a nucleus for a world-wide aerosol lidar network.

EARLINET data can contribute significantly to the quantification of aerosol concentrations, radiative properties, long-range transport and budget, and prediction of future trends on European and global scale. It can also contribute to improve model treatment on a wide range of scales and to a better exploitation of present and future satellite data. EARLINET is playing

an important role in the validation and in the full exploitation of the CALIPSO mission, the NASA-CNES satellite mission with the first lidar onboard launched in April 2006. EARLINET started soon correlative measurements for CALIPSO [4,5] developing an ad-hoc observation strategy based on the analysis of the high resolution ground track data provided by NASA.

EARLINET will contribute to future satellite missions with lidar onboard such as ADM-Aeolus and EarthCARE. Both these missions will have onboard an High Spectral Resolution Lidar at 355nm able to give independent measurements of aerosol extinction and backscatter coefficient in the UV. The multi-wavelength EARLINET data will be very useful to validate these missions and also to give the conversion factors that allow to integrate the aerosol data at 532nm and 1064nm from CALIPSO with the measurements at 355nm from ADM-Aeolus and EarthCARE.

The eruption of the Eyjafjöll volcano

Eyjafjallajökull is one of the smallest glaciers in Iceland. After seismic activity recorded during December 2009, a first eruption started on 20 March 2010, between 22:30 and 23:30 UT. After a brief stop, a new phase of the Eyjafjallajökull eruption started around midnight on 14 April. An eruption plume was observed in the early morning on 14 April. Eruptive activity continued almost without interruptions until 24 May. In the proximity of the volcano, the erupted plume, which lasted longer than 1 month, reached a variable maximum height (between 2 and 8 km a.s.l.). Depending on the wind, the eruption plume was transported towards different regions of continental Europe and towards the Atlantic Ocean at different altitudes. To prevent possible damage to aircraft engines, airspace over large part of Northern Europe was closed on 15 April when the first erupted plume reached continental Europe. The closure of airspace over Europe proceeded patchily and discontinuously for the whole eruption period.

On 15 April 2010, 10 UT, an alert was distributed from CNR-IMAA, Potenza, to all EARLINET stations informing about a large amount of ash directing towards North-West of Europe. Almost all the EARLINET stations performed measurements whenever weather conditions allowed it, for the whole period [6]. Answering to both scientific and public interests in this volcanic eruption, EARLINET set up a web-page where quick-look of lidar measurements are accessible to the public and quickly updated. In addition, a report with all information concerning the EARLINET observations of volcanic ash was daily updated and available on the EARLINET web page (www.earlinet.org).

During the 15-30 April period, volcanic particles were detected over Central Europe over a wide range of altitudes, from 10 km down to the local PBL. Until 19 April, the volcanic plume transport toward South was almost blocked by the Alps. Then Southern and South-Eastern Europe were interested by the volcanic particles transport. Descending aerosol layers are typically observed all around Europe and intrusion in the PBL is observed almost at each site interested by the arrival of the plume.

Due to a change in the main wind direction, at the beginning of May (5-15 May), material emitted by the Eyjafjöll volcano reached almost directly Western Europe (Spain and Portugal) to be then transported toward Italy, Greece and Balkans. In this period, Saharan dust intrusions over Southern Europe occurred as well, resulting in a very interesting aerosol content situation with volcanic and desert dust layers at different altitudes but in some cases also present in a mixed aerosol type layer. Lidar data measured by the EARLINET stations are used to determine the geometric (altitude, base and top), optical (backscatter, extinction, lidar ratio) and microphysical (shape, size distribution, refractive index) properties of the volcanic cloud.

An example of the powerful of the lidar technique is reported in Figure 3, where the temporal evolution of the range corrected lidar signal at 1064 nm measured on 20 April 2010 shows the presence of volcanic particles layer at about 4 km above sea level and a further thin descending layer between 8 and 10 km above the sea level.

EARLINET followed the entire event providing the 4 dimensional distribution of the volcanic ash plume over Europe and supporting international and national authorities during the whole emergency period.

Acknowledgments. The financial support for EARLINET by the European Commission under grant RICA-025991 is gratefully acknowledged.

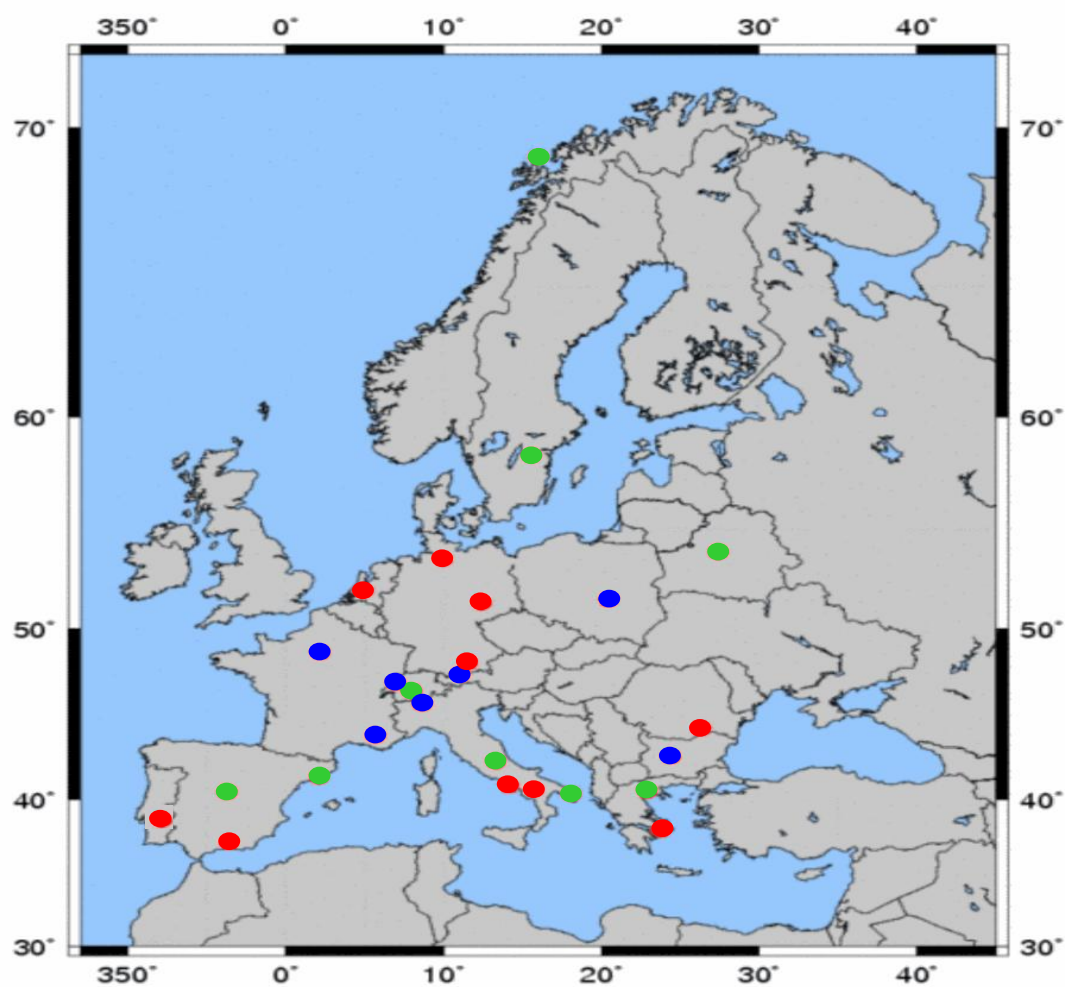


Figure 1. Map of EARLINET stations: multi-wavelength (red), Raman (green) and single backscatter (blue) lidar systems.

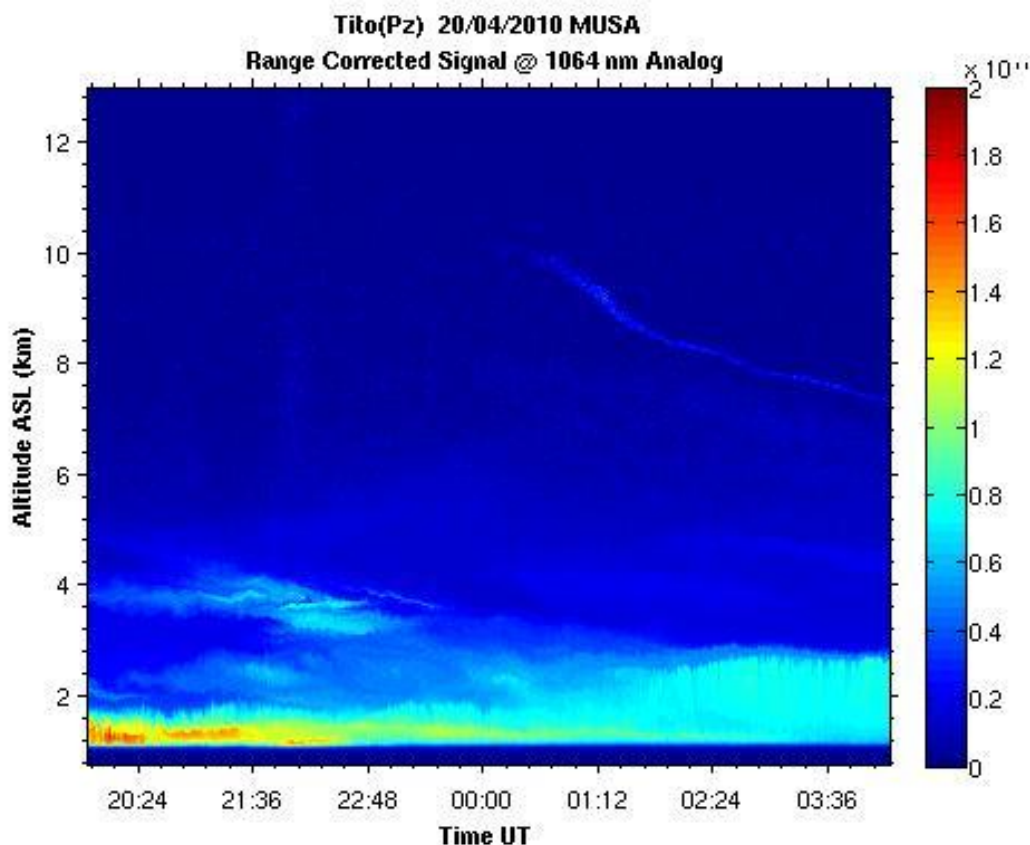


Figure 2: Example of a lidar measurement quick-look relative to measurements performed at Potenza EARLINET station on 20 April 2010. Volcanic particles are observed in a layer at about 4 km above sea level and in a thin layer descending between 10 and 8 km above the sea level.

References

- [1] Lidar: Range-Resolved Optical Remote Sensing of the Atmosphere (Springer Series in Optical Sciences), Vol. 102, edited by Claus Weitkamp, 2005.
- [2] Bösenberg, J., et al. (2003), EARLINET: A European Aerosol Research Lidar Network to establish an aerosol climatology, Rep. 348, Max-Planck-Institut für Meteorologie, Hamburg, Germany.
- [3] Amodeo, G. Pappalardo, J. Bösenberg, A. Ansmann, A. Apituley, L. Alados-Arboledas, D. Balis, C. Böckmann, A. Chaikovsky, A. Comeron, V. Freudenthaler, O. Gustaffson, G. Hansen, V. Mitev, D. Nicolae, A. Papayannis, M. R. Perrone, A. Pietruczuk, M. Pujadas, J.P. Putaud, F. Ravetta, V. Rizi, V. Simeonov, N. Spinelli, D. Stoyanov, T. Trickl, M. Wiegner, A European research infrastructure for the aerosol study on a continental scale: EARLINET-ASOS, Remote Sensing of Clouds and the Atmosphere XII, edited by Adolfo Comerón, Richard H. Picard, Klaus Schäfer, James R. Slusser, Aldo Amodeo, Proc. of SPIE Vol. 6745, 67450Y, (2007) doi: 10.1117/12.738401
- [4] Pappalardo G., U. Wandinger, L. Mona, A. Hiebsch, I. Mattis, A. Amodeo, A. Ansmann, P. Seifert, H. Linné, A. Apituley, L. Alados Arboledas, D. Balis, A. Chaikovsky, G. D'Amico, F. De

Tomasi, V. Freudenthaler, E. Giannakaki, A. Giunta, I. Grigorov, M. Iarlori, F. Madonna, R.-E. Mamouri, L. Nasti, A. Papayannis, A. Pietruczuk, M. Pujadas, V. Rizi, F. Rocadenbosch, F. Russo, F. Schnell, N. Spinelli, X. Wang, and M. Wiegner, EARLINET correlative measurements for CALIPSO: First intercomparison results, JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 115, D00H19, doi:10.1029/2009JD012147, 2010.

[5] Mona, L., Pappalardo, G., Amodeo, A., D'Amico, G., Madonna, F., Boselli, A., Giunta, A., Russo, F., and Cuomo, V.: One year of CNR-IMAA multi-wavelength Raman lidar measurements in coincidence with CALIPSO overpasses: Level 1 products comparison, Atmos. Chem. Phys., 9, 7213-7228, doi:10.5194/acp-9-7213-2009, 2009

[6] Pappalardo G., and I. Mattis, Dispersion and evolution of the Eyjafjallajökull ash plume over Europe: vertically resolved measurements with the European LIDAR network EARLINET (solicited), European Geosciences Union General Assembly 2010, Vienna, Austria, 2 – 7 May 2010, -15731.

Contact:

Gelsomina Pappalardo

EARLINET Coordinator

CNR-IMAA, Italy.

pappalardo@imaa.cnr.it

www.earlinet.org

5. FUTURE EVENTS

5.1 EARSel EVENTS

22-24 September 2010: Second joint EARSel SIG workshop, GHENT UNIVERSITY

EARSel is organising its second joint workshop between the SIG's:

- Urban remote sensing
- 3D remote sensing
- Radar remote sensing
- Developing Countries
- Thermal remote sensing

The workshop will take place 22-24 of September 2010.

The aim of this joint workshop is to bring the members of the different SIG's together in one joint meeting in order to meet each other and to find common grounds and complementary items in their research. Many times research topics are not only related to one specific SIG, but in most cases there is a certain overlap. This joint workshop aims to canalise these overlaps. This broader forum allows and encourages more interdisciplinary contacts among remote sensing scientists.

Presentations:

- Comparison of two classification techniques for urban impervious surface mapping and the impact on simulated runoff.
- Identifying the Poor in the Cities - How can Remote Sensing help to profile poverty (slum dwellers) in megacities?
- Spatio-temporal analysis of informal settlements development. A case study in Istanbul, Turkey
- Further Advances in Automatic Mapping of Seismic Damage Based on Very High Resolution SAR Images
- Definition of radargrammetric model and application with COSMOSKYMED imagery. .
- Identification of structural changes caused by different type of damages in agriculture by synergistic use of optical and radar data
- Inferring urban morphology for the Greater Dublin Area from continuous sealed surfacedata: a metric-based approach
- Using information on urban morphology derived from a time-series of medium resolution remote sensing data for the calibration of the MOLAND urban growth model
- Estimating the impact of urbanisation on hydrology in Dublin, Ireland
- Use of multi-angle high-resolution imagery and 3D information for urban land-cover classification
- Aerodynamic resistance for flux estimation in an urban area
- Thermal remote sensing of urban surface parameters for use in urban climate models
- Urban heat island of Munich, Germany – A multisensoral and multiscale approach
- Ontology for slums
- Imagery, in the Western Desert of Egypt
- The role of remote sensing in an urban observatory for developing countries.
- The ASTER Global Topographic Data Set
- Assessment of Surface Model Extraction of an Urban Scene from VHR MultisensorSpaceborne Imagery

- Matching strategies for Dsms extraction in urban area from High Resolution Satellite Imagery
 - The changes of the ecological significance of wetlands in the Red River coastal Zone, Vietnam
 - Forests destruction asses by using remote sensing data and field study (case study: Khuzestan, Albaji's desert
 - Evaluation of effects of Multiresolution Segmentation parameters on the accuracy of Object-Oriented Classification of satellite images for land use\cover (case study in Tehran)
 - Application of integrating thermal remote sensing data with other satellite imageries to examining changes in global LST
 - Remote sensing for physical protection of the pipeline network
 - A software for agricultural and drought monitoring in morocco, using vegetation indexes
-
- Monitoring the drought status in the western forest covered regions of Algeria with remotely sensing Landsat ETM+ data
 - evaluation of methods efficiency Kriging and Idw method for simulation of rain parameters
 - assessment efficiency linear regression and longbin method to reconstruction of Hydrometric data
 - Landscape Change and desert land Monitoring and Assessment
 - Dimensionality Reduction of Hyper Spectral Data using Area Based Feature
 - Multiple endmember unmixing of chris/proba data for mapping of sealed surfaces in the brussels capital region
 - Capabilities of and requirements for urban remote sensing
 - Comparison of high resolution insar and optical dems
 - A comparative analysis of the results achieved by the spinua and delf psi techniques: ground deformation monitoring of the gulf of Gdansk coastal area (poland)
 - Ground-Based SAR Interferometry: analysis of some experimental observations
 - Mapping, monitoring and re-constructing historical evolution of eruptive activity at Nyamulagira, DRC, and its implications for hazards
 - Fusion of Airborne MTIonSAR and Ancillary Information for Vehicle Tracking
 - 3D THz-imaging on simulated data with a first test on real radar VNA data in the GHz domain.
 - Modelling air temperature via assimilation of satellite derived surface temperature within the Urban Heat Island project.
 - Ground surface temperatures (GST) modeling in the Russian Altay Mountains by using MODIS Land Surface Temperatures (LST).
 - The advantages of thermal remote sensing data for surface and subsurfaces soil properties mapping in desert environments
 - Influence of spatial resolution and distribution of remotely sensed impervious surface cover on runoff prediction in urbanized catchments
 - LIDAR Data for Urban Land Cover Mapping Based On Decision Tree
 - The use of stereoscopic images taken from a micro-drone for the documentation of Heritage – an example from burial mounts in the Russian Altaï.
 - Evaluation of DisTrad downscaling of MODIS thermal products over Dublin
 - Post-fire changes in land surface temperature and surface albedo assessed with MODIS
 - Dependence of thermal infrared emissivity on soil moisture. Field and laboratori Measurements
 - Using GEOBIA to assess crown diameter classes of Acacia tortilis in Bou Hedma, Tunisia
 - Object-based classification of a sclerophyllous oak forest in Northwest Yunnan (China) based on high resolution satellite imagery
 - Digital Surface Models in Urban Areas based on Satellite Imagery
 - Accuracy evaluation of DEM extracted from a GeoEye stereo pair of flat rural areas for hydraulic hazard analysis

- DSM extraction from very high resolution WorldView1 satellite images: comparison between the manual and the automatic digital surface generation
- ENDELEO, a web-based tool to monitor vegetation dynamics in Kenya
- Analyzing vegetation change in relation to environmental and socio-economic factors in lower Lancang watershed, China
- Urban expansion and its impact on urban agriculture – remote sensing based change analysis of Kizinga and Mzinga Valley – Dar Es Salaam, Tanzania
- Image fusion techniques for the integration of high resolution SAR data and multispectral imagery in an urban environment – A statistical comparison
- Gpr time lapse to quantify the subsidence degree in an urban area
- Building detection in urban areas from combined optical and INSAR data exploiting context

Weblink:

<http://www.geoweb.ugent.be/data-acquisition-3d/earsel-workshop>

7-9 FEBRUARY, 2011: 6TH WORKSHOP ON REMOTE SENSING OF LAND ICE AND SNOW. BERNE, SWITZERLAND. ORGANISED BY UNIVERSITY OF BERNE

30 MAY - 3 JUNE 2011: 31ST EARSel SYMPOSIUM AND 34TH GENERAL ASSEMBLY, PRAGUE TECHNICAL UNIVERSITY, CZECH REPUBLIC

In the framework of the 31th symposium:

- 3RD WORKSHOP ON EDUCATION AND TRAINING
- 1ST FORESTRY WORKSHOP: OPERATIONAL REMOTE SENSING IN FOREST MANAGEMENT
- 5TH WORKSHOP ON REMOTE SENSING OF THE COASTAL ZONE
- 4TH WORKSHOP ON LAND USE/LAND COVER

11-13 APRIL 2011: 7TH WORKSHOP ON IMAGING SPECTROSCOPY, UNIVERSITY OF EDINBURGH, SCOTLAND, UK

20-24 SEPTEMBER, 2011: 2ND WORKSHOP ON REMOTE SENSING FOR ARCHAEOLOGY. POZNAN, POLAND.

5.2 FORTHCOMING CONFERENCES

1. the ForestSat 2010 CONFERENCE, 7th and 9th of September, 2010. Santiago de Compostela (USC)

<http://forestsat2010.usc.es>

ForestSat 2010 is the fourth international conference on operational spatial tools, new technologies and remote sensing techniques to improve forest management. Previous conferences have taken place in Scotland (2002), Sweden (2005) and France (2007). This conference aims to explore the synergies between industry and the scientific community.

The conference will provide an opportunity to exchange information about user needs and future developments.

The event will take place at the University of Santiago de Compostela (USC) campus facilities in the city of Lugo (Galicia, Spain), between the 7th and 9th of September, 2010.

Additionally, a tour of Santiago de Compostela, declared a World Heritage Site by UNESCO in 1985, is scheduled on the 10th September.

After the conference, the best contributions will be selected and their authors encouraged to send their papers to a scientific journal.

Aims of ForestSat 2010. The aim of the Conference is to present remote sensing techniques and methodologies that improve land management and forestry. It will focus on the multiple uses of forests, from their productivity to their social role, without losing sight of their importance as a source of biodiversity and their role in the sequestration of CO₂.

Topics:

- Forest inventory
- Estimation of biophysical parameters
- Forest growth and change detection
- Landscape ecology and biodiversity
- Natural risks and forest health
- Data fusion and integration
- SDIs applications in forestry
- 3-D techniques
- REDD (Reducing Emissions from Deforestation and forest Degradation)
- Special sessions: Commercial applications, new techniques and operational tools.

For information please contact:

Universidad de Santiago de Compostela,
Escuela Politécnica Superior,
Benigno Ledo s/n. Lugo (Spain)

Information: +34 600942357

Información: +34 982252231

ext 23259/ ext 23266

Fax: +34 982285926

Email: forestsat2010@usc.es

22 – 24 June 2010

ISPRS Technical Commission V, Mid-term Symposium "Close range measurements techniques"

Newcastle upon Tyne, UK

<http://www.isprs-newcastle2010.org>

28 June – 2 July 2010

2010 ESA Living Planet Symposium

Bergen, Norway

<http://www.congrex.nl/10a04/>

29 June – 2 July 2010

GEOBIA 2010 (Geographic Object-Based Image Analysis)
Ghent, Belgium
<http://geobia.ugent.be/>

5 – 7 July 2010

ISPRS Commission VII Symposium
Vienna, Austria
<http://www.isprs100vienna.org/tc-vii-symposium/>

18 – 25 July 2010

38th Scientific Assembly of the Committee on Space Research (COSPAR)
and Associated Events “COSPAR 2010”
Bremen, Germany
<http://www.cospar2010.org/>

25 – 30 July 2010

IGARSS 2010, 30th anniversary
Honolulu, Hawaii, USA
<http://www.igarss10.org/>

1 – 3 September 2010

RSPSoc2010 Annual Conference,
University College Cork, Ireland
<http://www.rspsoc2010.org/>

20 – 23 September 2010

Spie Europe Sensing
Toulouse, France
<http://www.spie.org/>

Back Cover –Pictures from the 30th EARSeL Symposium 2010 at UNESCO in Paris.



)

EARSeL Sponsoring Agencies:



Council of Europe



European Space Agency

Information concerning EARSeL activities can be obtained from the

EARSeL Secretariat
 Nienburgen Str. 1
 30167 Hannover, Germany
 Tel: +49 511 762 2482
 Fax: +49 511 762 2483
 Mail: secretariat@earsel.org
 Http: www.earsel.org/