EARSeL

In memory of

Gunter Menz

+18.11.1956 † 9.8.2016

June & September 2016
No. 106 & 107

NEWSLETTER

EARSeL

European Association of Remote Sensing Laboratories

Front Cover – Gunter Menz, Courtesy of Bonn University.

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Editorial

Dear members,

The last period at EARSeL has been marked with the great loss of our dear friend and colleague Gunter Menz. EARSeL mourns his death and these two issues, from the month his death has been announced until the last month of the year 2016, have been dedicated to him. His research contributions in remote sensing have been highly acknowledged in the research community and his loss is hard to cope with.

Amongst the material of this EARSeL Newsletter, an obituary for Gunter Menz is the least the EARSeL community can do to honour his memory.

He will be sorely missed.

The Editors

News from EARSeL

Obituary for Professor Dr. Gunter Menz (18.11.1956 – 9.8.2016)

Prof. Dr. Gunter Menz (Institute for Geography, University Bonn) died on August 9, 2016 surprisingly and completely unexpected following a serious accident. His sudden death tears a hole in the remote sensing and geography community. We all have lost a highly esteemed University professor, enthusiastic scientist and good friend. He leaves behind his wife and two children to whom we all share our deepest sympathy.

In June 2016, Prof. Menz organized with great success the international annual EARSeL Symposium at the Gustav-Stresemann-Institute in Bonn. Besides the Symposium, he managed to organize several workshops and the Junior Scientist Days, which will be kept in good remembrance due to the great number of young participants. Gunter was always very enthusiastic in promoting and encouraging young scientists in their career.

Gunter Menz, born 1956 in Heidenheim, studied mathematics and geography at the University in Freiburg/Germany. He had planned to become a high-school teacher and his exam thesis brought him to African, especially East-African, landscapes for the first time. However, things often turn out in a different way as originally planned. Instead of starting a teacher position, he accepted a PhD position at the University of Freiburg under the supervision of Prof. Dr. Hermann Gossmann who was a PI for the HCMM campaign (Heat Capacity Mapping Mission) in Europe. The HCMM satellite offered two spectral bands, one visible with 500 m and one thermal infrared with 600 m spatial resolution, which was at that time of the late 70s and early 80s a very good resolution in the thermal IR band offering new challenges for regional to local scale studies.

The excellent contacts between the Institute of Physical Geography (IPG) at the University of Freiburg and the Bio-Meteorological Research Unit of the German Weather Service (DWD) provided the basis for his PhD thesis, which was finalized and published in 1987 and titled “Maps of human heat stress in the Freiburg-Basel region computed from satellite data” (Freiburger Geographische Hefte 27, 1987).

Due to the fact that during that time GIS systems were not really existing or powerful enough and satellite data analysis was usually only possible by booking some working hours at the DLR in Oberpfaffenhofen (formerly named DFVLR) or the Joint Research Centre in Ispra, Gunter Menz had to design the software he needed himself. This was only possible because the IPG in Freiburg invested in its own multi-user computer infrastructure to enable to work independently from the DLR, Ispra etc.

This individual software development strongly affected the work of Gunter Menz and allowed him to develop analytical tools and algorithms, which were at that time mostly unavailable to a “normal” young scientist in geography or environmental sciences.

Then his career developed were rapidly. In 1988, he accepted a post-doc position with Prof. Mathias Winiger at the Geographical Institute of the University of Bonn to help to establish a powerful remote sensing unit. He was very successful and finished his habilitation thesis in 1993 at Bonn University. His topic was to model and estimate precipitation patterns and biomass productivity in semi-arid

East-African ecosystems using preferably Meteosat satellite data. The habilitation thesis was published in 1996 at Franz Steiner Publishers Stuttgart.

Following his habilitation, he started years of travel and gained manifold experiences on non-tenured professorships at various geographical institutes in Mainz and Bonn. In 1995, he became a visiting scientist at the University of California in Santa Barbara with Prof. John Estes who was a pioneer in developing applications of Earth observation data e.g. for urban applications. This visit at the University in Santa Barbara affected Gunter's work for a long time.
In 1996, he was appointed associate professor for remote sensing at the University of Jena and two years later in 1998, he accepted the appointment on the newly established chair for remote sensing at the Geographical Institute at Bonn University.
He very successfully developed the Remote Sensing Research Group (RSRG) at the Geographical Institute and was a co-founder of the inter-disciplinary Centre for Remote Sensing of Land Surfaces (ZfL), acting as its director from 2001 – 2010.
He also engaged as speaker of the remote sensing working group of the German Geographical Association and as representative of the Geographical Institute at the University of Bonn within EARSeL, the European Association of Remote Sensing Laboratories. Together with Prof. Rudi Goossens from Ghent University, he organised several workshops of the EARSeL Special Interest Group (SIG) "Developing Countries" such as the workshop of 2002 in Bonn.
His research project repeatedly brought him back to Africa from Morocco, Ghana and Benin to Kenya and Namibia. Much of his work related to topics such as land degradation, biomass etc. Mostly in connection to satellite remote sensing data analysis.
He was a very productive professor and great mentor for his students. Gunter had an exceptional ability to lead and guide graduate students, rather than direct them, in pursuit of their education and research objectives. His strength in teaching both undergraduate and graduate students was based on his thorough knowledge and competence of his scientific subject and his ability to organize and present complex materials. Many of his former students and postdocs hold positions in important German and EU institutions and will continue what they have experienced from Gunter Menz. His contribution for the future development of geographical sciences and remote sensing as well as his advice will be missed. His co-workers in Bonn lost an important mentor and supervisor and his colleagues an open-minded friend.
Prof. Gunter Menz became only 59 years of age. On November 18, 2016 when he would have normally celebrated his 60th anniversary, the Geographical Institute of the University of Bonn held a big memorial colloquium with international speakers – friends, colleagues, and companions from different periods of his life. This was an appropriate event and Gunter would have had his pleasure with this special day.
Our deepest sympathy goes out to his wife and his two children. We can hardly understand the loss, we are very sad and we all miss him.

6th EARSeL SIG LU/LC & 2nd EARSeL LULC/NASA LCLUC Workshop
6 – 7 May 2016, Prague, Czech Republic

New Earth Observation frontiers are being formed continuously by the dynamically changing expectations set by contemporary and expected developments in the geo- and bio-sphere as a counterbalance for pressures and demands emerging from a changing climate and the anthroposphere. Environment, Food security, Energy, Health and Security require continuous, reliable and cost effective monitoring of the Earth's surface and its resources. The 2nd joint Workshop of the EARSeL Special Interest Group on Land Use & Land Cover and the NASA Land-Cover/Land-Use Change (LCLUC) Program was considered supportive to the objectives of the imminent following ESA Living Planet Symposium 2016, as a brainstorming preparation and an opportunity for specialists to formulate a common understanding and language prior to entering the wider discussions of the more diverse audience.
The Workshop was jointly organized between the EARSeL SIG LULC and NASA's LCLUC Science Teams at the Department of Applied Geoinformatics and Cartography, Faculty of Science, Charles University in Prague, Czechia, on May 6-7, 2016. 123 researchers from 30 countries discussed upcoming opportunities and challenges of LCLUC and remote sensing at the beginning of this new big data era.

The Workshop was organized around four representative sessions, covering the latest advances; trending activities and future challenges in land-cover services in the big data era:

1. Harmonization of Sentinel-2 and Landsat products
2. Mapping Land Cover and Land Use with cross-scale and cross-sensors approaches

3. Challenges of Land-Cover and Land-Use Monitoring with Dense Time Series of EO Data
4. EO benefits for ecosystem services and human wellbeing

Each session opened with presentations by distinguished keynote speakers who triggered and set the stage for the discussion among all participants. Each session continued with poster presentation and concluded with discussion wrapping-up the key elements of the session and enhancing collaboration among the participants.
The welcome addresses were given by Premysl Stych from Charles University in Prague, Garik Gutman (NASA LCLUC), Lena Halounova and Ioannis Manakos (both EARSeL). Ioannis and Garik provided a short overview of the EARSeL LULC and NASA LCLUC programs, their goals, current activities and future plans.
Jeff Masek, NASA GSFC and Pierre Defourny, University of Louvain started off with keynotes in session 1 on the new opportunities offered by Sentinel-2 and Landsat products, which represent the most widely accessible medium-to-high spatial resolution multispectral satellite data. The potential for synergistic use of the two sources creates unprecedented opportunities for timely and accurate observations of Earth status and dynamics. Thus, harmonization of the distributed data products is of paramount importance for the scientific community. Here, a good collaboration between NASA and ESA was emphasized as an aim to optimize scientific outcomes of the new opportunities. Jeff described possible approaches to harmonize reflectance products from Landsat and Sentinel-2, presented the current status and scientific applications, while Pierre showed global land-cover data-base progress as well as challenges regarding Sentinel-2 and Landsat data. Keynote presentations and posters proved that activities aiming to harmonize data. The following discussion points are outlined here: 1) Continuous Landsat-8 & Sentinel-2 inter-calibration, 2) Geometric co-registration, 3) Consistent atmospheric correction and cloud/shadow masking, 4) Need for international standardized processing or quantifying the differences between major systems, 5) Interest in pre-processed data ready to be provided to the community.

Alexandra Tyukavina from the University of Maryland and Alexander Prishchepov from the University of Copenhagen opened the second session with keynotes on Mapping Land Cover and Land Use with cross-scale and cross-sensors approaches. This session gave room for presentation and discussion of approaches for multi-sensor analysis, including data and decision fusion approaches for mapping land cover and land use. While Alexandra gave an overview of using Landsat and Sentinel-2 data to baseline and forward monitor land-cover change, Alexander focused on the opportunities and challenges of application of satellite remotely-sensed data in land-systems science. Posters in the session underlined and discussed the need for fusion of data from multiple sources in the era of big data and pluralism of satellite sensors. The discussion points are outlined here: 1) Challenges to go beyond classification, 2) Combination of classes and their characterization, 3) Easy access to multiple

data streams, 4) Solutions needed for high volume processing (Earth Engine, NEX, TEPs), 5) Combination of RS time series with ancillary data in (complex) database products, 6) Capacity building/training end-users; alternatively: deriving easy-to-understand end products for decision makers, 7) Improvement of the accessibility to image data (e.g. microsatellites), 8) Improvement of metadata and searchability of enormous volumes of existing LCLUC datasets, 9) Acknowledgement of the challenge to bridge the gap between R&D results and operational, full-scale implementation.

Day 1 and Day 2 at different rooms

Day 2 of the Workshop began with presentations by Son Nghiem, NASA JPL, and Sebastian van der Linden, the Humboldt University of Berlin, within the session on Challenges of Land-Cover and Land-Use Monitoring with Dense Time Series of EO Data. The vast amount of data from Landsat-8 and Sentinel-2 a/b lead to unprecedented density in time series of high resolution multi-spectral data. This creates new needs for the efficient handling of large volumes of optical images and approaches to translate temporal developments into land cover/use characteristics. This session was dedicated to aspects of dense and/or long time series with a focus on Landsat and Sentinel data. Son provided an overview of different data sources and land- cover mapping practices followed by specific examples from different disciplines, approaches and challenges in synergistic use of multi-satellite sensors for mapping. Sebastian, on the other hand, illustrated how important and useful are time series analysis in the Sentinel-Landsat era. He talked about time series data applications, mainly in the dry parts of southern Europe including Turkey and southern Portugal. This was a great example of moving away from common classification approaches to more refine and continuous estimates of land-cover components. The poster session showed how many land-use related results and methods are nowadays addressed by analysis of archival data. The discussion points are briefly highlighted here: 1) Availability of Sentinel data, particularly about any start-up costs of finding and using these data, 2) Technical challenges using data from different sensors such as Landsat and Sentinel-2 data including BRDF correction issues in the Sentinel-2 data, 3) Geometric mis-registration between Landsat and Sentinel-2 observations and lack of standard atmospherically corrected Sentinel-2 data, 4) Need to have phenological metrics derived from medium resolution Landsat-like observations, similar to what is available from MODIS, 5) Merging optical and radar observations would increase our ability to monitor various landscapes, especially in areas with persistent cloud cover.

The last session "EO benefits for ecosystem services and human wellbeing" focused on the evaluation of natural and anthropogenic pressures, which cause serious threats to ecosystems, leading to habitat degradation and loss of ecosystem services. Earth Observation data offer unprecedented capacity in timely and wide-extent monitoring of endangered areas, through the calculation of a variety of indicators and essential variables for fields including climate, biodiversity, and habitat monitoring. Open and harmonised data, e.g. following the principles of the Global Earth Observation System of Systems (GEOSS) and the Copernicus program, offer new potential in ecosystem modeling, enhanced management and restoration, and capacity building. Chris Justice, University of Maryland, gave insight in the field of Earth Observations for agricultural monitoring and food security. Palma Blonda, ISSIA CNR – Bari, emphasized the high value of remote sensing for LC taxonomies for applications to biodiversity and ecosystems monitoring. The discussion points are briefly highlighted here: 1) Policy is an important driver behind the work on this topic, 2) Focus is on monitoring, 3) GEOGLAMS output for AMIS requires simple visuals of crop condition, 4) EO products are needed for managers, 5) Ecosystem condition (beyond crops, and beyond just LCLU), 6) Maintenance of ecosystem services to a sustainable status, 7) Continuity and consistency of EO products provision is particularly important, 8) Consistent taxonomy.

The program of the Workshop led to very intense discussions of both individual presentations as well as entire sessions. It was commonly agreed that the time of organization of the Workshop was just right for this type of event because of the new Sentinel missions. Many studies, projects and cooperation that use the Sentinel and Landsat data, supported by US and European agencies, have been under development. The success of this Workshop suggests that it is desirable to organize a follow-up joint event in about two years. At the closing, some ideas for the future Workshop were suggested, such as longer poster sessions, support of young scientists, etc. The organizers are open for more ideas and suggestions and would be happy to receive them by email.

Special thanks and acknowledgement to our sponsors, ESA and BELSPO, our highly qualified keynote speakers, to the contributors and participants for their vivid discussions, and to the scientific and organizing Committees. The Workshop was organized under the auspices of Bohuslav Gaš, the Dean of Faculty of Science, Charles University in Prague.

Sincerely,

Premysl Stych[1], Ioannis Manakos[2], Garik Gutman[3]

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[2] EARSeL SIG LULC Chairman, Centre for Research and Technology Hellas - Information Technologies Institute

[3] NASA Land-Cover/Land-Use Change Program

2nd Student Workshop on Ecology and Optics of Coastal Zones 19 - 23 July 2016, Museum of the World Ocean, Kaliningrad, Russian Federation.

From 19th to 23th of July 2017 the Second Student Workshop on Ecology and Optics of Coastal Zones was held in Kaliningrad. The previous one, the 1st Student Workshop on Ecology and Optics of the White Sea was held two years ago at the White Sea Biological Station of Moscow State University, Russia. Last summer students, Ph.D. students and lecturers from Russia, Germany, Estonia, and Belorus became guests of the westernmost part of Russia. The scientists from the Moscow Zoo have also joined our Workshop. The workshop and student conference were organized by collaboration of EARSeL, University of Oldenburg (Germany), Moscow State University (Russia), Museum of the World Ocean, Immanuel Kant Baltic Federal University, and the Atlantic Branch of the Institute of Oceanology of the Russian Academy of Sciences.

Kaliningrad, or Königsberg in the past, combines the rigor of the old German architecture and unique romance of the Soviet one. City is a park full of greenery and chestnuts, cut by the river Pregel, and rich with water bodies – lakes and large ponds. The main tourist attraction, the Cathedral, is located on the island, the island of Kant. Museum of the World Ocean with its interesting pavilions and museum-ships is located not far from the Cathedral, along the Quay of Peter the Great. Exactly there, in the heart of the city, the Workshop took place. The museum of the World Ocean provided rooms and equipment; its staff led interesting tours and gave informative lectures for the participants of the Workshop. In the museum building the lecturers performed various reports related to the biology and chemistry of the ocean, the history of ocean research expeditions, the methods of analysis of experimental data, and, of course, to the optics and ecology of the coastal waters. The young researchers, students and PhD students, reported about their scientific work in a special session making poster and short oral presentations. The most memorable lectures were: the talk from a student of the Far Eastern University about their unique marine biosphere reserve, the lecture given by a professor from Germany about the role of the oceans in climate change, and the presentation of biologists from Moscow Zoo about the aquarium and marine mammals of the Zoo in Moscow.

As a part of the Workshop, an expedition to collect water samples along the river Pregel within the city of Kaliningrad was undertaken, and the tours to Baltijsk and the Baltic Spit, Svetlogorsk were organized. Scientific groups from Germany, Estonia, Belarus and from Institute of Oceanology in Moscow brought with them spectral instruments: spectrophotometers, fluorescence spectrometers, lidars. Open demonstration lessons on working with these devices were held for participants of the school. In these lessons, even the flora surrounding the Museum was used in the work: participants learned how to get pigment extracts from the leaves and petals of roses and other plants. Then the extracts were investigated by spectral methods. Using water samples from the river Pregel, each participant of the Workshop could learn how to work with a given optical instrument, review their features and details of application. For example, in the spectral measurements using spectrophotometer and luminescence spectrometer brought by Solar company (Minsk, Belarus), participants assessed the state of riverine water. Measured just after water sampling fluorescence spectra contained several bands corresponding to the emission of colored dissolved organic matter (CDOM), water Raman scattering bands, but there were no traces of oil or other organic contaminants found in the samples.

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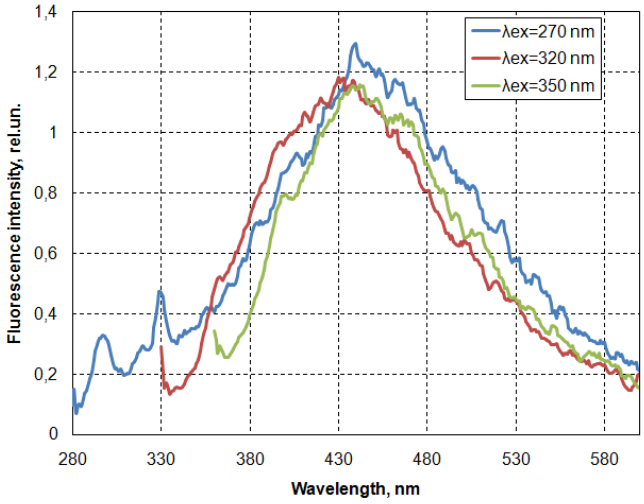


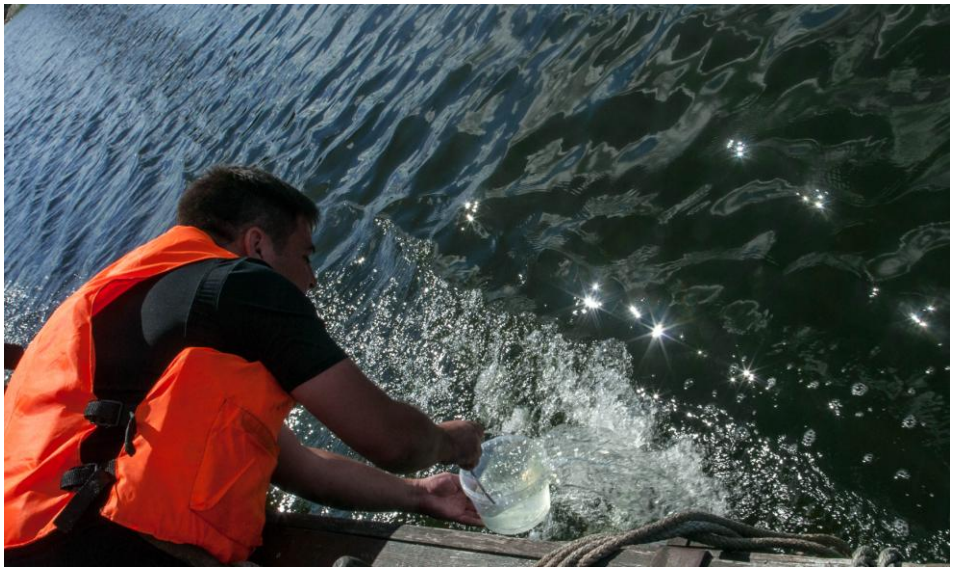
Fluorescence spectra of water sample from the river Pregel taken at several excitation wavelengths.

Like for student participants, the opportunity to take part in practical exercises and in lectures was also opened for regular visitors to the museum, only a desire and interest were needed.

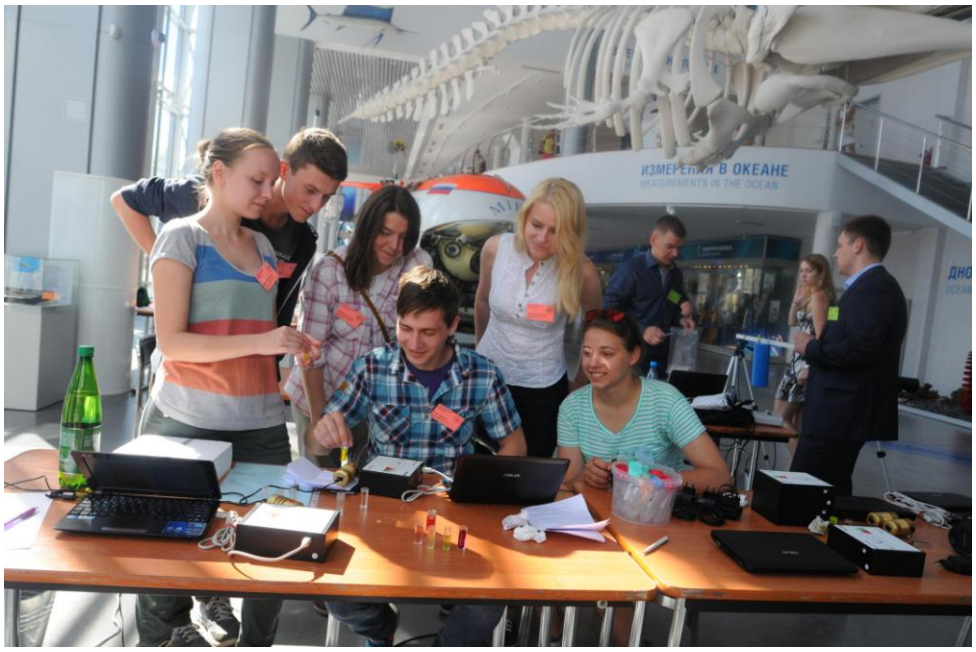
The workshop joined together various fields of science related to the study of the ocean and coastal zones, allowed to look closer at each of them, to see similarities and differences, taught work with several types of devices. Within a short time of the event, the participants visited different parts of the Kaliningrad region, admire the beauty of its nature and spent a very good time communicating with each other.

Practical exercises at the pavilion "Depth", the Museum of the World Ocean near the submersible "Mir" apparatus.

Members of the Workshop in front of the Museum of the World Ocean.



Water sampling in the river Pregel with the historic wooden boat "Kurėnas".



Practical classes with spectral instruments.

Text: Catherine Vervald, magister student,
Text and spectra: Anastasiia Kharcheva, Ph.D. student,
Photo: Alexander Efitorov, young specialist (programmer).
Faculty of Physics, Lomonosov Moscow State University, Russia

News from Other Organisations

Third European SCGIS Conference *"Geoinformation technologies for natural and cultural heritage conservation"*

11-12 October 2016, Sofia, Bulgaria

On 11 and 12 October 2016 the Third European SCGIS (Society for Conservation GIS) conference "Geoinformation technologies to protect the natural and cultural heritage" was held in the city of Sofia, Bulgaria. The Third European SCGIS Conference is organized as a joint initiative of the SCGIS Chapter Bulgaria, SCGIS Chapter Slovenia, Space Research and Technology Institute – Bulgarian Academy of Sciences (SRTI-BAS), Anton Melik Geographical Institute of the Slovenian Academy of Sciences and Arts, ESRI Bulgaria and Bulgarian Geographical Society. The main idea of this event is to invite researchers and professionals from various scientific fields dealing with the conservation issues through geoinformation technologies, to promote the conservation idea and to popularize the Society for Conservation GIS. The SCGIS is a non-profit organization which mission is "to build community, provide knowledge, and support individuals using geographic information systems and science for conservation of natural resources and cultural heritage" (www.scgis.org).

The Great hall of the Bulgarian Academy of Sciences.

Plenary and Technical Sessions

Conference opening took place on 11th of October at the Great Hall of the Bulgarian Academy of Sciences, followed by the plenary and technical sessions. The conference was attended by scientists and specialists from different institutes and universities in Bulgaria and abroad, students and pupils.

During the plenary session the Society for Conservation GIS, Space Research and Technology Institute at the Bulgarian Academy of Sciences, Geographical Institute of the Slovenian Academy of Sciences and Arts, ESRI Bulgaria and the European Association of Remote Sensing Laboratories (EARSeL), European Association of Geographers (EUROGEO) and professional social network GEONET

were presented. During the plenary session the "Space School" Initiative of the Space Research and Technology Institute and Bulgarian Astronautical Society, aimed at promoting the space-related sciences, Earth observation and modern achievements in the field of aerospace research and technology among pupils and students was presented. The technical session, prepared by ESRI Bulgaria, presents the novelties in the software product ArcGIS 10.4, techniques and tools for spatial analysis of natural and cultural heritage using the capabilities of geographic information systems.

SCGIS presented by Dr. Stefan Stamenov, leader of SCGIS Chapter Bulgaria.

The Scientific secretary of Space Research and Technology Institute – BAS (SRTI-BAS) welcomed the conference participants and attendees and presented the SRTI-BAS activities.

Geographical Institute of the Slovenian Academy of Sciences and Arts presented by Dr. Rok Ciglic, head of their *GIS* Department and leader of SCGIS Chapter Slovenia.

Welcome speech from Serguey Shishov, ESRI Bulgaria Ltd.

Presentation of the *Space School* Initiative by Dr. Vanya Stamenova, SRTI-BAS & SCGIS Chapter Bulgaria.

Presentation of GEONET network by Dr. Stefan Stamenov, SRTI-BAS & SCGIS Chapter Bulgaria.

European Association of Remote Sensing Laboratories (EARSeL) presented by Dr. Vanya Stamenova, Bulgarian national representative at EARSeL.

European Association of Geographers (EUROGEO) presented by Dr. Stelian Dimitrov.

Technical Session of ESRI Bulgaria, presented by Dimitar Koritarov.

Thematic Sessions

The thematic scientific sessions of the Third European SCGIS Conference "Geoinformation technologies for natural and cultural heritage conservation" were held at Park Hotel Moskva in Sofia, Bulgaria on 11th and 12th of October 2016. During the thematic sessions reports of scientists and professionals from Bulgaria, Slovenia, Romania, Macedonia, Poland, Russia, Czech Republic, Italy and Ukraine dealing with the conservation of natural and cultural heritage by applying geoinformation technologies were presented. The conference has two main sessions:

- GIS-based Conservation of Natural Heritage sites and Natural Resources – during this session papers and posters focused on GIS for protected areas, remote sensing and GIS of Natura 2000 habitat types, GIS for biodiversity conservation, landscape diversity, Land use change, climate change and human footprint, and GIS in landscape studies have been presented.
- Research and Conservation of Cultural Heritage Sites using GIS – the presented papers and posters in this session covered the following sub-topics: Field survey and data collection in archaeology, Landscape studies over time: spatial-temporal modelling, GIS as a tool for archaeological sites' documentation, UAV applications for cultural heritage, Virtual GIS and mapping tools.

Conference dinner

The conference ended with a dinner at the Restaurant "Panorama" of the park hotel Moskva, with the participants, who have stayed and wanted to come.

The restaurant and the view.

Cultural Tour

The third day was planned for the cultural tour of Sofia. The cultural tour started from the Bulgarian Academy of Sciences and the Monument of the Tsar Liberator, and continued with St. Alexander Nevsky Cathedral, Saint Sofia Church, National Archaeological Museum, the Largo, Romanian church

in Sofia, Holy Sunday Church, Saint George Rotonda and Ivan Vazov National Theater and finished at St. Kliment Ohridski Sofia University.

For more information please visit: www.scgisbg.org

GEO Business 2017

23 - 24 May 2017, Business Design Centre, London, UK

The geospatial event for everyone involved in the gathering, storing, processing and delivery of geospatial information. Launched in 2014, the annual geospatial show has grown year on year and is now firmly established as the must attend event in the industry.

Organised in collaboration with the Royal Institution of Chartered Surveyors (RICS), the Chartered Institution of Civil Engineering Surveyors (ICES), The Survey Association (TSA), the Association for Geographic Information (AGI) and the Institution of Civil Engineers (ICE).

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EARSeL eProceedings

New Publications in Vol. 15 (1), 2016

Unsupervised classification of satellite images using K-Harmonic Means Algorithm and Cluster Validity Index

Habib Mahi, Nezha Farhi, and Kaouther Labed

Abstract Read full paper online: http://www.eproceedings.org

In this paper, we are presenting a process, which is intended to detect the optimal number of clusters in multispectral remotely sensed images. The proposed process is based on the combination of both the K-Harmonic means and cluster validity index with an angle-based method. The experimental results conducted on both synthetic data sets and real data sets confirm the effectiveness of the proposed methodology. On the other hand, the comparison between the well-known K-means algorithm and the K-Harmonic means shows the superiority of the latter.

Volume 14, Special Issue 2, 2015: 9th EARSeL Imaging Spectroscopy Workshop, 2015

Evaluation of leaf area index and dry matter predictions for crop growth modelling and yield estimation based on field reflectance measurements

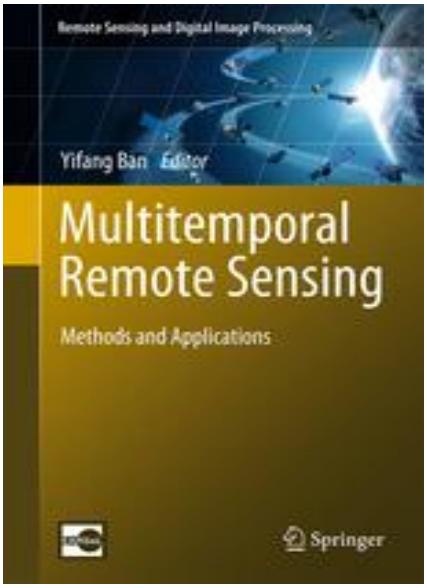
Heike Gerighausen, Holger Lilienthal, Thomas Jarmer, and Bastian Siegmann

Abstract Read full paper online: http://www.eproceedings.org

The Leaf area index (LAI) and above ground biomass dry matter (DM) are key variables for crop growth monitoring and yield estimation. High prediction accuracies of these parameters are a vital prerequisite for sophisticated yield projections. The aim of the study was to examine the predictive ability of partial least squares regression (PLSR) for LAI and DM retrieval from hyperspectral (EnMAP), superspectral (Sentinel-2), and multispectral (Landsat 8, RapidEye) remote sensing data based on field reflectance measurements. Data was acquired from several crop types (wheat, rye, barley, rape, potato, sugar beet) during field campaigns in three different regions of Germany between the years 2011 and 2014. The field reflectance measurements were resampled to match the different spectral resolutions. Continuous reflectance and resampled data were transformed using five spec-tral pre-processing techniques. Continuous data were used for comparison and served as best case scenario. The predictive ability of the PLSR models for LAI and DM was examined with respect to the spectral resolution and the pre-processing techniques. To verify whether the composition of the data set had an effect on prediction quality, the entire data set (global) was divided in sub data sets (local) with respect to the region of acquisition, the year of acquisition and the crop type. Statistical models of the local data sets were compared with those based on the global data set. Generally, models were assessed with two validation strategies.

R2 of the global PLSR models based on continuous field reflectance measurements and independent validation varied from 0.74 to 0.79 (LAI), and from 0.76 to 0.87 (DM). Root mean square error ranged between 0.70 and 0.74 m2 m-2, and between 1.64 and 2.56 t ha-1, respectively. There was no pre-processing method which consistently improved model performance. However, results pointed out that the technique should be chosen with respect to the sensor and the parameter of interest. Models based on hyperspectral information performed generally best. Prediction error increased with the superspectral sensor configuration by only 3% for LAI, and 16% for DM. Multispectral sensor configurations caused the prediction error to rise by up to 22% and 54%, respectively. A stratification into local data sets according to date of acquisition, sampling region and crop type partially increased the prediction performance. Cross-validation yielded higher prediction errors than independent validation in most cases.

Book Releases

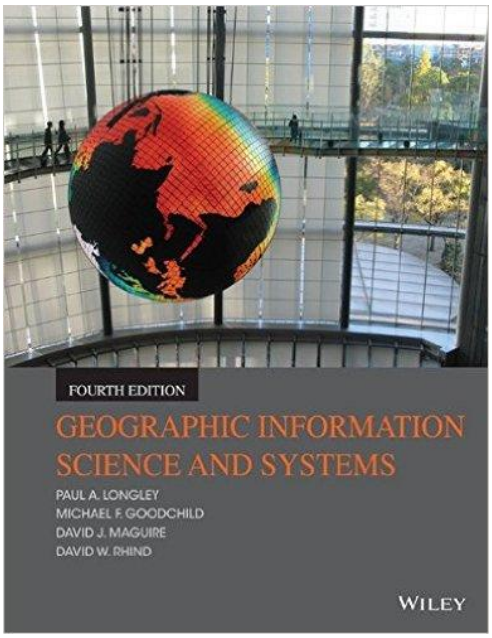


Multitemporal Remote Sensing, Methods and Applications edited by Ban, Yifang, belongs to the EARSeL book series: Remote Sensing and Digital Image Processing, published by Springer.

Written by world renowned scientists, this book provides an excellent overview of a wide array of methods and techniques for the processing and analysis of multitemporal remotely sensed images. These methods and techniques include change detection, multitemporal data fusion, coarse-resolution time series processing, and interferometric SAR multitemporal processing, among others. A broad range of multitemporal datasets are used in their methodology demonstrations and application examples, including multispectral, hyperspectral, SAR and passive microwave data.

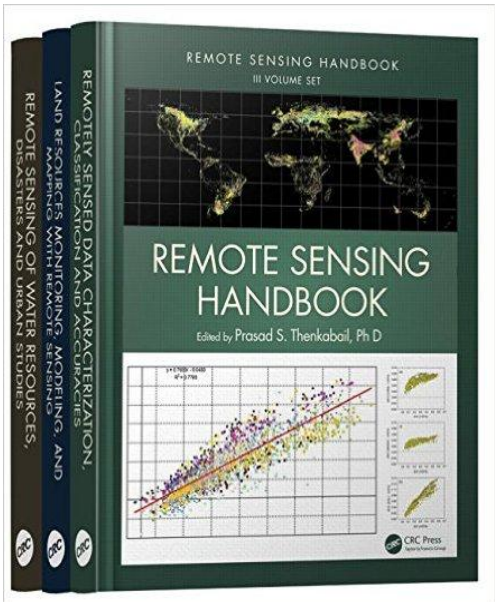
This book features a variety of application examples covering both land and aquatic environments. Land applications include urban, agriculture, habitat disturbance, vegetation dynamics, soil moisture, land surface albedo, land surface temperature, glacier and disaster recovery. Aquatic applications include monitoring water quality, water surface areas and water fluctuation in wetland areas, spatial distribution patterns and temporal fluctuation trends of global land surface water, as well as evaluation of water quality in several coastal and marine environments.

This book will help scientists, practitioners, students gain a greater understanding of how multitemporal remote sensing could be effectively used to monitor our changing planet at local, regional, and global scales.



Geographic Information Science and Systems by Paul A. Longley, Michael F. Goodchild, David J. Maguire and David W. Rhind is the 4th edition of the standard book of GIS, published by Wiley.

Effective use of today's vast geographic information (GI) resources requires more than just powerful technology for problem solving. It requires science to help us understand the way the world works, and to help us devise effective procedures for making decisions. Three previous editions have established this text as a defining multidisciplinary treatment of the scientific principles that underpin the use of geographic information technologies for problem solving. This extensively revised and updated edition provides a guide to the enduring scientific principles and information systems that support effective use of today's GI. It also provides a primer on essential methods for analysis of GI, and the ways in which effective management of GI informs policy and action.



Remote Sensing Handbook - Three Volume Set edited by Prasad S. Thenkabail is a three-volume Remote Sensing Handbook series, **Remote Sensing of Water Resources**, **Disasters**, and **Urban Studies** documents the scientific and methodological advances that have taken place during the last 50 years. The other two volumes in the series are Remotely Sensed Data Characterization, Classification, and Accuracies, and Land Resources Monitoring, Modeling, and Mapping with Remote Sensing.

In true handbook style, this volume demonstrates in-depth, extensive and comprehensive coverage of **Remote Sensing of Water Resources, Disasters,** and **Urban Studies**. The book provides fundamental as well as practical knowledge of remote sensing of myriad topics pertaining to water resources, disasters, and urban areas such as hydrology, water resources, water use, water productivity, floods, wetlands, snow and ice, nightlights, geomorphology, droughts and drylands, disasters, volcanoes, fire, and smart cities.

Highlights include:

- Hydrological studies, groundwater studies, flood studies, and crop water use and water productivity studies
- Wetland modeling, mapping, and characterization
- Snow and ice studies
- Drought and dryland monitoring and mapping methods
- Volcanoes, coal fires, and greenhouse gas emissions
- Urban remote sensing for disaster risk management
- Remote sensing for the design of smart cities

Considered **magnum opus** on the subject the three-volume **Remote Sensing Handbook** is edited by **Dr. Prasad S. Thenkabail**, an internationally acclaimed scientist in remote sensing, GIScience, and spatial sciences. The volume has contributions from pioneering remote sensing global experts on specific topics. The volume gives you a knowledge base on each of the above mentioned topics, a deep understanding the evolution remote sensing science, and familiarity with state-of-the-art of technology as well as a future vision for the field.

Forthcoming EARSeL Conferences

3rd EARSeL SIG Forestry Workshop

Organised by the University of Agriculture in Krakow, Faculty of Forestry, Institute of Forest Resources Management

15 – 16 September 2016, Krakow, Poland **More info**

Workshop topics:

- from 2D to 3D forest inventory and forest planning using digital Photogrammetry - image based stereomatching; LiDAR and Radar (ALS, TLS, MLS),
- forest change: 4D time detection of multi-temporal and multi-source information,
- forest mapping technologies using very high ground resolution and hyperspectral sensors,
- automation of data processing (e.g. GEOBIA, LiDAR point clouds classification),
- state-of-the-art remote sensing technologies: UAV-LiDAR and hyperspectral mapping, TLS, etc.,
- multi-source RS data integration,
- mapping of forest decline/degradation/disasters,
- modeling application on forest biomass,
- monitoring of protected forests, biodiversity, forest services.

Further information can be found at: http://sigforestry2016.eu/

11th EARSeL Forest Fire Special Interest Group Workshop

25 – 27 September 2017, Chania, Greece.

8th EARSeL Workshop on Remote Sensing of the Coastal Zone

31 August – 1 September 2017, Kaliningrad, Russian Federation.

3rd Student Workshop on Ecology and Optics of Coastal Zones

10 – 13 July 2017, Museum of the World Ocean, Kaliningrad, Russian Federation. **More info**

The 3rd Student Workshop on Ecology and Optics of Coastal Zones will be a 4-day education and training event with a focus on optical oceanography and remote sensing of coastal waters. It follows a workshop at the Museum of the World Ocean in 2016, and a first workshop at the White Sea, Republic of Karelia, in 2014.

The Workshop is intended for master and PhD students dealing with natural sciences and addresses the principles, methods and results of optical methods for measuring environmental parameters. It offers students the opportunity to meet international researchers and to gain first-hand experience in hydrography and coastal ecology, in environmental optics and remote sensing.

The relevance of oceans and coasts for the daily weather and for the regional climate will be outlined, and projections of the future climate based on the impact of global change on the oceans and coasts will be discussed. Students will have the opportunity to demonstrate their projects in oral or poster presentations.

Further information can be found at: http://www.earsel.org/SIG/ET/3rd-student-workshop

10th EARSeL Workshop on Imaging Spectroscopy

Organised by EARSeL, University of Zurich.

19 – 21 April 2017, Zurich, Switzerland. **More info**

EARSeL's Special Interest Group on Imaging Spectroscopy aims at encouraging interdisciplinary discussions among specialists working with innovative Earth Observation methods and technologies.

After almost 20 years, the 10th workshop goes back to its roots at the University of Zurich where the first meeting took place at the Remote Sensing Laboratories (RSL) in 1998.

For this anniversary, we welcome contributions related to any topic in spectroscopy!

Imaging spectroscopy is increasingly finding its way into transdisciplinary research aiming to integrate state-of-the-art methods and data analysis concepts in response to today's key environmental and societal challenges. Besides the discussion of advanced technologies for spectroscopy data processing and analysis, as well as next generation platforms and sensors, the workshop will particularly address integrated approaches in Earth System Science using spectroscopy across all spheres, including the anthroposphere.

Click here to download the workshop flyer.

Further information can be found at: http://www.earsel.org/SIG/IS/workshops/10-IS-Workshop/index.php

8th EARSeL Workshop on Remote Sensing of Land Ice & Snow.

7 – 9 February 2017, Bern, Switzerland. **More info**

Significant parts of IPCC AR5 report on the status of the cryosphere rely on publications, where satellite data are involved. The announced workshop will focus on the latest developments in remote sensing of land ice and snow. Presentations are encouraged on all fields of research and applications with the focus on snow and ice as proxy for changing cryosphere, methods for retrieving cryospheric parameters from various types of remote sensing data, theoretical basis of inversion methods and

their application, state of the art of retrieval algorithms, data assimilation of remote sensing data and in situ observations in process models, current and planned sensors for snow and ice, etc. Half of a day will be dedicated to the COST action ES1404 Harmosnow and future activities from ESA (CCI+).

Further information can be found at: http://www.earsel.org/SIG/Snow-Ice/workshop/call.php

Other Conferences

13-17 June, 2016: 6th INTERNATIONAL CONFERENCE ON CARTOGRAPHY & GIS & Seminar with EU cooperation on Early Warning and Disaster / Crisis Management
Albena Resort, Bulgaria

20-24 June, 2016: 36th EARSeL Symposium
Bonn, Germany

21-24 June, 2016: 9th NASA Direct Readout Conference
Valladolid, Spain

28-29 June, 2016: Small Unmanned Aerial Systems for Environmental Research
Worcester, United Kingdom

28 June - 07 July, 2016: 16th International Multidisciplinary Scientific GeoConference & EXPO SGEM2016
Albena Resort, Bulgaria

4-6 July, 2016: EORSA 2016 - The Fourth International Workshop on Earth Observation and Remote Sensing Applications
Guangzhou, China

12-19 July, 2016: XXIII ISPRS Congress and EARSeL: Imaging Spectroscopy in environmental analyses
Prague, Czech Republic

12-22 July, 2016: 2nd Student Workshop on Ecology and Optics of Coastal Zones
Kaliningrad, Russia

30 July - 7 August, 2016: 41st Scientific Assembly of the Committee on Space Research (COSPAR 2016)
Istanbul, Turkey

21-24 August, 2016: 8th Workshop on Hyperspectral Image and Signal Processing: Evolution in Remote Sensing (WHISPERS)
Los Angeles, United States

24-26 August, 2016: FOSS4G conference 2016
Bonn, Germany

14-16 August, 2016: 6th GEOBIA - Solutions & Synergies
Enschede, The Netherlands

15-16 September, 2016: 3rd EARSeL SIG Forestry Workshop.
Cracow, Poland

22-23 September, 2016 2nd Virtual Geoscience Conference
Bergen, Norway

22-23 September, 2016 GeoTirol 2016
Innsbruck, Austria

26-29 September, 2016: SPIE Remote Sensing 2016 in Edinburgh
Edinburgh, United Kingdom

29-30 September, 2016: EUROGEO 2016: Geographic Information: for a better world.
Malaga, Spain

20-23 March, 2017: 11th RSCy2017 - Fifth International Conference on Remote Sensing and Geoinformation of Environment. Paphos, Cyprus.

23-24 May, 2017: GEO Business 2017. London, United Kingdom.

4-9 June, 2017: Split Remote Sensing summer school 2017. Dubrovnik, Croatia.

5-8 September, 2017: RSPSoc Annual Conference 2017. London, United Kingdom. Organised by RPSoc

11-14 September, 2017: SPIE Europe's Remote Sensing Symposium. Warsaw, Poland.

18-22 September, 2017: 3rd Symposium of the Committee on Space Research (COSPAR): Small Satellites for Space Research. Jeju Island, Republic of Korea.

14-22 July 2018: 42nd Scientific Assembly of the Committee on Space Research (COSPAR) and Associated Events. Pasadena, CA, United States.

Back Cover – Members of RSRG and ZFL in front of the Department of Geography (July 2016), Courtesy of Bonn University.

Credits: University of Bonn

Source: University of Bonn, https://www.geographie.uni-bonn.de/forschung/arbeitsgruppe-menz

EARSeL Sponsoring Agencies:

Council of Europe European Space Agency

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