IEEE GEOSCIENCE and REMOTE SENSING Newsletter

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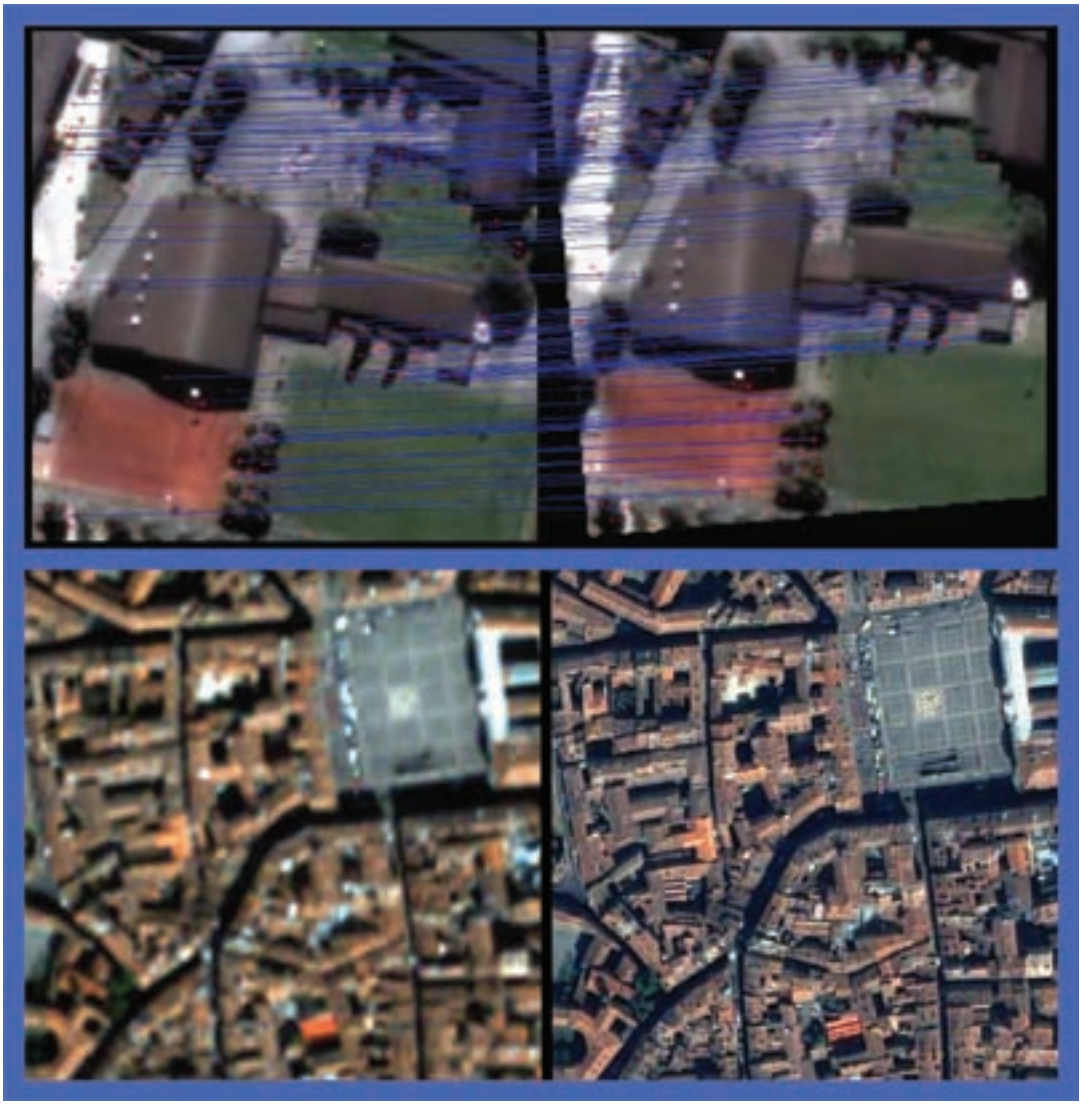

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To begin this issue, I would like mention that at the end of last year there were two changes to the editorial board of the Newsletter. First, I would like to recognize Prof. Yoshio Yamaguchi for his service to the Newsletter. Yoshio has been on the Editorial board for 6 years as of this issue and I would like to thank him for his service and contributions to the Newsletter these past years. Secondly, please welcome Prof. Akira Hirose of the University of Tokyo as the new Associate Editor for Asian Affairs. Prof Hirose's bio appears in the December 2008 Newsletter. Please also welcome Prof. Jocelyn Chanussot of the Grenoble Institute of Technology (Grenoble INP), as the Associate Editor for European Affairs for the Newsletter. Jocelyn is very active within the GRSS also joining the GRSS Administrative Committee this year. Prof. Chanussot's bio also appears in the December 2008 Newsletter. Congratulations!

In this Newsletter you will notice a new section included to provide the Private Sector Newsletter edited by Bill Gail of Microsoft Corporation. The e-version of the Private Sector Newsletter will continue to be distributed by Bill. We hope it will provide additional perspectives to this Newsletter as well.

The feature article for this issue is entitled "Open Source Remote Sensing: Increasing the Usability of Cutting-Edge Algorithms" authored by Emmanuel Cristophe of The Centre for Remote Imaging, Sensing and Processing (CRISP), National University of Singapore, and Jordi Inglada of CNES, Toulouse. The article addresses the issue of transitioning research algorithms into production software or 'operations.' The article suggests ways in which the algorithm developer or researcher can facilitate this transition using open source software tools.

An industrial profile featuring Atmospheric Environmental Research (AER) Inc. by Hilary Snell, Vice President of AER's Sensor Applications and Modeling Division appears on page 21. The article describes many of AER's capabilities from fundamental research to applications that aid decision making for a variety of Government customers.

(continued on page 4)

President's Report

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The 38 Societies that make up the IEEE family each have a five year review of their activities. There is also a separate review of Publications. Both reviews are based on written documentation prepared by the Society which is discussed at an open interview carried out by the Technical Activities Board of IEEE. In November 2008 our journals TGARS and GRSL and the Newsletter were formally reviewed. In February 2009, the Society Review took place.

I am very pleased to report that both reviews went extremely well. The Society was complimented both for the quality of its publications and for the standard and range of activities and services provided for members. As President I would like to thank the Administrative Committee and all society members who helped prepare the documentation and who participated in the interview process. Special mention must be made of our two retiring Editors, Jon Benediktsson (TGARS) and Bill Emery (GRSL). Thanks to Jon's leadership TGARS is now ranked no 2 in the world and thanks to Bill, GRSL is now number 4 in its journal class. I would also like to extend a welcome to Chris Ruf and Paolo Gamba our new TGARS and GRSL Editors respectively.

(continued on page 4)

Cover Information: Examples from our feature article on open source remote sensing. Top: matching between tie points extracted from two images after a deformation, Bottom: pan-sharpening processing obtains a high resolution multi-spectral image. See page 9.

(Editor's Comments continued from page 3)

The Newsletter also contains a report from the recent African Association of Remote Sensing of the Environment (AARSE) symposium held last October in Accra, Ghana. The symposium spanned 4 days and featured the signing of a memorandum between GRSS and AARSE to facilitate the common goals of each society. A photo of the signing appears on page 19.

Another feature of this Newsletter is the GRSS History Page. The chart on page 29 was developed by Dr. Kiyo Tomiyasu (Hon. Life Member) as the GRSS Historian. For those that have been involved with the society for several years, a casual peruse of this page will be difficult. I hope you will find that careful reading will provide a valuable perspective of the Society's nearly 30 year history by highlighting our leadership, IGARSS and major award winners.

Finally, it is with sadness that we include the obituary of Albert Guissard of the Université Catholique de Louvain (UCL), Belgium (page 8). Dr. Guissard was an active member of GRSS.

(President's Report continued from page 3)

GRSS continues to be one of the fastest growing societies within IEEE. Our membership grew by 12% over the past five years and at the end of 2008 had passed 3000. This is at a time when many of the other IEEE societies are losing membership.

Cape Town IGARSS'09 is shaping up to be an outstanding Conference. With its theme "Earth Observation: Origins to Applications", the meetings will be held 13–17 July next in South Africa. Over 2000 abstracts have been processed. This will lead to us having 12 concurrent sessions to choose from. As this is our first IGARSS on the African Continent, please plan to attend. If you think the distance is great from your location, remember the earth is not flat. Have a look on Google and you will discover just how close Cape Town is to North America and to Europe. I look forward to meeting you in July!

Regards,
Tony Milne
President

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GRS-S MEMBER HIGHLIGHTS

GRS-S MEMBERS ELEVATED TO THE GRADE OF IEEE FELLOW FOR 2009

Dr. Ian Cumming "for achievements in synthetic aperture radar signal processing"
Dr. Jaideva Goswami "for contributions to wavelet theory and development of electromagnetic sensors and data analysis methods"
Dr. Mahta Moghaddam "for contributions to forward and inverse scattering techniques for radar remote sensing"
Dr. Yisok Oh "for contributions to microwave remote sensing of soil moisture and surface roughness"
Dr. Helmut Rott "for contributions to microwave techniques for evaluating climate change"
Dr. Sebastiano Serpico "for contributions to pattern recognition for remote sensing image analysis"
Dr. Felix Yanovsky "for contributions to airborne radar for flight safety"
Dr. Simon Yueh "for contributions to polarimetric radar and radiometer remote sensing"

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IN MEMORIAM

Albert Guissard passed away on August 27, 2007, just 50 years after having obtained the degree of electrical engineer from Université Catholique de Louvain (UCL), Belgium. He obtained his Ph.D. degree in 1965. He started his career in 1961 as a young Professor at the *Lovanium University*, set up by UCL in Zaire (now Democratic Republic of Congo). He spent ten years there and acted as Dean in the Lovanium Polytechnical School. In 1972, he returned to UCL where he taught Circuit Theory, Electromagnetism, Electrical Measurements, Physics (Electricity and Waves), Electroacoustics, Antenna Theory, Propagation and Microwave Remote Sensing with a strong emphasis on practical laboratory and experimental work with students.

His research work dealt with non-linear circuit theory (subject of his Ph.D. thesis), basic problems in electromagnetism, antennas and microwave propagation through the atmosphere. Since 1978 he was engaged in microwave remote sensing. He was interested in the observation of the oceans and of the atmosphere with satellite radars, radiometers and SAR's, and with the inversion of remote sensing measurements for the estimation of surface and atmospheric parameters. He participated in several studies of the hydrodynamic and electromagnetic modeling of the ocean surface, on the development of efficient synergic inversion methods for combined payloads and on the evaluation of multipath effects in satellite maritime communications. At the end of his long career he also developed scattering models for vegetation and forests for the interpretation of polarimetric radar measurements. He wrote many scientific reports, and scientific papers in international journals and conferences, particularly in the field of wave propagation and remote sensing.

Albert Guissard was an early hour ecologist, very aware of our planet's environmental problems. On a global scale he was very conscious of environmental issues, and pollution of the atmosphere, ocean and land. On a more local scale he was very engaged to promote and defend nature, and in particular invested a lot of effort to act and promote walking paths in forests and in the country side near his village. Albert liked very much to hike through beautiful regions in the country side or mountains with his wife Lutgarde.

His colleagues, students and the international scientific community will miss Albert as a source of scientific and human inspiration.

Piotr Sobieski
Université Catholique de Louvain (UCL), Belgium

Maurizio Migliaccio
Università di Napoli Parthenope, Italy

FEATURE

Open Source Remote Sensing: Increasing the Usability of Cutting-Edge Algorithms

Emmanuel Christophe, *Member, IEEE* and Jordi Inglada, *Member, IEEE*

Abstract— **One common problem when working with satellite images is the gap between cutting edge algorithms available in the literature and methods which are available in production software. Constraints on production are often strong and do not cope well with research algorithms. To help a faster transfer of the new algorithms to real production situations a strong and robust software architecture is required. One of the main objectives of the Orfeo Toolbox (OTB) is to provide such a framework to help the scalability of newly implemented algorithms and relieving (at least partially) the researcher from such concerns. OTB is valuable for all people working in the remote sensing imagery community. Releasing it under an open source license, CNES (French Space Agency) hopes to benefit from contributions of many specialists to help grow the practical use of satellite imagery. The first feedback has been very positive and open source development seems to be particularly suitable to increase the usability of cutting-edge algorithms.**

I. INTRODUCTION

One common problem when working with satellite images is the gap between cutting edge algorithms available in the literature and methods which are used in production. Some of these new algorithms can require some fine tuning for which an in-depth understanding of the theory is necessary, some might not scale well when asked to process billions of pixel images, some would be too slow to enable interactivity, and some would try to guess (often wrongly) what the end user needs.

To bridge this gap, it is necessary to enable a shorter interaction between people creating improved algorithms and people using them. In other words, an easy access to these new algorithms must be given to end users in order to get feedback from them, so that the final result fits their needs.

Another problem is the complexity of the processes involved: it is not possible for a research team, not to mention a single individual, to be a specialist of all aspects of the satellite image preprocessing (calibration, localization, pan-sharpening) and information extraction (pattern recognition, image classification). Furthermore, all these steps of the processing chain may differ according to the type of data (optical, SAR data, Lidar).

In order to overcome these difficulties, CNES decided to develop an open source remote sensing image processing library, the Orfeo Toolbox [1], which capitalizes state of the art techniques as well as recent results published in the literature.

In the remainder of this paper we will address how OTB can be helpful for end-users and remote sensing scientists working with them (section II). We will also introduce the features of the library as well as how it can be used for building innovative processing techniques (section III). Finally, the underlying software framework will be presented (section IV).

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II. THE RIGHT ALGORITHM FOR THE END USER

Algorithms used for information extraction from remote sensing images in operational contexts are often not performing as well in terms of the resulting quality as the cutting-edge algorithms that are available in the labs. On the other hand, production software is often robust and does not need fine tuning of several parameters requiring an in depth knowledge of the underlying algorithms. It also performs fast enough to enable interaction with the expert.

To ensure compliance with operational requirements, it is important to bring the algorithms as early as possible to the end-user. Only the expert, whether it is in hydrology, forestry, oceanography, defense or disaster management can tell if the algorithm is doing what is required. On the opposite, only people with a deep experience in image processing can extract pertinent information with a good reliability using advanced methods.

In order to increase the interaction between end-users and researchers developing processing methods, OTB proposes some small applications. These applications make the use of these new algorithms easier and more user friendly. The feedback from users has been extremely positive.

Figure 1 shows a screen shot of an interactive object segmentation application which allows the non expert user to compare the performances of classical region growing approaches to recently developed algorithms.

Figure 2 shows a screen shot of an interactive classification application bringing Support Vector Machine methods to the end user.

Other applications are available for orthorectification, pan-sharpening, fine image registration, object counting, interactive change detection, for example.

III. THE BEST ALGORITHMS FOR THE RESEARCHER

Extracting information from remote sensing images relies on a complex process. The preprocessing required to generate the data is a heavy task that has a major impact on information extraction algorithms performance. Several steps such as orthorectification, radiometric corrections, etc. are necessary before providing an image with a physical meaning. Many

Fig. 1. Segmentation application: cloud segmentation on a Quickbird image

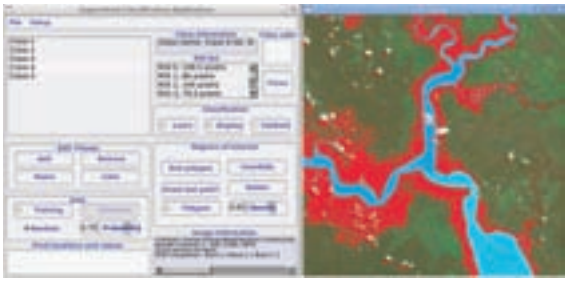


Fig. 2. Classification application: classification of mangroves on a SPOT 5 image

alternatives exist for each step of the processing. The optimal choice for each of these tasks is not necessarily the same depending on the final purpose. The idea of OTB is to provide the researcher with a wide range of choices for each of these tasks and give him control on the process as a whole. Of course, sometimes, it is not necessary to start from the lowest level of data.

The problem of data access is also a major one when one first dives into remote sensing. Not two different sensors use the same data format with the same meaning for the different parameters. There is also an increasing amount of data on the Internet, not limited to images, and the access and formats are not uniform. It is necessary to free up the researchers from these tasks to help them focus on their work.

Moreover, the strong underlying software framework makes it easier to share the latest algorithms with a wide community as soon as they are published. This approach, known as reproducible research, is a good way to increase the impact of the publications and build on each other's work [2].

A. Many components available

About 3000 C++ classes are already available in the current version of OTB for most of the usual operations on remote sensing images. All of these operations can be combined to lead to fully functional applications. This modularity also enables replacing easily one method by another one in the processing chain to evaluate its impact on performance. Such modules include:

- image access: optimized read/write access for almost any of the existing remote sensing image formats, meta-data access, visualization;
- geometric modeling: sensor models for optical and SAR sensors, digital elevation models (DEM) access, cartographic projections, image registration, disparity map estimation;
- filtering: blurring, denoising, enhancement;
- feature extraction: interest points, alignments, lines;
- image segmentation: region growing, fast marching, watershed, level sets;
- object extraction: road network extraction, template-based detection;
- classification: K-means, SVM, Markov random fields;
- change detection.

As we can see, the functionalities cover the whole range of image processing, from access to image format to applications like change detection and the list is steadily growing. A few examples are detailed and illustrated below.

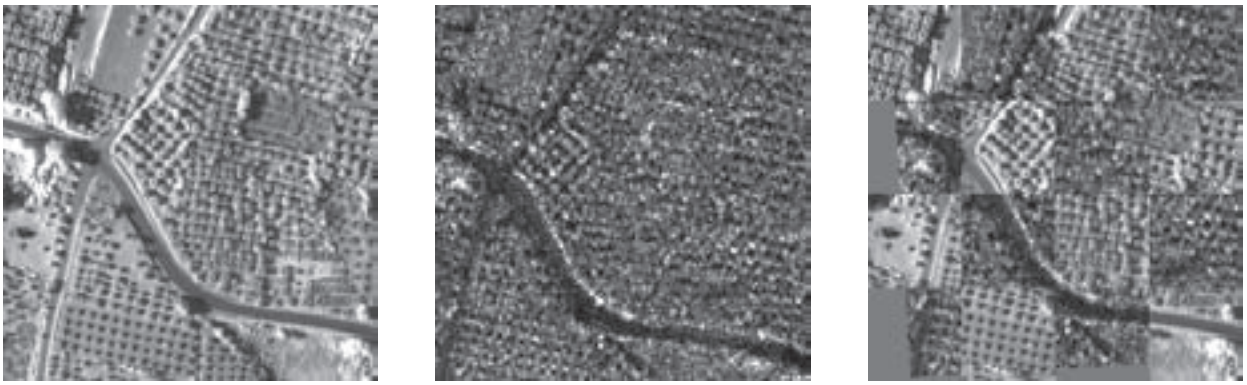
Segmentation is a basic task in image processing. On figure 3 an example is given for the fast marching algorithm starting from three different seeds directly on the luminance image.

Fig. 3. Segmentation example: from three different seeds. The fast marching algorithm generates three different areas.

It is increasingly common to have several data sets over the same area. Either to study temporal phenomena in multi-temporal image series or to jointly exploit information from multisensor datasets [3]. On figure 4, the registration between an optical and a radar image of the same area is illustrated. The deformation model is done by a centered affine transform which is able to introduce translation, rotation and scaling effects. The similarity metric cannot be a simple correlation due to the completely different acquisition processes between the two sensors: mutual information is used instead [4].

Often the registration is done by manually taking tie-points. This task can be automated using features like SIFT [5] or SURF [6]. Figure 5 illustrates the matching between tie points extracted from two images after a deformation.

Most current high resolution optical sensors (Spot 1 to 5, Quickbird, the coming Pleiades), have a high spatial resolution panchromatic band and a multispectral band with a lower resolution (typically by a factor of four). A pan-sharpening step is necessary to obtain an image with four spectral bands with the highest spatial resolution. Several pan-sharpening



(a) Optical image (b) Radar image (c) Registration checkerboard result

Fig. 4. Registration: the optical and the radar images represent the same area with a deformation. A six parameters transform is computed (translation, rotation, scaling) using the mutual information as a similarity measure.

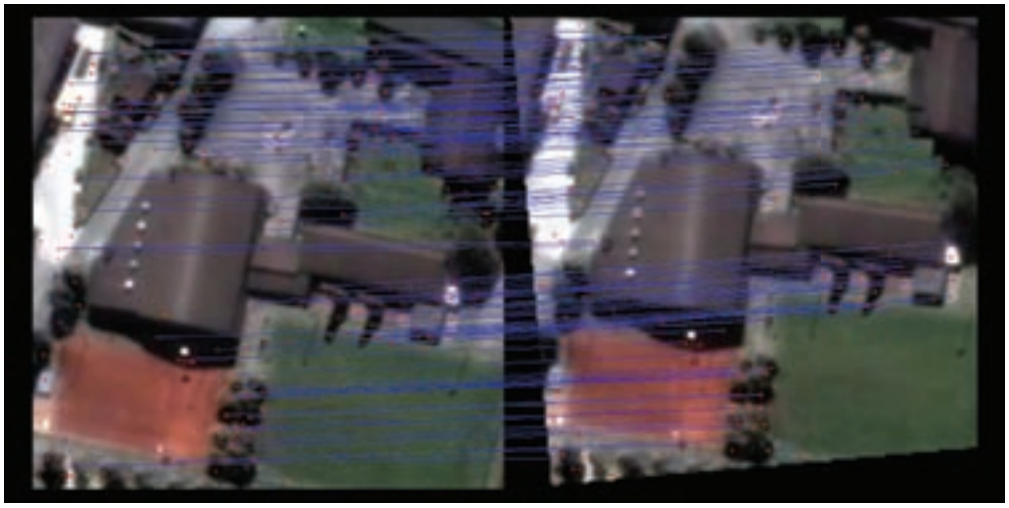


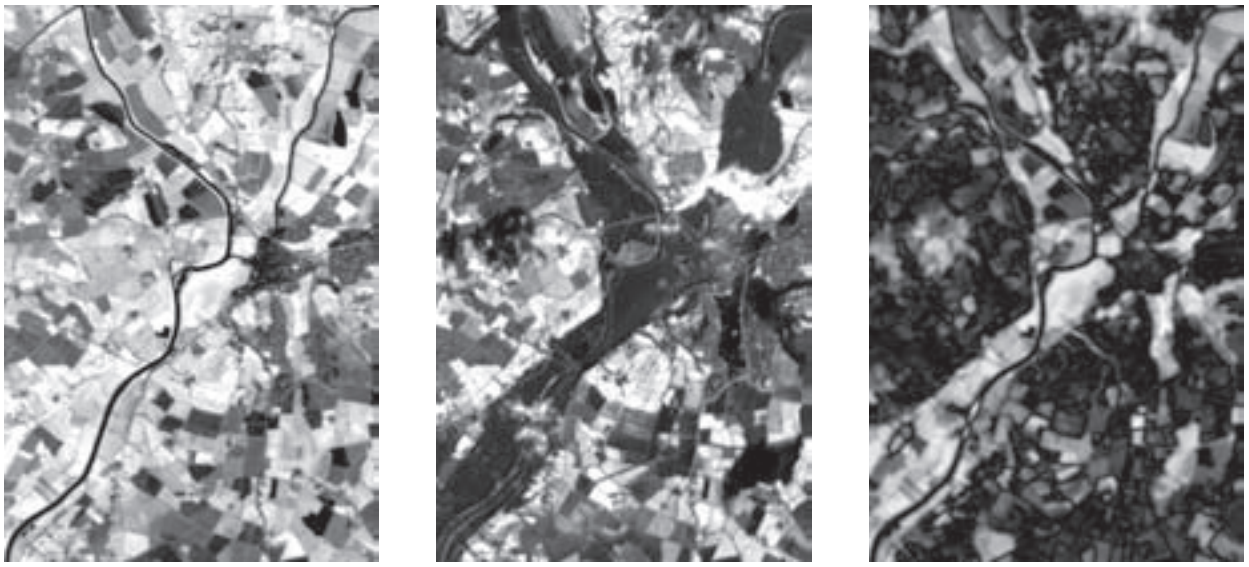
Fig. 5. Automatic tie-point extraction using SIFT: the red dots are the detected points; the blue lines link the pairs of points found by the matching algorithm.

(a) Panchro image (b) Multispectral image (c) Pan-sharpening

Fig. 6. Pan-sharpening example: high resolution of the panchromatic image is introduced in the multispectral image to obtain a multispectral high resolution image.

(a) Multispectral image (b) Regions of interest for learning (c) Classification result

Fig. 7. Support Vector Machine example: on a multispectral image, four areas of interest are defined. These areas are the base for the SVM learning step. Then all pixels are classified.



(a) Spot image before a flood (b) Spot image during a flood (c) Change detection

Fig. 8. Change detection example on two SPOT images (before and during a flood) in the South of England with a mean difference change detector.

methods are available in OTB. One example is illustrated in figure 6.

Image classification from examples is a very useful task. Support Vector Machines (SVM) can produce good classification models from a few examples [7]. On figure 7, an example of classification by SVM is illustrated. On the multispectral image, a few regions of interest are selected to train the SVM. Then the entire image is classified.

One common application of satellite images is the change detection between two images, either to detect the effects of natural disasters or to update vector databases [8]. Figure 8 presents the application on floods on the South of England using SPOT images. Many other change detectors have been implemented in the toolbox using statistical similarity measures, as for instance the one presented in [9].

Finally, direct objects or network extraction can also be developed. Figure 9 presents a real-time road extraction algorithm [10].

B. Using the best established libraries

When developing a complex library, thorough validation of the algorithms is always a very delicate part. To be able to provide well tested algorithms, OTB is based on numerous, carefully chosen, open-source libraries. For each domain, we select the library which has a broad base of users (the library is well tested) and which is compatible in terms of license requirements (open source). Access to these libraries is then integrated in the framework of OTB, giving a homogeneous interface for the OTB user: there is no need to learn the interface of each underlying library.

The core of the OTB system is coming from ITK [11] which has proven its efficiency for medical image processing. Most of the algorithms for segmentation and registration have been well tested in this context. For the Support Vector Machine (SVM), OTB includes the libSVM [12] library. The graph representation is done using the Boost library [13].

Sensor models, map projections and DEM handling capabilities are provided by OSSIM [14]. The sensor models are integrated as a special type of ITK transforms which enable

(a) Multispectral image

(b) Road network extraction

Fig. 9. Road extraction example combining radiometric and geometric features.

Libraries	Functions
ITK	Architecture, Segmentation Registration
libSVM	Support Vector Machines
Boost	Graph representation
OSSIM	Sensor models, DEM handling
6S	Radiometric corrections
Gdal	Image formats
dxflib	DXF format
OpenJPEG	JPEG 2000 format
libLAS	LIDAR data access
libSiftFast	SIFT implementation
Edison	Mean Shift clustering

TABLE I

OPEN SOURCE LIBRARIES USED IN OTB AND THEIR FUNCTIONS

an elegant structure for the orthorectification. Radiometric correction capabilities are provided by 6S [15]. 6S is originally a Fortran code that has been automatically translated in C to enable integration into OTB.

Most image formats are read through GDAL [16], enabling OTB to read and write numerous image formats. DXF files are handled by the dxflib library [17]. For the case of JPEG 2000, as options required by satellite images were not available in any JPEG 2000 implementation with compatible license, CNES participated in the development of OpenJPEG [18] to add these capabilities.

The implementation of the SIFT detector is complex and difficult to validate. The LibSiftFast [19] made the integration of SIFT in OTB straightforward. The Mean Shift filtering and clustering is a recently introduced technique which allows image pre-processing and segmentation yielding very interesting results [20]. The code implemented by the authors of the algorithm, called Edison [21] is available in OTB.

As we can see, many algorithms are available and well-tested in the open-source community. Therefore, they can be integrated into an existing project at marginal cost. When only a few options are missing in projects integrated in OTB, the project team usually welcomes contributions to add them.

IV. ALGORITHMS READY FOR PRODUCTION

Without using established methods for software development, it is hard to combine efficiently the work of several people. Sharing software is not easy: each computer, due to its hardware and software configurations, is more or less unique. Without proper planning, it can take a few days to migrate a program from one computer to another one.

A second issue is coming from the size of the data to process. When designing an algorithm, it is unpractical to run it on the full size image. However, after the algorithm has been proven to be working well on the small test data, one has to ensure that it will still perform properly with full-size data.

Finally, with the growing popularity of multi-core processors it becomes easy to double or quadruple the speed of a program, provided it was coded in the right way to enjoy this benefit. This is a very technical issue which involves much more than remote sensing expertise.

Here are some of the strengths of OTB which provide a rigorous framework to alleviate the hassle of such considerations.

A. Multiplatform

The library is multiplatform and works under different operating systems (Linux, Unix, Windows, or MacOS X) and different architectures (32 or 64 bits) to get rid of hardware constraints. The multiplatform aspect is also very important because it imposes to follow strict design and coding rules thus leading to a robust system less sensitive to particular platform specificities.

B. Large data processing

One frequent problem when going from the research algorithms to the real application is the difference in the data

size. A satellite image can reach billions of pixels often in several spectral bands. In this situation, it is unreasonable to load the whole image in the computer memory to process it. This is even truer for high resolution imagery based mapping applications, where, in order to cover the area of interest several satellite scenes are usually used.

Streaming techniques enable one to read, process and write the result progressively without having to load the entire image into memory. Most image processing operations work locally and are compatible with streaming. Streaming capabilities are included in OTB transparently for the user, thus enabling easy processing of huge images.

C. Efficient data processing

Since images are divided into separate streams and since most current processors have two, four, or even more, cores, it is tempting to use these capabilities to process data in parallel and to reduce computing time. This property is called multithreading. Once again, OTB automatically enables multithreading when it is possible. This is especially valuable for work on computer clusters where the combination of several processors helps to greatly reduce the total processing time. These operations and the balancing on the different computing units is transparent for the OTB user, thus removing most of the burden of multithreaded programming.

D. Validation

OTB is a complex system and needs to be validated both at a computer engineering level and at a functional level. Automation is the key factor for an efficient validation. Every atomic function has several tests to check the non regression and the validity of the results. All these tests are executed every night on 15 different platforms with different compilation options. Impact of modifications on one small part of the code is clearly visible on the whole library for the different compilers and compilation options.

A more difficult part, but critical for the OTB user is the validation of the proposed functions from an application point of view: not only make sure that a given function is doing something but make sure that it is doing it well. Basically, it is not because a program returns a good looking result that the program is correct. For this validation, in-depth knowledge of remote sensing is compulsory. That is why it is particularly important to start with existing and validated developments or to rely on experts for each domain. For example, an image processing specialist can't qualify a classification algorithm for forest types without relying on a forest specialist. This validation is done through the availability of user friendly applications.

V. PERSPECTIVES

For information extraction from remote sensing images the concepts used are often difficult to handle and many users rely on commercial products. However, to truly master the process, a hands on approach is unavoidable.

In this context, OTB allows the user to practice and experiment with real data and real tools and can be used in several situations:

- for end-users:
  - easy access to a wide range of well tested algorithms;
- for engineers:
  - efficient development of new remote sensing applications;
  - quick evaluation of the performance of a particular algorithm on a specific type of data;
- for researchers:
  - fast prototyping of new algorithms;
  - library of existing algorithms to compare the results with a new one;
  - easier to share a new algorithm to increase the impact of a publication;
- for professors: teaching of image processing;
- for students: benefit from many heavily-tested algorithms popular in the literature.

This is an ambitious goal and it can't be attained without a wide participation. The Orfeo Toolbox (OTB) tries to federate several initiatives borrowing a lot from existing projects and with the contributions of many researchers. The ORFEO Toolbox is valuable for all people working in the remote sensing imagery community. Releasing it as an open source software, CNES hopes to benefit from the contribution of many specialists to help grow the practical use of satellite imagery. The first feedback has been very positive and open source development seems to be particularly suitable to increase the usability of cutting-edge algorithms.

A special session will be held on *Open Source Initiatives for Remote Sensing* at IGARSS 2009 and will be particularly focussed on OTB. Join us in Cape Town to meet OTB users and contributors.

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Emmanuel Christophe received both his Engineering degree in Telecommunications (ENST Bretagne) and DEA (University of Rennes 1) in Telecommunications and image processing with honors in 2003. In October 2006, he received the PhD degree from Supaero and University of Toulouse in hyperspectral image compression and image quality for his work in TeSA in cooperation with Centre National d'Etudes Spatiales (CNES), Office National d'Etudes et de Recherches Aérospatiales (ONERA) and Alcatel Space. He has been a visiting scholar in 2006 at Rensselaer Polytechnic Institute, Troy, NY, USA. From 2006 to 2008, he was a research engineer at CNES, the French Space Agency, focusing on information extraction for high resolution optical images. Since that time, he is also deeply involved in the development of the open-source Orfeo Toolbox. In October 2008, he moved to Singapore at CRISP, National University of Singapore, where he now is tackling new challenges for remote sensing in tropical areas. His research interests include image and video compression, as well as image processing and computer vision for remote sensing.

Jordi Inglada received the Telecommunications engineer degree in 1997 from both Universitat Politècnica de Catalunya and École Nationale Supérieure des Télécommunications de Bretagne and the PhD degree in Signal Processing and Telecommunications in 2000 from Université de Rennes 1. He has been since working at Centre National d'Études Spatiales, CNES, the French Space Agency, in Toulouse, France, in the field of remote sensing image processing. He is in charge of the development of image processing algorithms for the operational exploitation of Earth Observation images, mainly in the fields of image registration, change detection and object recognition. He is responsible for the Orfeo Toolbox project at CNES.

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REPORTS

THE 7th AARSE CONFERENCE, ACCRA, GHANA

Summary Report by Tsehaie Woldai

The 7th biennial conference of the African Association of Remote Sensing of the Environment (AARSE) took place in Accra, Ghana from October 27 to October 30, 2008 and was hosted by the Centre for Remote Sensing & Geographic Information Services (CERSGIS), University of Ghana, Legon, Accra, Ghana. The main theme of the conference was "Application of Earth Observation and Geoinformation for Governance in Africa" and was held at the Accra Conference Center.

The conference featured:

- over 300 presentations and 40 posters, 10 keynote addresses in four Plenary Sessions, 31 technical sessions representing eight (8) sub-themes on various aspects of Geoinformation Sciences and Earth Observation, two poster sessions and a GEOSS workshop on: "*Water Security and Governance in Africa*" (*see above*). In addition to these, eight special sessions were conducted on: "TIGER Project" by the European Space Agency (ESA), "Global Dialogue on Emerging Science and Technology (GDEST)" by US-Department of State, "African Reference Framework (AfREF)" by UN Economic Commission for Africa (UN-ECA), "Un-SPIDER" by UNOOSA, University Network for Disaster Risk Reduction in Africa (UNEDRA)" by the International Institute for Geoinformation Science and Earth Observation (ITC), The Netherlands, "ESRI USER and application" by SAMBUS, Ghana, GeoEye and ERDAS. A half-day Youth Forum on "space science and applications" was organized by ISPRS and CERSGIS involving more than 100 Ghanaian university and high school students. Consecutively, four meetings (AARSE Council, AARSE General Assembly, EIS Africa, UNEDRA), three round tables and many business meetings were conducted.
- A full GEONETCast reception facility was installed (the antenna was provided by the Ghana Meteorological

Partial view of one of the AARSE session in progress

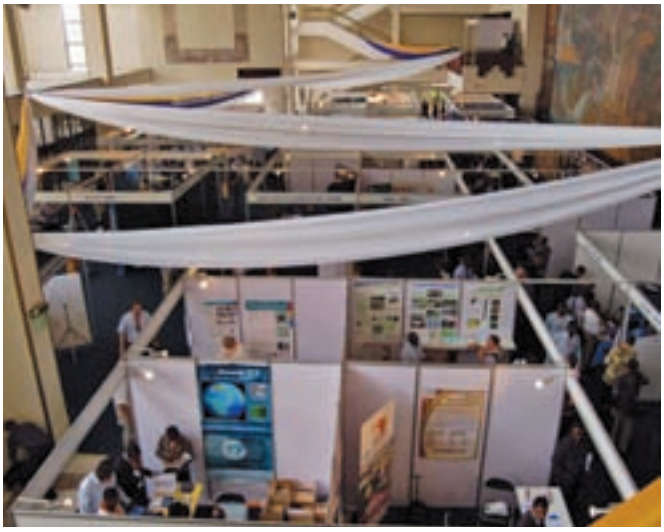
Organization and the other necessary components were provided through EUMETSAT).

The 7th AARSE Conference was attended by five hundred and forty (540) registered participants from forty (40) countries including over 30 exhibition stands emanating from national and international organizations in Africa, Asia, Europe, Middle East, North America and Russia. The conference was opened by His Excellency Dr. Alhaji Alieu Mahama, the Vice President of Ghana who was introduced to the Conference participants by Mr. Alhaji Ahmed Yirimea Awudu, the Honorable Deputy Minister, Minister of Local Government, Rural Development & Environment. In his keynote address, the guest of honor commended the conference for its facilitating role in increasing awareness of the benefits of geo-information for good governance. He said that it was essential to develop innovative ways to bridge the geospatial science – policy gap in Africa and devising strategies for effectively educating and sensitizing African Policy makers on the role of geospatial technologies in the management of sector-wide plans and programs. He concluded by suggesting that many important questions should be asked regarding 1) the extent to which geoinformation tools were being used by African policy makers to a: plan and manage natural resources in their respective countries; and b: monitor land cover and land use change, climate change, deforestation, and desertification; 2) what efforts were being made to strengthen the human and institutional capacities of African geoinformation scientists, researchers and practitioners to build decision-support databases for use by planners and policy makers to understand the usefulness of geo-information tools and space-based technologies for disaster and emergency management as well as marine surveillance and pollution control? The Vice-President expressed his hope that these issues would be addressed if African countries were to move forward as developing nations towards the achievements of the Millennium Development Goals, especially Goal 7 on environmental sustainability.

Before the Vice President's speech, both the Chairman of the Local Organizing Committee, Mr. Foster Mensah, and the President of AARSE, Dr. Tsehaie Woldai welcomed participants to the conference. The AARSE President pointed out the importance of natural resources in Africa as the most important potential source of wealth in a continent that is paradoxically the richest in the endowments of natural resources but poorest in development. He suggested that the geoinformation specialists attending the conference had a responsibility to innovatively influence policy to change this situation.

Immediately after the welcoming address of the AARSE President, congratulatory messages followed from the 1st Vice-President (and Past President) of the ISPRS, Prof. Ian Dowman, and the President of IEEE-GRSS, Prof. Tony Milne. This was then followed by Dr. Giovanni Rum, on behalf of GEO Director Dr. Jose Achache on: "Global Earth Observation System of Systems (GEOSS) Build-up in Africa" and the award ceremony.

The organization and logistic part of the conference was very good. The LOC had devoted a great deal of thought, time and energy in its planning, not only in deciding on the excellent facilities, the technical program and the scientific exhibit, but also in the social activities. In spite of the long daily duration of the sessions (up to 6:30 PM sometimes), the attendance was reasonable and constant till the end with oral presentations short and focused, and discussions afterwards lively. The technical programs were accompanied by visits to various exhibition stands. The social events (e.g., Conference reception, AARSE Gall Dinner, ITC alumni party, etc.), allowed a better social interaction and fruitful discussions.



A portion of the exhibition hall.

Opening of the Conference exhibition by the Vice President of Ghana.

Workshop on GEOSS Interoperability and Application to Water Security & Governance (24–26 October 2008), Accra, Ghana

This three-day AARSE2008 pre-conference workshop focused on human capacity building for the Global Earth Observation System of Systems (GEOSS) and provided the latest update on the implementation of the GEOSS information infrastructure. Special attention was on how to develop operational end-user applications and actively work with end-users for informed decision making for Water Security and Governance. The GEOSS workshop was organised by AARSE, ICEO, IEEE-GRSS, INPE (Brazil), ISPRS, ITC, OGC, 52N, and the University of Johannesburg, South Africa.

The workshop was opened by Dr. Tsehaie Woldai who introduced Her Excellency Mrs. Cecilia Dapaah (MP), the Hon. Minister of Water Resources, Works and Housing. In her opening address to the GEOSS workshop, the Minister commended the organizers for choosing the highly relevant theme of water. The need to develop strategies for an effective Earth Observation based assessment and monitoring system for the sustainable and integrated management of water resources in Africa, taking into account in-continent applied research capacity, could not be overemphasized. An effective strategy for the development and sustainability of human resources, infrastructure and institutional capacity within Africa would need to be drawn up. Ghana has taken significant steps towards integrated water resource management (IWRM) with the creation of the Water Resources Commission (WRC) in 1996 in which all main stakeholder groups and sectors involved in water resources are represented. The Minister expressed her hope that the efforts made by GEO and its partners be sustained in a way that will make African professionals and policy makers self-sufficient and proficient in the use of geo-based technologies and products for the effective management of the most valuable, but also very vulnerable resource: water.

Over 60 people from various parts of Africa attended the workshop. The participants were well balanced (in terms of countries they represented), of high caliber (who knew their profession well), highly motivated and engaging.

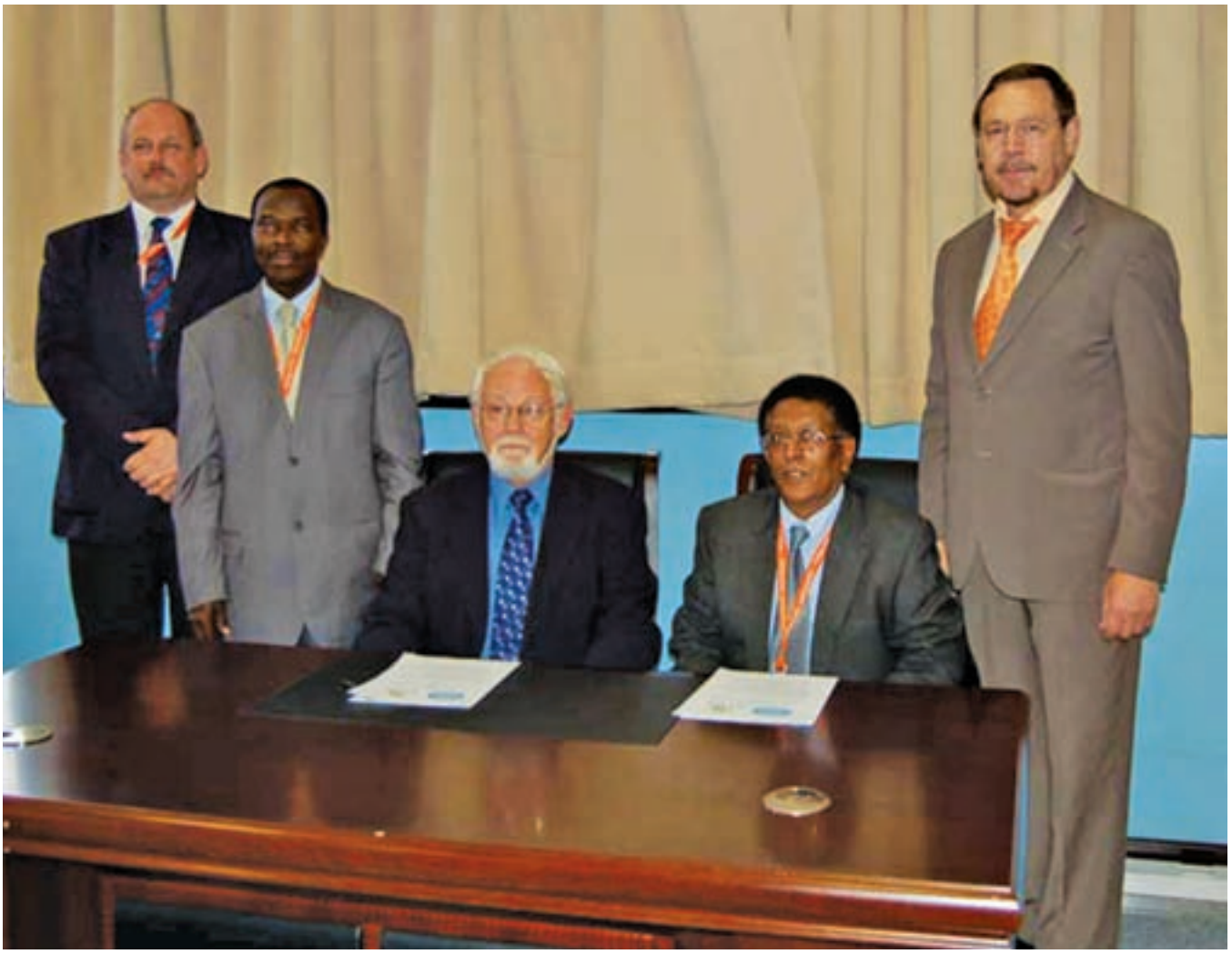
Accra Workshop Participants take a picture break.

Memorandum of Understanding Signed by IEEE-GRSS and AARSE

During the 7th African Association of Remote Sensing of the Environment (AARSE) Conference (27-30 October 2008) in Accra, Ghana, the IEEE-GRSS President, Prof. Tony Milne and the AARSE President, Dr. Tsehaie Woldai signed a Memorandum of Understanding which would enable the two organizations to cooperate in developments and applications of geoscience and remote sensing. IEEE-GRSS and AARSE agreed that:

- The two Societies will use their best endeavors through cooperation and, where appropriate, joint ventures, to promote the science and applications of geoscience and remote sensing for the betterment of mankind.
- Each Society will encourage collaboration between relevant IEEE-GRSS Technical Committees and relevant AARSE Committees.
- Each Society will endeavor to organize joint technical sessions in conjunction with events of the other; will insert a link of the other on its home page and provide a complimentary literature display area at relevant events for the other Society.

The signing ceremony was witnessed by members of IEEE-GRSS and the Executive Council of AARSE. As a sign of gesture IEEE-GRSS provided AARSE 100 free GRSS affiliate memberships for 2009.



Signing ceremony of the MOU between AARSE and IEEE-GRSS. L-R Prof. Sias Mostert (AARSE Vice President for Southern Africa), Dr. Jide Kufoniyi (AARSE Secretary General), Prof. Tony Milne (President IEEE-GRSS), Dr. Tsehaie Woldai (AARSE President) and Prof. Harold Annegarn (Treasurer of AARSE)

Prof. Ian Dowman Receives AARSE Merit Award

Prof. Ian Dowman, Vice-President of the International Society of Photogrammetry & Remote Sensing (ISPRS) received the AARSE Merit Award 2008 during the 7th AARSE Conference in Ghana for his long-standing engagement and unflinching support to the aims and ideals of AARSE, from the Honorable Vice-President of Ghana, His Excellency Dr. Alhaji Alieu. The AARSE Merit Award is bestowed to a person who has contributed significantly to the development, organization or professional activities of remote sensing in Africa. Nominations for the awards were made by African national organizations and individuals. These nominations were subsequently approved by the Executive Council of AARSE after going through a number of deliberations as required by the constitution. The award consists of a certificate and a plaque and is given once every 2 years.

Prof. Ian Dowman, ISPRS Vice President receiving the AARSE Merit Award from His Excellency Dr. Alhaji Alieu Mahama, The honorable Vice President of Ghana.

CALL FOR NOMINATIONS FOR THE GRS-S ADMINISTRATIVE COMMITTEE

The Nominations Committee calls upon our membership to nominate members to serve on the GRSS Administrative Committee (AdCom). A nominating petition carrying a minimum of 2% of the names of eligible Society members (~50), excluding students, shall automatically place that nominee on the slate. Such nominations must be made by May 25, 2009. The Nominations Committee may choose to include a name on the slate regardless of the number of names generated by the nominating petition process. Prior to submission of a nomination petition, the petitioner shall have determined that the nominee named in the petition is willing to serve if elected; and evidence of such willingness to serve shall be submitted with the petition. Candidates must be current members of the IEEE and the GRSS.

Petition signatures can be submitted electronically through the Society website, or by signing and mailing a paper petition. The name of each member signing the paper petition shall be clearly printed or typed. For identification purposes of signatures on paper petitions, membership numbers or addresses as listed in the official IEEE membership records shall be included. Only signatures submitted electronically through the Society website or original signatures on paper petitions shall be accepted.

A brief biography of the nominee, similar to that used for TGARS authors, but not to exceed one page, will be required and should be submitted with the nominating petition by May 25, 2009 to the GRSS Nominations Committee, c/o Dr. David G. Goodenough, IEEE GRSS Nominations Chair, Pacific Forestry Centre, 506 Burnside Road West, Victoria, BC, V8Z 1M5, Canada. E-mail: dgoodeno@nrcan.gc.ca.

The slate derived by the Nominations Committee shall be presented to the Society membership at large via mail ballot, and the three candidates receiving the greatest number of votes shall be elected. The Administrative Committee shall hold an Annual Meeting in November, 2009 after results of this vote are known, at which time elections will be held to fill the remaining three regular vacancies in the Administrative Committee, with all successful candidates to start on January 1, 2010.

Our AdCom consists of 18 elected persons, each of whom serves for three years. Their terms are overlapping to ensure continuity. Additional information on the society and the AdCom is available at http:// www.grss-ieee.org/. We thank all candidates for their willingness to serve and support the IEEE Geoscience and Remote Sensing Society.

INDUSTRIAL PROFILE

ATMOSPHERIC AND ENVIRONMENTAL RESEARCH, INC.

Hilary E. Snell
Vice President, Sensor Applications and Modeling Division

Introduction

Founded in 1977, Atmospheric and Environmental Research, Inc. (AER) is a unique company that is internationally known for cutting-edge research in all areas of atmospheric and environmental research. AER scientists combine basic research and development with practical solutions to specific applications. Beginning with basic skill sets in radiative transfer theory, environmental data processing and analysis systems, ensemble-based numerical modeling of the atmosphere and oceans, and end-to-end sensor system performance assessment, AER supports the interests of commercial clients and government agencies, serving operational civilian and defense needs as well as diverse commercial interests in weather-sensitive business activities. These basic skills are complemented by capabilities in software engineering and system implementation which blend environmental sensing and monitoring technologies with data processing software and hardware. The result is a unique and encompassing ensemble of synergistic products and services that provide information and industry expertise in the form of solid, basic science solutions as well as tailored information to help organizations measure, manage and reduce risk.

Overview

AER was established to provide advanced simulations to NASA in the area of atmospheric chemistry in the context of the ozone depletion problem. As the company evolved, complementary research areas were added to expand the fidelity and breadth of research. Consequently, the emphasis grew from pure research to include application of the atmospheric sciences for developing information technology products and services for customers in government and business. Today our company capabilities include state-of-the-art algorithms for remote sensing of geophysical parameters, integration of remotely sensed data into information production systems, engineering systems for characterizing space weather, atmospheric radiation, mesoscale modeling and data assimilation, assessment and modeling of air quality and atmospheric chemistry on local and regional scales, and numerical oceanography. AER scientists and engineers support a vast array of environmental research programs. We are able to provide a full range of services beginning with environmental data and observations and culminating in decision aides that provide information to a wide range of government and commercial customers (Figure 1). This diversity provides the ability to propose, develop, test and integrate end-to-end systems which mitigate adverse environmental effects in a robust, cost-effective fashion, grounded in tools and techniques embraced by the broader scientific community.

By actively participating in the broad scientific community, AER scientists are able to provide a wide range of scientific services with an understanding of currently acceptable paradigms, well-grounded in fundamental science. More than two thirds of AER's staff of over 100 hold advanced degrees. Their contributions to the atmospheric, oceanographic, and environmental sciences are reflected in an impressive list of publications in leading scientific journals. AER's emphasis on quality science and products is exemplified by the achievement of ISO 9001 certification. To achieve this certification we have implemented a set of requirements, standards, guidelines and

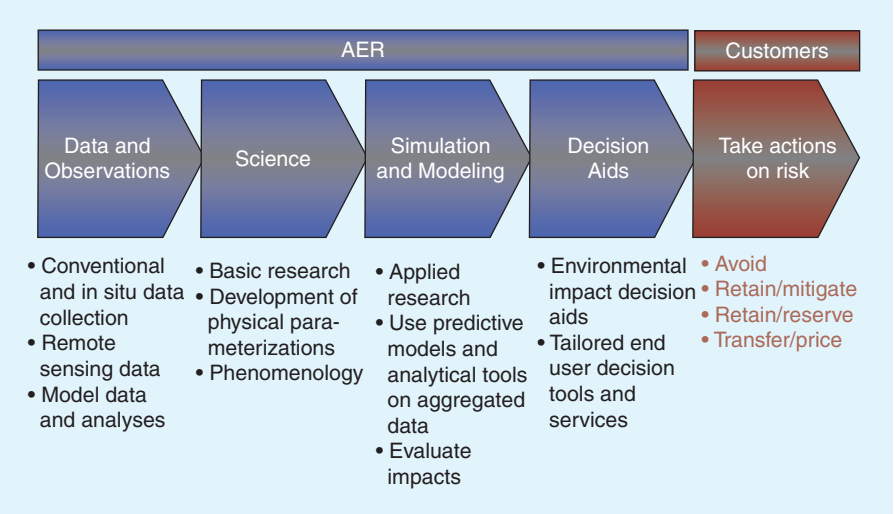


Figure 1. AER's services ranging from data collection to decision aids to reduce risk.

templates to standardize software development at AER and are moving forward toward the more stringent CMMI certification for our larger software development programs.

Company Capabilities

AER is organized into divisions to reflect focus areas within the broader scope of company objectives. By necessity there is considerable cross-division leveraging of resources and expertise. Overall, AER's government customers include fundamental research and development organizations such as universities and the National Science Foundation, applied research organizations such as the Environmental Protection Agency, the Department of Energy and NASA, and the operational community represented by civilian environment programs (e.g., NOAA) and the Department of Defense. In addition, we support a variety of international organizations in the commercial and government sectors. Through our commercial products and services division, some of the research and operational products developed at AER have been transitioned more directly into the commercial market represented by financial institutions, trading firms and insurance/risk-management companies.

The overall breadth of AER encompasses a range of scientific disciplines from oceanography through land and atmospheric processes and out into space. One longstanding area of expertise focuses on state-of-the-art techniques for remote sensing of environmental data and the development of integrated remote sensing systems for national government and commercial programs. AER scientists are active participants in major national and international satellite missions (Table 1). This includes both traditional remote sensing missions aimed at the measurement of land, ocean and atmospheric properties, as well as future missions geared toward measuring and better understanding global environmental and climate change. We create science-based software used to convert the raw data from earth-orbiting satellite sensor payloads to useful environmental information. Applications include meteorological nowcasting and forecasting, support for military operations, oceanography, land use, and mission planning. But the truly unique discriminator of AER is the in-house capability to provide modeling and simulation expertise as both the developer and end-user of technology. Our remote sensing value-added technology includes "across the spectrum" applicability, including radiative transfer models, environmental data sets, and software development tools and testbeds. These resources provide accurate and consistent physics-based approaches uniformly across the realm of extant remote sensing sensor hardware technologies: visible, infrared, millimeter wave, and microwave. By using our ensemble of scientifically well-established radiative transfer and other computer simulation models, AER scientists can calculate what a satellite sensor will measure before it is actually built and launched. Turning the problem around (the so-called "inverse problem"), by developing environmental data parameter retrieval algorithms, we can also assess the *a priori* performance of a satellite sensor at measuring desired environmental data parameters. Our software design and development process allow for these same retrieval algorithms to be used operationally after a system is launched to convert the sensor data stream of remotely sensed measurements into value-added environmental data products, which are provided to a customer. This end-to-end sensor system capability has been successfully applied to the detection of trace gases by *in situ* sensors and assessment of environmental impacts on weapons and communications systems using passive and active sources. In addition, AER scientists use and develop the numerical models designed to ingest remote sensing data, thus providing a resource for system developers to understand user requirements during the sensor design and mission formulation phase.

Table 1. AER's participation in major national and international satellite missions.

Current		Future
United States	**International**	
AIRS (NASA)	IASI (Eumetsat)	NPOESS (NOAA/ DoD/NASA
TES (NASA)	GOSAT (JAXA/NIES)	GOES-R (NOAA)
MODIS (NASA)	JASON-2 (Eumetsat)	MTG (Eumetsat)

The remote sensing of cloud properties is a longstanding area of expertise, including the lead developer for the Cloud Depiction and Forecast System—Version II (CDFS-II) at the Air Force Weather Agency (AFWA). The program provided new science algorithms and operational infrastructure to analyze combined global-coverage data from the Defense Meteorological Satellite Program (DMSP), the civilian Polar Operational Environmental Satellite (POES) program, and the international constellation of geostationary environmental satellites operated by the United States, Europe, and Japan. AER is the developer of the CDFS-II science algorithms and leads the Science IPT. Within the Cloud Remote Sensing group we maintain a robust research program revolving around the use of remote observations to measure and characterize specific cloud properties. An example of this research is the use of satellite data to distinguish aircraft contrails from natural cirrus clouds (Figure 2). This work has applications in a variety of areas including understanding the role of anthropogenic clouds in the global radiation energy balance.

Knowing the weather forecast is one thing, but knowing the specific effects it will have on mission critical sensor systems is another. AER scientists develop tools that use advanced physical modeling of the environment to predict the

consequences of weather on operations that utilize both imaging and non-line of sight acoustic sensor systems. We make extensive use of multi-spectral satellite imagery and GIS/image processing for state-of-the-art description of near surface conditions. We also develop and support tools for large scale modeling and simulation. These tools couple computationally fast weather and sensor performance calculations with connectivity to extensively indexed historical global weather archives. These tools eliminate much of the 'handwork' required to provide weather to modeling and simulation (M & S) users and allow realistic physical modeling calculations in high volume applications. These tools are used in both live combat operations as well as modeling and simulation activities.

AER's Space Weather and Effects Division has been modeling and generating data products alongside scientists at the Air Force's primary research center, AFRL, for decades. Over the years, our staff has contributed to the development and maintenance of state-of-the-art environmental models to provide space weather specification and prediction. Our scientists have contributed to the advancement of atmospheric density and composition models; thermosphere/ionosphere interaction; and solar/magnetosphere coupling for use in the next generation space weather specification. Our knowledge of near-Earth phenomenology and its impact on civilian and defense system provides the necessary information for space operations.

Through our involvement in key programs such as the Communications/Navigation Outage Forecasting System (C/NOFS), Scintillation Network Decision Aid (SCINDA), Operation Space Environment Display (OpSEND), and Modified Atmospheric Density Model (MADM), AER scientists have been involved in leading edge advances in these growing fields. Our development of the AFRL C/NOFS Data Center has provided a design and operational implementation for data processing and modeling in support of the next generation military utility decision aid. Our scientists and engineers have contributed to the development of the ground station software, data processing, and modeling to provide an environmental effects fusion system for impact product generation.

Our focus in physical oceanography is on the analysis and interpretation of satellite and *in situ* datasets and the use of models and data assimilation methods to study the oceans. The combined interests of our staff span a variety of research areas, from the low frequency variability of the large-scale circulation and sea level, to high frequency atmospherically-forced dynamics, to frontal instabilities and mesoscale modeling. We also cherish an integrated view of the planet with the ocean as a key player. Some of our research topics with broader geophysical interest include the role of the oceans in inducing changes in the Earth's rotation, gravity field, and climate.

We have worked extensively on modeling and interpreting sea-level and ocean bottom pressure variability at periods from

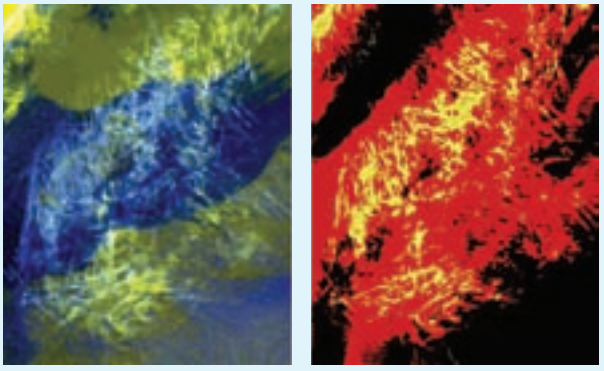


Figure 2. Automated contrail masks using retrieved particle size and shape.

days to decades as determined by satellite altimetry and gravity missions and by *in situ* measurements. These efforts have involved active participation on NASA/CNES altimeter teams for many years and more recently on the GRACE Science Team. We have considerable expertise in other important ocean datasets, including atmospheric forcing fields such as wind stress and pressure and other remotely-sensed surface oceanic variables. Our modeling capabilities include the use of state-of-the-art as well as simpler (single layer) general circulation models in global or regional configurations. We are currently partnering with MIT, GFDL, and JPL on efforts to implement quasi-operational, ocean state estimation systems as part of the Global Ocean Data Assimilation Experiment (GODAE).

In addition to groups focusing on basic research and development and applied systems for government customers, AER maintains the Commercial Division to transition typical research projects into the commercial marketplace. Research results and latent technologies are reviewed and, via internal research and product development efforts, are transformed into stand-alone products suitable for sale to a broad range of customers. This research to operations mechanism has allowed AER to develop a complete suite of forecast tools from nowcasting, medium range forecasting, and seasonal forecasting to long-range climate studies (Figure 3). This suite of weather forecast products not only provides weather risk information to leading companies in the financial marketplace, but can also be used for weather-related research studies and aircraft flight planning for scientific field campaigns.

AER's statistical approach to long range weather forecasting has been used operationally by the energy and financial markets in the U.S. and Europe since 1999. Today reports are issued for the U.S., Western Europe, the Far East and the Russian Federation, thus providing forecast coverage over the entire Northern Hemisphere. This suite of scientifically

nCast	Local 0–72 hour Weather Forecast Software	A local weather forecast software package based on the most widely used mesoscale models, this product is easily tailored to suit your specific weather needs.
eCast	15–day Ensemble Forecast Tool	A tool delivers the power of over 7,000 weather forecast per city per day to your desktop. Clear, concise information in a web-based format with easy-to-understand tables, plots and charts.
mCast	1–3 Month Long Range Forecasts	Long range forecast products that incorporate proprietary modeling techniques to deliver concise temperature, heating and cooling degree-day, and precipitation data.
sCast	Seasonal Forecast	Verifiably accurate seasonal forecasts that incorporate proprietary modeling techniques for the best results in the industry today.
hCast-SR	Short Range Hurricane Forecasting and Tracking Service	Statistical interpretation of forecast hurricane risk based on an ensemble of leading hurricane prediction models from tropical storms through hurricane landfall.
hCast-LR	Long Range Hurricane Consulting	Assessment of leading long range hurricane forecasts from 12 months prior to hurricane season for an early look at hurricane risk.

Figure 3. AER's suite of forecast tools.

advanced weather prediction services is designed to assist in smart business decisions for weather sensitive industries. An additional product, the Energy Seasonal Forecast (ESF), is an unprecedented forecast tool created by leading atmospheric scientists at AER and real-time power flow experts at Genscape that offers an advanced look at the demand for generation fuels three months before the start of the summer and winter seasons. ESF provides a comprehensive quantitative seasonal outlook of generation fuel consumption based on the most accurate seasonal temperature forecasts available in the industry and proprietary power generation information unequaled in the energy market.

In addition to commercial tropospheric weather products we have also transitioned space weather research into a commercial system. What began as an Air Force situational awareness tool for the space weather community has evolved into a tool used during sensor/spacecraft design and development. Our modeling support is combined with the implementation of new data sources resulting in new forecasting techniques with the capability to identify, model, assess, and predict space weather impacts on civilian and defense systems. These improved space weather depiction and phenomenology prediction are collected in the AER Space Environment Effects Toolkit (SEET) to provide comprehensive modeling of the space environment for mission planners, satellite designers and mission operators interested in understanding the space's impact on your satellite and its electronic systems. This software is developed in conjunction with the STK software from AGI. SEET provides tools for planning for the effects of radiation, damaging meteorites or space debris, local magnetic field, and heavy ion fluxes and their associated Single Event Upsets (SEUs) among other things. Within the SEET software there is a wide range of models, algorithms and computations that provide the capability to predict various effects of the ambient near-earth environment on space objects.

The Future

Today the status of the Earth's atmosphere, oceans, and biosphere is routinely monitored using a global constellation of satellites and sensors operating across the spectrum. The skill set required to convert satellite sensor measurements to value added environmental products such as temperatures (of the atmosphere, of the land, of the sea surface), moisture (water, vapor, clouds, precipitation), aerosols and trace gases (ozone, methane, etc.), bio-productivity (vegetative index, ocean color), and climate indices is based on application of fundamental sciences such as spectroscopy, radiative transfer, and applied mathematics. At AER, these skill sets are unifying themes from which research and information technologies are developed to mitigate unknowns and uncertainties in the geophysical environment.

AER is a leading environmental information technology company serving the government and commercial research, development, applications, product and services marketplaces. Our technologies in remote sensing and weather forecasting make AER particularly well positioned in the coming decades. Our corporate culture and history will ensure such growth with flexibility and continued excellence.

GRSS WEB CORNER

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On February 21–22, 2009 the GRSS Administrative Committee had is winter meeting in Atlanta. GA, USA. Despite the general situation, a two-year strategy was presented to revitalize the web site and convert it in the focal point of Society's activities.

For 2009, the activities that are foreseen are:

- **Website Content**: update the web content and remove obsolete sections, renovation of the publication (TGARS, GRSL, JSTARS) web pages to help the potential author find all the information about the journal, submission procedure and recent papers in a easy manner. Also the ISIS working group has been linked as a new Technical Committee of GRSS, pending on the formatting aspects of their web pages for homogeneity purposes.
- **Website Upgrade**: including a redesign and global reformatting of the web site and its contents, and a migration to a new platform. New translating tools will be added for improved communication with non-native English speakers and outreach.

Finally, regarding the Distinguished Speakers Program and IGARSS two new initiatives will be put in place:

- The **Distinguished Speakers Program** needs to be revitalized, since it has not been used as it could have been for a number of reasons, that it is not here the place to comment. In any case, it has been proposed to make extensive use of IT technologies (Skype, Webex…) to minimize travel costs and the time spent. Upgraded video information on the tutorials will be incorporated in the GRSS website for better marketing of them.
- A **Pilot Project** will be tested during the coming **IGARSS** to webcast (video + audio) a number of selected sessions. If successful, the initiative will be opened to the general public in an attempt to service those people from countries where constant travel difficulties prevent people from attending IGARSS. Of course, direct networking between professionals at remote IGARSS will not be feasible, but at least it will serve for educational purposes.

For 2010, the goals are to go even farther by syndicating news for more frequent updates and adapting the **website** so that it can be visited, tutorials downloaded, and even IGARSS sessions streamed into **mobile** devices now that two thirds of the world's population has a cell phone.

These are exciting years and we hope to better serve you. Please send us your comments and suggestions to increase the quality of our web site, and do not forget to take a look to the recently uploaded IGARSS 2008 tutorials.

Best regards,

Adriano Camps, Full Professor,
Universitat Politécnica de Catalunya

VP of Information Resources and web master
www.grss-ieee.org/
Barcelona, 28 February 2009

L-R: Peter Chester and Shane Pearlman of Shane & Peter Inc. (www.shaneandpeter.com) providing support for the GRSS website, Siri Jodha Singh Khalsa (GRSS IEEE Standards Committee Representative), and Adriano Camps (GRSS Webmaster) at the February Administrative Committee Meeting in Atlanta.

PRIVATE SECTOR NEWS

Remote Sensing News For and About the Private Sector

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2. IGARSS 2009 – Cape Town!
3. NETWORKED REMOTE SENSING – exponential growth for remote sensing
4. COMMUNITY REMOTE SENSING – the power of billions
5. ON-DEMAND REMOTE SENSING – what we need when we need it
6. COMPANY NEWS – what companies are up to
7. EVENTS - upcoming conferences, meetings, and events
8. PROFESSIONAL ORGANIZATIONS – more information, by organization

1. The Decentralization of Remote Sensing – Brief Editorial

Information technologies provide the foundation for society's rapid progress in the 21st century. Information about the environment (both natural and human-built!) is central to this progress. The enormity of the required undertaking – observing and understanding our world at all space and time scales – takes your breath away. Remote sensing has traditionally been a centralized activity, sponsored or performed by governments to accomplish largely government purposes. Centralized approaches will not scale to meet society's 21st century needs. Fortunately, the convergence of three remote sensing trends will help us resolve this. The first is the growth of networking, both between sensor systems and among remote sensing institutions. Networking exponentially enhances our investments in otherwise stovepiped capabilities, ranging from sensors to people. The second is the rapid growth of community-contributed remote sensing information, itself a consequence of the global internet and easy access to technologies such as GPS and mobile phone cameras. Finally, the market need for information-on-demand is driving more rapid acquisition and distribution of remotely sensed information. Governments will come to rely on decentralized remote sensing for understanding local details of climate change and responding to natural disasters. The private sector will use it to build digitally-augmented worlds that make commerce more efficient and accessible. Within just a decade or so, the mainstreaming influence of decentralized remote sensing will be as profound for society as the satellite revolution has been over the last decades.

2. IGARSS 2009 in Cape Town

IGARSS 2009 is being held July 13–17 in Cape Town, South Africa. The theme this year is "Earth Observation: Origins to Applications". For those who have attended previously, you know that IGARSS is the premier remote sensing conference for bringing together government, academia, and industry. Historic attendance has been running about 1500. A variety of tutorial sessions are planned with interest to the private sector. For additional information on the conference and opportunities to exhibit, contact Bryan Stewart (bstewart@cmsworldwide.com). Future symposia include Honolulu (2010), Sendai (2011), Munich (2012), and Melbourne (2013).

3. Networked Remote Sensing – Exponential Growth for Remote Sensing

Social networks such as Facebook and LinkedIn have opened our eyes to the power of "network effects" and "viral adoption". Networks are becoming increasingly important to remote sensing. NASA has pursued networked satellite architectures for well over a decade; the A-Train is an early implementation allowing multiple satellites in the same orbit to replicate an integrated sensor suite. On an international scale, the Global Earth Observing System of Systems (GEOSS) is creating both sensor and organizational networks that enhance remote sensing effectiveness beyond what individual nations could do on their own. Wireless sensor networks have tremendous potential for expanding the value of remote sensing data; they enable cooperative strategies among sensors, object tracking, and other capabilities not possible with isolated sensors. More effective integration of spaceborne and ground-based sensing networks will provide powerful new capabilities in the coming decade.

4. Community Remote Sensing – The Power of Billions

The community of governments that sponsor remote sensing is in the hundreds; the community of the world's people is nearing seven billion. Both are sources for remote sensing information. Wikimapia and similar projects have shown how community input can help create and maintain the world's maps - particularly in locations where informal "community" names are more common than official names for locations or objects. Michael Goodchild at UCSB has been a leader in this area with work such as citizens-as-sensors and the Alexandria Digital Library project. Community remote sensing has value at all scales. At local scales, it can provide the often-missing details for everyday activities(such as "how can I identify front doors on my city's public buildings"). At global scales, it enables projects that are best accomplished through aggregation of local information from localized sources. One example is assessment of global biodiversity change by integrating community-based sampling. Another is inventory/monitoring of forest carbon assets by using detailed community data in sample areas to refine coarse global satellite data. Building the community tools that enable both the remote sensing itself and the easy sharing of sensed information is a major task. The private sector is currently developing many of these, from mobile device sensors to social networks that encourage virtual communities to work toward common interests.

5. On-Demand Remote Sensing – What We Need When We Need It

Obtaining timely remote sensing information today still requires luck, but change is coming. The commercial satellite industry has responded with constellations such as RapidEye to cut revisit times. NASA and other space agencies have worked to create rapid access, such as with the MODIS Rapid Response System. At ground-level, we now routinely use internet-connected highway cameras to monitor real-time traffic or road conditions in urban areas. What if we could have what we need "on-demand", where we want it and when we want it? Real-time information is essential for many decision systems. One is road weather to enhance traffic flow and reduce weather-related accidents. Centralized systems have limited ability to meet these needs. Community networks provide an alternative tool, particularly with the combination of mobile phone cameras and location-aware devices. We've already seen how quickly amateur images and videos of natural disasters and other events can propagate on YouTube and Flickr. Can we encourage these informal imagery sources to provide quantitative information rather than just "eye candy"? Can we leverage this community network to provide data on request? And how do we combine these rapid-response community sources with more traditional remote sensing data to solve important problems? Perhaps soon satellites will be tasked on eBay, with all interested bidders sharing the cost.

6. Company News – To Advertise at No Cost, Please Submit Short Requests to the Editor

TerraGo Technologies - Geospatial raster imagery can be difficult to easily distribute so that it can be used by those who need it. Many formats require custom viewers and sheer file size makes distribution prohibitive. TerraGo Technologies' Publisher for Raster solution breaks down technology barriers and lets geospatial professionals easily share and view multiple kinds of raster images all through one standard format with no special tools or software. Users are able to quickly and easily convert several Raster formats to a GeoPDF file and from there, incorporate them into maps and share them with users who can take advantage of rich mapping capabilities with or without Internet connections. TerraGo Publisher for Raster leverages the functionality of the source GIS application and readies it for easy collaboration with non-technical users. For more information, please visit www.terragotech.com, email us at customer@terragotech.com or call 866-453-1609.

7. EVENTS

4–6 Feb	GEOSS Asia-Pacific Symposium, Kyoto, Japan
10–13 Feb	Map World Forum, Hyderabad, India
19–20 Feb	North Carolina GIS Conference, Raleigh, NC
8–13 Mar	ASPRS Annual Conference, Baltimore, MD
10–12 Mar	Goddard Memorial Symposium, Greenbelt, MD
15–17 Mar	GISWORX, Dubai, UAE
23–26 Mar	ESRI Developer Summit, Palm Springs, CA
30–2 Mar/Apr	National Space Symposium, Colorado Springs, CO
31–2 Mar/Apr	Civil Commercial Imagery Eval Workshop, Fairfax, VA
14–16 Apr	Map Middle East, Dubai, UAE
19–22 Apr	GITA Geospatial Infrastructure, Tampa, FL
4–8 May	Intl Sym on Rem Sens of Environ, Stresso, Italy
4–8 May	IAA Sym on Small Sat for Earth Obs, Berlin, Germany
19–21 May	Where 2.0, San Jose, CA
20–22 May	Joint Urban Remote Sensing Event, Shanghai, China
24–27 May	American Geophysical Union Spring Mtg, Toronto, Canada
1–4 Jun	GeoTec, Vancouver, Canada
3–5 Jun	GEOINT Tech Days, Reston, VA
25–29 Jun	MAPPS Summer Conference, Brewster, MA

13–17 Jul	IGARSS 2009, Cape Town, South Africa
13–17 Jul	ESRI Intl User Conference, San Diego, CA
27–31 Jul	GeoWeb, Vancouver, Canada
2–6 Aug	SPIE Optics and Photonics, San Diego, CA
18–20 Aug	Map Asia, Singapore
26–28 Aug	IEEE GRSS Conf on Hyperspectral, Grenoble, France
9–12 Sep	Sixth Intl Symposium on Digital Earth, Beijing, China
13–17 Sep	GITA GIS for Oil & Gas Conf, Houston, TX
14–17 Sep	AIAA Space, Pasadena, CA
29–2 Sep/Oct	URISA Annual Conference, Anaheim, CA
5–7 Oct	Location Intelligence, Westminster, CO
12–16 Oct	Intl Radar Conference, Bordeaux, France
26–30 Oct	AfricaGIS, Kampala, Uganda
16–19 Nov	ASPRS/MAPPS Fall Conference, San Antonio, TX

8. Professional Organizations – See More Orgs (Public, Private, Academia)

Institute of Electrical and Electronic Engineers (IEEE)
Aerospace Industries Association (AIA)
American Astronautical Society (AAS)
American Geophysical Union (AGU)
American Institute of Aeronautics and Astronautics (AIAA)
American Meteorological Society (AMS)
American Society for Photogrammetry and Remote Sensing (ASPRS)
Geospatial Information and Technology Association (GITA)
International Society for Photogrammetry and Remote Sensing (ISPRS)
International Union of Radio Science (URSI)
The International Society for Optical Engineering (SPIE)
Management Association for Private Photogrammetric Surveyors (MAPPS)
Space Foundation
United States Geospatial Intelligence Foundation (USGIF)
Urban and Regional Information Systems Association (URISA)
Women in Aerospace (WIA)

The IEEE Geoscience and Remote Sensing Society (GRSS) Private Sector Liaison Group was formed in 2002 to increase collaboration between the private sector, academia, and government in the remote sensing field. The readership of this newsletter now exceeds 2000 people from companies associated with remote sensing, as well as government agencies, international space agencies, professional organizations, non-government organizations, OMB, and Congressional staff. We in the private sector want to help keep our colleagues informed of the activities and capabilities of the private sector – and the role that GRSS plays in supporting and promoting these activities. Should you need further information about the Private Sector Group, require that contact information for you or your organization be updated, or request to be removed from the list, please contact Bill Gail (bgail@microsoft.com).

HISTORY PAGE

Dr. Kiyo Tomiyasu
Honorary Life Member
History and Records Chair
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Pomona, CA 91767 USA
E-mail:ektom2@verizon.net

By about 1995, it was noted that a few individuals had contributed a great deal to the formation and nurturing of the IEEE Geoscience and Remote Sensing society. I had been involved with the earliest activities of GRSS, and chaired its first Awards Committee. I noted the sustained involvement of some individuals in various capacities, and believed it would be desirable to document their extensive participation by a chart, then dubbed "Key Members."

This Chart expanded from the initial Presidents and Editors, to GRSS Symposia and Society Awards. The chart has been useful for GRSS Committee operations, and hence deemed significant for Membership information by this Newsletter.

Kiyo Tomiyasu

GRSS KEY MEMBERS (1981 - 2009)											
		Awards			IGARSS			Publications			
Year	President	Distinguished Achievement Award	Outstanding Service Award	Education Award	IGARSS Location	IGARSS General Chair	IGARSS Technical Chair	TGARS Editor	Newsletter Editor	GRSL Editor	JSTARS Editor
2009	A. Milne				Cape Town	H. Annegarn	M. Inggs R. King	C. Ruf	D. Kunkee	P. Gamba	E. LeDrew
2008	A. Milne	L. Tsang	W. Moon	Y. Yamaguchi	Boston	J. Kerekes E. Miller	D. Entekhabi S. Reising	J. Benediktsson	D. Kunkee	W. Emery	E. LeDrew
2007	L. Tsang	G. Franceschetti	J. Benediktsson	E. Pottier	Barcelona	I. Corbella	A. Camps	J. Benediktsson	D. Kunkee	W. Emery	
2006	L. Tsang	D. Goodenough	A. Gasiewski	F. Ulaby	Denver	A. Gasiewski V. Chandrasekar	G. Wick W. Emery	J. Benediktsson	A. Camps	W. Emery	
2005	A. Gasiewski	K. Sarabandi	W. Boerner	D. Solimini	Seoul	W. Moon	S. H. Lee W. Emery	J. Benediktsson	A. Camps	W. Emery	
2004	A. Gasiewski	P. Pampaloni	C. Luther	W. Emery	Anchorage	V. Kaupp	C. Dobson C. Davis T. Lukowski	J. Benediktsson	A. Camps	W. Emery	
2003	C. Luther	E. Westwater	R. Narayanan	D. Landgrebe	Toulouse	D. Massonnet	J. C. Souyris	J. Benediktsson	A. Camps		
2002	C. Luther	W. Wiesbeck	T. Jackson	N. Khazenie	Toronto	E. LeDrew	D. Goodenough T. Lukowski	J. A. Smith	S. Reising		
2001	W. Wiesbeck	W. Keydel	J. Gatlin		Sydney	A. Milne	J. Richards M. Lewis	J. A. Smith	S. Reising		
2000	W. Wiesbeck	J. Kong	L. Tsang		Honolulu	A. Blanchard D. Goodenough	A. Gasiewski K. St. Germain	L. Tsang	S. Reising		
1999	N. Khazenie	M. Hallikainen	J. Smith		Hamburg	W. Alpers	R. Bamler R. Winter	L. Tsang	C. Ruf		
1998	N. Khazenie	A. Ishimaru	W. Keydel		Seattle	L. Tsang	Y. Kuga D. Winebrenner	L. Tsang	C. Ruf		
1997	M. Hallikainen	R. McIntosh	V. Salomonson		Singapore	H. Lim	T. S. Yeo et al.	L. Tsang	C. Ruf		
1996	M. Hallikainen	D. Staelin	A. Blanchard		Lincoln	R. Narayanan	R. McIntosh C. Swift	L. Tsang	S. Gogineni		
1995	A. Blanchard	J. Reagan	D. Goodenough		Florence	P. Pampaloni	P. Bruscaglioni	J. A. Smith	S. Gogineni		
1994	A. Blanchard	C. Swift	M. Hallikainen		Pasadena	J. B. Way D. McCleese	E. Njoku	J. A. Smith	R. Narayanan		
1993	D. Goodenough	K. Raney	R. Doviak		Tokyo	M. Takagi	S. Fujimura	J. A. Smith	R. Narayanan		
1992	D. Goodenough	D. Landgrebe	C. Swift		Houston	A. Blanchard	A. Fung A. Sieber	J. A. Smith	R. Narayanan		
1991	J. Reagan	E. Schanda	K. Itten		Helsinki	M. Hallikainen	M. Tiuri	R. Doviak	J. B. Cimino		
1990	J. Reagan	None	K. Raney		Washington	V. Salomonson	J. Smith	R. Doviak	J. B. Cimino		
1989	K. Raney	A. Fung	J. Reagan		Vancouver	J. MacDonald	J. Gower	R. Doviak	J. B. Cimino		
1988	K. Raney	G. Guyot	D. Landgrebe		Edinburgh	J. Hardy	P. Williams	F. Ulaby	J. B. Cimino		
1987	D. Landgrebe	C. Elachi	A. Sieber		Ann Arbor	F. Ulaby	K. Carver	F. Ulaby	J. B. Cimino		
1986	D. Landgrebe	V. Salomonson	K. Tomiyasu		Zurich	H. Haefner	K. Itten	F. Ulaby	R. Newton		
1985	C. Swift	J. Wait	R. McIntosh		Amherst	R. McIntosh	C. Swift	F. Ulaby	A. Blanchard		
1984	R. McIntosh	D. Hogg	K. Carver		Strasbourg	P. Gudmansen	W. Keydel	C. Swift	A. Blanchard		
1983	K. Carver	F. Ulaby	J. Eckerman		San Francisco	K. Carver	D. G. Rea D. Weissman	C. Swift	C. Balanis		
1982	K. Carver	R. Moore	F. Ulaby		Munich	J. Bodechtel	Ph. Hartl	C. Swift	C. Balanis		
1981	F. Ulaby	None	H. Kritikos		Washington	F. Ulaby	K. Carver	C. Swift	J. Crawford		

CALL FOR PAPERS

IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing (J-STARS)

A Special Issue of the IEEE J-STARS on Bio-Geophysical Parameter Retrieval in Agriculture has been recently approved by the GRS Editorial Board. The Guest Editors of the GRS Special Issue are Irena Hajnsek (DLR), Jose Moreno (University of Valencia), Malcolm Davidson (ESA).

The monitoring of agricultural areas and retrieval of relevant bio- and geophysical parameters using SAR and optical remote sensing is often limited by the lack of appropriate multi-temporal observations. A promising development in this respect are the ESA Sentinel missions, which constitute the first series of operational satellites responding to the Earth Observation needs of the EU-ESA Global Monitoring for Environment and Security (GMES) program. These will include a series of SAR and Optical satellites with enhanced imaging configurations and spectral bands and substantial improvements of data provision in terms of revisit frequency, coverage, timeliness and reliability.

To fully exploit such future data sources, requires an improved understanding of bio-/geo-physical parameter retrieval from multi-temporal multi-parameter SAR and Optical data and a better linkage of retrievals to the modeling of land-atmosphere processes, as well as agricultural applications including precision agriculture and tools for improved management of crops. Recent focused activities to collect airborne and space borne acquisitions have provided appropriate data for the evaluation of these research topics. Key results include improvements in the quantification of bio-/geophysical parameters of agricultural crops and of the soil surface on which they are growing. Such progress is essential if decisions regarding agricultural cultivation practices need to be made. Therefore, prior to the exploitation phase of future multi-temporal and hyper-temporal satellite missions, relevant remote sensing (radar & optical) data serve as the basis for the development and validation of models, retrieval algorithms and product prototyping.

The Special Issue contributions should be related to the following topic's:

- New sources of airborne and satellite SAR and optical data as well as energy/water balance and other meteorological data and field measurements of bio/geo-physical parameters for validation purposes
- Prototype Sentinel-1 and Sentinel-2 simulated products from airborne measurements
- Agricultural bio-geophysical parameter retrieval using multi-temporal multi-parameter SAR and Optical data
- Temporal analysis with remote sensing techniques in order to quantify crop growth and structural changes
- Joint exploitation of SAR and optical information for parameter retrieval, with emphasis on data synergy
- Integration of remote sensing information into land surface process modeling for the energy and water budget modeling

Inquires concerning the Special Issue should be directed to the Guest Editors:

Dr. Irena Hajnsek, Email: irena.hajnsek@dlr.de
German Aerospace Center
Member of the Helmholtz Association
Microwaves and Radar Institute
Department: SAR Technology
Research Group: Pol-InSAR

Prof. Jose MORENO, Email: jose.moreno@uv.es
Laboratory for Earth Observation
Department of Earth Physics and Thermodynamics
Faculty of Physics, University of Valencia

Dr. Malcolm W. J. Davidson, Email : malcolm.davidson@esa.int
European Space Agency
Agence Spatiale Européenne
Mission Science Division

Special Issue on Temporal Change Observation for Bio-Geophysical Parameter Retrieval in Agriculture from SAR and Optical data

Submission Deadline Extended to May 31, 2009

CALL FOR PAPERS

JSTARS Special Issue on Earth Observation Sensor Web

In recent years, one of the major advances in the Earth observation is the realization and development of concepts relating to sensor web technologies. One consensus view of the Sensor web is a coordinated observation infrastructure composed of a distributed collection of resources - e.g., sensors, platforms, models, communications infrastructure - that can collectively behave as a single, autonomous, taskable, dynamically adaptive and reconfigurable observing system that provides raw and processed data, along with associated meta-data, via a set of standards-based service-oriented interfaces. Many research projects relating to the sensor web are being conducted worldwide. Various space agencies and international Earth observation programs have an active component that contributes to the Earth observation sensor web. For example, NASA has funded over 30 research projects addressing the development and applications of the sensor web technology. Both the Global Earth Observation System of Systems (GEOSS) and the Committee on Earth Observation Satellites (CEOS) have engaged in sensor web research and applications. The IGARSS 2008 conference in Boston had multiple sessions in the technology and applications of the Earth observation sensor web. These activities show that the sensor web is an active research field in Earth Observation. This special issue will summarize the progress thus far and explore some new horizons in this very active field of research.

This special issue will try to cover the recent developments in both technology and application aspects of the Earth observation sensor web. Specifically, the special issue calls for papers addressing:

- Intelligent sensor observation systems
- Sensor web architecture and implementation
- Interoperability approaches and standards for sensor web
- Geospatial Web Services and workflow for sensor web
- Multi-scale sensor data fusion
- Collaborative sensing
- Information extraction to support content-based search and access to sensors and their observations
- On-demand processing for data reduction and improvement in information access to derived products from raw sensor observations
- Targeted data acquisition and rapid data assimilation to reduce forecast uncertainty
- Sensor data virtualization and on-demand product generation
- On-line data analysis systems
- E-Science and the sensor web
- Applications of sensor web technology to provide timely calibration and validation of sensors
- Applications of sensor web technology to time-critical monitoring tasks, such as severe weather, disaster, wildfire, volcano
- Applications of sensor web technology in societal benefit areas of Earth observation
- Other topics related to sensor web

Prospective authors should follow the regular guidelines of the IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing (JSTARS), as listed in the back cover of the Journal. Authors should submit their manuscripts electronically to http://mc.manuscriptcentral.com/jstars. Instructions for creating new accounts, if necessary, are available on the login screen. Please indicate in your submission that the paper is intended for the Special Issue by selecting "Sensor Web Special Issue" from the pull-down menu for manuscript type. Questions concerning the submission process should be addressed to editor-in-chief of JSTARS at ells@watleo.uwaterloo.ca. Inquiries concerning the Special Issue should be directed to the Guest Editors:

Prof. Liping Di, E-mail: ldi@gmu.edu
Center for Spatial Information Science and Systems (CSISS)
George Mason University
6301 Ivy Lane, Suite 620, Greenbelt, MD 20770, USA
Tel: 1-301-982-0795, FAX: 1-301-345-5492

Ms. Karen L. Moe, E-mail: Karen.Moe@nasa.gov
Earth System Technology Office http://esto.nasa.gov
NASA/GSFC MS Code 407, Greenbelt, MD 20771, USA
phone: (301) 286-2978, FAX: (301) 286-2756

Mr. Terence L. van Zyl, E-mail: tvzyl@meraka.org.za
ICT for Earth Observation (ICT4EO)
Meraka Institute, Meiring Naude Road, Brummeria, Pretoria, South Africa 0184
Tel: +27 (0)12 8412171, Fax +27 (0) 12 8414720

Submission Deadline: September 30, 2009

International Conference on Land surface radiation and energy budgets:

Observations, Modeling and Analysis

March 18-20, 2009
Beijing, China

Honorary Chair:
Prof. Guanhua Xu, CAS, China

Co- Chairs:
Dr. William Kustas, USDA ARS, USA
Dr. Xiaowen Li, Beijing Normal University, China
Dr. Shunlin Liang, University of Maryland, USA

Abstract submission:
Before December 30, 2008
Email: LandEnergyBudget@yahoo.com

Register:
Before February 25, 2009

Registration fees:
USD $250

Web Address:
http://www.landenergybudget.org

CALL FOR PAPERS
4th International Conference on
Recent Advances in Space Technologies
Space for the Developing World
RAST 2009
11-13 June 2009, İstanbul, TURKEY
www.rast.org.tr

Organized by: Aeronautics and Space Technologies Institute (ASTIN), Turkish Air Force Academy, Turkey
In Technical Co-operation with:
IEEE Aerospace & Electronic Systems Society
IEEE Geoscience & Remote Sensing Society
AIAA (American Inst. for Aeronautics & Astronautics)

Coverage: RAST (Recent Advances in Space Technologies) Conferences have now become a traditional biennial event with worldwide participation. The fourth RAST Conference or RAST 2009 will be held again in Istanbul on 11-13 June 2009. RAST Conferences are open to all areas of space.

Paper submission: Prospective participants are invited to electronically submit an extended summary (minimum 500 words) of their work, following the instructions available on the web page. Accepted papers will be published in an IEEE proceedings volume (EI indexed) that will be available at the time of the conference. Further information about the conference can be obtained from the web site.

Important Dates:

Submission of summaries:	4 January 2009
Notification of acceptance;	31 January 2009
Camera-ready submission of full papers:	15 March 2009

31st Review of Atmospheric Transmission Models

16-17 June 2009
National Heritage Museum
Lexington, Massachusetts

CALL FOR PAPERS

The conference will provide scientists, engineers, and technical managers from academia, industry, government, and the military with a forum to present their research and exchange ideas on all aspects of atmospheric science as it effects radiative transfer and the retrieval of atmospheric and surface properties. Papers on phenomenologies associated with diverse aspects of earth-atmospheric radiative transfer, including cloud and aerosol effects, surface characterization, solar illumination, littoral interfaces, and polarization, are especially welcome. This will be an unclassified meeting featuring renowned keynote speakers and technical program sessions.

Abstract Deadline: 01 May 2009

For more information, visit www.grss-ieee.org .

The 17th International Conference on Geoinformatics The ways to advance GIScience researches and applications

August 12-14, 2009
Fairfax, Virginia, USA

Center for Spatial Information Science and Systems (CSISS), George Mason University

GEOINFORMATICS 2009 Chair:
Liping Di, CSISS, George Mason University

Abstract submission:
Before February 15th, 2009
Submit online: http://www.geoinformatics2009.org

Register:
Before May 1st, 2009

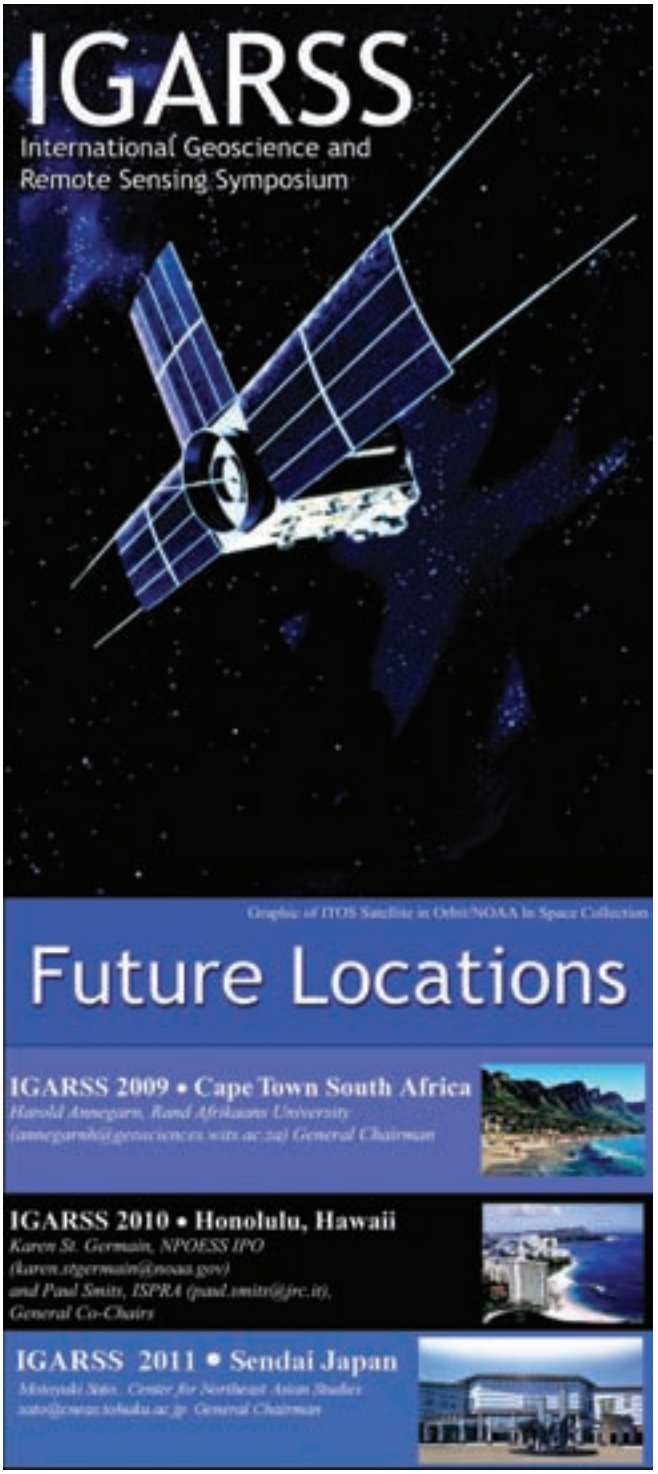
Registration fees:
Regular $435 / CPGIS member $395
Student $395 / Student CPGIS members $325

Web Address:
http://www.geoinformatics2009.org

ICST-2009: International Conference on Space Technology

August 24-26, 2009
Electra Palace Hotel, Thessaloniki, Greece
Greek Ministry of Development
Greek Space Agency
IEEE Geoscience and Remote Sensing Society
IET Hellas and IEEE Hellas
University of Patras

Conference Chair:
G Lampropoulos, Greek Space Agency
Abstract submission:
January 17, 2009
Web address:
http://www.icspacetechnology.com/
Location:
Thessaloniki is the second largest city in Greece, with direct flight connections to many international cities. It is near the beaches of Halkidiki, Olympus mountain and the palaces of Alexander the Great and the Macedonian tombs of Vergina.



IGARSS 09 Cape Town

IEEE International
Geoscience & Remote Sensing Symposium

Key dates

Proposals for special sessions:
14 September 2008

Abstract submissions:
4 January 2009

Conference dates:
13 – 17 July 2009

Website

www.igarss09.org

General chair

Prof Harold Annegarn, University of Johannesburg.
hannegarn@gmail.com

Technical chair

Prof Mike Inggs, University of Cape Town & Centre for High Performance Computing
Michael.Inggs@uct.ac.za

Financial chair

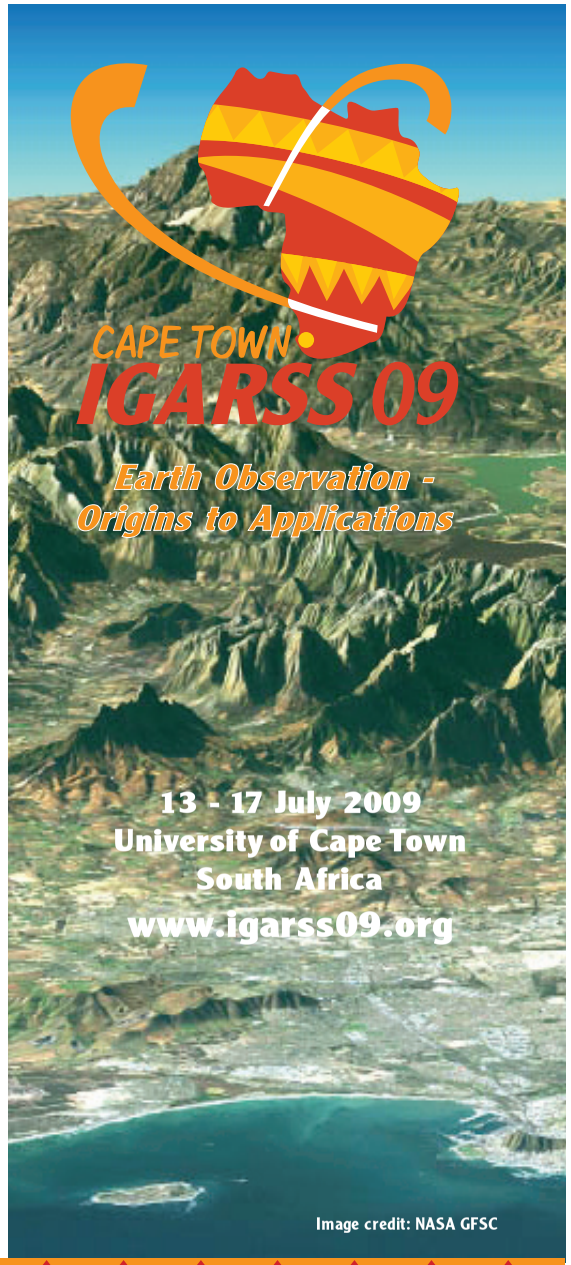
Dr Michael Sears
msears@icon.co.za

Secretariat

Billene Mercer, Conference Management Services Inc.
mercer@cmsworldwide.com

Associated institutions

AARSE
University of Cape Town
ITC Netherlands
Sunspace
CSIR Meraka Institute
UCT/MERAKA Centre for High Perfomance Computing
EIS Africa
University of Johannesburg
University of Stellenbosch
ARC - ISCW
GEOSS



Invitation to the 2009 IEEE International Geoscience & Remote Sensing Symposium, Cape Town, Africa

The venue for IGARSS 09 has been chosen as the University of Cape Town on the slopes of Table Mountain. The choice of Cape Town, the first time that IGARSS will be held on the African continent, represents a milestone in the IEEE Geoscience and Remote Sensing Society's strategic objective to broaden international participation, particularly in the developing countries. Awarding this Symposium to Africa is a tangible and committed step to engage African governments, institutions and individuals in the powerful global network of GRSS earth science and remote sensing specialists. At a stage when many regions of Africa are emerging from dark periods of civil strife and regional conflict, it is an appropriate moment to embrace the possibilities of remote sensing and associated sciences as tools in development, environmental protection, health, good governance, disease and poverty alleviation. A broad alliance of African states, ranging from Algeria to Nigeria to South Africa are cooperating in their new national programmes of space science and Earth Observation, with several small satellites launched or in the planning and construction stages. To meet the human resources needs of these new programmes, young scientists need to be introduced to and become part of the international remote sensing community. The holding of this IGRSS Symposium in Africa will provide a magnificent opportunity to foster these interactions.

IGARSS 09 in Africa will not be happening in isolation. Africa has its own complementary disciplinary societies: the African Association for Remote Sensing of the Environment (AARSE) and EIS-Africa, which organisations will be partners in hosting the international community in Cape Town. Over the past five years, through a series of training workshops and conferences on remote sensing technologies and applications we have been building up a momentum towards IGARSS 09. Members of the GRSS have made significant contributions to these development efforts.

It is thus with great pleasure on behalf of the GRSS, IGARSS 09 Local Organizing Committee, the Universities of Cape Town and Johannesburg and associated institutions that I invite you to start planning your participation in our annual symposium for Cape Town in 2009.

The programme for Cape Town will have several special sessions, in addition to maintaining continuity of traditional GRSS themes.

Cape Point wild flowers

We hope to celebrate ten years of MODIS Earth observations, and to take stock five years into the GEOSS programme. On the technical side, we will organise special sessions on micro-satellites. In terms of African development, several sessions on applications will address disaster preparedness and response, global change and adaptation, good governance, role of RS in health and disease monitoring, water and food security, forest and fire monitoring, and urban planning.

We invite you also to bring your families. Cape Town is one of the world's premier tourist destinations, with a wide range of activities. We will plan a family friendly programme that will cater for children, wine lovers, outdoor enthusiasts, culture aficionados and more.

Prof Harold Annegarn, General Chair
July 2008

Technical themes

Customary themes of IGARSS plus:

- GEOSS - 5 Years On
- African micro-satellites – technical
- African micro-satellites – applications
- Ten years of MODIS Earth Observations
- Assisting African Development Needs
- Numerical Weather Prediction (NWP) and Radiance Data Assimilation
- Ocean Synoptics and Weather
- Human and Environmental Health
- Baseline Climate Identification and Global Change
- Remote Sensing Education
- Radar-based Earth Observation – the Next Wave
- Atmospheric chemistry from space
- Marine resources of Africa – the Benguela Project
- Forest resources of Africa
- Earth Observation and Governance

Attractions

A family friendly conference - Cape in the Green Season

- Table Mountain
- Robben Island
- Cape Peninsular National Park
- Cape Wild Flowers
- Kirstenbosch Botanical Gardens
- African Penguins at Boulders Beach
- Wine routes to Stellenbosch and Boland
- Victoria and Albert Waterfront precinct - restaurants, museums, aquarium, harbour cruises, shopping, jazz, African curios.
- Adventure tours

Accommodation

A range of five star luxury to three star hotels at Victoria and Albert Waterfront. In addition you will also find a large array of charming bed-&-breakfast inns with a touch of warm local hospitality. Student rooms on UCT campus will be available for the budget minded.

Travel and Student Support

Mindful of the costs of the international travel, the Local Organizing Committee is committed to creating an affordable conference package, including options for inexpensive university dorm accommodation. We will also seek funding to support travel costs and sponsorships of student registrations and to facilitate maximum participation from developing countries.

Victoria and Albert Waterfront Precinct

UPCOMING CONFERENCES

See also http://www.techexpo.com/events or http://www.papersinvited.com and page 29 of this issue for more conference listings

Name: International Conference on Land surface radiation and energy budgets: Observations, Modeling and Analysis
Location: Beijing, China
Dates: March 18–20, 2009
Contact: Dr. William Kustas, USDA ARS, USA
Email: LandEnergyBudget@yahoo.com
URL: www.landenergybudget.org

Name: Civil Commercial Imagery Evaluation Workshop
Location: Fairfax, VA USA
Dates: March 31–April 2, 2009
URL: http://www.usm.edu/profdev_edoutreach/jacie/

Name: Geospatial Infrastructure Solutions Conference
Location: Tampa, FL
Dates: April 19–22, 2009
URL: http://gita.org/gis/

Name: 2009 Joint Urban Remote Sensing Event
Location: Beijing, China
Dates: May 20–22, 2009
URL: http://www.urban-remote-sensing-2009.org.cn/

Name: 4th International Conference on Recent Advances in Space Technologies Space for the Developing World RAST 2009
Location: Istanbul, Turkey
Dates: June 11–13, 2009
URL: www.rast.org.tr

Name: IGARSS'09
Location: Cape Town, South Africa
Dates: July 13–17, 2009
URL: www.igarss09.org

Name: The 17th International Conference on Geoinformatics
Location: George Mason University, Fairfax, VA
Dates: August 12–14, 2009
Contact: Liping, Di
URL: www.geoinformatics2009.org

Name: ICST 2009: International Conference on Space Technology
Location: Electra Palace Hotel, Thessaloniki, Greece
Dates: August 24–26, 2009
Contact: G. Lampropoulos, Greek Space Agency
URL: www.icspacetechnology.com

Name: First IEEE GRSS Conference on Hyperspectral Image and Signal Processing: Evolution in Remote Sensing
Location: Grenoble, France
Dates: August 26–28, 2009
Email: info@ieee-whispers.com
URL: www.ieee-whispers.com

Name: 6th International Symposium on Digital Earth
Dates: September 9–12, 2009
Location: Beijing, China
URL : http://www.isde6.org/

Name: International Radar Conference
Dates: October 12–16, 2009
Location: Bordeaux, France
URL: http://www.radar2009.org/

Name: AfricaGIS
Dates: October 26–30, 2009
Location: Kampala, Uganda
URL: http://www.africagis2009.org/

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