News**Letter**

ISPRS
Student
Consortium

The Usage of LASER SCANNING

CRYOSAT-2: RELOADED

Interview with Prof. Mojca Kosmatin Fras

isprs

ISPRS SC NewsLetter

To join our members area visit
www.isprs-studentconsortium.org

Frontpage designed by Ayda Aktaş
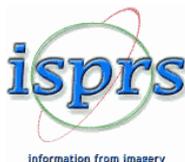
Table of Contents

NEWS FROM STUDENT CONSORTIUM

Dear SC Follower,

Since Student Consortium is in preparation for different ISPRS Technical Symposiums, we have begun intensively publish SC promotional materials to be delivered during the symposiums. All these ISPRS TC events that are about to happen in next months are a precursor to the upcoming Melbourne Congress in 2012 (you can find more details under the rubric "Future ISPRS related events" on page 7). With the cooperation of the Technical Commissions there will be young authors` sessions organised at the selected symposiums. We hope this will also lead to new innovation and that ISPRS Symposiums will attract more young professionals.

SC will also present its activities and outputs at the celebration of the 100th anniversary of ISPRS in Vienna in July.

Don't forget that among all these events there is also ISPRS SC Summer School planned for Autumn this year! All the details of the 5th SC Summer School will be available soon.

We are all looking forward to meeting you at one of the ISPRS events this year!

Best Regards,
Cemal Özgür KIVILCIM
SC Chair

SPOTLIGHTS

Interview with Prof. Dr. Mojca Kosmatin Fras
by Urša Kanjir

In this interview we are hosting dr. Mojca Kosmatin Fras, professor at the Faculty of Civil and Geodetic Engineering at University of Ljubljana, Slovenia. She has been active in the ISPRS waters for a long time, being co-chair and chair of WG VI/3 from 1996 to 2004 and chair of WG VI/5 in next quarter. She makes great effort to promote the profesion among students and is one of the main reason that Student Consortium stands where it is today.

1. Dear prof. Mojca Fras, can you explain to us what your research field/professional work is at the moment?
My work is related to photogrammetry and remote sensing and because we are a very small team I have to follow a variety of areas. However, our priorities in research work are digital image processing (objects detection), high resolution satellite images (topographic data acquisition) and lidar (aerial and ter-restrial). We try to stimulate our students to participate in research work already during their graduate study, whereas for post-graduate students research work is essential. We also cooperate with other institutions and private companies to share infrastructure and knowledge.

2. Why did you decide for this profession in the first place (maybe you can tell us something more about your first steps)?
I decided for photogrammetry during my university study (I graduated in 1985), simply because I liked photography. In that time I was an enthusiastic amateur photographer, having my own laboratory for developing films and for producing hardcopies on paper. At the faculty we learnt the analog photogrammetry which I did not like very much. Analog instruments were very large and complicated devices and for me it was difficult to understand in detail how they worked. On the contrary, I liked mathematics and physics, so analytical photogrammetry was close to that, but unfortunately, in the lectures we only heared little theory. Accidentally, I found a paper in an international professional journal about using amateur cameras for photogrammetric application, and this immediately attracted my interest. I started to investigate this topic and made my diploma work about on-the-job camera calibration methods and from that I stayed with photogrammetry. In my first job I developed a prototype on a personal computer for digital orthophoto production (in years 1986-88), and later took part in many important national research and developmental projects, in topography and close range applications. I experienced the transition of the technology from analog to analytical and digital, and found this extremely interesting and challenging.

3. What advice would you give to students and young professionals to be successful in their future career?
My advice is simple: they should always strive for professional excellence and, not being less important, also develop their own personality with additional activities (reading good literature, practice sports, contribute to the society etc.). They should find work they really like, only then they can be successful and satisfied.

4. In your opinion, how important is participation of young people to international professional events like Congresses, workshops, etc? What do you think are the benefits of such activities to youth and to profession?
For young people it is very important to enter the international society as soon as possible, although they might not be aware of that. They can get a lot of information from textbooks, professional journals, Internet and other sources, but personal acquaintances and social networks can be gained only by attending events. There is

a lot of information and useful material we can receive in such events, we also can find friends, experience new cultures, learn languages etc. If I look back to the beginning of my career, I am sure that my early involvement into the professional society was essential for achieving my recent position.

5. How do you see the future of spatial information sciences (remote sensing, photogrammetry, GIS, and related fields)? What would you propose to young scientists as the most challenging fields and research problems in the profession?
It is really difficult to answer this question. I often ask myself where we are going to. Based on recent state-of-the art, the near future is in highly integrated and automated technologies (digital aerial or satellite imagery, lidar, positional orientation systems) and high quality end-products. But, if we look a little bit out of our profession, there are so many crazy discoveries on the horizon (bio and quantum computers, nano technologies etc.) that might thoroughly redirect our work. I think the future of our profession is nevertheless exciting.

6. As one of the main foundation leaders of the Student Consortium – how do you see our organization after 6 years of activity?
I am really happy to see the Student Consortium grow and I appreciate every effort of students and young professionals they give for this purpose. I would especially like to thank the team of the SC Newsletter for their hard work, producing four issues a year, as well as the Student Consortium board, regional coordinators and other active members that care for the better future of our profession.

Thank you very much for your answers!

The Use of Laser Scanning in Monument and Building Documentation
by Thanasis Moysiadis (University of Thessaly)

Terrestrial laser scanners have been widely used in monument and building documentation, mainly because a precise three dimensional point data can be generated at over a relatively short time. Due to the high point density, not only three dimensional surface models can be generated, but also surface images, provided that intensity data are available. The resulting "point cloud" data in standardized format (ascii, iges, stl) can be easily imported for further processing into a software that handles laser scanning data. Laser scanning instruments gain appreciation in architectural and cultural heritage documentation applications, because surfaces with both smooth and highly decorative features can be recorded and modelled.
According to the principles of operation, laser scanning instruments can be divided into two categories:

1. Ranging scanners
i) Time of flight of a laser pulse
A laser pulse is sent to the object from the scanner and the distance between transmitter and the surface is computed from the time the signal takes to be transmitted and received and the known speed of light. The accuracy of these instruments depends on how well they can resolve the time interval to be calculated.
ii) Phase comparison method
The transmitted beam is modulated by a harmonic wave and the distance is calculated using phase difference between the transmitted and received wave. Due to the fact that a very well defined signal is needed for a correct range determination, erroneous points may be produced.

2. Triangulation scanners
i) Single camera solution

© Moysiadis, University College London

A laser beam is transmitted to the object at defined incrementally changed angle from one end of a mechanical base and the other end from a CCD (charged coupled device) camera which detects the laser beam.
ii) Double camera solution
It is a variation of the triangulation principle that uses two CCD cameras at each end of the base. The spot is generated by a separate projector which does not have any measuring function. The operation of a laser scanner instrument is largely affected by the surface properties being scanned. The main accuracy considerations for laser scanner instruments are described on next page:
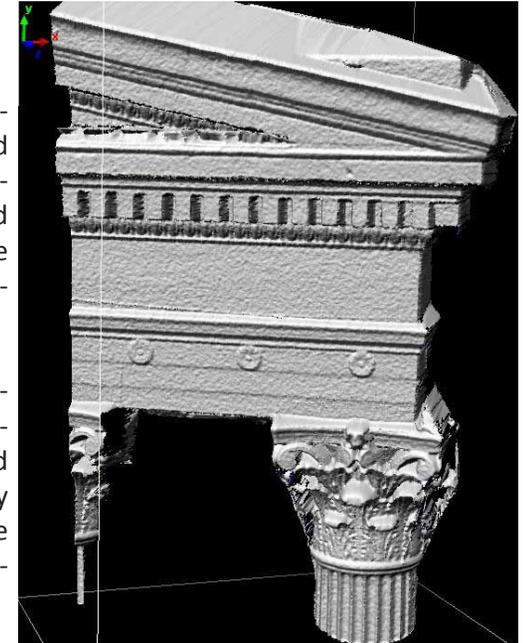
- **Angular accuracy -** The laser pulse is deflected by a small rotating device and is sent to the object. A second angle perpendicular to the first may be changed using another optical device. The 3D coordinates are computed by reading these angles. Therefore, any deviations will result in errors perpendicular to the laser path.
- **Range accuracy -** Using ranging scanners, errors may be observed when known distances in range direction are measured with the scanner.
- **Resolution** - Resolution refers to the smallest distance that can be defined between two objects in the point cloud. In other words, the smallest increment angle between two successive points and the spot size of the laser beam.
- **Edge effects** - The laser spot of a laser scanner has a certain size which is dependant of the range. Part of the laser beam may be reflected from an adjacent surface, a different surface or not at all. This means that edges of a surface cannot be accurately modelled.
- **Surface reflectivity -** Surface reflectivity is another key factor that influences laser scanner's accuracy and data quality. The strength of the signal is dependent on the surface roughness and the surface colour. As electromagnetic energy from a laser hits the façade's surface, it must be reflected, absorbed or transmitted. Each proportion of the above depends on the nature of the surface, the wavelength of the energy and the angle of illumination. The performance of laser scanners and many other optical instruments is affected and limited by the physical laws of reflection and the optical properties of materials. White surfaces give good reflections whereas poor reflection is produced by dark surfaces. Shiny surfaces are not easy to record and coloured surfaces depend on the spectral characteristics of the laser beam.
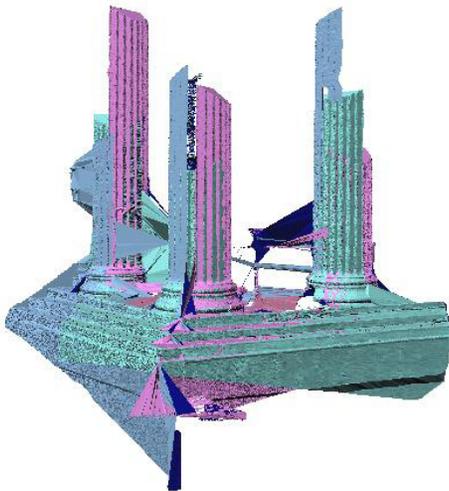
© Moysiadis, University College London

In conclusion, laser scanning is suitable for rapid data acquisition and can be used in monument and building documentation providing a quite well produced and accurate 3D model.

In the *next Newsletter issue,* a comparison is made between Close Range Photogrammetry and Laser Scanning in monument and building documentation.

Useful Links
3D Scanners, Digitizers, and Software for making 3D Models and 3D Measurements, http://www.simple3d.com/

A free non biased forum discussing all 3D Laser Scanning devices and techniques, http://www.3dlaserscanning.org/

3D Laser Scanning for Heritage http://www.english-heritage.org.uk/upload/pdf/3D_Scanning_accessible.pdf?1270996586

Cryosat-2: Reloaded
by Vasileios Kalogirou (RSAC c/o ESA)

My first course in SAR interferometry, I cannot forget: wet afternoon in London, Prof. Duncan Wingham (Lead Investigator of Cryosat mission) enters the room, wearing a nice dark blue coat with the Cryosat logo on it. He speaks with a characteristic calm voice about SAR interferometry, explaining the basic principles. Then he speaks about ESA's first Earth Explorer mission, called Cryosat, and its importance. I remember thinking about all those lucky PhD students and scientists that would have the opportunity to work on Cryosat's data. And then, a couple of weeks after, I was reading the shocking news: 'Cryosat fails to reach orbit'. It was October 2005.

Since then, almost 4.5 years have passed and the need for accurate satellite data is more crucial than ever, in order to understand the changes that are taking place in the Earth's climate. As a sensitive component of the climatic system, cryosphere is of particular importance. Recently I've seen an amazing animation made with ASAR time-series, showing a 97-Km long iceberg that collided with a Glacier Tongue, which finally broke (http://www.esa.int/esaEO/SEMUD27K56G_index_0.html).
Dynamic phenomena are taking place down- (and up-) there and we are able to catch them 'on-tape' with earth observing satellites. Nevertheless, what we clearly need is data, that will enable us to precisely measure ice extend(is extend the technical – extension better) and thickness, as well as snow quality.

Driven by this need, ESA decided to prepare a Cryosat replacement mission. At the time of writing Cryosat-2 is in the desert steppes of Kazakhstan, in Baikonur Cosmodrome, waiting for its approximately 700-Km trip into orbit. The lift-off is scheduled for 13.57 UTC on Thursday 8 April 2010. So at the time you are reading those lines, Cryosat-2 (fingers-crossed) has been launched. And my mind goes again to all those lucky students and scientists that will have the opportunity to work with Cryosat-2 data and provide us with some more scientific proofs and answers.

ISPRS SC Presence in South America

The V Workshop on Lidar measurements in Latin America
by Elena Lobo and Carlomagno Soto

As part of our efforts to expand the ISPRS SC range of action and find partners and members in regions where representation is low, the Regional Coordinators for Central America attended the V Workshop on Lidar measurements in Latin America held on Dec 2009 at Buenos Aires, Argentina. The event contained a range international delegates and a great deal of South American representatives.

This was a unique opportunity to interact with individuals and organizations that rarely participate with events in Central or North America. We were glad to find great interest and enthusiasm for ISPRS SC and we hope to that the contacts we established will be strengthened and further improved in the future. The South American students and young professionals were very excited about the possibility of collaborating and organizing events in Central America and establishing a stronger link between the two regions.

We were very impressed with some of the technology and scientific research that was presented and the certainly the creativity in adapting and creating instruments that addressed their scientific needs.

Lastly, we are extremely grateful to the organizing committee that provided us with funding to make our attendance possible and displayed impressive organizing abilities. We hope the seeds that were planted by our interactions at this meeting will grow to become close collaborations between the individuals and organizations that we met.

OGC Releases New Candidate 3D Standards

OGC, The Open Geospatial Consortium, has introduced three new sets of candidate 3D standards. These are a revised version of the **Web 3D Service (W3DS)** and **Web View Service (WVS)**. An extension profile of the **Symbology Encoding Specification for 3D (SE 3D)** has been added that can be used with the both services. These establish a new family of 3D portrayal services focusing on virtual 3D maps, 3D cartographic visualization, and interactive virtual environments.

Web 3D Service (W3DS)
The purpose of the W3DS is to support interactive 3D web applications. The W3DS can be used in two ways. Firstly to generate a complete 3D map with all the geospatial content. The second way is to use the W3DS as a streaming server and download all geospatial content tile-by-tile and layer-by-layer.

Web View Service (WVS)
The WVS is an interactive image-based 3D portrayal service that provides a different approach of how to visualize 3D city and landscape models based on server-side rendering. 3D Symbology Encoding (3D SE) is compatible with the conventional Symbology Encoding offering all options for visualizing 2D geometries, text and also themtical, geometric and topologicals selections based on the OGC Filter Encoding.

Source : http://www.opengeospatial.org/standards/dp

Photomod 5.0

Racurs' Photomod 5.0 provides a response to the challenges offered by the rapid development of sensor acquisition technology and the need of customers to process huge volumes of remote sensing (RS what does it mean) data. The new package is the result of the effort by qualified teams of mathematicians and software engineers to implement the wishes of Photomod users.
Main PHOTOMOD 5.0 characteristics are:
• 20,000-image project size
• Unlimited image size
• Full support of 16-bit images
• Multichannel images processing
• Unlimited DEM size
• New level of automation and reliability in aerial triangulation measurements
• Uniform program environment for seamless workflow
• Powerful distributed network processing
Source: http://www.racurs.ru/?page=553

Mappamondo GIS
More info here

Planet Geospatial
More info here

EDUCATION
Eduspace
More info here

RESOURCES
GIS Wiki
More info here

TUTORIALS
Videos of the 5th gvSIG Conference
More info here

JOURNALS
EOmag - Earth Observation Magazine
More info here

Journal of Geology and Mining Research (JGMR)
More info here

FREE SOFTWARE
Basic Radar Altimetry Toolbox (BRAT)
More info here

RELATED ORGANIZATIONS
International Academy, Research and Industry Association (IARIA)
More info **here**

Websites that indicate the user's real-time geographical location
Analyzing your traffic. Read more...
Determining the geographic location of a network device (Patent). Read more...
Geolocation API Specification. Editor's Draft 10 February 2010. Read more...
McIDAS – (Man computer Interactive Data Access System). Version 2008. Read more...
Real-Time Geo-Location Based Contact Service System (Patent). Read more...
Firefox's plug-in called LOKI. Read more...

Census Participation Rates
Unless you never check your mail, those living in the United States have probably received more than one reminder (I've received two postcards and one letter so far) that you're required by law to fill out and mail back in your census form. Even with that legal requirement, only 72% of households returned their census forms, with averages ranging greatly from state to state. As part of an effort to encourage census participation, the U.S. Census has partnered with Google Maps to on their "**Take 10 Map**" which shows updated census participation rates across counties.
Read more...

For Vegetation Management, All LiDAR is Not Created Equal
The massive August 14, 2003, electrical power blackout was the largest outage ever experienced in North America, yet power-related disturbances continue to cost $25 - $180 billion annually. To reduce the likelihood of future system blackouts, the North American Energy Reliability Commission (NERC) created FAC-003, stringent standards governing how utility companies are to manage vegetation throughout their transmission grids.
The federal mandate for vegetation management is clear, and potentially harsh. Utility companies must eliminate the occurrence of all power outages caused by vegetation interference in power lines. Failure to meet this zero-outage mandate can result in fines of up to $1million per occurrence per day.
Read more...

Dynamic Line Rating and Aerial LiDAR Surveys Provide Critical Benefits to NERC Standards and the Smart Grid
National Energy Reliability Corporation (NERC) Reliability Standard FAC-008 will require utilities to provide methodology to determine normal and emergency facilities ratings. New technologies such as Dynamic Line Rating (DLR) and aerial LiDAR surveys allow monitoring of transmission line characteristics and environmental conditions, enabling calculation of real-time line ratings and represent key enabling technologies for the Smart Grid by increasing the reliability of Bulk-Power System and improving its economy.
Read more...

STUDIES AND PRACTICAL WORK

This column serves as a guide for the students who are thinking or are willing to go studying or doing practical work abroad. We have searched for new opportunities in different faculties, schools and other learning programs all over the world in order to encourage as many students as possible to take new steps towards new horizons.

CLGE FirstSTEP: a Student & Trainee Exchange Programme

FirstSTEP: The purpose of this programme is to provide students and trainees with an opportunity to discover the geodetic practice within different European countries and concurrently gain experience in their field of study, past or present. CLGE acts as a bridge between the working world and the academic world enabling companies to post a notice of any vacancies, and for students willing to gain experience in a different European country as to where they are currently living or studying. FirstStep is a meeting point for students and trainees that are in search of work and for companies that are in search of students and/or trainees. For further information visit our website or mail us on FirstSTEP@clge.eu.

The Centre for Geo-Information at **Wageningen University, Nederlands**, is offering a **PhD position in land remote sensing**. Work will be based on combining terrestrial LIDAR measurements and new remote sensing algorithms for monitoring of vegetation structure and biophysical variables, with focus on forest areas. A full-time PhD position is open for 4 years. More information you can find on this page.

Estellus, a service company in atmospheric and environment science, is searching for an **Early Stage Researcher** for the period of **36 months** (from 1 October 2010) in **Paris, France**. Candidate will work on a project entitled '**Constraints on surface temperature and terrestrial hydrology using remote sensing**'. The objectives of the thesis is to produce satellite-derived soil moisture estimates for model comparison, validation, analysis, and improvement, with the final goal of providing more reliable hydrological predictions under a changing climate. More info here.

EuroSDR (Spatial Data Research) is launching in Summer/Autumn 2010 **distant short courses** (e-learning) of **two week duration** each. Courses will include following topics: **Laserscanning for tree extraction** (May 17 – 28, 2010), **Assessment of the quality of Digital Terrain Models** (June 7 – 18, 2010), T**he INSPIRE Directive and its Implementing Rules**. How to understand and apply them? (August 30 – September 10, 2010), **Schema matching, mapping and transformation for INSPIRE** (September 20 – October 1, 2010) and others. For more info check this page.

FUTURE ISPRS RELATED EVENTS

14th International Symposium on Spatial Data Handling
Hong Kong, 26-28 May 2010
For more info visit: http://isgis.lsgi.polyu.edu.hk/

GISCA 2010
Bishkek, Kyrgyz Republic, 27-28 May 2010
For more info visit: http://gisca10.aca-giscience.org/

30th EARSeL Symposium - "Remote Sensing for Science, Education, and Natural and Cultural Heritage"
Paris, France, 31 May – 3 June 2010
For more info visit: http://www.earsel.org/symposia/2010-symposium-Paris/

ISPRS Commission VI Symposium "Education & Outreach"
Enschede, The Netherlands, 2-4 June 2010
For more info visit: http://www.itc.nl/isprscom6/symposium2010/

100 Years ISPRS - Advancing Remote Sensing Science
Vienna, AUT, 5-7 July 2010
For more info visit: http://www.isprs100vienna.org/tc-vii-symposium/

ISPRS Commission V Technical Symposium - Close Range Image Measurement Techniques
Newcastle, UK, 22-24 June 2010
For more info visit: http://www.isprs-newcastle2010.org/

IC WG II/IV 7th International Symposium on Voronoi Diagrams in Science & Engineering (ISVD2010)
Quebec City, Canada, 28-30 June 2010
For more info visit: http://isvd2010.scg.ulaval.ca/

ESA Living Planet Symposium
Bergen, Norway, 28 June - 2 July 2010
For more info visit: http://www.esa.int/LivingPlanet2010/

ISPRS Commission VIII Symposium "Remote Sensing Applications & Policies"
Kyoto, Japan, 9-12 August, 2010
For more info visit: http://www.isprscom8.org/