NewsLetter

ISPRS Student Consortium

Issue No.3, Vol. 8 – December 2014

Interview with
Dr. Batuhan Osmanoglu

Construction of UAS by Slovenian Student Society

Student Activities at
ACRS 2014 and ISPRS-SC SS Myanmar

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ISPRS SC NewsLetter

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Frontpage designed by Ayda Aktaş

Would you like to join SC Newsletter team? Do you want to make a difference? Want to learn new skills?

SC Newsletter is at a stage where getting broader and better demands more people to be involved in the process of it's formation. That's why SC Newsletter team is looking for the following volunteers:

- More **people who would be willing to prepare articles** for existing or new rubrics,
- Designers of Newsletter

If you can help us with any of the above, please let us know!

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And also...
If you **would like to publish your research work** in the SC Newsletter send us your abstract on email written above. We will soon contact you for further information.

Dear ISPRS SC Newsletter readers,

We are about to enter a new year, 2015. Mr. Hamilton Wright Mabie once said: »New Year's eve is like every other night; there is no pause in the march of the universe, no breathless moment of silence among created things that the passage of another twelve months may be noted; and yet no man has quite the same thoughts this evening that come with the coming of darkness on other nights.« New year is usually the accepted time when we make our regular annual resolutions and when we reflect upon how we felt, did things and live allover in the last year. As we start a new year we can gain courage by looking at the good aspects of our past and the glimmers of good fortune that lie in our future.

Take your time for your family, relatives and friends. For a moment try to forget about work or try to do the things for which you do not have time during the year. Together with these words I want to wish our members a happy new year and raise my glass to all the new adventures that are ahead of us.

Urša Kanjir,
ISPRS SC Chair

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ISPRS Student Consortium

Let's Come Together to Make The World Smaller and Smaller, While Enlarging and Powering Our Student Consortium Network!!

JOIN US!!!

Interview
by Ayda Aktas

Dr. Batuhan Osmanoğlu

Dr. Batuhan holds a B.Sc. in telecommunications engineering and a Ph.D. in synthetic aperture radar interferometry time-series analysis. His dissertation was selected to be the most original research, and he is the winner of the University of Miami Rosenstiel School F.G. Walton Smith Prize for 2013. His primary area of expertise is radar remote sensing, and he has worked on applications for observing surface deformation, measuring target velocities, boosting signal-to-noise ratio in target detection algorithms, and radar design and instrumentation. *

Can you explain us what your research is focused at the moment?

These days my work is focused on airborne synthetic aperture radar remote sensing. It is a convoluted expression for saying that I am looking at imagery generated by a radar sensor from a plane. There are of course many different aspects for radar imaging research. We are mostly interested in looking at forest structure to estimate biomass, which has big implications for climate change research and international carbon tax policy.

Can you give us a brief introduction regarding your professional career and why did you choose this profession in the first place.

My career started at Istanbul Technical University when I got interested in radio frequency communication. Electronics and computers always intrigued me, and I thought radio communication offered me opportunities in both fields. I was lucky enough to go to University of Miami in Florida as an exchange student, which operated a satellite remote sensing station just like Istanbul Tech. After an internship at ITU's Center for Communications and Remote Sensing under Prof. Filiz Sunar and working on a senior project on radar altimetry under Asst. Prof. Mesut Kartal I was set on following opportunities in remote sensing.

What are some of the bittersweet experiences you've faced while making a professional career in a foreign country?

I learned a saying when I was a freshman at ITU: "You know everything when you are freshman, you know almost everything when you are sophomore, you know enough when you are a junior, and you know nothing when you are a senior." Something similar happened when I first got to United States. I thought I knew a lot about US, and over the years I realized I knew nothing. Similarly the people I worked with didn't know much about me, ITU or Turkey, so I had to start from scratch.

In your opinion how important is participation of young people in international professional events like Congresses, workshops, etc? What do you think are the benefits of such activities to youth and to profession?

International meetings provide a window to the ongoing research at different institutions, which is a great opportunity to find points a researcher missed on his/her research, as well as getting validation and recognition for the things the researcher does well. For young professionals meetings provide an opportunity to meet with the senior researchers in their field. Social gatherings are often organized around the scientific meetings, which are great opportunities for fostering new relationships within the international research community.

What advice can you give to students and young professionals regarding a successful career?

It may sound a bit cliché but here are some guidelines I learned from successful people I met through the years: Do what you love, love what you do; Work hard before you play hard; Compete with yourself and collaborate with others.

CONSTRUCTION OF UNMANNED VEHICLE FOR SPATIAL ACQUISITION A PROJECT OF SLOVENIAN GEODETIC STUDENT SOCIETY FLYEYE

Nejc Dougan (nejc.dougan@gmail.com); Aleksander Šašo (aleksander.saso@gmail.com); Urh Tržan (urh.trzan@gmail.com); Blaž Vidmar (mr.blazvidmar@gmail.com) and students of geodesy and geoinformatics

What are unmanned aerial vehicles, and why would we build our own?

Use of different unmanned aerial vehicles (UAV) for capturing spatial data is nowadays becoming more and more popular. All over the world many companies already own and use such systems. Existing commercial UAV systems are expensive and University of Ljubljana does not have a similar system yet. So we decided to take matter in our hands and build our own. Our wish was to build a less expensive autonomous vehicle that is suitable for capturing spatial data. The project represented a great challenge, an opportunity to learn about modern technology and a way to contribute to modernity of our Faculty of civil and geodetic engineering in Ljubljana.

Unmanned aerial vehicle is a generic aircraft designed to operate autonomously, or it can also be remotely controlled. Over the years, they had become more affordable and are therefore more and more frequently used as a platform for different sensors. For UAV photogrammetry (photogrammetric measurement platform which operates semi-autonomously or autonomously) purpose, sensor is usually digital camera (compact or single-lens reflex camera(SLR)) or in some cases LiDAR (Light Detection and Ranging). Current standard UAVs allow the registration and tracking of the position and orientation of the implemented sensors in a local or global coordinate system. The system price may vary within some orders of magnitude, depending on the complexity of the system. With costs between €1000 up to several millions of Euro, the system can be similar or even higher priced compared to a standard manned aircraft system (Eisenbeiss, 2009).

Our wish at DŠGS (DŠGS is abbreviation for Društvo študentov geodezije Slovenije which means Slovenian Students of Geodesy Association) is that students could be able to keep pace with the times and get familiar with modern technology for spatial data acquisition in their educational process. That is why we decided to build our own UAV equipped with digital camera. And the main goals we set were:

- our UAV must be built for less than 1000 €,
- flight time must be greater than 10 minutes,
- it has to lift at least 300 grams of payload.

Our quadrocopter named DŠGS FlyEye is now available for research purposes and also to students for making their bachelor or master thesis, which was part of our vision. You can read more about DŠGS FlyEye project on our web page http://www.dsgsflyeye.com/. Feel free to contact us by email.

Unmanned aerial system structure

An unmanned aerial system (UAS) basically consists of following three (Skrzypletz, 2012):

- ground control station (GCS) for controlling unmanned aerial vehicles and payloads,
- unmanned aerial vehicle (UAV) – sensor platform,
- wireless connection between GCS and UAV.

There are many different types of UAVs, but we decided to build multirotor UAV – quadrocopter (UAV with 4 rotors) to be exact. Regardless of multirotor UAV type, it includes the same basic components. Let us look at these components on DŠGS FlyEye quadrocopter. Every component was chosen after internet research (forums, user reviews) and use of online multirotor calculator eCalc (http://www.ecalc.ch/).

Frame

Frame defines UAV shape and it is used as a platform for all other components. Instead of building our own frame, we choose to buy frame kit and slightly modified it. We added another floor and drilled a few holes for cables.

Autopilot

Autopilot controls the flight of UAV. It consists of three different sensors: gyroscope, accelerometer and barometer. Other sensors can be connected on autopilot as well. We are using PixHawk autopilot (new 3D Robotics product).

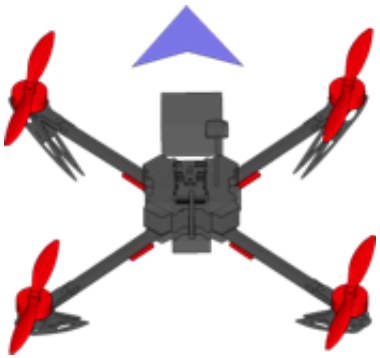
GPS and compass

Modul that combines GPS receiver and compass is connected on autopilot. It provides information about current position and orientation of UAV. It is important that modul is as far as possible from other electronics, because of possible interference. That's why it is stationed on a pole above other components.

Telemetry

There are two main different telemetry systems, which are connected on autopilot. First telemetry is responsible for connection between UAV and computer (GCS). It receives and transmits signal on the 433 MHz frequency and provides GCS with information about: height, position, battery status, tilt and many more. It is also able to receive commands from GCS, but we usually don't use that option. Second telemetry is a receiver, which is responsible for connection between UAV and remote control. It receives commands from remote control on the 2,4 GHz frequency on 8 channels. We use another (fail safe) telemetry, which triggers alarm in case of lost connection between UAV and GCS.

ESCs, motors and propellers



Electronic speed controller (ESC) varies an electric motor's speed, according to autopilot demands. Each motor has its own ESC. Motors are responsible for rotation of propellers. We are using 12-inch plastic propellers.

Battery

Battery provides power for operation of UAV. We use Li-Po battery with capacity of 5000 mAh. It is sufficient enough for around 15 minutes of flying. Battery is connected to a power distribution board which distributes energy for all ESCs and autopilot. We also use sound alarm, which triggers in case of low battery.

Camera and camera dumper

We need a suitable sensor for spatial data acquisition. We are using digital camera Canon IXUS 132. It is a low-cost camera, which basically means, that it does not allow basic camera settings (sensor sensitivity - ISO, time of exposure, aperture values) and remote triggering. To overcome this issue, we have installed open source CHDK (Canon Hack Development Kit). We are using CHDK Plus script, which allows us to set:

- sensor sensitivity ISO 100 (low values, so photos aren't too bright),
- exposure time 1/1000 s (provides sharp photos, regardless moving and vibrations during exposure),
- aperture f = 3,5.

For purpose of remote triggering, the camera is connected to autopilot with mini USB cable. Camera is mounted in a homemade aluminum case, which is attached to frame with two holders. It is designed in such way that eliminates vibrations (necessary for sharp photos).

Figure 1: DŠGS FlyEye quadrocopter equipped with digital camera mounted in aluminum case in the front.

All the components, listed in this section, are part of our UAV – DŠGS FlyEye (figure 1) that weighs around 2 kilograms. For the functionality of entire system (UAS) we also need a computer (GCS), ground telemetry and Li-Po battery charger.

Flight planning and data acquisition

Working process of UAS for photogrammetry purpose contains of three main stages: flight (mission) planning, execution flight plans (missions) and data processing.

We are planning our flights with open source software Mission Planner. Main input data are area of interest, spatial resolution and overlap. Area of interest is defined with polygon. Spatial resolution depends on camera (sensor size) and flight height. Therefore we adjust flight height, to get desired spatial resolution. For photogrammetric purpose, the photos taken with UAV, must overlap in both directions (over-

lap and side overlap around 60 %). According to input data, mission planner sets the flight lines, waypoints for camera triggering and time needed to execute flight. Calculated time does not include take-off and landing time. Autonomy of DŠGS FlyEye is around 15 minutes, that's why we never plan mission longer than 10 minutes. Figure 2 shows mission example planned in Mission Planner. Outer yellow lines present area of interest. UAVs path is defined with inner yellow lines, where the green points are waypoints for camera triggering.

Figure 2: Mission example planned in Mission Planner

After mission planning is over, we upload mission onto the autopilot. We take-off manually to a few meters above ground, and then we switch to automatic mode. Autopilot carries out the uploaded mission and triggers camera on each waypoint. Mission planner is then used as ground control station. Telemetry allows us monitoring of the flight, during the mission. At the end of the mission, UAV returns to point of take-off and lands automatically. If there are high objects nearby, we take over the controls and land manually. Mission results are overlapping images of area of interest.

For the purpose of georeferencing we need to measure certain number of ground control points (GCP) coordinates, which should be placed evenly on the area of interest, to minimize the error in scale and orientation. Coordinates are usually obtained with GNSS measurements. We can measure coordinates of well-defined terrain points or use specially designed targets that we place on the landscape. Quality control of georeferencing is carried out on checkpoints, which are obtained in the same way as GCPs.

Data processing

Input data for photogrammetric processing are:

- overlapping images of area of interest (UAS mission),
- ground control points and check points coordinates (GNSS measurements).

Photogrammetry data processing is made in one of the available softwares for producing photogrammetric data out of aerial images (3D Survey, Pix4D, PhotoScan and others). Regardless of choice, basic procedure is the same. First of all, we need to import images and GCPs coordinates. Based on image matching algorithms 2D-mosaics are created and bundle block adjustment, which leads to 3D point cloud, can be carried out. Filtered point cloud can be used to create digital surface model (DSM). With DSM and 2D mosaic of aerial images, we can create orthomosaics or orthophotos. That is carried out with perpendicular projection or transformation of 2D-mosaic of aerial images over DSM.

Results

Unmanned aerial system DŠGS FlyEye, combined with GNSS measurements and use of suitable software allows us to create different spatial products. So far, we have managed to create most common spatial products such as: aerial images and videos, 2D-mosaics, point clouds, volume calculations, different types of digital models (digital surface model (DSM), digital terrain model (DTM)), orthophoto and contour lines generated from DTM. Some of them are shown in figures below. All of listed products can be used in different professions. Volumes are important for quarries, landfill sites, construction sites and as basis for damage assessment in case of landslides. Different types of digital models are frequently used for GIS analysis. Furthermore, every rural development and urban planning project needs a spatial data as basis for planning.

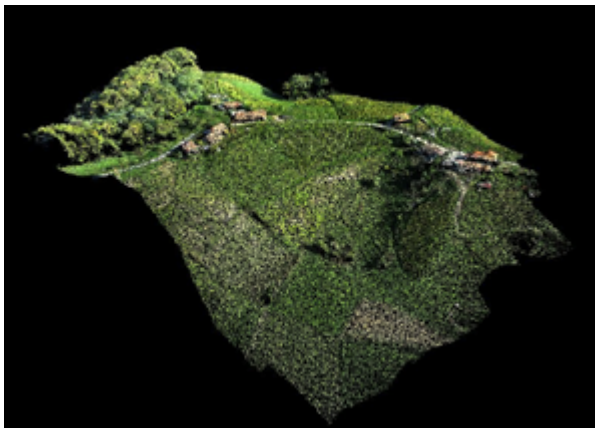


Figure 3: Point cloud of vineyard, created out of DŠGS FlyEye aerial images

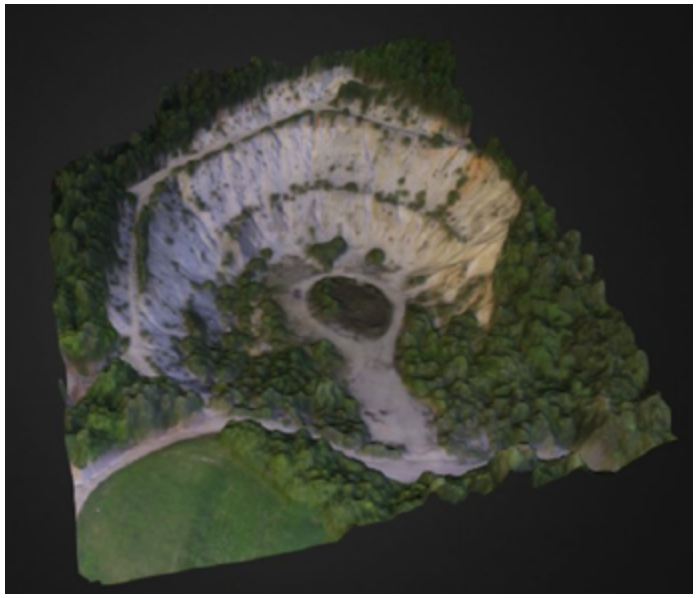


Figure 4: Digital model of quarry, created out of DŠGS FlyEye aerial images.

Figure 5: Orthophoto of the school area in Radovljica, created out of DŠGS FlyEye aerial images.

Besides common spatial products, we tried to expand the scope of DŠGS FlyEye. We added another camera with few modifications, so it can detect reflection in infrared part of spectrum. Combined with red part of RGB image allows us to create vegetation index (VI) or normalized vegetation index (NDVI). Figure 5 shows first NDVI.

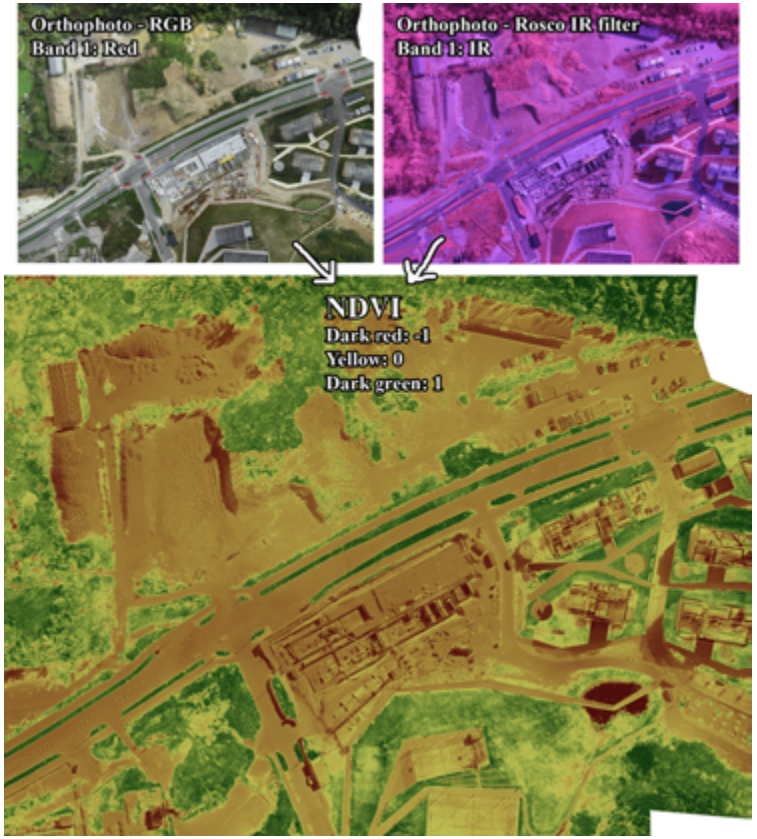


Figure 6: NDVI created out of DŠGS FlyEye aerial images.

We also tried to reconstruct building model out of aerial images and ground images. Aerial images from the top were taken autonomously during mission. Then we flew in manual mode and took side images. Combined with images taken from the ground we reconstructed our first building model (figure 6). All of the spatial products, created with DŠGS FlyEye were processed in PhotoScan.

Figure 7: Building model created from DŠGS FlyEye aerial images and ground images

Conclusion

We could say that we accomplished all of our goals that we set for ourselves at the beginning of the project. DŠGS FlyEye is now functional and available for all students of our Faculty of civil and geodetic engineering in Ljubljana, which are eager to get familiar with this technology, or use it for research. Although DŠGS FlyEye is completed, we are still keen on exploring the boundaries of this technology. We wish to improve it, make it better, more reliable and more useful.

References

Eisenbeiss, H., 2009. UAV Photogrammetry (doctoral dissertation). ETH Zurich, Zurich.

Skrzypletz, T. (2012). Unmanned Aircraft Systems for Civilian Missions. BIGS Policy Paper February 2012.

End...

MASTER SCHOLARSHIPS

International joint masters in limnology and wetland management

http://www.wau.boku.ac.at/en/ihg/master-programme/international-joint-master-in-%20limnology-wetland-management/fellowships/

MESPOM (Erasmus Mundus scholarship)

The MESPOM Consortium is inviting applications for the Erasmus Mundus Masters Course in Environmental Sciences, Policy and Management (MESPOM) in 2015-2017.

http://mespom.eu/news/2014-12-03/apply-now-for-mespom-2015-2017

PHD SCHOOLARSHIPS

University of Edinburg PhD Opportunities

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http://datascience.inf.ed.ac.uk/apply/

POSTDOC OPPORTUNITIES

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GIS and Remote Sensing – support research/understanding of the hydrological, hydraulic & ice regimes of Mackenzie and Saskatchewan River basins.

http://jobs.usask.ca/job_postings/jobs/research_giws_pdf.php#.VJwafkALb8

JOB OPPORTUNITIES

Jobs for geoscientists

http://www.digital-geography.com/jobs-digital-geoscientists/

Assistant Geomatics Aerial Surveyor Job Position at East Midlands, UK

http://www.gisblog.com/assistant-geomatics-aerial-surveyor-east-midlands-uk/

Canadian Geomatics Employment Center

http://gisjobs.ca/

Report on the Student Activities in the 35th Asian Conference on Remote Sensing (ACRS 2014)

Sheryl Rose C. Reyes, Wilson Wong and Hengqian Zhao

The 35th Asian Conference on Remote Sensing was successfully organized at Nay Pyi Taw, Myanmar. This year, 415 participants of scientists, academicians, researchers, students, professional and practitioners from 32 countries attended the conference from 27th to 31st October 2014. Various sessions of the conference such as keynote speeches, technical presentation sessions (172), poster presentation sessions (61), and exhibitions (25) provided a platform for students and young researchers to learn, discuss and enhance their knowledge and experience in related research fields.

The Asian Association on Remote Sensing Student Group (ASG) is the organization embedded in AARS and acts as the main body in the preparation of the student activities in ACRS. As in previous years, WEBCON4, Student Session, and Student Night were organized during the conference. This year WEBCON4, a web contest for students and young scientists, attracted seven (7) entries from Taiwan, Japan, Malaysia and Myanmar. The main objective of the contest was to promote the development of web materials which may give us a future vision of sharing tools related to geo-information sciences over the Internet. The winners' received awards with certificates of commendation and the prizes were presented by Dr. Fuan Tsai of National Central University (NCU), Taiwan and Dr. Emmanuel Baltsavias of ETH Zurich, Switzerland. The gold prize was given to the team from National Cheng Kung University (NCKU), Taiwan for their entry entitled, "3Doodel: Building Model Retrieval System for Automatic City Modeling."

Figure 1. The 3Doodel entry being presented by NCKU during WEBCON4

The traditional White Elephant session for this year was presented by Prof. Armin Gruen, Prof. Ian Downman, and Prof. Shunji Murai. Participants in this session learned and enhanced their knowledge on many tips in writing thesis, making research proposal and giving oral presentation from the speakers.

The Student Session aims to provide students with an opportunity to introduce their universities and the ongoing student activities and researches in their respective departments and laboratories. This year, a total of 15 presentations given by participants from Myanmar, China, Philippines, China Taipei, Hong Kong, Malaysia and Japan. Each presenter introduced their own university or institute such as the available facilities, programs/activities, and ongoing research projects. This session was chaired by Sheryl Rose Reyes, the First Co-Chair of ASG, from the University of the Philippines. Moreover, presentations from ASG and the International Society for Photogrammetry and Remote Sensing Student Consortium (ISPRS-SC) were also delivered by their respective board members. The students were very enthusiastic in presenting their universities and sharing the different and unique activities in their universities such as remote sensing debates, participation in international activities and social events. In addition, Mr. Jakrapong Tawala of the Geo-Informatics and Space Technology Development Agency (GISTDA), a public organization in Thailand, discussed the future activities of the said organization, which includes the ASEAN Center. The ASEAN Center is expected to host a number of trainings and workshops that will target young scientists and students in the field of remote sensing and geo-information sciences.

Figure 2. Photos during the Student Session.

The Student Night was organized in Man Myanmar Hotel and yearly, students look forward to attending this social event because of the opportunities to meet other students from other Asian countries and to talk with professors coming from international universities. The Student Night began with opening remarks by Dr. Fuan Tsai. The event was hosted by Hengqian Zhao, ASG's Second Co-Chair from the Chinese Academy of Sciences in Beijing, China. Cultural dance was performed by the students from Myanmar followed by singing performance from the participants. A $100 prize was given by a very kind donor who did not disclose his name as prize for the best singers of the night. The winner for the best performance was awarded to the student volunteers from Myanmar.

Figure 3. Photos of the Student Night

The ASG was able to successfully organize these student events in ACRS 2014. In addition, the following National Coordinators were also present during the events: Mr. Jakrapong Tawala (Thailand), Dr. Jow Siow Wei (Malaysia), Mr. Jhe Syuan Lai (Taiwan) and Dr. Kyaw Zayar Htun (Myanmar) and ASG board member from Malaysia, Mr. Wilson Wong. ASG aims to continue to provide Asian students and young researchers opportunities to learn, present and connect with fellow students, researchers and experts in the field of remote sensing and geo-information sciences.

GIS Ostrava 2015
Ostrava, Czech Republic, 26-28 January 2015
For more info visit: *http://gis.vsb.cz/gisostrava/index.php*

SPIE Photonics West 2015
San Francisco, California, USA, 7-12 February 2015
For more info visit: *http://spie.org/photonics-west.xml?WT.mc_id=RPWCAW*

ISPRS WG: 3D-ARCH International Workshop
Avila, Spain, 25-27 February 2015
For more info visit: *http://www.3d-arch.org*

ISPRS WG: Laser Scanning Applications
Cologne, Germany, 16 March 2015
For more info visit: *http://www.tr32db.uni-koeln.de/workshops/overview.php?wsID=5*

Photogrammetric Image Analysis (PIA15) & High resolution earth imaging for geospatial information (HRIGI)
Munich, Germany, 25-27 March 2015
For more info visit: *http://www.pf.bgu.tum.de/isprs/pia15/*

Joint Urban Remote Sensing Event (JURSE 2015)
Lausanne, Switzerland, 25 March - 01 April 2015
For more info visit: *jurse2015.org/*

ISPRS & CIPA Workshop: Underwater 3D Recording and Modeling
Piano di Sorrento, Italy, 16-17 April 2015
For more info visit: *http://3dom.fbk.eu/files/underwater/index.html*

Innsbruck Summer School of Alpine Research 2015 - Close Range Sensing Techniques
Obergurgl, Austria, 5-11 July 2015
For more info visit: *http://www.uibk.ac.at/geographie/summerschool/*

XXIIIrd ISPRS Congress
Prague, Czech Republic, 12-19 July 2016
For more info visit: *http://www.isprs2016-prague.com*

The 12th ISPRS Student Consortium & WG VI/5 Summer School

Floyd Rey P. Plando

The 12th ISPRS Student Consortium & WG VI/5 Summer School was held in the University of Forestry, Yezin, Nay Pyi Taw, the new administrative capital city of Myanmar, from 1st to 5th of November 2014, with the theme "Geospatial Technology for Environmental Management and Monitoring". This extensive, five-day summer school provided opportunity for the participants to update on the most recent advances in the field of GIS and remote sensing.

This summer school, which was participated by students and young researchers from Myanmar, Thailand, Vietnam, Indonesia, and the Philippines, consisted of series of lectures, including LiDAR processing, analyzing statistical data, mapping and modelling. Notable lecturers from their respective fields were invited to discuss. On the first day of the session and as an opening remark, Dr. Myint Oo, the university rector warmly welcomed all the participants to the University of Foresty, which is the only university in Myanmar specializing in forestry. This was followed by Professor Jun Chen, from the National Geomatics Center of China and ISPRS President, where he introduced GlobeLand30, a web-based information platform providing high resolution land cover data which is available for browsing and download. Then, Dr. Emmanuel Baltsavias from ETH Zurich, gave lectures about photogrammetry and remote sensing techniques. The second day session was spearheaded by Dr. Martin Isenburg of rapidlasso GmbH. He introduced his LAStools software, conducted hands-on sessions, and discussed extensively the LiDAR processing course. On the third day, the participants visited the vast zoological garden of Nay Pyi Taw. Moreover, they also went to Uppatasanti Pagoda, a prominent landmark in Nay Pyi Taw and stands 99-meter tall. Myanmar is definitely very rich not only in resources, but also in history, tradition and culture which can be reflected in their gigantic, gold-plated pagodas, Buddhist carved statues and portraits and decoration around it. To continue the session, Dr. Moe Myint, research scientist, founder and Chief Scientist of the Mapping and Natural Resources Information Integration of Switzerland, headed the fourth day of the summer school. Some of his discussions included land cover classification, analyzing data, applications of geoinformatics in forestry, and how to create the field sampling design using statistical methods. On the last day of the summer school, Dr. Soe Win Myint, professor from Arizona State University, USA, delivered lectures on land use/land cover change with regards to regional climate change using a numerical modeling approach,urban heat island, crop type mapping, and evapotranspiration modeling for agriculture in response to drought. The day ended by giving certificates of participantion to the attendees of the summer school, led by by Dr. Tin Aung Moe and Dr. Kyaw Zayar Htun, members of the local organizing committee.

Participants together with the lecturers and organizing committee of the 12th ISPRS SC and WG VI/5 SS

Indeed, it was a successful event. It is one of the many workshops that should not be missed, because it serves as an avenue for young researchers to be more knowledgeable in utilizing GIS and remote sensing techniques in various disciplines as taught by the experts. Not only that, it also opened doors to meet fellow young researchers, who can be future collaborators. Hoping to see more people joining in the next international summer schools.

One of the stone-carved portraits depicting Sumedha doing great charity (11th of the 24 Buddhas).

The stunning Uppatasanti pagoda at night time

INTERESTING LINKS

PPgis.net
http://ppgis.iapad.org/

GIS Cloud
http://www.giscloud.com/apps/

RESOURCES

Resource for Fellow Geoscientists
http://opengeosci.org/

Old Maps Online
http://www.oldmapsonline.org/

EDUCATION

North Dakota – Geographic Information Science Graduate Certificate
http://und.edu/academics/extended-learning/online-distance/

FREE SOFTWARE

QGIS 2.6
http://www.qgis.org/en/site/

JOURNALS

ISPRS International Journal of Geo-Information
http://www.mdpi.com/journal/ijgi

TUTORIALS

Resource for Geospatial students and educators
https://www.youtube.com/channel/UC89oeNETuxB9PfWfZkeI2Sw

eBook

Dive into Python
http://www.diveintopython.net/

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Our previous Newsletter issues

ISPRS-SC TEAM
WISHES YOU JOYFUL AND PROSPEROUS

Happy New Year