NewsLetter

ISPRS Student Consortium

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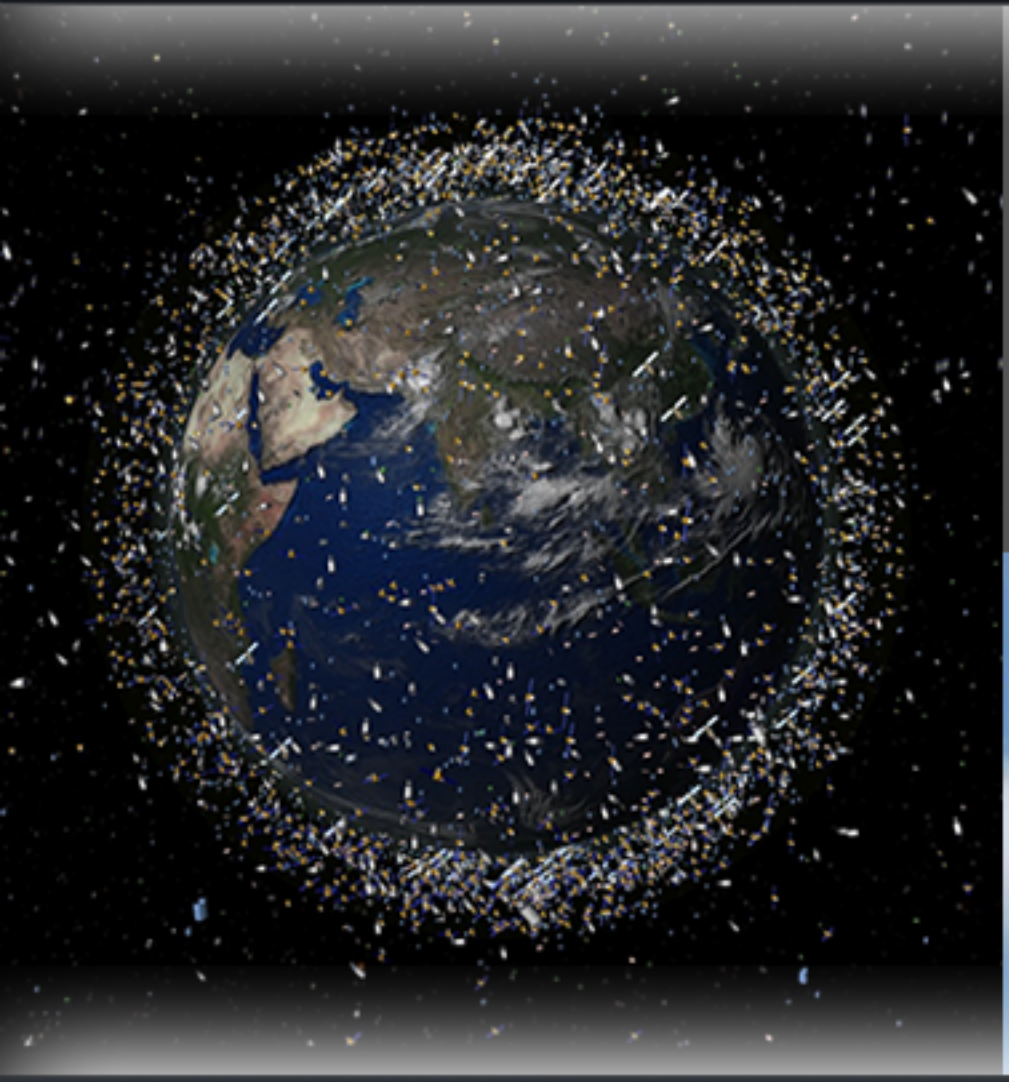

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ISPRS SC NewsLetter

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

In the main article of this issue of the SC Newsletter we are focusing on space sustainability.
The word satellite comes from the Latin word satelles, which means attendant or guard. It is widely known that there are thousands of satellites helping daily life on Earth, but most people do not know what happens with satellites that complete their mission or what happened with all the objects that were ever sent to space.
How many of you are actually aware that tens of millions of pieces of space debris are orbiting the Earth and that some of these parts are older than 50 years and still out there, dysfunctional? Keep in mind that the first artificial Earth satellite, Sputnik 1, was sent to space in 1957. Since this milestone, the number of satellite launches has steadily increased and continues to grow. Increasing amounts of space debris threaten the sustainability of outer space itself.
Rather than seeing space as an infinite resource, it is time to start thinking widely not only about sustainability on Earth but also about sustainability of space. A sustainable outer space is crucial for the continued functioning of any human-made objects that orbit the Earth.
More "whys", "whens" and "whats" about the issue can be found in the content of the article on Space sustainability. What is certainly unambiguous is that future space missions must be made sustainable by including plans for safe disposal of material when they are completed.
I wish you happy reading of this new issue and a relaxing and fun-filled summer!

Urša Kanjir,
SC Chair

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

JOIN US!!!

Interview
by Ayda Aktaş

Dr. Lena Halounová

Dr. Lena Halounová is the head of the Remote Sensing Laboratory (RSL) of the department of mapping and cartography at the Faculty of Civil Engineering of the Czech Technical University in Prague and the chairperson of the Czech Society for Photogrammetry and Remote Sensing (SFDP). She is also the congress director of XXIIIrd ISPRS 2016 Prague.
She received her Ing. (civil engineer) at the Faculty of Civil Engineering, Czech Technical University Prague, branch Water Constructions and Water Management in 1980 and PhD. (Three-dimensional nonstationary flow in open channels) at the same faculty in 1989.
She defended her habilitation on the topic of automated classification of black and white aerial photographs and radar data at CTU in Prague in 2005.

Can you explain to us what your research is focused on at the moment?
Our laboratory has been working on two projects during the last few years. The first one is conducted by my colleague Ivana who has been using interferometry to monitor the stability of surroundings of an open brown coal mine. It is the mining company which asked us to offer an independent measurement of subsidences for comparison with their own regularly performed levelling. The second project has focused on evaluation of land use development in fifty cities in our country during last forty years – twenty during an old political regime and twenty a since the beginning of the new. Evaluation of urban development was combined with measurements of road traffic intensity and its changes in these cities. The urban development is has been documented in a GIS vector database of cities in the years 1970, 1980, 1990, 2000, and 2010. The data were also used for an atlas of 36 selected cities. The atlas is bilingual and includes statistics on the individual cities. A deep analysis of the relationship between urban development, road traffic intensity and other statistical data is still in progress.

Why did you decide for this profession in the first place (maybe you can tell us something more about your first steps)?
My profession is a result of my two fears. The first one was a fear of my bad memory, which could be a reason that I was able to become a doctor. That is why I studied the same branch as my father – water management, where I even defended my Ph.D. My second fear was that I would not be a good mother if I were employed at a common position with regular working hours, but at a university I would be able to be more flexible. The only vacant place at my faculty was in the Remote Sensing Laboratory. The head of this laboratory answered my question – "I have no idea what is remote sensing is, you do not mind?" – with "No, you will master it. " That was in 1985. Thanks to my part-time employment at a private company from 1994 to 1999, I have also been involved in GIS. That is why I am now teaching and have projects in remote sensing, image processing and GIS.

What advices would you give to students and young professionals regarding successful career?
Be polite, kind and modest. Don't look down on anybody, but don't humiliate yourself. Listen to people and then make your own opinion. This will allow you to find and have good friends, who will give you a hand at the moment you might need it. All of that is a foundation for you to do what you want under good conditions. Afterwards, it will be your own fair work which will bring you necessary results for a long lasting career.

How do you see the role of the Student Consortium in the ISPRS organization?
I think it is prepares a new generation of our colleagues, whose work we can see, analyse, help and profit from, as your members can give us new ideas, or even show what we do as in a mirror. I think that there is a mutual influence between the ISPRS members and the Student Consortium, just as in families. We have an experience and you are eager to do more than we have done. We can show you the way, give you advices, but it is your generation who is slowly taking over the sceptre.

What is the role of youth involved in the profession (photogrammetry and remote sensing) in Czech Republic in general?
They are employed in various positions – using these branches as a main activity, using them as a complementary knowledge to GIS. They can be found in local authorities, mapping agencies, private companies, schools, etc.

In your opinion how important is the participation of young people in international professional events such as summer schools, congresses, and workshops? What do you think are the benefits of such activities to youth and to the profession?
It is the most important way to learn what is going on in our "world", to improve one's own knowledge, and to find friends and colleagues for a future collaboration. Progress in technical branches is so quick that such meetings and activities allow us to get "on line" in a very short and definitive way.

Common Horizons

Written by ISU SHS SP-13 participants

Common Horizons is this year's final product of the Southern Hemisphere Summer Space Program (**SHS-SP**) 2013. SHS-SP is **International Space University**'s (ISU) annual program provided in partnership with the **University of South Australia**. The program is designed with a particular eye to the southern hemisphere environment and is built around the themes of space applications, space policy and space services, while giving a well rounded exposure to the principles and concepts involved in space science, space systems engineering and technology, space business and leadership and space legal and regulatory issues.

The combination of experience among the 37 participants from 11 countries that have lived the interdisciplinary, intercultural, and international experience has resulted in the paper that creates awareness of community dependence on access to space capabilities for sustainability on Earth. The paper examines the connection between sustainability on Earth, outer space activities, and sustainability of the space environment. It further proposes solutions to assist the use of space systems for sustainability on Earth and ways in which to help sustain the space environment into the future. These topics are considered from the perspective of the 'Global South', that means countries that lie in whole or part south of the Tropic of Cancer.

In this Newsletter we are publishing only partial content of the White paper; section that is focusing on Space sustainability.

http://commonhorizons.wordpress.com/

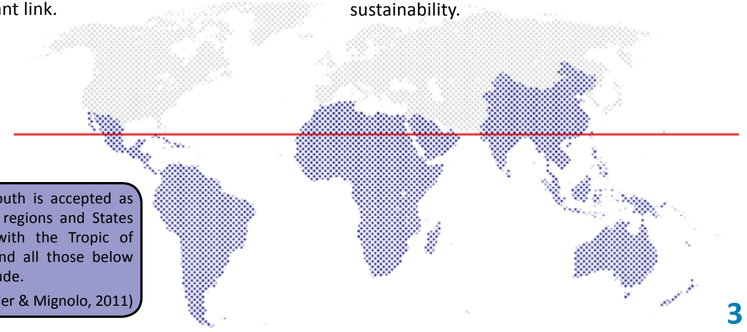
As members of an international community we look out and see a common horizon. To us, that horizon is not only the physical intersection of Earth and Space, but also a symbol of our collective interest in establishing the sustainable use of space. Outer space is the province of all humankind, and for this reason it is our responsibility to manage this important natural resource if we are to continue to benefit from it.

Introduction

Space sustainability is the ability of all humanity to continue to use outer space for peaceful purposes and socioeconomic benefit over the long term (Secure World Foundation, 2013). In modern society we all benefit from access to hundreds of satellites that provide navigation, weather forecasting, land management, telecommunications and other valuable services. Satellite capabilities are a fundamental part of the strategy for addressing the eight Millennium Development Goals (MDGs) as highlighted by the United Nations (UN). Thus, to ensure our Earth is sustainable, a sustainable space environment is crucial. Common Horizons emphasizes this important link.

Space Sustainability

Outer space is the province of all humankind. Most space activities occur in near-Earth space, which extends from an altitude of about 100km to the geostationary Earth orbit (GEO) at 36,000km. The sustainability of the near-Earth space environment is at risk, and we must ensure that this environment remains sustainable to allow future generations to benefit from space technologies as much as we do now. Use of these technologies is under threat from overcrowding of certain orbits, limited availability of radiofrequencies, and increases in orbital debris. Each year the UN adopts a Resolution affirming the principles of the Outer Space Treaty, and concerns for space sustainability.



Global South is accepted as being all regions and States aligned with the Tropic of Cancer and all those below that latitude.
(Levander & Mignolo, 2011)

The Hostile Space Environment

Near-Earth space is a hostile environment where space debris and space weather threaten spacecraft. Space debris can cause catastrophic damage to spacecraft, while space weather can damage space systems and affect terrestrial infrastructure.

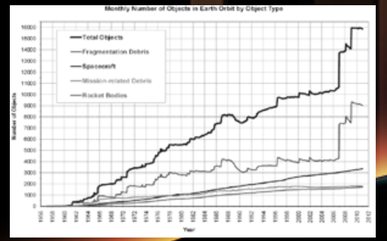
Orbital Debris

Orbital debris are “man-made objects in orbit that are not, or are no longer, carrying out a useful function” (Pisacane, 2008). Orbital debris threaten sustainable space activities and have the potential to cause extensive damage to the valuable assets now existing within our near-Earth space environment. In the worst case, access to this environment could become completely unviable.

The three main causes of artificial orbital debris are satellite launches, satellite deteriorations and satellite fragmentations (Kennewell, 2013). Other contributions to debris include jettisoned items such as clamps, lens covers, de-spin devices, pyrotechnic release hardware, and wrap around cables lost from human space exploration (National Research Council, 1995).

Debris are spread across all orbits, notably those used by active satellites and the International Space Station. Pieces of debris as small as 1cm, which travel at relative speeds as high as 10km/s, are sufficient to cause catastrophic damage in a collision event (Liou and Johnson, 2009). Orbial debris pose a threat to people and terrestrial infrastructure on re-entering the atmosphere and hitting the Earth’s surface.

While the threat of orbital debris has been increasing steadily since the launch of Sputnik in 1957, several notable incidents have dramatically increased the severity of the problem. In 2009, an accidental collision between the Iridium-33 and Cosmos-2251 satellites created 1366 traceable pieces of debris (Kelso, 2009). In addition to this accidental event there have been intentional anti-satellite tests, which have resulted in hundreds of thousands of additional pieces of debris. There are serious implications for the sustainability of space if orbital debris continue to be generated at current rates.



Historical space debris trends (UNCOPUOS, 2011)

In 1978, Donald Kessler, an American astrophysicist and former NASA scientist, conceptualised The Kessler Syndrome, stating that as more satellites are launched into orbit the likelihood of collisions increases to such point that an in-space collision would result in a cascading effect of further collisions. This would lead to the establishment of a ring of debris around the Earth making the space environment inaccessible (Kessler and Cour-Palais 1978). In 2010, Kessler stated that the amount of debris orbiting Earth would increase exponentially with time even though a zero net input were maintained (Kessler et al. 2010). This implies that even if we stopped launching satellites into space, debris would still be created and the possibility of this cascading effect would still exist.

The significant threat to space sustainability posed by orbital debris has been identified by launching States worldwide. Since 1995 every NASA program or project requires a detailed orbital debris assessment report. The assessment report is required to demonstrate the measures taken to mitigate debris throughout the project lifecycle. The United States government developed ‘Orbital Debris Mitigation Standard Practices’ based on the NASA guidelines. Following this, Japan, France, Russia, and the European Space Agency (ESA) developed their own orbital debris mitigation guidelines (Stansbery, 2013). The Inter Agency Debris Coordination Committee (IADC), comprised of ten major space agencies, adopted a set of debris mitigation guidelines in 2002. Only two of the space agencies representing China and India are from the Global South. This under-representation of the Global South indicates that common ‘best practices’ for orbital debris mitigation are not necessarily applied by emerging space nations or their space entities. It is essential to continue international cooperation to expand appropriate and affordable strategies to reduce the threat of orbital debris on all future space missions (United Nations, 2008).

Optical and radar systems are employed in an effort to predict collisions with debris; however, objects that cannot be seen by the sensors used have necessitated the addition of physical protection against the event of a collision (JAXA, 2003). Spacecraft shielding and lifelong operational procedures have become critical design features for spacecraft and satellites. Various measures such as adding low degradation coatings on spacecraft and satellites, propellant depletion burns, and venting of excess gasses prevent the creation of debris.

At the end of the operational life of a satellite, a de-orbit maneuver in which thrust is used to force a Low Earth Orbit (LEO) satellite into a high drag orbit, has been used successfully to decrease the orbital life of the satellite. For satellites in higher orbits such as Medium Earth Orbit (MEO) and GEO, end-of-life de-orbiting is not a feasible solution. Therefore the IADC recommends that satellite operators should move defunctional satellite into some orbit significantly above GEO, known as a graveyard orbit (IADC, 2007). This action does not remove the satellite, but rather relocates it to an orbit where it is far less likely to collide with other objects.

Mitigation and removal are two approaches that can be utilized to solve this problem of space debris. Mitigation refers to “reducing the creation of new debris” whilst removal refers to “either natural removal by atmospheric drag or active removal by human-made systems” (Ansdell, 2010). Active debris removal is currently being researched worldwide but it may be many years until it can be practically demonstrated.

Despite these preliminary efforts to mitigate space debris, stronger global coordination and more innovative solutions are needed to effectively solve these problems in the future.

Space Weather

Space Weather is the interaction of energetic particles and radiation ejected from active regions of the Sun, with the Earth’s magnetic field. These particles and radiation are formed in solar flares and coronal mass ejections (CMEs). The interaction occurs in the near-Earth space environment and can adversely affect space and terrestrial infrastructure.

Spacecraft manufacturers and satellite operators endeavor to reduce the effects of high intensity solar events on their systems. These can disrupt spacecraft operations by causing failures of the on-board electronics that control critical systems such as communications and navigation. In severe cases satellites may be rendered non-operational, which contributes to further space debris.

In October 2003, a solar flare of significant intensity was observed by the ESA SOHO satellite and proceeded to impact the Earth. This storm increased atmospheric ionization, causing problems to satellites and radio frequency communications. Sensors aboard the NASA ACE satellite, which measure energetic particle fluxes, were severely affected by the storm and did not return to normal functionality until several weeks later (Weaver et al. 2004). There have been several other satellites in LEO which have experienced failures attributed to space weather events, such as the Galaxy 4 failure in 1998 (Baker, 2001).

One method of mitigating space weather problems is by improving the monitoring of solar activity and solar wind with a number of terrestrial solar observatories, as well as dedicated solar weather satellites for remote sensing measurements (Baker, 2002). Early warning of space weather events through automated monitoring techniques is necessary to ensure sustainability of space systems. It allows more time for spacecraft operators to prepare for such events by switching off non-essential electronic systems, preventing interference, power disruptions and permanent damage to systems. Space weather forecasting is reasonably accurate for short term predictions of phenomena such as sun spots, solar flares, coronal mass ejections and geomagnetic fields (Space Weather Prediction Center, 2013). This suggests current space weather models are not accurate enough to allow for long term predictions.

Space Situational Awareness

Space situational awareness (SSA) can be defined as the characterizing of the space environment and its effects on space activities. “SSA combines positional information on the locations of objects in Earth orbit using optical telescopes and radars, commonly known as space

Space Sustainability

surveillance, with information on space weather" (Weeden, 2010). SSA is becoming more important because a growing number of nations are using the space environment, causing it to become more congested (Ausmin, 2010).

Space objects need to be tracked in order to prevent collisions from occurring and contributing to orbital debris or causing damage to operational spacecraft and satellites. It is important to protect the assets on which many industries worldwide depend.

Currently there are two main state level SSA networks; the United States Strategic Command (USSTRATCOM) Space Surveillance Network (SSN) and the Russian Space Surveillance System (SSS), both legacies of Cold War ballistic missile warning programs. The United States' system is the largest and now includes ground based radar and optical sensors as well as an optical space-based surveillance sensor. Some of the Russian sensors are located in former Soviet republics and operate under bi-lateral agreements (Bobrinsky, 2012). ESA is also developing its own SSA system which will undergo a test-and-evaluation process during 2013-2016 (Bobrinsky and Koshny, 2011).

The Global South offers unique fields of view to vast portions of near-Earth space that are currently unmonitored by ground based SSA (Weeden, 2010). The sensors for the two largest Space Situational Awareness Systems (the United States SSN and Russian SSS) are primarily located in the Northern Hemisphere. Introducing optical and radar sensors in Australasia, Africa and South America would allow for more accurate tracking of space debris and prediction of orbital collisions, complementing existing systems in the Northern Hemisphere (Smith, 2012).

Partially filling the gaps left by the United States SSN are the International Scientific Optical Network (ISON) and the Space Data Association (SDA), both non-governmental collaborative efforts to increase space situational awareness. ISON is an international partnership of 11 countries, mostly located north of the Equator, which uses small optical telescopes to observe and track objects in orbit (Agapov and Molotov, 2008). The SDA is a collaborative network of satellite operators that combines satellite orbital data provided by its members and notifies them of potential collisions (Space Data Association, 2010).

The unclassified data provided by the United States SSN are much less accurate than the classified positional data held by USSTRATCOM. National security requirements mandate that classified data is not shared with satellite operators or other entities not authorized to hold that data. The United States does however provide concerned parties with information pertaining to potential collisions of their assets, as they have a vested interest in maintaining space sustainability.

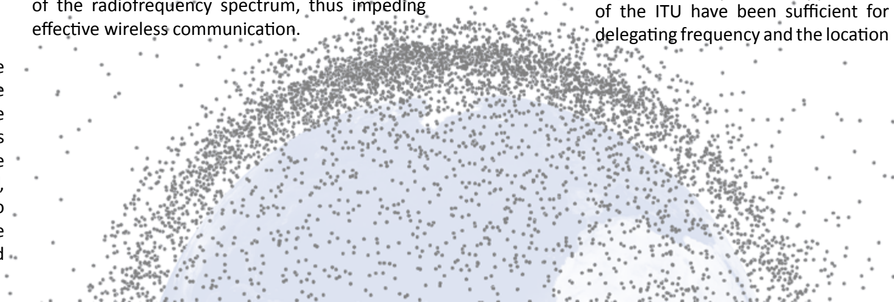
Use of Near-Earth Space is Limited

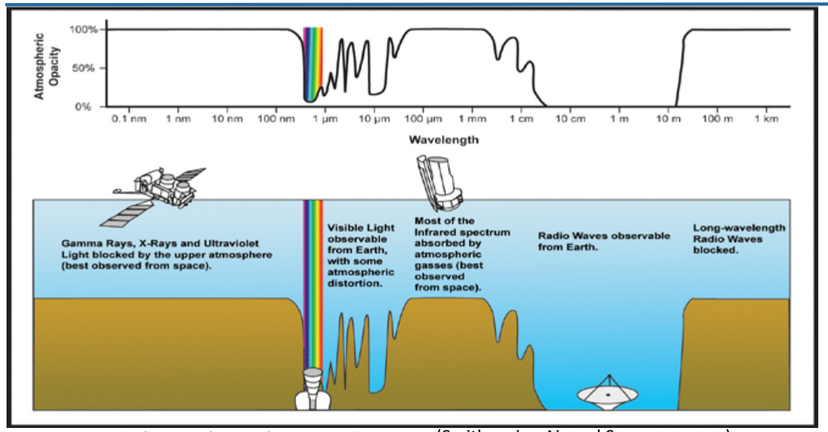
Space activities are dependent on the limited availability of resources, namely the physical location of orbits and the use of the radiofrequency spectrum. As a result of society's increasing reliance on satellite applications, these resources are becoming increasingly congested, contested, and competed. It is essential to properly manage these resources to continue to benefit from outer space applications and ensure space sustainability.

Management of the Radiofrequency Spectrum

The radiofrequency spectrum is essential for wireless communication used by satellites. The electromagnetic spectrum is the entire range of frequencies of electromagnetic radiation, the physical properties of which, dictate that not all of the spectrum can be used for satellite communications, making it a scarce commodity. The biggest challenge is that the Earth's atmosphere absorbs signals transmitted over most frequencies within the electromagnetic spectrum (shown in the image on the right). As a result, there are limited frequency windows that are not substantially impeded, and which are useful for satellite communications (He et al. 2010).

The frequency window used for satellite communications is known as the radiofrequency spectrum. These frequencies are allocated by the International Telecommunication Union (ITU) in coordination with governments of the participating countries (ITU, 2010). This management is essential to avoid harmful interference between different users of the spectrum. Harmful interference is radiation that endangers the use of the radiofrequency spectrum, thus impeding effective wireless communication.





Atmospheric windows in electromagnetic spectrum (Smithsonian Air and Space museum)

Increased prevalence of modern technologies places demand on the radio spectrum, making the allocation of frequency windows a challenge. By managing these resources, the ITU is addressing space sustainability and attempting to ensure equitable access to the radiofrequency spectrum and satellite orbits. In the past the approaches of the ITU have been sufficient for delegating frequency and the location of satellite orbits but an increase in the number of operational satellites will make management a greater challenge.

Both radio frequencies and the locations of satellite orbits for GEO are limited. In fact, the Federal Communication Commission estimates that the United States will run out of available spectrum in 2013 (Pretz, 2012). This has significant ramifications for the continued development of the United States' communications infrastructure that directly feeds into the telecommunication industry.

The availability of radiofrequency spectrum and orbital slots is under threat as more satellites are being launched that require the use of these resources. Regulation of these orbits is necessary to decrease the probability of harmful interference or collision within and between orbits.

Orbital Congestion

With more satellites entering operation, the available orbital slots are becoming more crowded and therefore limited. Orbits such as the GEO orbit and the sun-synchronous polar orbits serve unique functions, and it is paramount that they continue to be managed efficiently for future use.

The Outer Space Treaty (1967) states that "outer space is not subject to national appropriation", which means that no one can claim ownership of satellite orbits. Coordination among States is currently the only mechanism to regulate the launch and operation of satellites in Earth orbit. With more and more satellites being launched, the limited area in which satellites can be operated is becoming congested (Ausmin, 2010).

In order to avoid interference of the radiofrequency spectrum, GEO satellites which have been allocated with the same band of electromagnetic spectrum are spaced between 1.5° and 5° apart under international treaty by the ITU (Smith and Baumann, 2011). These spaces, which separate GEO satellites, are orbital slots and are becoming a rare and sought after resource as demand increases and more countries plan to gain access to space by launching satellites.

Some LEOs are also becoming congested. Polar orbiting, sun-synchronous satellites in particular are very useful for optical remote sensing, which is the reason for these orbits becoming crowded (Gini, 2012). Collaborating on satellite projects in these orbits is one way States are currently cooperating to reduce mission redundancy and costs. Further collaboration by space players is required to reduce congestion.

Complete paper and references can be found on:

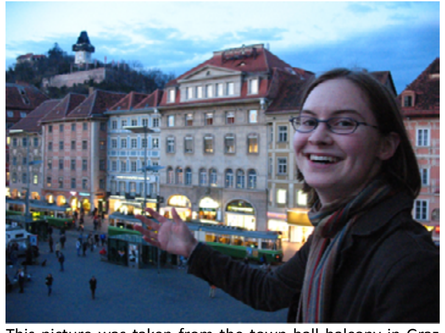
http://commonhorizons.wordpress.com/

Homemade Apple Strudel
… and Other Good Things that Come from Student Exchange

by Erin Kahr, Department of Geomatics Engineering, University of Calgary

As I write this article I am sitting in a train, on my way "home" to Munich, Germany, where I am currently studying abroad, after a weekend in Graz, Austria, where I previously spent a semester. My current stay in Munich is the sixth time that I have travelled to an institution other than my home university for an extended period of time to further my Geomatics studies. Graz was, without a doubt, the most influential.

I went to Graz during the final semester of my Bachelor's degree, but the planning started much earlier. I am Canadian, but my father's side of the family originates in Graz. When I discovered a few months into my Geomatics studies that TU Graz was one of only two Geomatics-specific exchange partnerships for my university, it immediately became my goal to study there. No one has heard of Geomatics. No one has heard of Graz! The coincidence was too big to ignore. It promised the opportunity to reconnect with the European side of my family and rediscover some of my cultural roots, take some interesting courses not offered at my home university, and travel Europe on the weekends.



This picture was taken from the town hall balcony in Graz during my 2007 exchange. New exchange students were invited to a reception with the mayor. In the background is the Uhrturm, the city's signature landmark.

In spite of the exchange partnership, studying in Graz was not entirely straightforward. First and foremost of the challenges was that the courses in Graz are taught in German. This terrified me, and prompted the first of my exchanges, a six week summer language course in Stuttgart, Germany. The experience was spectacular, and my exchange addiction was born. Over the following two years I proceeded to take every German language course I could find in Calgary in preparation for Graz.

The other major challenge was the alignment of the two programs. The semesters were offset, and I was planning to go in my final year, when I had the most freedom to choose technical electives but would also have to fulfill the capstone project requirement for my bachelor's degree. While I was surfing the TU Graz website planning my exchange I came across an article about their involvement in a small satellite project in collaboration with university of Toronto, and a call for student volunteers. I suggested to my Calgary supervisor that I do a project somehow tied into this fascinating opportunity in Graz, and was amazed when he instead offered me the chance to work on a very similar project that University of Calgary was getting involved in.

Six years later I am working on my PhD at University of Calgary, in collaboration with the German Aerospace Agency, DLR. The collaboration comes as a result of my bachelor's project, which involved some design work for the CanX-2 Nanosatellite's GPS receiver payload. Eight months after CanX-2 launched I left my industry job to go back for a master's. Operating the CanX-2 GPS experiment became the basis of my Master's research. I went on exchanges to the Canadian Space Agency in Montreal, and to University of Stuttgart to take satellite geodesy. I met my current German co-supervisor when I presented some CanX-2 results at the ION conference in 2011 and he took an interest in my research. I'm currently researching relative positioning for formation flying satellites in highly elliptical orbit using GNSS, and will be presenting the first results at the formation flying conference in Munich in a week, the underlying purpose of my current trip to Munich/DLR.

Needless to say, all those hours I spent learning German have paid off many times over. So has my tight relationship with my Austrian relatives, who are happy to bake apple strudel on short notice when I announce I'm planning a weekend trip to Graz. I also can't imagine life without my network of international friends, who I have met through my numerous exchanges and who have helped me out on countless occasions. For anyone who has ever thought studying abroad sounded interesting, my best advice would be to go for it!

My exchanges:

- Universität Stuttgart, summer university 2004
- Technische Universität Graz, summer semester 2007
- Canadian Space Agency (Montreal), 2010
- Universität Stuttgart, summer semester 2010

- Technische Universität Munich and Deutsches Zentrum fuer Luft- und Raumfahrt, fall 2011-summer 2012
- Deutsches Zentrum fuer Luft- und Raumfahrt, spring 2013

Silly reasons people don't go on exchange:

Cost – Ok, this is a very serious reason, but there are scholarships! There are paid internships! Often you pay tuition through your home university. The cost of living may be lower than your home country. I have earned more money than I spent on three of six exchanges.

Language – Many universities offer courses in English. Even if they don't, in my experience professors always speak good English and are typically willing to re-explain something for you or even change the language of instruction of the entire course. Learning another language is naturally more work but in my experience is also incredibly worthwhile.

I don't think I'm smart enough – You'll be studying in the same field, you already know you're smart enough!

I won't know anyone – Upon arrival you will immediately meet a huge group of other exchange students who will also want to explore and travel on the weekend, and who will become lifelong friends.

I don't want to delay my program – Industry will still be there six months later waiting for you. Or you can find a short summer program and get ahead in your studies. Regardless, you'll be earning credit for your degree or valuable work experience. The delay is worth it… or maybe you, like me, will decide to continue studying just so you can go on more exchanges!

Me in front of one of the control rooms at the German Space Operations Centre, near Munich, on my current exchange.

Exchange stories from Calgary

by Jacky

To visitors from Vancouver, Calgary is a city hidden behind the Rockies, and for people living in Toronto it is too far across the prairies. To most people who ski and ice skate, Calgary is best known for hosting the 1988 Winter Olympics. In recent years, Calgary has been recognized for its petroleum industry. It was in 2006, faced with the boom of the oil and gas industry, that I had to choose my engineering specialization. Although I had been accepted into Chemical Engineering, I decided to transfer into Geomatics Engineering. I can still remember the administration staff's facial expression when I politely asked to leave the most demanded engineering discipline at that time. I almost had to offer up my first born child to assure her that I was transferring of my own will. I am happy to say that it was a decision I do not regret making. Geomatics Engineering has given me valuable skills and many opportunities to excel.

During my PhD studies, I was given the opportunity to do research at multiple labs in Europe. I had the chance to visit 4DDynammics, a company that scans the body and face, in Antwerp, Belgium, where I was part of their research and development team for 3 months. Denise, Aivaras, and Fiona welcomed me into their team wholeheartedly and I learned so much from my friends Geert, Stephane, Yannick, Chris, and Stijn. The outcome of the project was a markerless head scanner that can capture high-resolution facial expressions of multiple people simultaneously.

I also lived in Paris, France, where I was a trainee at the terrestrial laser scanning research division of Trimble (MENSI). Working alongside their hardware and software experts was a fascinating experience. Exploring the anatomy of these expensive and complicated instruments was unforgettable. Most laser scanner users treat these systems as a black-box. Despite my curiosity, convincing my supervisor we should open up his scanner and see what's inside the case was a difficult battle to win. My friends Stephane and Guillaume taught me about French cuisine and were my personal trip advisors who made my journey an even bigger eye opener. Despite barely knowing me, David and Volker offered me a place to stay at their apartment when I was still desperately learning to adapt to the new culture.

Currently I'm visiting artanim, a non-profit foundation located in Geneva, Switzerland. Artanim provides service and education to people who are

interested in motion capture. It is here that I am studying the kinematics of the human shoulder with the assistance of MRI, X-ray, and photogrammetric imaging data. The results of this research will be a non-invasive imaging method for measuring the rotations and translations of the shoulder.

In a couple months, I will be in Enschede, Netherlands, doing an internship at Xsens, a leader in manufacturing MEMS inertial measurement units. I will be working on their new navigation solutions which use various sensors.

This student experience in Geomatics Engineering is very rewarding. I've met many great inspirational people along the way, like Andres, Axel, Erin, Eunju, and Mohannad, and especially my former lab instructor (now friend), Ivan, who introduced me to many student activities, such as the American Society of Photogrammetry and Remote Sensing (ASPRS), where I was the Networking Councillor for their Student Advisory Committee. Ivan was one of the reasons why I founded the Geomatics Graduate Group, a student association at the University of Calgary.

Geospatial Media and Communications
http://www.geospatialmedia.net/

Planet Action
http://www.planet-action.org/

RESOURCES
TIMELAPSE Project: "Time and Space"
http://world.time.com/timelapse/

GlobalAtlas
http://www.irena.org/GlobalAtlas/

EDUCATION
GIScOnline
http://www.bbk.ac.uk/geds/

TUTORIALS
Geospatial Modeling & Visualization
http://gmv.cast.uark.edu/

FREE SOFTWARE
VSceneGIS
http://www.vscenegis.com/index.php/en/

gvSIG 2.0
http://www.gvsig.org/web/projects/gvsig-desktop/official/gvsig-2.0/downloads

JOBS, CAREER OPPORTUNITIES
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http://www.tmdr.com/

eBOOK
Ocean modelling for coastal management - Case studies with MOHID
http://mohidmodel.wix.com/oceanmodelling2013

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http://www.onlinegis.com/

RELATED ORGANIZATIONS, ASSOCIATIONS
Center for Excellence in Geographical Information Science (CEGIS)
http://cegis.usgs.gov/

The Seventh China Youth Remote-sensing Debate Competition Held Successfully

by Hengqian Zhao

China Youth Remote-sensing Debate Competition is an academic activity, held by the Association on Environment Remote Sensing of China (AERSC), which is aimed at promoting academic exchanges between young scientists to enhance their ability for critical thinking, and to broaden their range of knowledge. In May 1998, the first debate competition was held in Dalian, Liaoning Province. After more than ten years of development, China Youth Remote-sensing Debate Competition has become one of the most influential and charismatic academic activities in Earth Science in China, and the delegation teams come from many well-known universities and research institutions in China.

In concurrence with The 18th Remote Sensing Conference of China, the Seventh China Youth Remote-sensing Debate Competition was held at Lake International Conference Center in Wuhan, Hubei province, on October 20 - 23, 2012. The Seventh China Youth Remote-sensing Debate Competition was sponsored by Beijing Insight Information Technology Co., Ltd. and hosted by the Association on Environment Remote Sensing of China (AERSC). It attracted 14 teams went through seven rounds of debate. The 56 debaters fully exhibited critical thinking skills on significant issues in remote sensing with the elegant manners of young remote sensing scholars of China. Topics of debate included "GIS better promotes the development of remote sensing", "China should focus on the development of radar remote sensing", and "Remote sensing is the main method for researching geographic conditions".

There are seven headings under which credits are awarded: grounds of argument (15 points), logic and persuasiveness (20 points), literary talent (15 points), adjustment to changing circumstances (20 points), humor (15 points), and manners (15 points). The sum of each of the four debaters' scores is the total score of the team. The panel of judges included Prof. Li Deren, Prof. Tong Qingxi and 12 senior scholars in remote sensing. Research Institute of Forest Resource Information Technology Team won the team championship, Beijing Normal University Team won second place, and Wuhan University Team won third place. Hangzhou Normal University Team won the best cooperation award. Yang Peiqi, the 4th debater for the Beijing Normal University Team, won the best individual debater award. Because of this unique competition, many young scientists had a great opportunity great opportunity for self -improvement in both knowledge and ability.

The Opening Ceremony

The Scene of Debating Competition


Awarding Ceremony

Report on The International Symposium on Mobile Mapping Technology (MMT) 2013

by Jyun-Ping Jhan and Chao-Yuan Lo

The International Symposium on Mobile Mapping Technology (MMT 2013) was successfully organized by the ISPRS Commission I, FIG, and IAG. Both the MMT 2013 summer school (April 29-30) and the symposium (May 1-3) took place in National Cheng Kung University (NCKU), Taiwan.

Twenty-two professionals and forty-two students participated in the summer school. Over two days, Prof. Ayman Habib and Dr. Charles Toth introduced current technologies in mobile mapping systems. They discussed geo-referencing, quality assurance and quality control, airborne digital camera systems, airborne LIDAR systems, LIDAR waveform processing, and applications.

The symposium consisted of 12 sessions covering such topics as image processing, positioning and orientation systems, system calibration, LIDAR applications, mobile mapping technology, unmanned aerial vehicle (UAV) platforms, and data processing. More than 97 students from different countries presented their latest researches and had a great opportunity to exchange their ideas with international scholars Awards for Best Student Paper given to the students to with the most innovative mobile mapping research.

An exhibition of UAV systems and applications was also held within this symposium. Three types of platforms were shown - aircraft, land vehicles, and marine vessels. During the session on mobile mapping systems, demonstrations were given of the latest scanning systems in Taiwan, including LIDAR systems, aerial cameras, and position and orientation systems (POS). The other major focus of the exhibition was products and services. Students thus had a great chance to see how their backgrounds might connect directly with industrial needs and to understand future job opportunities.

The local organizers of MMT2013 are to be congratulated. Most of them are students from the department of Geomatics, NCKU. MMT2013 could be a good template for teaching students how to cooperate and organize a large international event that provides all participants with a chance to exchange knowledge.

Continuing the very successful tradition of the previous summer school started by the ISPRS Student Consortium in 2005, ACRS 2013 will also held the " 9th Student Consortium and WG VI/5 Summer School ". The Summer School will take place from 25 to 30 October 2013 at Werdhapura Sanur – Bali, Indonesia.

It will include lecturers, practical labs, social events, field trip and much fun. Apart from acquiring new knowledge, culture and nature experiences, this is an excellent opportunity to meet lecturers, scientists and locals and strengthen your network.

The topics of the Summer School are:

- Principles of Remote Sensing
- Space Based Technology for Disaster Risk Management
- Landcover Change
- Marine Habitat and Water Quality
- Geo-spatial Technologies in Indonesia
- LIDAR data processing using LAStools for climate change monitoring/land use management (practical works, lab)
- Overview on Climate Change
- Climate Change mitigation
- Carbon counting
- Field trip

For more information and important dates please visit:
http://www.acrs2013.com/side-events/summer-school.html

GI_Forum 2013 - Creating the GISociety
Salzburg, Austria 2-5 July 2013
For more info visit: http://www.gi-forum.org/

8th International Symposium on Digital Earth (ISDE 2013)
Sarawak Malaysia, 26-29 August 2013
For more info visit: http://isde2013kuching.com/

IEEE International Geoscience and Remote Sensing Symposium (IGARSS 2013) - Building a Sustainable Earth through Remote Sensing
Melbourne, Australia, 21-26 July 2013
For more info visit: http://www.igarss2013.org/

ICWG I/Vb: UAV-g
Rostock, Germany, 4-6 September 2013
For more info visit: http://www.uav-g.org/

2nd Joint International Symposium on Deformation Monitoring (JISDM)
Nottingham, UK, 9-11 September 2013
For more info visit: http://www.nottingham.ac.uk/engineering/conference/jisdm/

13th International Scientific and Technical Conference From Imagery to Map: Digital Photogrammetric Technologies?
Fontainebleau, France, 23-26 September 2013
For more info visit: http://www.racurs.ru/France2013/enhttp://www.racurs.ru/France2013/en

ISPRS Conference on "Serving Society with Geoinformatics" (ISPRS2013-SSG)
Antalya, Turkey, 11-17 November 2013
For more info visit: http://www.isprs2013-ssg.org/

Borderlands Modeling and Understanding for Global Sustainability
Beijing, China, 5-6 December 2013
For more info visit: http://news.isprs-sc.org/2013/05/borderlands-modeling-and-understanding.html