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 its 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,
- English native speakers for proof reading.

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

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 Lat-in word satelles, which means atten-dant or guard. It is widely known that there are thousands of satellites help-ing 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, dys-functional? 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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What is remote sensing is, you do not mind? — with “No, you will master it.” That
is a common position with regular working hours, but at a university I would be able
to get “on line” in a very short and definitive way.

In your opinion how important is the participation of young people in internation
al professional events such as summer schools, congresses, and workshops? What
advice would you give to students and young professionals regarding suc-
cessful career?

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.

Spotlights

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). The program took place in the University of South Australia’s (ISU) annual program provided in partnership with the University of South Australia. The program was designed with a particular eye to the southern hemisphere environment and is built around the themes of space sustainability, space environment, telecommunication, and technology, space business and leadership and space legal and regulatory issues.

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 500km to the geostationary earth orbit (GEO) at 36,000km. The sustainability of the near-space environment is at risk, and we must ensure that outer space 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, telecommunication and weather forecasting, land management, telecommunications and other valuable services.

The theme of the conference is “space sustainability” as a fundamental part of the strategy for addressing the eight Millennium Development Goals (MDGs) as highlighted by the United Nations. The conference is focused on four main topics: space science, space systems engineering and space technology, space business and leadership and space legal and regulatory issues.

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Near Earth space is a hostile environment where space debris and space weather threaten the habitat of all space activity available and not available now existing within our near Earth space environment. In the worst case, this access to the environment could become completely unavailable. The three main causes of artificial orbital debris are satellite launches, satellite re-entries and satellite fragmentation. Other contributions to debris include jettisoned items such as clamps, lens covers, de-spin devices, pyrotechnic release hardware, and wrapped cables lost from human space exploration (National Research Council, 1999). Debris is 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 (Kessler, 1978). 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 that considers the potential for objects to intersect a critical event (Lewis and Joseph, 2009). Orbital debris poses a threat to people and terrestrial infrastructure on re-entering the atmosphere and hitting the Earth’s surface. The threat of orbital debris has been identified as a serious environmental hazard by the United Nations (UNCOPUOS, 2011). Over the past decades, a significant increase has resulted in thousands of additional pieces of debris. Mitigation refers to “reducing the creation of new debris” whilst removal refers to “either active or passive disposal of debris. Mitigation and removal are two approaches that can be utilized to solve this problem of space debris, as well as to reduce the likelihood of space weather events through automated monitoring techniques so that systems are prepared to react in a timely manner.” (Baker, 2002). Space debris is a concern for all space activities. “SSA combines space weather, orbital debris and space situational awareness. It allows more time for spacecraft operators to prepare for such events by switching off non-essential electronic systems, preventing interference, power management and personnel management, and repositioning to safer locations to systems.” (Weather Prediction Center, 2013). This suggests current space weather models are not accurate enough to allow for long term predictions and that new space situational awareness is needed to assist in short term predictions. Space debris includes solar storms, sun spots, solar flares, coronal mass ejections and geomagnetic fields. Space situational awareness (SSA) can be defined as the awareness of the space environment, including both space weather and its effects on space activities. “SSA combines space situational awareness, space weather and orbital debris.” (Baker, 2002). Space debris in Earth orbit using optical telescopes and radars, commonly known as space debris. Space debris threaten sustainable space operations by increasing the potential for collisions with operational satellites. The Space Weather is the interaction of energetic charged particles and radio frequency fields with space assets and humans in Earth orbit. “Space weather is a term applied to variations in the state of the magnetosphere and ionosphere that influence space and Earth systems.” (Baker, 2002). Space weather effects spacecraft, radio communications and communication satellite. Space weather can adversely affect space and Earth systems. “SSA combines space weather, orbital debris and space situational awareness.” (Baker, 2002). Space debris is “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 catastrophic damage in a collision. 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 catastrophic damage in a collision. Orbital debris are “man-made objects in orbit that are not, or are no longer, carrying out a useful function” (Pisacane, 2008).orbital debris mitigation guidelines (Stansberry, 2013). The Inter Agency Debris Coordination Committee (IADC), comprised of government, industry and international space agencies, have created guidelines in 2002. Over 150% of the space agencies representing China and India are from the Global South. This under-representation of the Global South means the IADC guidelines are not necessarily applied by emerging space nations or their space entities. It is essential to continue international cooperation to expand the IADC guidelines to developing nations. Kessler syndrome (Kessler et al., 1996) illustrates the potential for cascading collisions of 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 have used necessitated the addition of physical protection against the event of a collision (JAXA, 2003). Spacecraft shielding and lifelogging operational procedures have become critical design features for spacecraft and satellites. Various measures such as adding degraded coatings on spacecraft and satellites, propellant depletion burns, and various of excess energy 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 those in geosynchronous orbit (GEO) end-of-life de-orbiting is not a feasible solution. Therefore the IADC recommends that satellite operators should move defunct satellite to an inaccessible (Kessler and Cour-Palais, 1978). In 2010, Kessler stated that although debris orbital Earth would increase exponentially due to collisions, the number of objects in low Earth orbit is still manageable (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 impacting future space missions is a concern. 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 increase to such point that an in-space collision would result in a cascading effect of further collisions. This would lead to the establishment of an inactive space environment (Kessler and Cour-Palais, 1978). In 2010, Kessler stated that the amount of debris orbiting Earth would increase exponentially due to collisions, the number of objects in low Earth orbit is still manageable (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 impacting future space missions is a concern. 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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.

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 more frequencies within the electromagnetic spectrum (shown in the image on the right). As a result, there are limited frequency windows that are 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, which is divided into a series of bands of electromagnetic waves (International Telecommunication Union (ITU) in coordination with governments of the participating countries). Space situational awareness 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.

Increased prevalence of modern technologies plays a role in 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 that 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 more complicated.

Both radio frequencies and the locations of satellite orbits for GEO are limited. In fact, the Federal Communication Commission estimated that the United States will run out of available spectrum in 2013 (Prett, 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 one way States are currently cooperating to reduce mission redundancy and satellite orbits are a rare and sought after resource as demand increases and more countries plan to gain access to space by launching satellites. Some LEDs are also becoming congested. Polar orbiting, sun-synchronous satellites in particular, are very useful for remote optical sensing, which is the reason for these orbits becoming crowded (Smith, 2012). Collaborating on space orbits in these orbits is one way States are currently cooperating to reduce mission redundancy and launch costs. Further collaboration of space players is required to reduce congestion.

Complete paper and references can be found on: http://commonhorizons.wordpress.com/
Homemade Apple Strudel

As I write this article I am sitting in a train, on my way to Munich, Germany. I am currently studying abroad, after a weekend in Graz, Austria, during my 2007 exchange. New exchange students were in the city when I was still desperately learning to adapt to the new culture. The administration staff’s facial expression that I had to choose my engineering specialization. Although I had been accepted into Canadian Space Agency (Montreal), 2010

SPOTLIGHTS

• 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 Canadian Space Agency, DLR. The collaboration comes as a result of my collaboration with the German Aerospace Agency, DLR. The collaboration comes as a result of my studies at the Canadian Space Agency (Montreal), 2010-2011.

- Eight months after CanX-2 launched I left my industry job to return to University of Calgary, in collaboration with the German Aerospace Agency, DLR. The collaboration comes as a result of my studies at the Canadian Space Agency (Montreal), 2010-2011.

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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.
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.

FUTURE ISPRS RELATED EVENTS

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/

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/

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/

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/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