Spatial Data Infrastructure
Asia & the Pacific Newsletter

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Spatial Data Infrastructure – Asia and the Pacific (SDI-AP) is a free electronic newsletter from the Global Spatial Data Infrastructure Association (GSDI) which is available in both English and Chinese language versions. The newsletter is produced for people interested in Spatial Data Infrastructure, GIS, remote sensing and geospatial data issues in Asia and the Pacific. It aims to raise awareness and provide useful information to strengthen SDI initiatives and support synchronising these activities across the region. Support for the newsletter is also provided by the Permanent Committee on Geographic Information for Asia and the Pacific (PCGIAP), a regional forum to enhance cooperation in the development of a regional geographic information infrastructure. The newsletter is currently being produced for GSDI by the Centre for Spatial Data Infrastructures and Land Administration at the University of Melbourne.

To subscribe to SDI-AP use this link. Back issues of the newsletter are at the GSDI website.
You can also sign up for GSDI News List to receive alerts of special news and announcements as well as notification of new issues of the SDI-AP newsletter. To subscribe and access archives of thematic or regional discussion lists please visit.

Contents

Message from the editors

Welcome to the September issue of the newsletter.

If you have news or information related to SDI, GIS, RS or spatial data that you would like to share with the community (e.g. workshop announcements, publications, reports, websites of interest etc.), kindly send us the materials by the 25th of the each month for your contribution to be included in the next newsletter.

Malcolm Park and Serryn Eagleson (Editors), at the Centre for Spatial Data Infrastructures and Land Administration, The University of Melbourne.

Contributions

Thank you to the following people and organisations for their contributions to this issue: Baek Wonkug for news feeds, Sean Lin and colleagues for the Chinese translation as well as Shivani Lal, *GIS Development*, *GeoSpatial World* and *Asia Surveying & Mapping* magazine for directly contributing to the newsletter.

Back to contents

Spatial Data Infrastructure
Asia & the Pacific Newsletter

GSDI and IGS Global News, Issue 3 Volume 3 for 2013

GSDI 14 Conference Preparations
Preparations continue for the joint GSDI 14 World Conference and AfricaGIS 2013 Conference scheduled to be held in Addis Ababa, Ethiopia, at the UNECA Conference Center, November 4-8 2013 in partnership with GSDI Association, EIS-Africa, the International Geospatial Society, EiABC - Addis Ababa University and the United Nations Economic Commission for Africa (UNECA).
AfricaGIS is the largest regularly occurring GIS conference in Africa with participants from the whole continent. The GSDI World Conference moves to sites across the globe to offer geospatial specialists from all parts of the world opportunities to better exchange ideas and learn from peers in building spatial data infrastructure. For past conferences.
The selected theme of the conference is "Spatial Enablement in Support of Economic Development and Poverty Reduction" The pressing needs of African nations, their citizens, and the needs of economically disadvantaged nations generally are a particular emphasis of the conference and include such concerns as:
- sustainable development,
- economic development,
- business intelligence and business geographics,
- disaster prevention, warning, management, response, and recovery,
- alleviation of poverty and crime,
- lessening the digital divide including access to information technologies,
- ensuring food security,
- support of transportation, health and communication systems, and
- facilitating land ownership.
Substantial reduction in registration fees will be available for local participants, members of EIS-Africa and members of the International Geospatial Society who are from low income per capita nations. Substantial reductions in Exhibit and Sponsorship fees will be available for companies and agencies that are members of the GSDI Association.
Consult the web site as the Call for Papers and details about the program, facilities and sponsorship opportunities become available.
We are now only two weeks away from the deadline for abstracts (for presentations) and full papers for peer reviewed publication – 15 May 2013!
This combined and fully integrated conference offers numerous opportunities for oral presentations and refereed and non-refereed publication outlets. We invite presentations covering the full range of practice, development and research experiences that advance the practice and theory of spatially enabling citizens, government, and industry. The conference theme is Spatial Enablement in Support of Economic Development and Poverty Reduction.
This call for papers supports two primary forms of publication:
(1) a Conference Proceedings, with Abstracts for all accepted submissions, and refereed and non-refereed Full Papers for some of the submissions, and
(2) a pre-conference published book containing fully refereed articles. The tentative title is "Spatial Enablement in Support of Economic Development and Poverty Reduction: Research, Development and Education Perspectives". The book will be published as an open access book in various e-reader formats.
* IMPORTANT CONFERENCE DATES *
Deadline for Submission of Abstracts: 15 May 2013
Deadline for Submission of Full Papers for Refereed Publications: 15 May 2013
Deadline for Submission of Full Papers for Non-refereed Publications: 1 Sept 2013
Deadline for Full Conference Registration Payment for All Presenters 15 Sept 2013
Conference Dates: 4-8 Nov 2013
* IMPORTANT CONFERENCE LINKS *
Joint Conference Call for Abstracts and Papers, Conference Website: Other Important Dates.
Past GSDI World Conference Proceedings. Past open access Books affiliated with the conference.
* JOIN the GSDI Association or International Geospatial Society to enjoy conference fee reductions! *
Substantial reduction in registration fees will be available for local participants, members of EIS-Africa and members of the International Geospatial Society who are from low income per capita nations. Substantial reductions in Exhibit and Sponsorship fees will be available for companies and agencies that are members of

Back to contents

Spatial Data Infrastructure Asia & the Pacific Newsletter

the GSDI Association.

Consult the web site for latest information and details about the program, facilities and Sponsorship opportunities. Come prepared to engage, learn and enjoy! More news on the conference in future issues!

International Geospatial Society (IGS) Free Memberships

At its recent meeting, the GSDI Board of Directors passed a motion that allows individuals in low and very low income nations to join the International Geospatial Society (IGS) by providing specific information of value to the global community in lieu of annual cash dues. To join, simply add your professional profile to the growing interconnected network of geospatial specialists across the globe. Benefits of membership in IGS are listed at http://www.igeoss.org/benefits. For further information, contact Harlan Onsrud, Executive Director, GSDI Association.

Outreach & Membership Committee

Committee vice-Chair, Roger Longhorn has joined the International Hydrographic Organization (IHO) Marine SDI Working Group (MSDIWG) and attended the Marine SDI Open Forum meeting in Copenhagen (remotely!) and the following two-day workshop of the MSDIWG, hosted by the Danish Hydrographic Service. The MSDIWG, which has existed since 2009, is setting its new workplan for 2013-2014 and is interested in developing a stronger relationship with non-marine SDI development initiatives at national, regional and global levels. Longhorn will explore this with the GSDI Board and Executive Committee at the next opportunity.

The Outreach & Membership Committee also manages the GSDI Group on LinkedIn, which has added seven new members in the past month, for a total of 229 members today. If you are not already a member of this group, please join today – and tell your friends! Visit http://www.linkedin.com to join, then find GSDI in the 'Groups' option, to join the group.

Technical Committee

Technical Committee Chair, Eric van Praag, Regional Coordinator, GeoSUR Program of the Latin American Development Bank (CAF), along with USGS, has nominated the GeoSUR Topographic Processing Service (TPS), built with ESRI´s AG Server 10.1, for the AAG Stanley Brunn Award for Creativity in Geography. See more news later in this issue.

The Technical Committee is also responsible for updating of the GSDI SDI Cookbook, a wiki maintained at: http://www.gsdidocs.org/GSDIWiki/index.php/Main_Page.

GSDI Member organisations, members of the GSDI Association Committees, Council and Board, and IGS members are involved in the many other regional and global initiatives on an on-going basis:
- Digital Earth (International Society for Digital Earth).
- Eye on Earth.
- Group on Earth Observations (GEO) / Global Earth Observation System of Systems (GEOSS).
- EuroGEOSS – GEOSS Project funded by the European Union.
- INSPIRE – Infrastructure for Spatial Information in the European Community.
- International Hydrographic Organisation – Marine SDI Working Group.
- UNESCO IOC – Marine/Coastal Spatial Data Infrastructure development.
- UNSD (Statistics Division) – UN-GGIM (UN Global Geospatial Information Management).
- UNGIWG (UN GI Working Group).
- UNESCO IOC – Marine/Coastal Spatial Data Infrastructure development.
- UNSDI – UN-GGIM (UN Global Geospatial Information Management).
- UNSDI – UNGIWG (UN GI Working Group).

SDI News, Links, Papers, Presentations

SDI Spotlight

This month's "Spotlight" feature is from Serene Ho who completed her Bachelor of Arts (Honours) at the University of Melbourne in 2002. Her honours thesis considered the politics of urban development and conservation on wetlands management in Singapore. More recently, she completed a Master of Geographic Information Technology (University of Melbourne) in 2010, where her research project examined the role of volunteered geographic information in helping to realise a spatially enabled society. Serene commenced her PhD at the CSDILA Centre in 2011.

Towards a 3D Paradigm for Urban High-rise Development: Exploring the institutional barriers to 3D innovation in an Australian context

Type '3D' into Google and you are likely to get just over 2.3 billion hits, with searches for the term sharply increasing from 2010, reflecting the mainstreaming of three-dimensional (3D) technologies that comes with maturing development. With such a movement, expectations of its use start to become more common amongst communities, as is the case in land and property management. An international groundswell of industry and government support is driving the use and application of 3D digital technologies to support development. Building Information Models (BIM), which are 3D digital virtual parametric models of buildings, are at the vanguard of the 3D (and implicitly digital) movement, but extends only to the physical aspects of development. Consequently, within the domain of land administration, research has emerged over the last decade to leverage emergent 3D technologies to support "the registration of the legal status in complex 3D situations" (FIG, 2012). Importantly, this wave of innovation is not only been technological, but necessarily encompasses changing attitudes and mindsets.

This research taps into these themes of social and cultural change, and considers and is positioned within the theoretical framework of institutional theory. Institutional theory, with its emphasis on shared systems of values, norms, rules, beliefs and assumptions, provides a framework for understanding how the cultural-cognitive, normative and regulative elements that provide meaning and stability within social systems can promote (conscious or unconscious) repetitive behaviour (Scott, 2001; 2008). Such behaviour becomes "locked in" and creates intrinsic cultural and cognitive obstacles to change – fundamentally the concept of path dependency. Institutional theory and path dependency have therefore been significant in helping to explain (adoption and resistance) issues in innovation. The relationship between innovation and institutions is essentially a tension arising from the interaction of two opposing social forces: stability (institutions) and change (innovations). Understanding the basis of this tension necessarily facilitates any push towards innovation.

In the context of introducing and adopting 3D technologies for facilitating land and property development and management processes, the scope of the issue is limited to the technical environment that facilitates information use and management. What are the challenges in using 2D plans for representing building and legal information in high-rise buildings? Why do we persist in using 2D plans? What are potential implications for using land and property information modelled in 3D?

Using a narrative-based approach, preliminary findings from an exploratory case study undertaken in the city of Melbourne in Australia reveal recurrent themes in cultural-cognitive, normative and regulative institutional elements across a cross-section of professionals in the land and property industry. These include:

- **cultural-cognitive themes:** logic of structuring information about different property types within the same building; challenges in applying the classical freehold model of tenure to communal living; the ability to 'see' a 2D plan in 3D;
- **normative themes:** shift towards apartment ownership; trend towards using multiple owners corporations to manage access and use; poor drafting in building subdivisions; perceived practical benefits of 2D plans for daily tasks;
- **regulatory themes:** legislation has not caught up with the increasing impact of architectural articulation on property rights; current subdivision process perceived to be functioning well for most buildings; etc.

These themes will form the basis for a broader survey of the land and property development industry. Ultimately, the aim of the research is to develop an empirical understanding of the institutional influences and their mechanisms in the current land development process as a way of creating a change path towards the use of 3D digital building information technologies to facilitate productivity of the legal aspects of development in the context of urban high-rise buildings. This research is part of a broader Australian Research Council (ARC) funded industry linkage project, 'Land and Property Management in 3D'. The aim of the ARC project is to investigate the different aspects of using three-dimensional (3D) information and technologies to support an evolution in land and property management, recognising that a 3D-based paradigm in land and property information management is especially beneficial for managing knowledge about the urban built environment, characterised by its structural density and complexity.

The editors remind our subscribers and readers that we welcome contributions for the *Spotlight* feature.

Back to contents

GIS Tools, Software, Data

Australian private healthcare group maps future health hotzones -
Cutting-edge mapping technology is underpinning a new generation of targeted health services in Geelong, a city south-west of Melbourne, helping Victoria's largest not-for-profit private healthcare provider plans its new $447 million teaching hospital for that region.
Using smart mapping technology to analyse research data would become essential for the Australian health industry, especially when driving new infrastructure development. It is certainly a growth area for the local health sector – where beyond identifying service gaps or growth opportunities, mapping technologies are increasingly used to explore the origins and causes of illness and diseases.
Mapping data gives healthcare professionals, policy makers and researchers a better understanding of the location-based elements of a disease – which may be used when deciding where to build future healthcare facilities or targeted education campaigns. The technology is a perfect fit for health awareness campaigns, because it can convey complex data typically stored in tables or databases in an incredibly engaging visual format that anyone can easily interpret.
Source: Geospatial World

Self-esteem grows with cartography
"Putting the Philippines on the Map," an exhibit organized by the Philippine Map Collectors Society (Phimcos) to help promote a sense of national pride, is on view at the Mall of Asia main lobby until Sept. 1.
With texts in Filipino and English, the exhibit hopes to make the appreciation and interpretation of maps accessible to a wide audience.
Maps help us find our place in the world. They do not only point out where we are and where we want to go but they also tell us who we are. Maps instruct us about our history and identity. They provide us with a memory and a destiny. Maps give us a sense of self-esteem.
Source: Philippines Inquirer

Mapping volunteers help save lives in Canberra
A 75-member Mapping and Planning Support (MAPS) group is helping emergency response in Australia by volunteering their time, specialised skills and mapping technology to provide emergency managers with the maps and geographic tools they need during national crises. MAPS was formed in 2005 to support response activities after prolonged fires hit the nation's capital in 2003. The members of the group have regular jobs, but when disaster strikes, the team makes itself available to assist various emergency service organisations across Australia. They have provided mapping support during some of Australia's most devastating events including both the 2009 Victorian Black Saturday bushfires and 2011 Queensland floods and cyclones. The group uses GIS technology to deliver critical disaster intelligence to fire fighters, police or other personnel on the ground and in the emergency control centres. They help in rapidly collecting, processing, and distributing vital maps of information to response teams and senior management making decisions in the field when they need it. These interactive maps contain layers of data such as flood-mapping, road closures etc. that can be switched on or off,

Back to contents

depending on the information required. Verified social media and crowd-sourced data are also integrated into the maps.
Source: Geospatial World

Typhoon Utor: Hong Kong shows the way

On August 12, a powerful typhoon, called Utor, battered the northern Philippines, leaving four casualties, and tens of thousands homeless. The typhoon moved across South China Sea and lashed Hong Kong on Wednesday. Hong Kong has over the years developed an effective warning system, and set up stringent building codes to protect the community. The implementation of various disaster prevention and mitigation measures has led to a steady decrease in the number of deaths/missing associated with tropical cyclones in the past 50 years. The Hong Kong Observatory, the government department responsible for forecasting weather and issuing warnings on weather-related hazards, has employed GIS in its Tropical Cyclone Track Information System. The system, accessible by the public on the department's Website, provides detailed information of the tropical cyclone, including latitude, longitude, classification and the maximum sustained wind near centre. Integrated with Google Maps and infra-red satellite images, the public can track the location of the cyclone as well as its moving direction and speed. Remote sensing and GIS applications have significantly improved early warning systems. In the Hong Kong case, although the typhoon brought the country to a standstill, no major casualties were reported (as of this writing). Such effective early warning system is exemplary, especially a lesson for other disaster-prone countries in the region.
Source: Geospatial World

40 maps that explain the world

Maps can be a remarkably powerful tool for understanding the world and how it works, but they show only what you ask them to. So when Max Fisher saw a post sweeping the Web titled "40 maps they didn't teach you in school," one of which happens to be a WorldViews original, he thought he might be able to contribute his own collection. Some of these are pretty nerdy, but he thinks they're no less fascinating and easily understandable.
Source: The Washington Post

There are more people living inside this circle than outside of it.

40 maps they didn't teach you in school – AND – **Maps they didn't teach you in school**
Source: Bored Panda blog

South Korea to Launch New Crime Map

South Korea plans to publish a "crime map" next year indicating areas with high crime rates in a bid to boost public safety, government officials said Wednesday.
The online map will identify regional blocks prone to four types of crimes -- sexual assault, school violence, domestic violence and food-related crimes -- based on a new database being established by the Ministry of Security and Public Administration, according to the officials.
Source: Global Post and Asian Surveying and Mapping

Australia-First Election Map Adds Voters to the Picture

Voters will go to the upcoming election more informed than ever before thanks to an Australian-first interactive Election Map that features real-time coverage of Twitter trends and one-click access to in-depth electorate analysis.
Geographic Information System (GIS) technology experts Esri Australia, Seven News and Yahoo!7 have partnered to develop the cutting-edge 2013 Federal Election Map.
Underpinning the map is a comprehensive collection of critical information about every federal electorate in Australia, divided into five key topics that cover: employment and education; infrastructure; ancestry; financial positioning and electorate demographics.
Source: Asian Surveying & Mapping

Google Street View driver detained by Thai villagers on suspicion of spying

Google's controversial Street View project has photographed millions of miles of roads and paths across the world, but that doesn't mean everyone has accepted the company's camera-equipped cars with open arms. A group of 20

Back to contents

villagers from Sa-eab, in Northern Thailand, blocked one of the cars, interrogated the driver, and then demanded he swear on a statue of Buddha that he wasn't up to no good, according to the Associated Press. Why the hostile response? The villagers weren't opposed to Google's mission, but they were concerned that the driver may have been scouting for a planned dam project that locals have vehemently protested.
Source: The Verge

Mapping indigenous language across Australia
A MULTI-MILLION DOLLAR PROJECT that spans 250 languages and took six years to finish, the **Indigenous Language Map** is a crucial resource to help preserve Aboriginal culture.
The map displays some of the traditional languages once spoken by indigenous groups across Australia, and was created using data collected by the Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS). Dianne Hosking, who worked as a linguist at AIATSIS when the map was developed, says the resource is extremely significant.
Source: Australian Geographic

Lifting the lid on ancient maps
A controversial map that casts doubt on when Europeans discovered Australia, a pocket globe housed in a sharkskin case and one of the first maps of the southern continent are just some of the rare historic maps going on display at Ozri.
This fascinating collection is part of an exclusive National Library of Australia (NLA) exhibit at Ozri, which will feature an array of unique and priceless maps never before displayed outside Europe.
Source: Esri Australia

India's open data portal launched with over 3600 datasets
Looking to promote transparent governance and innovation, India has officially inaugurated Data Portal India, a portal for the public to access and use datasets and applications provided by ministries and departments of the Government of India.
The Portal functions as a single access point for open government datasets across the country. Currently, there are about 3500 datasets from 49 government departments available for the public to access and use. The datasets include agriculture, commerce and industry, defence, finance, health, information and broadcasting, energy, transport and water resources, among others.

Back to contents

News from abroad

"This section has been included to highlight some of the developments happening outside the region which demonstrate SDI in action.

Visual Proof That Geographic Data Really Should Be Free
When the New York City government released a huge collection of geo-spatial data sets a few weeks ago, it really was Christmas in July -- at least for all those who love analyzing the city through data and maps.
In early July, we covered how the California Supreme Court of California finally ruled that GIS files are public data, siding with the Sierra Club -- who in 2007 tried to get land parcel information from Orange County, only to be hit back with an absurd licensing fee request of $375,000. Just a few weeks after, New York City government gave in to mounting pressure from New York's open data community, and opened up the PLUTO and MapPLUTO, data sets filled with tax lot information. Data sets on zoning and sidewalk cafes are now also available to the public.
Whereas you once had to pay $1,500, now the entire package of data -- cleverly trademarked "BYTES of the BIG APPLE" by the city -- can be accessed for free.
Source: The Atlantic: Cities "Maps"

Back to contents

Spatial Data Infrastructure
Asia & the Pacific Newsletter

The Face Scan Arrive

THE future of technological surveillance is fast approaching — and we are doing far too little to prepare ourselves. Last week, thanks in part to documents that I and the Electronic Privacy Information Center obtained under the Freedom of Information Act, the American public learnedthat the Department of Homeland Security is making considerable progress on a computerized tool called the Biometric Optical Surveillance System. The system, if completed, will use video cameras to scan people in public (or will be fed images of people from other sources) and then identify individuals by their faces, presumably by cross-referencing databases of driver's license photos, mug shots or other facial images cataloged by name.

While this sort of technology may have benefits for law enforcement (recall that the suspects in the Boston Marathon bombings were identified with help from camera footage), it also invites abuse. Imagine how easy it would be, in a society increasingly videotaped and monitored on closed-circuit television, for the authorities to identify antiwar protesters or Tea Party marchers and open dossiers on them, or for officials to track the public movements of ex-lovers or rivals. "Mission creep" often turns crime-fighting programs into instruments of abuse. At the moment, there is little to no regulation or legal oversight of technologies like the Biometric Optical Surveillance System. We need to implement safeguards to protect our civil liberties — in particular, our expectation of some degree of anonymity in public.

Source: New York Times
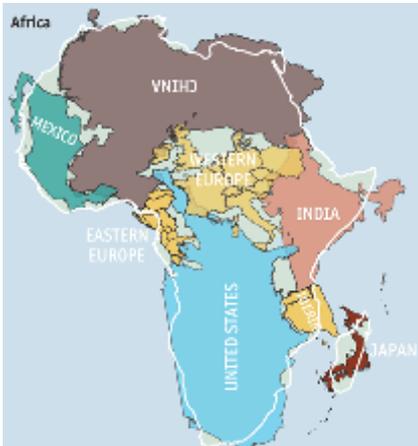
The true true size of Africa

[In 2010] Kai Krause, a computer-graphics guru, caused a stir with a map entitled "The True Size of Africa", which showed the outlines of other countries crammed into the outline of the African continent. His aim was to make "a small contribution in the fight against rampant Immappancy"—in particular, the fact that most people do not realise how much the ubiquitous Mercator projection distorts the relative sizes of countries.

Source: The Economist

NASA's Satellites Are Watching the Rim Fire Creep Into Yosemite

Viewed from 512 miles above, California's rampaging Rim Fire looks kind of like a classy cigarette ad, with a glowing ember giving off light wisps of smoke. That's deceptive. The largely uncontrolled inferno is now the seventh largest wildfire on record in the state, threatening thousands of buildings and burning brighter than the city lights of Reno.

Source: The Atlantic "Cities": Maps

Why 3D Modeling Will Play a Huge Role in Tackling Rapid Urbanization

One constantly evolving 3D model of a city, though, could knit all of this data into one tool, while enabling interactive simulations that would be readily understandable by engineers and the public alike. This video used the model of downtown Seattle, developed with software from Autodesk, to simulate the potential impacts of a massive earthquake on the Alaskan Way Viaduct during a time when the Washington Department of Transportation was planning to fortify it (the real damage kicks in at the 1:00 mark).

… That's obviously a powerful tool for presenting plans to the public (and for making the case for why the public needs to spend money fortifying viaducts). And it's a vast departure from how most plans are today presented to approval boards and the public.

Source: The Atlantic "Cities": Videos

Map shows pipeline incidents in the US from 1986 to 2013

A new time-lapse video from the Center for Biological Diversity brings frightening visualization to the 8,000 U.S. pipeline "incidents," i.e. spills and explosions, since 1986 that have brought death and destruction to the US.

Back to contents

According to the data, since 1986 there have been nearly 8,000 incidents (nearly 300 per year on average), resulting in more than 500 deaths (red dots on the video), more than 2,300 injuries (yellow dots on the video), and nearly $7 billion in damage. Since 1986 pipeline accidents have spilled an average of 76,000 barrels per year or more than 3 million gallons. This is equivalent to 200 barrels every day.
Source: AnyGeo blog

Chicago Real Time Bike Accident Map Identifies Hot Spots

An interesting effort in Chicago by a law firm who have made available a pretty sweet map that enables cyclists to report accidents in order to define hot spots within the city. This interactive map will allow users to report, not only bicycle accidents and doorings , but close calls or near misses as well, all in real time. Additionally, by reporting the type of collision, weather, lighting and surface conditions during the accident or close-to accident, we will be able to have more data about bicycle accidents, when they occur, where they occur, and how to prevent them.
Source: AnyGeo blog

Back to contents

Articles

Australia: **National positioning infrastructure, where are we now?**
Presented at: International Global Navigation Satellite Systems Society (IGNSS) Symposium 2013, Outrigger Gold Coast, Australia, 16-18 July, 2013

Abstract: Spatial organisations within Australia have been leading the push to develop a National Positioning Infrastructure (NPI) that will deliver uniform access to reliable and accurate Position, Navigation and Timing (PNT) information. The NPI will be based on the acquisition, processing and distribution of Global Navigation Satellite System (GNSS) data through Continuously Operating Reference Station (CORS) infrastructure. CORS networks are currently deployed and operated independently on an ad-hoc basis by governments and industry across Australia. Australia's spatial community has identified and responded to the need for more efficient and cost-effective management of PNT infrastructure by defining agreed principles and strategies for a NPI. Collectively, the Spatial Information Council's (ANZLIC's) NPI Policy, the Australian Spatial Consortium's (ASC's) Strategic Plan for GNSS, and the NPI Infrastructure Plan prepared by Geoscience Australia identify objectives and priority actions aimed at limiting infrastructure duplication and over-investment; implementing data and service standards; improving quality control measures; extending user access; providing redundancy through non-GNSS technology; and designing a NPI that supports the diverse PNT needs of all industry sectors. This paper provides a summary of past and present work towards establishing a NPI and identifies future challenges for communicating and realising its benefits. PNT initiatives that aim to improve user access and service performance both domestically and internationally are identified to justify why a NPI will ensure Australia remains competitive in a multi-GNSS future.
Key words: National Positioning Infrastructure (NPI); Global Navigation Satellite System (GNSS); Continuously Operating Reference Station (CORS); Position, Navigation and Timing (PNT); Service Level Management (SLM).

The top ten civilian uses of drones that don't impinge privacy?

Given the growing interest, and the ability for these tools to address new areas of application, it's fitting to survey the top markets, the advantage, and the sensors that provide new insight in a wide area of application.
Agriculture - The Association of Unmanned Vehicle Systems International (AUVSI) reports that the agricultural use of drones could comprise 80% of the market. The reasons include the need to closely monitor crops to improve management and yield, the need to do this more regularly and cheaply, and the environment of private land with little threat to others. Near-infrared sensors can be tuned to detect crop health, letting farmers react and improve conditions locally with inputs of fertilizer or insecticide.
Mines - Mining companies are already deploying drones worldwide with great efficiency and safety gains to accurately measure site conditions, inspect pit walls, calculate quantities, and measure and map in 3D. Photogrammetric techniques are used for 3D modeling to date, however more precise laser LiDAR sensors for UAV platforms will be developed in time.
Construction Sites - The monitoring from above of construction project sites provides a new input during all phases of a project lifecycle. Aerial photography is done now for only the largest projects, however the input would be used more widely and more frequently if more readily accessible. The ability to quickly model from

Back to contents

above in 3D with increasing precision will provide a check on projects with as-builts compared to plans, as well as the better coordination of materials on the job site.

Infrastructure Inspection - From pipelines to powerlines, to towers, to processing plants, the inspection of complex infrastructure will benefit from regular aerial monitoring. The ability to sense in three dimensions, take thermal readings, and to detect metal strain will greatly improve infrastructure inspection. Small and unmanned platforms that can hover and get close and surround infrastructure, such as a bridge or plant, will provide a new level of detail to improve performance.

Wildlife Research - Drones are being used internationally to monitor and track wildlife, providing new insight into animal behavior, as well as protection from poachers. With the ability to operate at night, and with thermal camera sensors, drones provide unprecedented protection.

Prospecting - Mineral and oil and gas exploration is a natural fit for drones, with field prospectors extending their toolset with aerial sensors to confirm and expand their insight. Magnetometers on aerial platforms can be used to detect ferrous metals and gravitational fields, with less of a disturbance due to their size.

Storm Tracking/Forecasting - Sending drones into hurricanes and tornadoes provides new insight into their behavior and trajectory. Unmanned systems are the best approach to these dangerous situations, and with specialized sensors to detail weather parameters, new insight becomes possible.

Emergency Response - After a natural or manmade disaster, a drone provides a quick means to gather information, navigate debris with a portable and useful technology that doesn't drown out cries for help, and that can be deployed by teams that are working a specific area.

Environmental Monitoring - Drones fill a gap between manned aerial inspections and traditional fieldwork, monitoring hard to reach areas, or taking reading in contaminated areas where human health would be at risk. The ability to quickly deploy and capture an area of interest in concert with in-situ measurements, provides an advantage to contamination and reclamation work. Near-infrared sensors provide details of plant health to determine environmental health. The site-specific insight will greatly improve habitat restoration, environmental assessments, monitoring, and remediation.

Search and Rescue - With thermal sensors, drones can quickly discover the location of lost persons, and are particularly useful at night or in challenging terrain. The search and rescue mission is a battle against time, particularly in harsh conditions, and drones become a powerful tool because of the ease of deployment.

Drones provide a paradigm shift for remote sensing, given their portability, low cost of operation, ease of use, and the automation of the analysis. It's just a matter of time before regulations are lifted, and they are widely used. There are legislative efforts that could dramatically impact their utility, but with a focus on best-use, and with tailored sensor and platforms for these applications, their benefit will be broadly felt without repercussion to privacy.

Source: Asian Surveying & Mapping

The Rise of the DIY Drones

There is a growing community of amateur Umanned Aerial Vehicle (UAV) developers and builders that are using open source hardware and software to capture aerial imagery. The primary website for this emerging marketplace is DIY Drones, a site owned by former Wired Magazine editor Chris Anderson, who also runs a drone company called 3D Robotics.

Source: Asian Surveying & Mapping

The use of GIS to forecast tourism demand by Dr Adnan AL-Jaber

Most applied methods to determine the tourism demand depend on the availability of demographic data, social and economic characteristics of tourists, tourism customs, the quality of tourist activities and facilities, and other foundations such as the capacity of the tourist destination, and its accessibility. So, a tourism site must be designed in accordance with the standards and regulations of great importance in the protection of environment resources, and to develop appropriate plans to meet the expected demand for tourism. The urban planning optimal tourism sites take into account the number of tourists forecast, whenever available accurate data on flow of tourists in the area, which makes tourism development more accurate and logical Because such information can often be unavailable or inadequate to forecast tourist numbers; due to lack of monitoring mechanisms set up, tourists and limitations add to the cost and effort and duration (Ghoneim, 2003). Define and analyze trade areas help forecast tourism flows.

The study goals to achieve the following:

1. Develop an approach for forecasting tourism demand by GIS.

Back to contents

2. Identify the different factors and variables that play an important role of spatial interaction related to tourism demand.
3. Design the necessary database for the model using GIS for a site with real data (Al-Uqair).
4. Implement the automated model, checking its validation, and discussing the possibility of generations.
5. Determine the geographic distribution pattern of the model output and discussing it in the light of the pros and cons of the automated application of the model.
Source: Co-ordinates magazine

Back to contents

Books and Journals (including Videos and Web publications)

Recent Theses from CSDILA
Nilofer Christensen *Land Administration for Macroeconomic Management*

Land markets contribute significantly to economic growth. Land administration provides the infrastructure for secure land market transactions. Government macroeconomic policies work to manage the economy as a whole. As new land markets develop, there is an increasing need for better, more reliable information for improved economic management of land and its resources.

The focus of land administration research has largely been on creating tenure information and registration for the security of land rights. Creating data products has also seen significant motivation. However, not much attention has been given to the potential of this authoritative land information to be used for other economic activities, and the user needs from this perspective. This is of growing concern as new land markets in resources like carbon and water emerge.

The growing international focus on sustainable development, natural systems and „green‟ economies has shown the utility of biomimicry. Biomimicry, a principle of natural capitalism, uses nature as a model, to study and design real-world systems that emulate the efficiency, sustainability and diversity of processes in nature. The ethos provides an innovative approach for studying land administration systems as information ecologies, and an opportunity for land administration to better service macroeconomic management.

This research initiates with a review of current literature within the disciples of land administration, macroeconomics, sustainable development and the impact of natural capitalism. Following this, a conceptual model that links the above disciplines is presented. The model proposes a land market information flow lifecycle as the ideal situation for achieving synthesis between land administration information and macroeconomic management, and forms the hypothesis of this research. A robust research design and methodology to test the hypothesis is developed and justified. This involves qualitative case studies of state-based real property, carbon and water markets in three Australian states: Victoria, New South Wales and Western Australia. The case studies help to evaluate the current situation and identify areas of the model that are currently not functional. The results also work to test the validity of the model and judge whether this representation of an ideal outcome is realistic or needs to be altered. A refined land market information flow lifecycle, with 31 principles to achieve a functional link between land administration and macroeconomic management, is triangulated from the results.

The refined model is tested for its operation by showing its implementation on the case study states. The implementation shows the importance of each stage of the lifecycle. Achieving all recommended principles can establish synthesis between land administration information and macroeconomic policy making. However one dysfunctional stage can undermine the operation of the entire lifecycle. Additionally, a demonstrator 3D Property Market Tool is presented to show how spatial intelligence can be added to fiscal and monetary policy decisions. Such decision-aiding applications are possible if authoritative market information derived from a dynamic land market information flow lifecycle is achieved.

The final chapter of this thesis summaries the research and major contributions of this work. The land market information flow lifecycle establishes an operational link between government land administration and macroeconomic policy agencies. It is the first of its kind to link the disciplines of land administration and macroeconomic management though information supply and demand; based on the principles of natural capitalism and the need for sustainable development of land and resource markets. However, this thesis does not claim to fully solve the problem of holistic land information infrastructures. Suggested further research areas are presented to help build on this work. These include investigations into other drivers for authoritative land information and a dissemination framework to help make the land market information flow lifecycle a reality. Research into incorporating informal land rights and rights in other complex commodities into a holistic land information infrastructure are also suggested to follow from this work.

Back to contents

Hamed Olfat *Automatic Spatial Metadata Updating and Enrichment*

Spatial information is necessary to make sound decisions at the local, regional and global levels. As a result, the amount of spatial datasets being created and exchanged between organisations or people over the networked environment is dramatically increasing. As more data and information is produced, it becomes more vital to manage and locate such resources. The role in which spatial metadata, as a summary document providing content, quality, type, creation, distribution and spatial information about a dataset, plays in the management and location of these resources has been widely acknowledged. However, the current approaches cannot effectively manage metadata creation, updating, and improvement for an ever-growing amount of data created and shared in the Spatial Data Infrastructures (SDIs) and data sharing platforms. Among the available approaches, the manual approach has been considered monotonous, time-consuming, and a labour-intensive task by organisations. Also, the existing semi-automatic metadata approaches mainly focus on specific dataset formats to extract a limited number of metadata values (e.g. bounding box). Moreover, metadata is commonly collected and created in a separate process from the spatial data lifecycle, which requires the metadata author or responsible party to put extra effort into gathering necessary data for metadata creation and updating. In addition, dataset creation and editing are detached from metadata creation and editing procedures, necessitating diligent updating practices involving at a minimum, two separate applications. Metadata and related spatial data are often stored and maintained separately using a detached data model that results in avoiding automatic and simultaneous metadata updating when a dataset is modified. The spatial data end users are also disconnected from the metadata creation and improvement process. Accordingly, this research investigated a framework and associated approaches and tools to facilitate and automate the spatial metadata creation, updating and enrichment processes. This framework consists of three complementary approaches namely 'lifecycle-centric spatial metadata creation', 'automatic spatial metadata updating (synchronisation)', and 'automatic spatial metadata enrichment' and a newly integrated data model for storing and exchanging spatial dataset and metadata jointly.

The lifecycle-centric spatial metadata creation approach aimed to create metadata in conjunction with the spatial data lifecycle steps. The automatic spatial metadata updating (synchronisation) approach was founded on a GML-based integrated data model to update metadata affected by the dataset modification concurrent with any change to the dataset, regardless of dataset format. The automatic spatial metadata enrichment approach was also design-rooted in Web 2.0 features IV

(tagging and folksonomy) to improve the content of spatial metadata keyword element through monitoring the end users' interaction with the data discovery and retrieval process. The proposed integrated data model and automatic spatial metadata updating and enrichment approaches were successfully implemented and tested via prototype systems. The prototype systems then were assessed against a number of requirements identified for the spatial metadata management and automation and effectively responded to those requirements.

Heri Sutanta *Spatial Planning Support System for an Integrated Approach to Disaster Risk Reduction*

Natural disasters are increasingly threatening human lives, infrastructure, and economic and social activities. Although most of the losses and casualties result from rapid onset disasters, the effects of slow onset disasters cannot be neglected. Little attention is paid to slow onset disasters, as their effects are not immediately evident. Nonetheless, their economic impacts are high and might hinder development and sustainability in many highly developed and densely populated cities. With the global climate change, particular attention should be paid to coastal cities. Global sea level rise, combined with locally borne hazards, have threatened many lowland areas in coastal cities.

Coastal cities are economically and socio-politically important, with more than half of the worlds' largest cities located in the area. Environmentally, the areas are sensitive to sea- and land-based activities, and are vulnerable to many types of natural, human-made and human-enhanced hazards. In light of this situation, protecting coastal cities from current and future natural hazards is an urgent matter. Specifically, it is important and less expensive to reduce the potential risks of disasters before they materialise.

Disaster risk reduction is an activity that involves multiple disciplines, perspectives and actors. Therefore, it requires an integrated approach that brings together all elements. It also requires cooperation between government agencies at different levels of hierarchy and jurisdiction.

Time is an important element in natural disaster risk reduction, where there are short- and long-term activities. Without discounting the benefits of short-term activities, long-term benefits will be higher, although not immediately evident. Long-term efforts rely on the reduction of exposure of elements at risk to multiple types of hazards, as well as measures to increase the coping capacity of the community and government to withstand disaster impacts. Long-term efforts should be served well by managing long-term relationships between people and infrastructure on one side, and natural hazards on the other. Spatial planning, with its function to regulate the long-term utilisation of land, is potentially very useful in minimising the exposure of

Back to contents

people, socio-economic activities and infrastructures to natural hazards. It is important to both rapid and slow onset disasters, but is particularly relevant for slow occurrence natural hazards or predictable hazards such as sea level rise and land subsidence.

This thesis asserts that the development of spatial planning would be better if facilitated by a planning support system (PSS), which functions to help planners and decision makers envision the future by simulating the developmental likelihood using a set of parameters and scenarios. The process will result in a prediction of where and when a particular development will occur. At the same time, the potential progression of natural hazards is also modelled. This information is essential for evaluating whether the initial spatial plan has met disaster-resiliency measures. Any possible collisions between the predicted progression of natural hazards and planned development would be avoided in advance.

The model has been developed based on the acceptable risk concept. All land use designations have different levels of risk, vulnerability and coping capacities, which should be taken into account when developing a spatial plan. Determining the acceptable risk level should be a result of public consultation; however, the government, which has better knowledge and resources, should lead the process. Considering the physical and psychological distance between people and the government, the process is best conducted at the local level. Local governments need guidance and directives from the relevant central government agencies, as they have limited resources, funding and capacity.

This study presents the methods and requirements to predict the potential effects of future natural disasters. The research differentiates between slow and rapid onset disasters, and focuses on slow onset disasters. The findings revealed that neglecting the possibility of disaster progression would result in a high economic cost in the future. The economic cost will likely be unaffordable for less affluent people, who are forced to live in marginal lands that are highly vulnerable to a number of disasters. To overcome limitations in the available space, cooperation with neighbouring jurisdictions is required to transfer activities from disaster-prone to disaster-free areas.

A PSS is essential for delivering the method, and particularly for obtaining the information on where and when the projected development will be realised. Spatial data infrastructure (SDI) is required to facilitate data discovery and exchange among local and national government agencies working on the topic. However, the use of a PSS has been limited in local government agencies. In the event that a PSS is to be introduced, it needs to be low cost, have high compatibility with existing GIS software and have a shallow learning curve. Many recent statistics from national and international agencies reveal an increasing number of natural disasters, along with greater numbers of people affected and higher economic losses. Advanced preparations will benefit both the government and the people, leading to sustainable development. This research fills the gap in linking risk mapping and disaster risk reduction.

Muyiwa Agunbiade ***Land Administration for Housing Production***

Brian Marwick ***A Collaborative Framework to Support a National Land Information Infrastructure in Australia***

As a federated country, Australia's land administration systems are state and territory based. These systems record information pertaining to land ownership, land tenure, land use and land valuation and have supported, and continue to support, the requirements of the respective states and territories. Australia's federated system of government however has evolved since federation in 1901. Many responsibilities that were previously the sole responsibility of the state and territory governments are now shared with the Australian Government. To support policy development and operational requirements for issues such as climate change, water management, fiscal and monetary policy, the Australian Government now needs access to this jurisdictional based land information. An increasing number of businesses operating nationally also often require access to this key land information.

This has created a situation where considerable duplication of effort is occurring as a result of many Australian Government departments and agencies individually acquiring land information from the respective jurisdictions to meet their particular requirements. Given the effort to conflate the information, issues relating to data currency, quality and consistency become apparent. A national approach to service the requirements of national users of land information such as the Australian Government is required.

The jurisdictional based land administration systems however potentially provide a sound basis on which to build a national land information infrastructure. All have taken advantage of the available technologies over the past decade to move to on line service delivery and are delivering effective services within their respective jurisdictions. What is now needed is a collaborative national framework that can build on the jurisdictional achievements to deliver a national approach to land administration information and services.

This thesis considers the drivers for a national land information infrastructure within the context of Australia as a federated country and the main elements of the collaborative framework necessary to deliver this

Back to contents

national view of land information. The key success factors necessary to implement and sustain this framework are identified through a number of case studies involving collaborative ventures both in Australia and overseas.

The key success factors identified through the research are:
● The existence of a major client / investor
● Active jurisdictional support
● A shared understanding of the problem and the desired outcome
● An extensive monitoring and review process
● A commitment to standards

Using these key success factors as a guide, a framework for a collaborative national land information infrastructure for Australia is proposed.

Future trends in geospatial information management: the five to ten year vision

A new edition of the Ordnance Survey/GGIM paper has been published, titled 'Future trends in geospatial information management: the five to ten year vision.' The document was prepared by John Carpenter and Jevon Snell of the Ordnance Survey at the request of the Secretariat for the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM).

A first draft of this paper, building on both written contributions received and on discussions held in April 2012, was presented to the UN-GGIM for consideration at their Second Session in August 2012. This paper has now been updated to reflect the feedback received at that meeting and subsequent submissions.

This paper takes the views of a recognised group of experts from a wide range of fields related to the geospatial world, together with valuable contributions from the national mapping and cadastral authorities (NMCAs) and attempts to offer some vision of how this is likely to develop over the next five to ten years. Based on the contributions received, trends have been broken down into broad themes covering major aspects of the geospatial world. They are as follows: trends in technology and the future direction of data creation, maintenance and management; legal and policy developments; skills requirements and training mechanisms; the role of the private and non-governmental sectors; and the future role of governments in geospatial data provision and management.

Article on the update to the US NSDI Strategic Plan as well as discussion of the Geospatial Platform

3D Visualisation World (May 2013 newsletter)

Manuel of Photogrammetry, Sixth Edition Now Available

The American Society for Photogrammetry and Remote Sensing (ASPRS) announces the Manual of Photogrammetry, Sixth Edition is now available for purchase through the ASPRS Bookstore.

Under the leadership of J. Chris McGlone, PhD, CP, as Editor-in-Chief and George Y.G. Lee, Technical Editor, the Manual covers photogrammetry in depth, as well as its constituent technologies, providing the student, practitioner, or researcher with a single valuable reference resource.

The overall outline of this Sixth Edition is slightly modified from that of the Fifth Edition. The emphasis is again on digital methods and products, while material on film cameras and analog plotters has been deleted. The mathematical content has been further expanded, especially the treatment of replacement sensor models, along with discussions of digital image processing and computer vision algorithms.

SDI Cookbook update

The SDI Cookbook, in its wiki version, now has an updated Chapter 10 to reflect the latest slate of standards and popular version numbers. We seek contributing editors for the other Chapters to also bring them up-to-date. About three months prior to the next GSDI Conference we will seek to affix a date and snapshot the Cookbook into a "SDI Cookbook 2013" PDF version. By saving a PDF and giving it a date of publication, it will clarify the reference and citation of the document and provide a time context.

If you are interested in helping update any of the chapters, please contact Douglas Nebert.

GSDI and IGS Global News, Issue 3 Volume 3 for 2013

NewGeography website

Mapping London blog

Back to contents

Spatial Data Infrastructure
Asia & the Pacific Newsletter

LandScan: a news update from Land Information New Zealand, Issue 64 (March 2013)
In this issue...
- International acclaim for the LINZ Data Service
- Property rights reputation remains high
- LINZ establishes Crown Land Centre of Expertise
- Location-based information to boost Canterbury recovery
- First new nautical paper chart produced in-house
- LINZ takes learners on a geospatial adventure
- Stakeholder survey - thanks for your feedback

Borderlines blog from the New York Times
Countries are defined by the lines that divide them. But how are those lines decided — and why are some of them so strange? Borderlines explores the stories behind the global map, one line at a time.
by Frank Jacobs
Frank Jacobs is a London-based author and blogger. He writes about cartography, but only the interesting bits. His other blog is Strange Maps

Blog of **Ragnvald Larsen, geographer**
Geographer working with maps at the Norwegian Directorate for Nature Management. Part of his job is to contribute to development aid projects.

Steve Goldman's **Map Fodder** website

David Rumsay Map Collection

International Society for Digital Earth - August, 2012 Newsletter

Thoughts on the Geospatial industry, Open Standards and Open Source Cameron Shorter's blog

New Zealand - SDI Cookbook Chapter 6 – Government and Industry, moving forward.
Carnival Of The Geospatialists #3 - Musings and Down-Right Cool Things Shared by the Geo Faithful

Open Planet 5, the magazine published for the International gvSIG Conference is now available in electronic format

SDI Magazine

Technology & More (July 2013)

Mother Pelican: A Journal of Sustainable Human Development
The December 2012 issue has been published

LiDAR News, Vol 3, No 11 (August 21, 2013 Newsletter)

LiDAR News magazine (July-August, Vol 3, No 4, 2013)

Think Quarterly – Google's new on-line magazine

Coordinates monthly magazine - **PDF** (February 2013)

SERVIR-Africa community news

GISuser - GIS and Geospatial Technology News

National Geographic website

The Atlantic Cities website including Maps

Back to contents

Spatial Data Infrastructure
Asia & the Pacific Newsletter

Professional Surveyor magazine

The American Surveyor newsletter (August 28)

The American Surveyor Vol.10 No.6 (May 2013)

My Co-ordinates e-zine – August 2013 issue (PDF)

UN-SPIDER Newsletter June 2013

UN SPIDER Updates May 2013

Thematic Mapping blog
Terrain mapping with Mapnik

Back to contents

Just for Fun!

Dalhousie University GIS Prof seeks solution to student ignorance of geography
Geographers from across the globe met in St. John's (in early August) to discuss the future of geographic education in Canada after alarm bells went off when some Memorial University students couldn't locate the Atlantic Ocean on a map.
James Boxall, a geography professor at Dalhousie University, said he wasn't exactly shocked when he saw a previous CBC report in which university students struggled to locate basic things.
"I actually do [a quiz] with my first-year students every year, I just haven't publicized it, and it's the same results," Boxall said.
Source: AnyGeo blog and CBC News

Jenni Spark's hand-drawn maps of London & New York
The Hand Drawn Map of New York that I've been working on for what seems like FOREVER! It was once again commissioned by the lovely Evermade.com and was just as hard as the Map of London, if not harder... Anyway, I'll let the images speak for themselves as I have lost the ability to think about anything other than buildings.
Source: Jenni Sparks's blog and The Atlantic "Cities": Maps

This map shows what the United States would look like if life were fair
The electoral college is a time-honored, logical system for picking the chief executive of the United States. However, the American body politic has also grown accustomed to paying close attention to the popular vote. This is only rarely a problem, since the electoral college and the popular vote have only disagreed three times in 200 years. However, it's obvious that reforms are needed.
The fundamental problem of the electoral college is that the states of the United States are too disparate in size and influence. The largest state is 66 times as populous as the smallest and has 18 times as many electoral votes. This increases the chance for Electoral College results that don't match the popular vote. To remedy this issue, the **Electoral Reform Map** redivides the fifty United States into 50 states of equal population. The 2010 Census records a population of 308,745,538 for the United States, which this map divides into 50 states, each with a population of about 6,175,000.
Source: Washington Post and Electoral College Reform

Back to contents

Spatial Data Infrastructure
Asia & the Pacific Newsletter

Watch the Intricate Patterns of Global Infrastructure Emerge From Geocoded Tweets
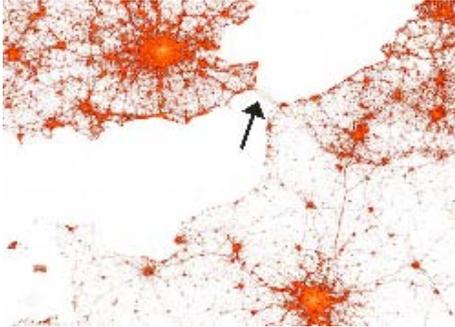
You may have seen earlier this summer a series of maps released by Twitter showing the geography of different cities as revealed by millions of tweets. Such maps of digital information are compelling for the way they also illustrate concrete infrastructure: the road networks around cities, the public parks inside of them, the clusters of commercial office buildings.

If you missed your own city in that series, Northeastern University assistant professor of computer science Alan Mislove has created a global, navigable map using much of the same data.
Source: The Atlantic "Cities": Maps

Back to contents

Training Opportunities

10th International Society for Photogrammetry and Remote Sensing (ISPRS) Student Consortium & WG VI/5 Summer School

Theme: Geospatial Science for Monitoring of Environment for Sustainable Development
29 October - 2 November Addis Ababa, Ethiopia **Online registration**.

With the main theme "Geospatial Science for Monitoring of Environment for Sustainable Development," the conference will bring together researchers, policy makers, and practitioners from developed and developing countries to share insights into the challenges and opportunities of geospatial science & technology and application in solving these world challenges. The event will showcase cutting-edge research from around the world, focusing on themes of equity and risk, learning, capacity building, methodology, and possibly investment approaches in geospatial applications. It will explore practical adaptation policies and approaches, and share strategies for decision making from the international to the local scale.

Event topics:
Change Detection
Food Security
Agriculture Monitoring
Land Cover/Use
Disasters Monitoring

All courses, except the technical trip and social events, include class lectures and discussions. Some of the courses will also offer practical instrument operations and lab exercises. Detail program and schedules will be published on the web site.

Important Dates
Online Registration Closes: 10th September 2013
Fee Transfer/ Participation Confirmation: 30th September 2013
Registration at Venue/ Accommodation: 28th October 2013
Technical Visit: 1st November 2013

Fees:
All Students: 100 US Dollars
ISPRS SC Members: 90 US Dollars
Above 35 years: 120 US Dollars

Limited scholarships for participation at the ISPRS Summer School are available for undergraduate students from Eastern African Universities

Free webinar recording: Open Source Software in Commercial GIS Sofware Applications
Presenter: Michael Rosen, LizardTech Seattle, WA US, Held July 26, 2013

PennState EDU Introduces Maps and the Geospatial Revolution Online Training

An amazing new effort from Penn State (PSU) kicks off this week in the form of a massive, online EDU offering – enter Maps and the Geospatial Revolution. In just 6-9 hours a week, students can enjoy this online offering and learn how advances in geospatial technology and analytical methods have changed how we do everything, and discover how to make maps and analyze geographic patterns using the latest tools. The course is led by

Back to contents

PSU instructor, Anthony Robinson. Geospatial Gurus may find the course a little simple but anyone else is encouraged to take part. See the course program.
Thanks to GISUser blog AND **Meet the Man Who Wants to Teach the World to Make Maps** above

UNIGIS distance learning MSc - registration open for fall 2013

Interested students and professionals from Central Asia will again have the opportunity to enhance their qualifications and to improve their career prospects: the UNIGIS MSc in 'Geographic Information Science & Systems' as well as the 'UNIGIS professional' certificate are offered via online distance learning to active professionals and graduates aiming at making GIS and Geoinformatics the basis for their current and future jobs.

The globally recognized UNIGIS qualifications are offered in Central Asia in a cooperation between the University of Salzburg's Z_GIS competence centre and the Austria-Central Asia Centre for GIScience - ACA*GIScience. Degrees and certificates are awarded from the University of Salzburg, Austria. The UNIGIS study programmes for Central Asia are based on English language online materials with support from instructors in local languages.

Registration now is open for the fall 2013 intake of students, starting in October. Enquiries and a brochure for Central Asian students is available online.

Arizona State University GIS Lab

A good place to get a sense of where the geographic information system (GIS) field is headed is Lattie F. Coor Hall at Arizona State University in Tempe, Ariz. That's the home of the 30-credit-hour Masters of Advanced Study in GIS (MAS-GIS) Program within ASU's School of Geographical Sciences and Urban Planning. Here, students are exposed to not only the latest GIS concepts but also ever-evolving technologies.
Source: The American Surveyor

Free Webinars on Solving Data Challenges

Sign up for future webinars and view past recorded webinars

Course Spotlight: Master of Spatial Information Science

The University of Melbourne Course Spotlight: Master of Spatial Information Science
Spatial information is an essential and indispensable part of any economy's infrastructure. It is needed in all walks of life and on many scales, with applications in land tenure systems, environmental modelling, food production, disaster management, climate change modelling, engineering, architecture and urban planning. Current industry shortfalls in spatial information practitioners combined with a growing demand in Australia and internationally, ensure graduates a range of well-paid job opportunities.
Find out more about the Master of Spatial Information Science, as well as our scholarship opportunities.

Back to contents

Funding Opportunities, Awards, Grants

Singapore Geospatial Challenge

The Singapore Geospatial Challenge [SGC] is an initiative of the Singapore Land Authority to encourage the use of Geographic Information Systems technology in schools. Supported by the United Nations Initiative on Global Geospatial Information Management (UNGGIM), the challenge is organized for Junior Colleges and Secondary School students to help create a spatially enabled Singapore.
Details:
The main event will be held on the 2nd August 2013, Singapore Geospatial Challengers will have to plan an optimal route prior to the event and use a geospatial mobile application (created by Organizing-Partner, Nanyang Polytechnic) to navigate around the civic district while they check-into caches (e.g. Heritage Buildings/Trees) selected by SGC partnering agencies, NParks, NEA and NHB. While navigating and checking-into the caches with their mobile device, students will learn of the power and benefits that geospatial information and applications can bring while simultaneously uncovering Singapore's rich historical and green heritage.
Once checked-in, the cache would become unavailable to other challengers for a set period of time. Challengers waiting to check-in may opt to use their 'Lifelines' [limited!] to unlock the cache so that they may check-into the cache. Conversely, rival teams may want to work together to challenge reigning teams by creating quiz-barriers to caches they might be attempting to check-into.

Back to contents

Singapore Government launches app competition

The Singapore Government announced the launch of Apps4SG, an app development competition promoting the use of government data in developing innovative applications. **The Competition is open to all Singapore residents**.

To be eligible for the competition, a developer must create either a mobile or web-based application featuring the use of at least one government dataset.

The government is offering three attractive cash prizes to winners - the first prize is SG$10,000, the second SG$5000, and the third SG$3000. In addition, all apps will be eligible for consideration to receive seed funding. The government will provide free cloud services to each participating team.

Participants are encouraged to participate in hackathons to get a headstart in conceptualizing ideas and prototypes. Apps that are developed from these hackathons can be submitted to Apps4SG.

Health Up! - May 2013

Environment Up! - April 2013

Apps4SG Hackathon - June 2013

Workshops on app development and government data will be organized for participants to attend.

Register your interest with us and be kept informed! http://www.data.gov.sg/apps4sg/reg.aspx

Submission deadline: October 1, 2013.

Singapore government introduces geospatial scholarship

The Singapore government has introduced the government on Friday introduced the Singapore Geospatial Scholarship, the first of its kind in the island nation. Senior Minister of State for Law and Education, Indranee Rajah, made the announcement on Friday last week. Rajah said the scholarship would be jointly conferred by several public agencies, and will meet the increasing demand for geospatial professionals for the industry. The scholarship is for undergraduate and postgraduate studies. More information is expected to be release later in the year. Ms Indranee noted that Geospatial Information Systems and Technology (GIST) touches many aspects of daily life, such as getting road directions on the smart phone, and providing live traffic condition updates. It is also used in monitoring dengue clusters, and managing issues such as climate change and disaster response

Channel NewsAsia

CARIS announces 2014 calendar contest

Note from the Editors: the rewards offered are the kudos & recognition associated with publication. Further note – entrants are required to utilize the CARIS software.

CARIS' popular calendar contest is back! Now in its eighth year of production, the calendar contest continues to gain in popularity.

Submit your CARIS images for the calendar contest

Submissions for the 2014 calendar contest are now being accepted. CARIS software users are encouraged to submit their favourite CARIS imagery including geospatial datasets, maps, charts, 3-D views and more.

The submission deadline is Friday, September 13, 2013.

New this year – You vote for the winners

**Winners will be featured in the 2014 CARIS calendar**

Once the voting period ends, the 12 images with the highest number of votes will win a spot in the 2014 CARIS calendar. In addition, CARIS judges will choose two additional images to be included in the 14-month calendar. The winning images will also be published on the CARIS website as downloadable calendar desktop images and be displayed on CARIS' social media pages.

The overall calendar contest winner, with the highest number of votes, will receive a mounted copy of their winning image and will be featured in CARIS Coastlines.

Check out our past calendar winners

Previous calendar images can be found on the Calendar Desktop Images web page. Check out last year's winner. The deadline for submissions is **September 13, 2013**. For more information, contact CARIS.
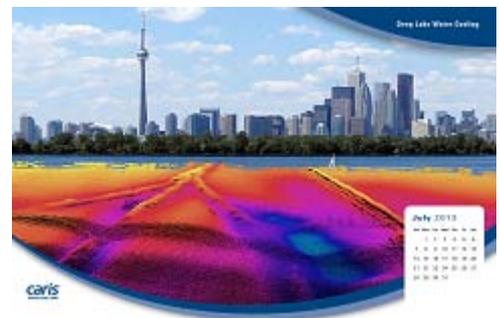
Ideas Challenge

The Ideas Challenge is at the core of the GMES Masters competition. It invites students, entrepreneurs, start-up companies and SMEs to submit their ideas for an innovative commercial use of GMES to a secure online database on the GMES Masters website. The best idea for a commercially viable business idea using GMES

Back to contents

data will be rewarded. The winner will be rewarded with a cash prize of EUR 10,000 as well as the chance to get his idea further developed in one of the six ESA Business Incubation Centres (BICs). The incubation package has a value of up to EUR 60,000.

ESA App Challenge

The European Space Agency (ESA) will award the ESA App Challenge to the best application idea for the usage of GMES on mobile phones. Proposals shall address one or more GMES main thematic areas (land, marine environment, atmosphere, climate change, emergency management). ESA is looking for ideas that can be implemented quickly into a profitable business. The application should consist of a base app containing info and news on GMES, as well as one or more specific content modules that provide relevant location-based data to users in real time. The winner will be considered for support by one of the six European Space Agency's Business Incubation Centres (ESA BICs) across Europe (value up to EUR 60,000).

European Space Imaging High-Res Challenge

European Space Imaging (EUSI) is Europe's leading provider of Very High-Resolution (VHR) satellite data. EUSI will award the best application idea using the most advanced VHR satellite data. Application ideas which are easily implementable, sustainable, cut costs and create efficiencies are of high interest. Participants are required to submit detailed application ideas including business concepts. The winner will be awarded a data package of EUSI satellite data worth up to EUR 20,000 for use in further developing the winning application.

DLR Environmental Challenge

DLR is looking for new applications in Earth observation, especially proposals addressing the mapping of the environment and climate. Ideas for using Earth observation to manage sustainable supplies of energy are also welcome. In addition to any kind of non-satellite geoinformation, proposals should be based on existing or imminent Earth observation satellite data that is available either for free or under commercial terms. The product or service generated from the idea should support either professionals from organisations and companies in environmental assessment, or the general public and consumer-oriented markets. Both regional and global applications and services are possible. Innovative ways to link the service with users are especially encouraged. The ideas should also describe a realistic scenario for their implementation involving either the general public or commercial benefits. The winner(s) will receive a voucher for a workshop or initial coaching according to what further realisation of the idea requires.

Best Service Challenge

The Best Service Challenge invites service providers to upload profiles of their existing services within the main thematic areas of GMES to the GMES Masters competition website. The Best Service Challenge aims at increasing the awareness of existing Earth Monitoring Services and their benefits to European citizens. The winner of the Best Service Challenge will benefit from a substantial satellite data quota made available with financial support by the European Commission.

T-Systems Cloud Computing Challenge

T-Systems will award the prize for its Cloud Computing Challenge to the best GMES application or service idea that will make use of the cloud computing model Infrastructure-as-a-Service (IaaS) to provide Earth observation data on demand via user-oriented web portal or mobile devices. T-Systems will assist the winner in getting the awarded project off the ground. They will support the winner to realise an innovation project, which could lead to a long-term partnership.

Challenge to spur the geospatial industry

The Singapore Land Authority has launched OneMap Challenge that seeks to promote the development of innovative map-based desktop and mobile applications by businesses and the community.

The OneMap Challenge provides a platform for application developers to showcase their creativity through the apps they develop to an increasingly tech-savvy population and enterprises, including those represented by the Association of Small and Medium Enterprises (ASME) which is one of the competition promotion partners. The Challenge also aims to facilitate collaborations between potential business partners for creating location-based apps that are useful for business enterprises and the general community.

With two top prizes of $20,000 cash each and other attractive prizes up for grabs, the OneMap Challenge is divided into two categories – Web Applications for applications that run on web browsers and Mobile Applications for those that run on smart phones, tablets and other portable devices.

Back to contents

Spatial Data Infrastructure
Asia & the Pacific Newsletter

Visit http://www.sla.gov.sg/OneMapChallenge to learn more about OneMap Challenge and check out the OneMap Facebook page at www.facebook.com/OneMap.
Source: Geospatial World and SLA press release

Back to contents

Employment Opportunities

New career resource (now in its second month) at **GeoJobsBIZ**. There's been about 200 opportunities listed and the growth has been steady in visits and users. If you need to recruit Geo/Tech talent hopefully you'll give it a shot and those of you simply browsing for a new gig so you can tell the boss to go take a hike perhaps there's something here for you. Good luck!

GIS Job Board Launches New Website: www.gisjobboard.com

New Site Provides Employers and Job Seekers Tools to Post and Search Jobs and Resumes in the GIS and Geospatial Disciplines

GIS Job Board has launched a new website specifically dedicated to GIS and other geospatial disciplines. The new site makes it simple for employers and job seekers to post and search for jobs and resumes. The site was created to serve the growing needs of the GIS community and help with recruiting and job seeking efforts.

Visitors also have the option to view the site in a different language if they choose, making it easier for them to have access to the content

Registered users can receive jobs or resumes by email. They can also flag jobs and resumes as well as save searches, setup resume alerts, and save resumes and jobs. Users have the capability of private messaging other users in case they ever want to communicate with someone.

For more information about GIS Job Board, please visit their website at **www.gisjobboard.com**

Back to contents

Conference Proceedings

2013 Esri International User Conference Paper Sessions

Proceedings: GMES & Africa Water Resources Management Workshop, May 14-15, 2013, Abuja, Nigeria
The "GMES and Africa" process was launched by the Maputo Declaration, signed on 15 October 2006. The initiative aims to strengthen and further develop infrastructure for a more coherent exploitation of Earth Observation data (space and in-situ), technologies and services in support of the environmental policies for sustainable development in Africa and ACP countries.
The GMES & Africa Water Resources Management Workshop (the 2nd GMES & Africa workshop) was organized through the BRAGMA FP7 project and was co-financed by the European Union in the framework of the joint Africa-EU Strategy and by the host organisation NASRDA. It was attended by over 60 participants from over 30 African countries and included representatives of the AUC, AMCOW, ECOWAS, EAC, CEMAC and NEPAD. The Workshop was furthermore attended by representatives from the EU and EU financed supporting projects in Africa and the European Space Agency. The background of the African technical representatives, as proposed by the AUC, was very broad and ranged from members of various (trans-boundary) water resources implementation organizations to members from various national universities, as well as the NASRDA, which also acted as the Workshop local organizing committee.
See: Report on the 2nd GMES and Africa Workshop on Water Resources Management (PDF)
Note: a 3rd GMES & Africa workshop focusing on Long Term Management of Natural Resources will be held June 25-26, 2013, in Sharm el-Sheikh, Egypt.

Australia: AURIN Training Update
Between the 1st and 3rd of May over 35 participants representing 15 partners agencies took part in a training and information session on the Australian Urban Research Infrastructure Network (AURIN) portal and
Back to contents

demonstrator projects conducted as part of the North West Melbourne Data Integration Project. This project has been delivered through the Centre for Spatial Data Infrastructures and Land Administration and jointly funded by the Australian National Data Service (ANDS) and AURIN.

Click here to view the latest Demonstrator video, showcasing the latest eTools and data available through the AURIN Portal.

Back to contents

Conferences, Events

For upcoming events of global or major international interest, please visit the upcoming conference list on the GSDI website – as this conference list will be reserved for conferences within or with specific interest to the Asia Pacific Region.

The editors welcome news of conferences & events from the newsletter subscribers

Call for Expression of Interest to host AARSE 2014 and future Conferences
Call for Expression of Interest to host the 10th biennial International Conference of the African Association of Remote Sensing of the Environment (AARSE) in October 2014 and future Conferences.

Date	Location	Event
September 2013		
2 – 4 September	Jakarta, Indonesia	**UN/Indonesia Workshop on Climate Change** **United Nations/Indonesia International Conference on Integrated Space Technology Applications to Climate Change** **Application deadline: CLOSED May 31, 2013** The United Nations is organizing the United Nations/Indonesia International Conference on Integrated Space Technology Applications to Climate Change under the framework of the United Nations Programme on Space Applications. The Conference will be hosted by Indonesia's National Institute of Aeronautics and Space (LAPAN). This conference will bring together experts from the space and the climate change community as well as decision makers to discuss methods to use space-based applications to support the identification and implementation of adaptation measures, as well as to share experiences and lessons learned on the use of such applications in the context of mitigation. The objectives of the Conference are: 1) To discuss ways in which countries affected by climate change can make better use of space applications to assess vulnerability to climate change. 2) To identify potential alternatives in the context of mitigation and adaption to climate change 3) To improve synergies among space agencies and organizations targeting efforts on climate change. 4) To strengthen international and regional cooperation in this area. 5) To raise awareness on the recent advances in space-related technologies, services and information resources which can be use to assess the impacts of climate change and the effects of measures implemented to reduce such impacts. Applicants must have a well-established professional working experience in a field related to the theme of the Conference. Applicants should ideally be involved in the planning or implementation of relevant space programmes in relevant governmental organizations, international or national agencies,

Back to contents

		non-governmental organizations, research or academic institutions or industry. Within the limited financial resources available to the co-sponsors, a number of qualified applicants from developing countries, who have expressed the need for financial support will be offered financial support to attend the Conference. This may include the provision of a round-trip air ticket between Jakarta and the applicant's international airport of departure and daily subsistence allowances to cover board and lodging for the duration of the Conference. En-route expenses or any changes made to the air ticket must be the responsibility of the participants.
4-6 September "NEW"	Brisbane, Australia	**Ozri 2013**
5 September "NEW"	Brisbane, Australia	**Australian Spatial Data Infrastructure (SDI) Forum at Ozri 2013**
7-19 September	Tehran, Iran	**ISNET/ISA Workshop on Space Applications for Disaster Risk Reduction and Management** **Application deadline: CLOSED June 30, 2013** The objectives of the Workshop are: 1) To provide participants with a broad overview of space-based technologies for disaster risk reduction and management 2) To provide specialized training in the processing, interpretation and applications of satellite remote sensing data for disaster risk reduction and management 3) To impart hands-on training on floods, earthquakes, landslides, cyclones, tsunamis and avalanches using space-derived optical, SAR and microwave remote sensing data 4) To impart knowledge on the use of advanced disaster risk reduction and management techniques and methodologies in handling space-derived data 5) To develop familiarization with techniques used to integrate optical and SAR data for applications in different disaster hazard areas 6) To enhance horizontal cooperation and collaboration among the participants through the development of synergy Applicants must have a professional background of working in the fields of satellite image processing, interpretation and analysis, disaster management applications especially floods, earthquakes and landslides. Applicants should ideally be involved in the areas of space technology applications for disaster risk reduction and management particularly on early warning, prevention, response and mitigation in space agencies, disaster management authorities and other space-related organisations. Those with the knowledge and working experience of optical, SAR/microwave remote sensing data processing and interpretation would be given preference. Postgraduate students who are in the second phase of their studies in disaster management area or Ph.D. fellows who are in the starting phase of their studies are encouraged to apply. ISNET will offer full/partial funding to a limited number of deserving applicants from OIC member states only. This will include the provision of a round-trip air ticket between Tehran and the applicant's international airport of departure and daily/subsistence allowance to cover board and lodging for the duration of the Workshop. En-route expenses or visa fees must be the responsibility of the participants. While applying for funding, an applicant must submit a letter of recommendation from the head of organisation alongwith a duly-filled application form to ISNET.

Back to contents

		Incomplete application forms shall either be returned or not be entertained depending upon the date of receipt.
12-14 September	Enschede, NL	**GISDECO: URBAN FUTURES. Multiple visions, paths and constructions** **Deadline for abstract submission:** 15 April 2013 Notification of acceptance: 15 May 2013 **Deadline full paper submission:** 15 August 2013 ? The upcoming GISDECO (GIS for Developing Countries) conference is being hosted by the Department of Urban and Regional Planning and Geo-Information Management (PGM) (Faculty ITC, University of Twente) and jointly organized with N-AERUS (Network-Association of European Researchers on Urbanisation in the South).? CALL FOR PAPERS Some pre-conference workshops/meetings can be arranged for a small fee can also be facilitated. Should there be a desire for these please contact the local organization committee before 31 March 2013. For any further information or communication regarding the conference please only use this email.
17-18 September	Singapore	**8th Annual GDI APAC 2013: Geospatial Defence & Intelligence 2013**
23-27 September	TSUKUBA, Japan	**ASPAR 2013 The 4th Asia-Pacific Conference on Synthetic Aperture Radar** "Overcoming the Hardships: Responding to Disasters with SAR"
24-25 September	Kuala Lumpur, Malaysia	**International Symposium & Exhibition on Geoinformation (ISG)**
24-26 September	Kuala Lumpur, Malaysia	**Asia Geospatial Forum 2013** CALL for ABSTRACTS Contact Abstract Submission — **30 May 2013** Abstract Acceptance / Non-Acceptance — **15 June 2013** Authors' Registrations — **30 June 2013**
October 2013		
8-10 October	Ankara, Turkey	**APSCO 5th International Symposium on Satellite Remote Sensing (RS) and Geographic Information System (GIS) Development in the Asia-Pacific Region** Abstract deadline: July 15th, 2013.
15 – 17 October	Coombe Abbey, Warwickshire, UK	**1st call for papers** for the **9th International Workshop of the EARSeL Special Interest Group (SIG) on Forest Fires**. The workshop is organised by the University of Leicester with support from the Laboratory of Forest Management and Remote Sensing, Faculty of Forestry and Natural Environment, Aristotle University of Thessaloniki. Contact **EXTENDED deadline for abstract submission is 15 April 2013.**
20-24 October **25-30 October "NEW"**	Bali, Indonesia	**34th Asian Conference on Remote Sensing 2013** **9th ISPRS Student Consortium and WG VI/5 Summer School**
23-25 October	Beijing, China	**United Nations International Conference on Space-based Technologies for Disaster Management - "Disaster risk identification and response"**. Please submit your application for participation online until 10

Back to contents

		August 2013. In the context of the Conference the International Training Programme "Flood Risk Mapping, Modelling and Assessment using Space technology" will be organised for 25 participants of the conference. The organisers will be able to provide financial support to a limited number of participants. Only participants/experts representing a country and/or an organisation engaged in developing a long-term partnership with UN-SPIDER will be considered for the funding support. Those who request funding support must express their government's or organisation's intention to develop a work programme with UN-SPIDER in the coming years. The support will defray the cost of travel (round-trip ticket – most economic fare – between the airport of international departure in their country of residence and Beijing) and/or room and board expenses during the duration of the event. If you have further questions about the conference, contact Mr. Shirish Ravan, Telephone: (+86) (10) 6353 3527 For specific questions related to the registration process contact Ms. Liu Jing, Telephone: (+86) (10) 6353 3527
28 - 30 October	Tehran, Iran	**2nd Meeting of the Regional Committee of United Nations Global Geospatial Information Management for Asia and the Pacific** (UN-GGIM-AP) Theme: NGIA's roles in successful disaster response The 2nd Plenary Meeting of the Regional Committee of United Nations Global Geospatial Information Management for Asia and the Pacific (UN-GGIM-AP) is being hosted by the National Cartographic Center of Iran under the theme of National Geospatial Information Authorities' (NGIAs') Roles in Successful Disaster Response. The theme was chosen based on a common understanding and recognition that strengthening regional capacities for disaster response is critical as Asia and the Pacific region is the most disaster-prone region in the world. The intensity and frequency of natural disasters are likely to increase due to environmental degradation, population growth, urbanization and climate change. Considering such circumstances, it is very important for us to meet and discuss disaster response and develop strategies in a coordinated manner. In addition, global trends in the spatial web services will be discussed under the sub theme of The Latest of Spatial Web Services Provided by NGIAs. As the number of Spatial Web Services by NGIAs is increasing in the region, the sharing of experiences and lessons learnt in this area is expected to be beneficial to all participants
November 2013		
4-8 November	Addis Ababa, Ethiopia	**GSDI 14 and AfricaGIS 2013:** The GSDI Association, EIS-Africa, the International Geospatial Society, and the United Nations Economic Commission for Africa (UNECA) are pleased to announce a close partnership in offering the joint GSDI 14 World Conference and AfricaGIS 2013 Conference. The theme of the conference is **Spatially Enabling Africa in Support of Economic Development and Poverty Reduction**. **IMPORTANT DATES** Deadline for Submission of Abstracts:15 May 2013 Deadline for Submission of Full Papers for Refereed Outlets: 15

Back to contents

		May 2013 Deadline for Submission of Full Papers for Non-refereed Outlet: 1 Sept 2013 Deadline for Full Conference Registration Payment for All Presenters: 15 Sept 2013
13-16 November	Skopje, FYRoM	**International Conference on Spatial Data Infrastructures and Spatial Information Management 2013** e-mail
December 2013		
2–5 December	Bellvue, Washington, USA	**Institute of Navigation (ION) Precise Time and Time Interval Meeting**
3–6 December	Hanoi, Vietnam	**Asia-Pacific Regional Space Agency Forum (APRSAF-20)** Theme: Values from Space - 20 Years of Asia-Pacific Experiences APRSAF-20 is being jointly organized by the Vietnam Academy of Science and Technology (VAST), the Ministry of Education, Culture, Sports, Science and Technology of JAPAN (MEXT), and the Japan Aerospace Exploration Agency (JAXA).
16–19 December	Ahmedabad, India	**AGSE 2013 -** "Geospatial Momentum for Society and Environment" Organizers: - Dr. Anjana Vyas (CEPT University, India) Dr. Josef Behr (Stuttgart University, Germany) **Important Dates** Last date of Abstract Submission: 20th June 2013 Last date of Full Paper Submission: 07th September 2013 End of Early Bird Conference Registration: 31st September 2013 **Contact**
2014		
	Malaysia	Malaysia will be hosting the (International Federation of Surveyors) FIG Congress in 2014. The decision was taken at the recently concluded FIG Congress 2010 in Sydney, Australia.
May 2014		
5-9 May **"NEW"**	Geneva, Switzerland	**Geospatial World Forum 2014** **CALL for ABSTRACTS** – to be submitted by November 1, 2013 Notification of Acceptance: November 15, 2013 Contact: info@geospatialworldforum.org
21-23 May	Thessaloniki, Greece	**5th International Conference on Geographic Object-Based Image Analysis** (GEOBIA 2014).

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