RNI: DELENG/2005/15153
Publication: 15th of every month
Posting: 19th/20th of every month at NDPSO

No: DL(E)-01/5079/11-13
Licensed to post without pre-payment U(E) 28/2011-13
Rs.100

ISSN 0973-2136

www.mycoordinates.org

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Volume VIII, Issue 11, November 2012

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This issue has been made possible by the support and good wishes of the following individuals and companies Abdul Kadir Bin Taib, Cetin MEKIK, Eray CAN, Hakan AKCIN, Hiroshi Murakami, Jaap Zevenbergen, João Paulo, Hespanha Joobin Im, LI Pengde, Paul Cheung, Rachael Knight, Samuela Naicegucegu, Senol KUSCU, Tarun Ghawana and Teo CheeHai; and Ashtech, CHC, Effigis, Foif, Hemisphere GPS, HiTarget, Ifen, Javad, Pentax, MicroSurvey, Navcom, Nottingham University, NovAtel, NRSC, Seafloor, Sensonor, Spectra, South, Trimble, Unistrong and many others.

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[advertising] sam@mycoordinates.org
[subscriptions] iwant@mycoordinates.org

Web www.mycoordinates.org

Annual subscription (12 issues) [India] Rs.1,200
[Overseas] US$80

Printed and published by Sanjay Malaviya on behalf of Centre for Geoinformation Technologies at A221 Mangal Apartments, Vasundhara Enclave, Delhi 110096, India.

Editor Bal Krishna

Owner Centre for Geoinformation Technologies

Designed at Spring Design (springdesign@live.com)

Printer Thomson Press India Ltd., B 315, Okhla Phase I, New Delhi - 110020, India

This issue of Coordinates is of 60 pages, including cover.

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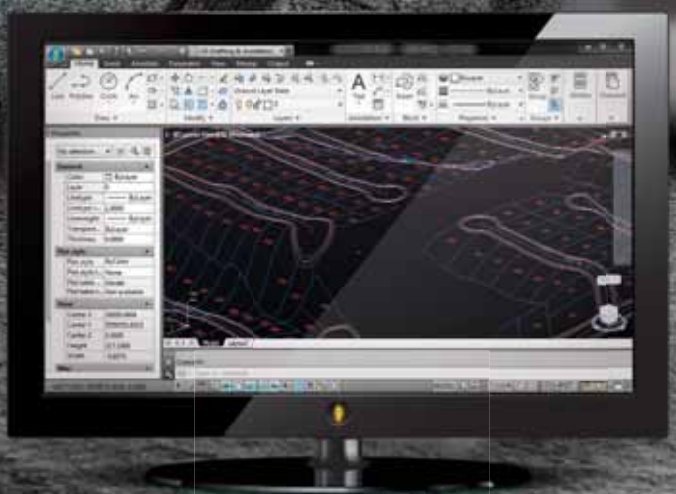

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Setting priorities

19th United Nations Regional Cartographic Conference for Asia and the Pacific

Emphasizes the need of global reference datasets,

Global geospatial information base and framework,

And establishing best practices in institutional arrangements.

It also appears that the National Geospatial Information Authorities (NGIAs)

Are being reoriented

To look beyond national boundaries

And play a role at regional and global level.

They are also repositioning themselves

To provide geospatial information deliverables

Needed by increasingly demanding users.

With the evolving world's geospatial ecosystems

NGIAs roles and priorities are changing.

However, the bigger challenge remains,

To make 'their priorities',

Of their governments'.

Bal Krishna, Editor
bal@mycoordinates.org

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JANAK

UN-GGIM: Global vision and perspectives

Experts highlight challenges and directions in Global Geospatial Information Management

Joobin Im
Director General
National Geographic Information Institute
Republic of Korea

In recent years, there has been a rapid increase in the occurrence of natural disasters; for example, earthquake in Haiti and Hurricane Katrina. Taking 2005 Hurricane Katrina of New Orleans in the United States for example, approximately 150,000 human lives were endangered, despite efforts to evacuate residents to safe shelters. As a result, New Orleans was faced with the loss of 220 billion dollars in assets. The damages were even greater the second time around, when proper measures failed to take place. Besides these natural disasters, there are a growing number of global issues including many cross-border problems like climate changes and natural disasters that not a single nation or region can be self-sufficient in dealing with it. The management of global geospatial information plays a key role in addressing and rapidly responding to such global challenges by consistently monitoring as well as being a tool to support decision making in addressing the issues at hand. So the UN and other related agencies have organized programs such as GDACS, UN-SPIDER that can inform about such natural disasters using geospatial data. During the earthquake of Haiti in 2010, the GIS was utilized to recognize the condition of situation as well as for its support operation. The well-structured geospatial information relating to damages became the grounds in establishing strategies that can be effective for recovery efforts alongside the delivery of relief goods.

Until now, any collection and production of geospatial information in dealing with globally challenging issues have been done independently by individual countries or by related organizations or departments under the UN. As such, the process mentioned above required a lot of time, funding and efforts. All the more, collected geospatial information was inconsistent and inadequate to make good and efficient use of it, even on a national level. In looking at the world as a whole, there are some nations that have already establish geospatial information and institution and legal framework Nonetheless, there are also nations that have not yet established Geospatial information. In this way, the level of establishing GI and conditions of each country vary. For this reason, sharing and exchange of global geospatial information is very difficult. Thus, it is essential to establish a global mechanism to enable sharing and exchange of geographical information from varying countries possible.

The UN initiative on GGIM

UN-GGIM past progress

Limits of existing efforts for global sharing of GI

In establishing geospatial information between nations and for globally

Geospatial information for economic growth

Paul Cheung
Director of GGIM Secretariat and Statistics Division, United Nations

With advancements in information technology, applications, web based services, mobile technologies, VGI, open data initiatives, and cloud computing services, developed and emerging economies are experiencing increasing returns on the investments made in geospatial information and place-based services. The challenge is for us to put in place the support needed to facilitate this growth globally. It is important to have geo-referenced data with increased accuracies, as it creates greater possibilities for application development, the delivery of new value added location services, and ultimately economic growth. But we must also put in place the policies, legislation and legal frameworks required to support the integration, sharing, access to and dissemination of this emerging place-based data. This is the role of the national geospatial information authorities.

sharing such information gathered, various strategies as well as technology, know-how, methods and so forth are necessary. For this, we have various international organizations, institutes, corporations, and professionals. In their own right, all have strived to establish global mechanism for sharing GI. A good example would be that of ISO and OGC for international standardization of geospatial information. Even so, such a sole activities centered on a individual organization can not make sufficient effect.

The UN initiative on Global Geospatial Information Management as global cooperation mechanism

Therefore, a measure to further support related int'l organizations, institutes, corporations, and professionals to share not only information but also create new technologies and know-how is essential and a systematic structure must take place to create synergy in its collaborative efforts. In addition, in establishing a global mechanism, we must find a collaborative cooperation system that incorporates such advanced technology, knowledge, and professionals to create group intelligence. For this, establishing a global geospatial information sharing mechanism, a continual and long-term investment must be made as well as setting up an organization to carry this main task and role positioning.

In consistent to a global geospatial information sharing mechanism, UN-GGIM was established under the leadership of the UN. UN-GGIM consists of a parallel structure of both committee of experts and high-level forum. As a formal UN Body Experts committee can provides global consultation mechanism of experts to UN- GGIM and makes the agenda of High Level Forum. High level Forum can inform the decision makers of the importance of global geospatial information management and to reflect the results of consultation of the forum to each of nation's policy.

1st High Level Forum on UN-GGIM

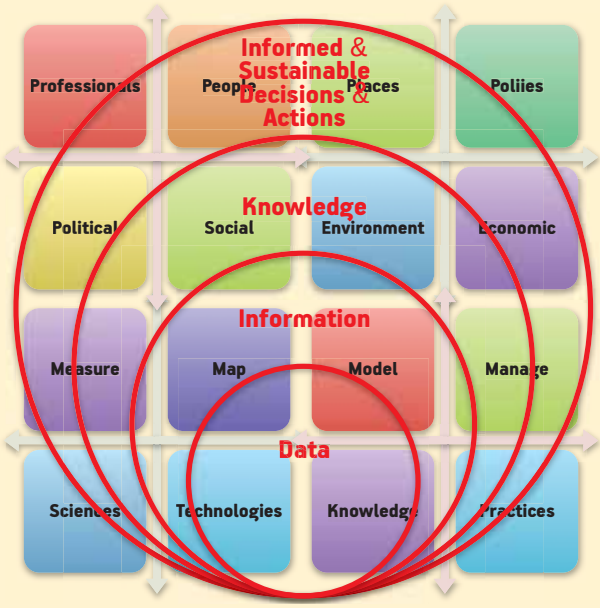
The First High-Level Forum on UN-GGIM took place for 3 days from Oct. 24 to 26 in 2011 where 350 members of 90 nations participated including 9 minister, UN representatives as well as 37 other int'l organizations and even private sectors. The forum was carried out in 4 sessions according to the following themes: Challenges in Geospatial Policy Formulation and Institutional Arrangement, Developing Common Frameworks and Methodologies, International Coordination and Cooperation in meeting Global Needs, Capacity Building and Knowledge Transfer. The outcome of 1st HLF on UN-GGIM is that it can inform

Spatial enablement towards managing all information spatially

Teo CheeHai
President, International Federation of Surveyors (FIG)

As UN-GGIM and the Regional Committee of United Nations Global Geospatial Information Management for Asia and the Pacific (UN-GGIM-AP) urge member states to migrate into the paradigm of managing all information spatially, one needs to take cognizance that we are on a journey. Fortunately or unfortunately, depending on how one sees it, there is no shortcut. Jurisdictions must take both time and effort to learn from the body of knowledge generated, from one another, understand their context and scale, before conceptualizing the more feasible and appropriate path forward, constructing and piloting the approach, evaluating and re-calibrating as one progresses. This can at times be difficult, given also the urgency to demonstrate results.

It's the view that there will also be structural changes within the domains this geospatial information community is working in. This journey towards managing all information spatially will require embracing open standards, interoperability (of systems, institutions and laws and regulations), promote and grow a culture of collaboration and sharing, avoiding duplication, encourage the incorporation of volunteered information and developing enabling platforms by locating, connecting and delivering information from difference scales, purposes and sources. However, there is optimism as this community has the sciences and technologies, the knowledge and practices to rely upon, that measures, maps, models and manages. The community is in touch with political, societal, environmental and economic realities and in the midst of all these, as professionals and with ethical and moral conduct, serving people, places and policies with its data, information, knowledge and actions. It's a complex and interconnected environment but when this environment is operating in synergistic and holistic manner, there can be sustainability.



NGIAs should provide "reliable geospatial information"

Dr Hiroshi Murakami
Director General,
Planning Department,
Geospatial Information
Authority, Japan

Rio+20 outcome document clearly states (paragraph 274), "We recognize the importance of space-technology-based data, in situ monitoring, and reliable geospatial information for sustainable development policy-making, programming and project operations." This means that national geospatial information authorities (NGIAs) in the world have a very important role in providing "reliable geospatial information" for the sustainable planet. However, current NGIAs seem to do things too differently with each other to be able to contribute to global issues. For example, the web map services provided by NGIAs look all different and hardly ready for global actions, though each web map service is supported by authoritative data carefully and accurately prepared and maintained by the respective NGIAs.

On the other hand, the web map service provided by OpenStreetMap, a typical volunteered geographic information project, look globally harmonized and nearly ready for global actions. Does this mean that NGIAs are inadequate or useless for global actions? I hope not, and I believe that the United Nations initiative on Global Geospatial Information Management (UNGGIM) will provide an adequate forum for NGIAs to discuss common agenda and consolidate their efforts on it to make contributions to global issues.

In order to maximize the benefit of UNGGIM, each NGIA needs to work closely with the government agencies to implement the decisions by UNGGIM. Otherwise, the efforts made for UNGGIM would not be materialized and result in vain. In this connection, NGIAs has a vital role in making necessary arrangements in their respective governments to implement UNGGIM decisions.

In the case of Japan, the Geospatial Information Authority of Japan (GSI; former Geographical Survey Institute) has been informing the government about the UNGGIM activities through an established channel of communications in the government for SDI development. This process will ensure that the responses from GSI properly represent the whole government and will lead to easier implementation of UNGGIM decisions in the country.

Finally, I would like to welcome the new regional body, the Regional Committee of the United Nations Global Geospatial Information Management for Asia and the Pacific (UNGGIM-AP), which was established on 1 November 2012, in accordance with a resolution adopted at the 19th UNRCC-AP, to contribute to the furtherance of UN-GGIM. Regional bodies such as UNGGIM-AP would facilitate the discussions of their member countries on the UNGGIM common agenda, so that the regional activities can be coordinated with UNGGIM. Such coordination will result in a better representation of regional needs in UNGGIM activities.

decision maker including ministers of the importance of global geospatial information management and motivate them to implement the results of forum.

Adoption of 'Seoul Declaration'

Based on the presentations and discussion of the forum, a 'Seoul Declaration' emphasizing the need of an increase in global collaboration in the field of global geospatial information was made. Through it, a vision and a firm conviction of continually developing geospatial information as well as its humanitarian support was shared. The contents of the 'Seoul Declaration' is as follows:

We, therefore resolve,

- to express our support for the initiative of the United Nations to foster geospatial information management among UN Member States, international organizations, and the private sector; and in this regard:
- to take actions to foster and strengthen national, regional and global cooperation with the aim of developing an interconnected global community of practice on geospatial information under the umbrella of the United Nations;
- to devise effective processes for jointly and collaboratively promoting common frameworks and standards, as well as harmonized definitions and methods for the treatment of national geospatial data in order to enhance geospatial information management at the national, regional and global level;
- to share experiences in policy-making, supporting legislation, and funding strategies, to encourage and develop best practices in the management (i.e. collection, storage, maintenance and dissemination) of geospatial information management at all levels and its integration with other data sources, and to facilitate and promote capacity development in the developing countries.

3 Working Group in Action: Rio+20, Inventory of Issues, and Vision Group

UN-GGIM The very first UNCE-GGIM (UN Committee of Experts on Global Geospatial Information Management) was held in Seoul, Korea on Oct. 26, 2011. Also, a resolution was made to form a 2 working group to prepare report as means of contributing to Rio+20 and to develop a roadmap and to list out realistic agendas for the next 5 years of UN-GGIM that will enable preparing of reports requested to evaluate the function of the UN-GGIM at the 2016 UN Economic and Social Council.

Rio+20

The Task Force formed during the 1st UNCE-GGIM documented the committee of expert contributions for the Rio+20 Conference making a 'Contribution of Geospatial Information to Rio+20 Processes' report and submitted it to the Rio+20 Conference in June 2012. Inclusive was the claim

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Built separately, shared together

Dr LI Pengde
Deputy Director General, National Administration of Surveying, Mapping and Geoinformation of China; President, Permanent Committee on GIS Infrastructure for Asia and the Pacific

Enhancement of geospatial information capacity can speed up growth and reduce poverty in developing countries. However, due to the fact that geospatial information is a specialized and fundamental tool giving support behind the scene, government leaders often pays inadequate attention to it. Not only domestic financial investment is not enough, but international aid is seldom used in this field. Capacity development involves some major aspects, including personnel training, awareness raising, institutional strengthening as well as technical facilities, engineering projects, demonstrative applications and social services. Also very important are financial resources and necessary equipment.

Therefore, it is expected that the UN-GGIM and the regional organizations could take the initiative to organize a series of international cooperation programs and projects, mobilize more organizations and countries to jointly provide a package plan for management consultancy, financial assistance, technical support and personnel training, and facilitate multilateral and bilateral collaboration under a unified framework. Geospatial information capacity enhancement is essential for achieving sustainable development. The mechanism of "built separately, shared together" for global geospatial information needs to be promoted at multiple levels by multiple organizations. However, capacity enhancement mainly lies with the countries themselves. There are big challenges to confront in achieving this strategic goal, but with concerted efforts from all the countries, the day will surely come when geospatial information becomes the common wealth of humankind and is available for international issues, national development, industry growth and the general public life.

that for the importance of an accurate and reliable geospatial information to monitor the implementation of conclusive results of Rio+20 providing users financial benefit and supporting a worldwide sustainable development of geospatial information that is both accurate and reliable, a side event of 'Monitoring Sustainable Development – Why Location Matters' (2012.6.20, Rio de Janeiro) should be held by UN-GGIM secretariat as well as England, Australia and Brazil. As a result, Rio+20 Outcomes document came to include article 187 - 'reduction of dangers from disaster' and article 274 – 'definition of execution – technology' emphasizing the importance of a reliable geospatial information.

Inventory of issues

The 1st UNCE-GGIM in discussion formed a working group to make listings of agendas gathering agenda list from member nations and categorized it into 9 themes.

- Developing a national, regional and global strategic framework for geospatial information;
- Establishing institutional arrangements and legal and common frameworks;
- Building capability and capacity, especially in developing countries;
- Assuring the quality of geospatial information;
- Promoting data sharing, accessibility and dissemination;
- Embracing trends in information technology;
- Promoting geospatial advocacy and awareness;
- Working in partnership with civil society and the private sector;
- Linking geospatial information to statistics.

Agenda list from member nations reveal well the comprehensive perspective of each issues by the member nations, however, it is insufficient for concrete activities of UN-GGIM henceforth. Thus, the UN-GGIM secretariat chose 4 key themes that would bring forth tangible results within the next 5 years.

- **Agreement to and implementation of core global reference datasets by specific themes**; With the need for a globally shared standardized datasets which the datasets must be formed and maintained with the world's geodetic survey as the basis, such classified data must be shared between the nations so that it can be utilized as reference material for various activities such as environmental issues as well as humanitarian works of the UN and/or other int'l organizations.
- **Establishing a global geospatial information framework and operating platform**; The 'global geospatial information platform', an authoritative and reliable mechanism for distributing the 'global datasets', will carry out the role as a window to geospatial information communication as well as distribution.
- **Increasing the global geospatial information base**; Expanding the geospatial information concept which was mainly land to the oceans and even to the universe spatial scope, it will link between geospatial information and statistical information integrating and combining conclusive results in various fields such as IHO(hydrographic map), UN-SPIDER(disaster prevention, universe spatial basis), and GEOSS(entire earth observation).
- **Establishing best practices in institutional arrangements and frameworks**; With the current situation that has vast differential gap in the standard basis of regulations and systems between the nations, it will present guidelines and indicators to the developing nations about the merits and demerits of already set up systems.

Vision group

A smaller group of committee was formed in providing vision as well as configuring trends in the field of geospatial information for the next 5 to 10 years which will be used for program planning and technical discussions of the committee

of experts of the GGIM. Discussions over categorized themes were made at the Vision Conference, a side event to the Global Geospatial Information Forum held last April 2012 in Amsterdam where the 'future trend of GGIM for the next 5 to 10 years' was drafted. This draft report was again discussed over during the 2nd UNCE-GGIM and the following suggestions made by the member nations about the future plans will be submitted as a final report on the 2nd HLF on GGIM.

Future Action Plan

The 2nd UNCE-GGIM was held Aug. 13 to 15, 2012 at the UN headquarters in New York.148 participants from 61 member nations including 34 UN delegations as well as non-governmental organizations and private corporate representatives attended the conference. During the 2nd UNCE-GGIM for 'Effective Development and Cooperation of Global Geospatial Information' had come up with the following resolution.

- Establish a global geodetic reference framework
- Gather global case studies that demonstrate the value proposition of Geospatial Information
- Communicate the efforts of UN-GGIM in supporting sustainable development agenda :
- Regional entities undertake an assessment of regional efforts and priorities :
- Consider issues related to standards setting in the international community :
- Consider a shared statement of principles for the GGIM community:
- Develop a global map for sustainable development :

Based on such conclusive result, the UN-GGIM plans to carry out the following actions.

Establish a platform for sustainable development of the global geospatial information

The principle body that acts as a mechanism for GGIM consists of individual member nations, regional consultative group, associated int'l organizations and corporations, and UN-GGIM - a key leader of future global mechanism. In order for the global mechanism to properly operate, there needs to be a global geospatial platform where the principle parties of these 4 categories can collaborate as well as exchange between each other. This global geospatial platform would be the basis where NSDI is established, global geospatial information is shared, knowledge exchange site for related professionals, and a cooperative as well as collaborative ground for globally sharing of geospatial information not to mention revision of actions. Moreover, it should include physical aspects such as hardware, software, services, contents, architecture, as well as regulatory or consultative agreement aspects that of standardization, bylaws, policies and so forth. As part of establishing this global geospatial information platform UN-GGIM is in the process of following activities.

Developing a GGIM portal as Knowledge base for managing the global geospatial information

To support the makings of geospatial information infrastructure in the developing

Empowering seamless geospatial solutions

Datuk Prof Sr Dr Abdul Kadir Bin Taib
Director General of Survey and Mapping Department of Survey and Mapping Malaysia (JUPEM)

Major advances in Information and Communication Technologies (ICT) in the last decade combined with the rapid growth of global information networks such as the Internet, have transformed businesses and markets in Malaysia. These trends have revolutionized learning and knowledge sharing, generated global information flows, empowered citizens and communities in new ways that have redefined governance and created significant wealth and economic growth. The developments have exponentially expanded both the need for geospatial information and the access to this information.

To overcome various issues and challenges to meet its Vision 2020, Malaysia has initiated and developed new strategies such as the National Transformation Programmes, Economic Transformation Programmes, New Economic Model and Digital Malaysia. In the area of Geospatial Information Management, activities such as data collection, creation and maintenance, geodetic networks, geospatial data infrastructure and multipurpose geospatial database as an enabling platform and access technologies for data dissemination are being enhanced. The incorporation of accurate geospatial information and technologies can empower seamless geospatial solutions which are useful in realizing Spatial Enablement in Malaysia.

nations, strategic framework, legal system, management models, technical standardization and so on should be sufficiently passed on to them. For this, UN-GGIM has plans to further develop its homepage www.ggim.un.org as an extension of various model case studies not to mention strategic guidelines and such as a knowledge exchange warehouse alongside being a portal. In order to be the foundational ground for knowledge base, preferential requirement would be to carry out research on model case studies of bylaws, systems and so on. Furthermore, continual efforts in the homepage contents as well as improvements in its function must be carried out. The portal's layout arrangement will be divided into 3 stages – global, regional, and each nation. On the nation's stage, SDI of each nation will be shown; in regional stage, INSPIRE (policies, governance, technical guidelines) of Europe for example; and in the global stage, One Geology (world's geological features), Global Map (map of the world), and GEOSS (earth observation system) etc. will be accessible providing integrated information. Also, educational resources will be posted alongside online forum corner set up to make the portal not merely an information sharing site but an educational and communicative hub.

Developing a Global Map for sustainable development

A Steering committee where member states and related int'l organizations take part, is to be formed under the leadership of the UN-GGIM to establish a Global Map that would become the key base for global geospatial information management. UN-GGIM's global geospatial information platform is to provide not only map reference but also various references such as statistical index, video visuals etc. as to become the window to communication and outlet between member nations as well as int'l organization regarding geospatial information sharing and distribution. For this, any global map discussions of the promotion committee should be based not in any specific reference but by balanced utilization of already established various data from ISCGM global map, UN-Map, SALB and so on. Other resource considerations should be fully observed and whether any part of it can be effectively applied such as that of the UN Map and geospatial information portals of the United States and Spain etc.

Improvement of the Global Geodetic Reference Frame

All global geospatial information distributed via the Global Geospatial Platform should be based on Global Geodetic Reference Frame and in order to improve on the accuracy of the Global Geodetic Reference Frame the government of each nation plays a vital role as well as in figuring out the current situation. UN-GGIM has active plans to demand governments of each nation to establishing institutional framework and technology etc as basis for Global Geodetic Reference Frame For the developing nations, plans are made to support technologically as well as financially through assistance.

For this, the initial steps will be taken from PCGIAP working group of geodetics surveys will be carried out concerning the current situation relating to global geodetic reference frame from each nation and regional organizations. Plans are underway for an informal consultation inviting professionals of int'l organization such as IAG, GGOS during the UNRCC-AP Conference discussing technical problems of the global geodetic survey. February next year, during Doha HLF on GGIM, a regional road map for this purpose will be presented. Donor agencies will be invited and a conclusive and detailed action plans in carrying out the road map of methodology in supporting the developing nations to implement and be a part of this global geodetic survey is to take place.

Establishing the Road Map

Sharing the vision, after prioritizing the lists of agendas for the next 5 years and with it as basis, plans are underway to establishing action plans and GGIM Road Map.

Sharing the Vision

Further developing the shared vision about the future trends of GGIM on the global, regional and national level

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UNGGIM Directions for Island Nations

Samuela Naicegucegu
Assistant Director of Lands – Mapping and Land Information- Fiji

The initiatives by UN through the UNGGIM is applauded given that the leading world body has come through to take a leading role in espousing the idea of an unified effort for a common platform in the development of geospatial information worldwide. It augurs well with the aspirations of developed countries as it allows them opportunities to raise their concerns and challenges they do face. Most of what professionals and technical personnel have sacrificed and toiled on in the field of data acquisition and information development have not been so well recognized and little do political leaders realize that data is the most important and critical component for sustainable development formats. There are a few areas that the UNGGIM can redirect its effort to.

Recognizing National Efforts

Most countries do not attend regional and global meetings and they should be deprived of any assistance if any is forthcoming. Every effort is to be made to ensure that they are also part of this global initiative and regional if regional bodies are too big to embrace all their participations than splitting them up will perhaps be an option. Island nations concerns of their own sustainable development programs can be realized by their own initiatives using natural and traditional means of predicting events by interpreting natural behavioral patterns and stringent control in the use of their land and sea resources now realized as having profound impact on their survival. What they cannot afford should be made accessible to complement such traditional methods and these can be viable and cheaper means of addressing geospatial development initiatives in the islands whilst awaiting the slow process of capacity building.

Reinforcing Regional Efforts

It is common knowledge that national developments are matters of concern at regional economic and social meet and advanced countries in such regional set up have a key role to play in addressing disparity. Whilst they strive to expose their technological advancements at global meet, they do have a more significant assignment as part and leading partner of a regional body to ensure that they effectively contribute at regional levels. Raising the bar of individual national effort within the ambit of regional cooperation framework can be an effective means for the UN to gauge global efforts in geospatial information initiative. Whilst focus are mainly on regional cooperation for economic development, right at the base of all these is the need to have quality data and information for any activity and until regional partners are aware of the importance of geospatial information they cannot understand nor attune their efforts towards this UN initiative. Surprisingly the UNGGIM relies on the expertise of Australian geodesists and technology for the global geodetic framework; most islands in the Pacific are yet to change from their old mapping datum.

Consideration of Human Development

Regional and national Non-Government Organizations funded by donor agencies and governments are to redirect their efforts more towards training of citizens to help sustain the adopted technology rather than setting up of pilot projects and the subsequent implementations of such projects. More projects set up cannot be sustained by countries as they do not have the capacity to carry on. Awareness programs of the direction of the geospatial information development in totality and advantages if a country adapt rather than the flashing of new software and hardware and their amazing capabilities by agents and especially through such regional organizations can effectively set the most appropriate platform for progress.

must be done. GGIM committee has already begun its vision action plans for the future technological trends that will be further discussed during the next HLF on GGIM at Doha.

Prioritizing the inventory of issues

Based on the priority of the list of agendas laid out and of the shared vision, a road map of GGIM's actions plans for the next 5 years will be set. However, even before following through, another prioritization needs to take place on the already decided agendas set out by the UN-GGIM. That is, prioritization assessment and diagnosis on a regional level with their own consultative mechanism will then enable the regions to decide on their own priority factors. Such conclusive regional prioritization should then be provided as feedback to be considered in the prioritized list of agendas.

Establishing the Code of Ethics

The need for developing a Code of Ethics for producing, sharing and utilizing of the geospatial information was first mentioned a the 1st HLF on GGIM (Inaugural Meeting held Oct. 2011, Seoul). It was then additionally discussed at the Kuala Lumpur Symposium (Feb. 2012) and Hangzhou Forum (May 2012). At present, a working group has been formed and has begun to work and provide presentation of its work on the 2nd HLF on GGIM (Feb. 2013, Doha) The Code of Ethics will be founded on the following principles:

- Being objective, science-based, and independent;
- Servicing the public good, societal development and user requirement
- Ensuring non-discriminatory and transparent processes;
- Maintaining confidentiality of data and appropriate access rules;
- Striving for quality; integrity; and cooperation at all levels

Regional Committee's Action for Global Geospatial Information Management

The UN-GGIM action plans must be carried out on the basis after considering regional committee's activities and conclusive

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results from it. It should combine all regional committee's action plans from a global perspective and thus provide adequate direction as well as guidelines for regional activities to take place. Therefore, regional consultative committee such as PCGIAP should provide issues specifically relating to regional factors as input to the UN-GGIM agendas as well as strive to find out how to best implement on a national and regional level some of the conclusive factors brought forth from UN-GGIM.

UN-GGIM supportive regional organizations and its activity results are as follows.

Activities of the Permanent Committee on GIS Infrastructure for Asia and the Pacific (PCGIAP)

As a Committee established in 1995 by a UN resolution in representing the Asia and the Pacific region, PCGIAP has been undertaking various projects to develop a regional spatial data infrastructure by setting up working groups and managing them through annual plenary meetings and semi-annual executive board meetings. Currently through three working groups involved in the topics that have been identified as the outstanding issues for the region: Geodetic technologies and applications; Geospatial data management and services; and Spatially enabled government and society, the committee has been contributing to addressing a number of regional agenda, including regional geodetic reference framework, survey on the status of SDI of the Asia and the Pacific countries, Land administration forum, Management against natural disasters, and the study on spatially enabled government and society. In addition, PCGIAP made an effort to identify the growing concern and challenges in the Asia-Pacific region on geospatial information management such as implementation of common geodetic framework; interagency data sharing; leadership of national geospatial information authorities; and knowledge transfer, based on its experiences in developing the regional spatial data infrastructure and on the results of the latest analysis of the questionnaire.

Activities of the Permanent Committee for Geospatial Data Infrastructure of the Americas (PC-IDEA)

As the Committee representing the region of the Americas in the area of geospatial information management, PC-IDEA was established to maximize the economic, social and environmental benefits derived from the use of geospatial information. Through the Working Group on Planning (GTplan) which has worked together with the Board, the Committee set up its work plan for the period of 2009-2013, covering seven themes: institutional capacity building; standards and technical specifications; best practices and guidelines for the development of Spatial Data Infrastructures (SDI); innovations in National Geospatial Information Authorities; knowledge gathering on topics relevant to SDI for the region (observatory on SDI); assessment of the status of SDI development in the Americas; and technological means for discussions related to SDI. In addition to the activities regarding seven themes, the Committee organized an event on prevention of disasters and risks focusing on SDI. In a part of the event, a survey on training, standards and specifications, best practices and a guide to SDI, National Institutes of Innovations in Mapping and Status of the implementation of SDI for Committee members of the Americas was conducted through the questionnaire, and some goals were developed based on the survey, such as implementation of assessment to the existing activities, Preparation of the cookbook, development of a new website, etc.

Activities of the Committee on Development Information, Science and Technology Subcommittee on Geoinformation (CODIST-Geo)

As a subcommittee on Geoinformation of CODIST, CODIST-Geo has carried out activities with regard to geospatial information management which are focusing on Policy issues; Technical Issues; Capacity building; and International cooperation and liaison. In policy issues, the Committee continues developing national policies and e-Strategies. Recognizing the importance on availability and use of information for spatially enabled e-government services, the Committee has developed several regional geospatial databases and guidelines as well as online applications and services, as the core of the African Regional Spatial Data Infrastructure, which are updated and accumulated to support regional initiatives. Furthermore, an African Reference Frame (AFREF) Project has been pursued for development of a unified geodetic reference frame for Africa. As part of Capacity building and outreach activities, the Committee has endeavoured to enhance national capacities for the utilization of geoinformation technologies by organizing educational programmes, several seminars and workshops. Some challenges have been come up through the activities in three sectors such as poor awareness and understanding among member countries and lack of resources, and future plans were set up as the need on emerging concepts.

Activities of EuroGeographics on Geospatial Information Management in Europe

EuroGeographics, as the membership association and voice of the European national mapping, cadaster and land registry authorities, has supported the national mapping, cadaster and land registry authorities (NMCAs) through relevant European legislation and initiatives, such as the Digital Agenda for Europe, INSPIRE Directive, the European Location Framework (E.L.F.), etc. According to one of relevant initiatives, the Committee has developed a technical infrastructure to deliver, as the European Location Framework, national reference data. Furthermore, the NMCAs are actively supporting the European Commission's disaster and emergency management service by providing access to their national reference data, as stipulated in an agreement signed with the European Environment Agency.

After inception of the UN initiative on Global Geospatial Information Management (GGIM), regional bodies have endeavoured to commit towards GGIM

goals with the collaboration of related organizations. PCGIAP organized a forum to discuss priority issues for the regional implementation strategy of the UN GGIM initiative, and PC-IDEA also implemented the regional mechanism associated to the UNGGIM initiative. CODIST-Geo has elaborated an African Action Plan on Geospatial Information Management to reflect African issues into the UNGGIM.

Policy proposal for GGIM

The building and strengthening capacity of developing countries

In the case for the developing countries, the inferior conditions to implement SDI infrastructure is an element hampering distribution of global SDI. Due its difficult conditions, they are unable to implement NSDI and impedes the socioeconomic development. The low economic development level deteriorates the condition for implementing SDI infrastructure for the emerging nations. It is utmost important for the emerging nations to improve conditions for adopting SDI infrastructure to outgrow from the vicious cycle. The problem is, it expected to take a very long time to self improve on the conditions for implementation Therefore aid from developed nations, international organizations and agencies is required in order to improve the condition of implementing SDI infrastructure for the developing countries.

Aid for SDI implementation funds

The acquisition of necessary budget for emerging nations are difficult due to its weak financial situation. In order improve they need financial aid for the implementation of SDI infrastructure. It is important to establish a fund network referring to the donor funds and grants to supply necessary funds for implementing SDI infrastruction by developing nations and international financial agencies.

SDI Strategy and Policy Aid

Emerging nations do not have appropriate policies or strategies to implement SDI infrastructure. To make improvements they need support from the policy-legal system-plan-methodology (Law of SDI). The GSDI has presented with the SDI Cookbook to have reference for SDI provider and user to make assessment and implement SDI (GSDI 2004). For this, finding best practice of SDI infrastructure implementation and by systemizing the case and providing it is yet another alternative.

SDI IT Aid

With low SDI IT level of emerging nations, they lack the independent IT that can be applicable to the implementation of SDI Infrastructure. In order to solve this problem, the basic IT must be provided and education training for the application of IT.

Aid for cultivating SDI experts human resource

There are also mass shortage of human resource of experts for implementing SDI infrastructure. There is a need for a human resource of experts program in order to heighten the self utilization of SDI infrastructure of emerging nations as well as systematically maintain and manage.

Global interoperability

In the case for developed nations and enterprises, implemented SDI infrastructure does not uphold the international standards and the global interoperability is inadequate. Futhermore, the legal systems related to SDI are centered on individual nation becoming the stumbling block for the distribution of global SDI (UN ECOSOC, 2011; Glenn Hyman 2002; Prestige Makanga and Julian Smit, 2010; Danny Vandenbroucke, 2010). In order to overcome this, it required to obtain voluntary cooperation from each nation and/or enterprises to reinforce international standards and introduce open legal systems related to SDI.

Cooperation to apply international standards

The implementation of SDI infrastructure for developed nation and enterprises that does not meet international standard lowers the global interoperabiltiy. Through the continuation of discussions with the international standard agencies, they must provide and supply unified international standards to implement information, coordinate use, share, disseminate and apply SDI.

Issues regarding legal systems pertaining to: where the responsibility lies/Privacy/ownership/ national security and safety

There are no legislatures to handle possible problems that may arise due to sharing of SDI, problems pertaining liability, privacy, ownership, national security and safety. For the maintenance of legal system in each nation, the cooperation, supervision, and system of support of international agency, organization, enterprise and experts must be provided.

Conclusion

UN-GGIM and its activities are base on national and regional activities structured with involvement of related organizations of its field for an in-depth discussion as well as activities from a profession. UN-GGIM is a representative and effective consultation mechanism striving to resolve globally challenging issues through utilization of the geospatial information and has a system that can implement directly to policies, factors relating to the global geospatial information with a professional knowledge basis. UN-GGIM pursuing factors are something that cannot be resolved in a short timeframe but through continuing efforts carried out on an extended term. For this, its member nations must cognitively and fully recognize the importance of UN-GGIM thus must actively implement to its policies any important issues concurred from it and pass on exemplary model cases for further establishing of the global geospatial information, maximizing its utilization for the bettering all human lives.

The paper with complete references can be accessed at http://unstats.un.org/unsd/geoinfo/RCC/docs/rccap19/ip/E_Conf.102_IP1_Korea_19th_UNRCC-AP_Keynote_final.pdf and www.mycoordinates.org

Measuring effects of mining on surface structure

A study focusing on the Kozlu mining regions, whose activities may adversely affect surface structures such as the Kozlu Seaport in future

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Mining activities create gaps inside the ground. These gaps withstand the load over it by vaulting inside the ground and prevent caving-in as long as they are opened deeper into the ground and remain in smaller proportions, as is the case in mining galleries depending upon the production length. With the mining production gaps reaching larger dimensions, however, the ground just above the gaps starts to collapse by layers breaking away and fills up the production gaps. The movements of the ground on the surface triggered by the collapse of cascading internal ground layers are termed as mining subsidence (Kratzsch, 1983; Kuşçu,1991; Perski and Jura, 2003; Deck *et al*., 2003; Duzgun, 2005; Akçın *et al*,. 2006; Saeidi *et al*., 2009; Can *et al*., 2011a, 2011b). These movements cause deformations on the earth surface and in the affected ground layers and disruptions on the natural balance of ground. As a consequence of this, engineering structures inside the affected ground and on the earth surface above the subsidence region either accommodate to these deformations or sustain damages. These damages, whether they occur on natural or man-made structures, by means of mining subsidence are called mining damages.

Mining subsidence as a result of mine productions underneath the settlement areas, especially in Western European countries where underground coal mining is of great value, has been long a crucial mining issue with economic, social, technical and environmental aspects. In Zonguldak Kozlu Hard Coal Region, coal seams dip mostly at high angle and their thickness is not uniform, therefore mining subsidence problems are most likely to occur causing serious problems with regard to urbanization. This study details the precise leveling and Global Positioning System (GPS) monitoring results for the Kozlu Seaport to determine the mining induced horizontal and vertical displacements.

Monitoring of mining subsidence

It is necessary to gather information on general and regional properties of subsidence formation and effective constituents which eventually cause damages on structures in order to mitigate mining subsidence induced issues and to provide solutions. Therefore it is of great importance that subsidence measurements and observation should be conducted on the earth surface and, if necessary, in the underground. Even though the mining activities have been going on for 160 years in Zonguldak Hard Coal Basin, there exists little or no knowledge of this, which is needed dearly today especially with the densification of settlement areas just above the old coal production galleries and mining activities continuing under new settlement areas.

The coal seams in Kozlu production region have steep inclinations as is generally the case in Zonguldak Hard Coal Basin and the subsidence occurring in this region have adverse effects on social, economic and legal aspects of life (Turer 2008). Figure 1 depicts the subsidence formation and its influence areas after mining activities in inclined coal seams in the region. In times when the main source of energy was coal in a region, much of the effort was spent on obtaining coal reserves under the settlement areas with less production losses and subsidence damages as much as possible.

This naturally gave way to important work and research for maintaining this purpose and then to the birth of a discipline called subsidence engineering, which is specialized

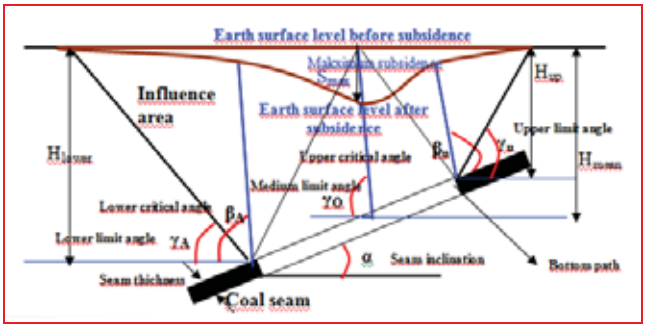

Figure 1. Subsidence tub forming after production in inclined coal seams and the other related definitions (Kratzsch, 1983).

in five topics as follows (Kuscu,1991):

- Subsidence measurements
- Subsidence estimations
- Subsidence damages
- Subsidence control
- Subsidence related laws and regulations.

In order to determine the subsidence occurring due to mining activities in an underground mine production region, subsidence measurements are utilized to ascertain:

- Subsidence parameters (critical and limit angles, displacement values, etc.)
- Relationship between subsidence and geology, tectonics and topography
- Relationship between subsidence, and production speed and time
- Relationship between subsidence and production method.

Features of Kozlu coal production region

Kozlu-Zonguldak Hard Coal Basin is a formation of the Late Plaeozoic–Mesozoic Age, consisting of various faults and topographic irregularities along the North Anatolian Mountain Range. The town of Kozlu within the Zonguldak Hard Coal

Figure 2(a). Town of Kozlu

Basin was established in 1941 and has a coal production rate of 780,000 ton per year, along with 3.3 million ton per year in the whole basin (URL1 2011; URL 2 2011). Kozlu is located in the Western Black Sea Region of Turkey at latitudes 41°–27′ N and longitudes 31°–49′ E (Citiroglu and Baysal, 2011). It borders city of Zonguldak to the northeast, Eregli to the southwest, Caycuma to the east and Devrek to the southeast. The coastline forms the north–northwest boundary of the study area (Figure 2a and 2b).

Kozlu is divided into 7 districts, namely Merkez, Tasbaca, Ihsaniye, Kilic, 19 Mayis, Güney and Fatih. The settlement of Kozlu is completely surrounded by mountainous areas. The streams within the study area include Kozlu Stream and its branch Kilic Stream (Ekinci, 2005).

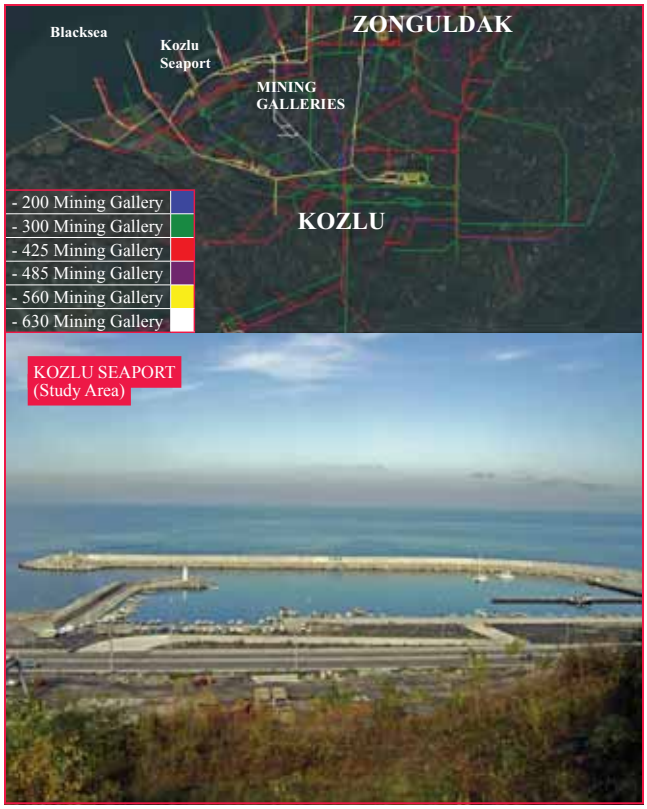

Figure 2(b.) Mining galleries and Kozlu Seaport (Study Area) in the Kozlu coal production region

Figure 3: Influence areas of old and new production panels in Kozlu Seaport under active and residual subsidence influences.

Table 1: Geometrical properties of production panels under Kozlu Seaport

Panel name	Year	Inclination	Thickness	Width	H_{mean}
E.U.2 (old)	1988	40°	3m	60m	-456m
E.U.3 (old)	1990	40°	3m	60m	-434m
E.U.4 (old)	2004	58°	3m	50m	-510m
E.U.5 (old)	2006	32°	2m	110m	-508m
E.U.6 (old)	1989	26°	1.5m	190m	-400m
E.U. 10 (old)	1987	28°	3m	120m	-283m
E.U.12 (old)	1990	27°	3m	80m	-256m
E.U.13 (old)	1990	17°	3m	60m	-321m
Y.U.2 (new)	2009	29°	2.5m	130m	-510m
Y.U.3 (new)	2009	20°	2m	30m	-445m
Y.U.4 (new)	2009	44o	2m	20m	-450m

Zonguldak-Kozlu-Kandilli (West Hard Coal Basin) is situated to the west of the Filyos River. The Carboniferous clastic sequence of Zonguldak basin contains several coal seams that have been mined since 1848 by underground methods. Coal seams are located in a Namurian to Westfalian D progradational delta and fluid plain sequence that is approximately 3,500 mt thick (Karacan and Okandan, 2000). These units are affected by Hercynian orogenic movements. Related tectonism and uplift led to widespread erosion.

Geometrical properties of mining panels affecting Kozlu seaport

The coal seams under the engineering structures focused on in this study have steep inclination angles, and they house production panels working on longwall method. Figure 3 demonstrates Ikonos satellite images containing old and new production panels just under the Kozlu Seaport with active and residual subsidence effects.

Table 1 lists the geometrical properties of panels in the Kozlu Seaport region such as opening year, inclination, thickness and width, and Table 2 depicts the maximum possible subsidence magnitudes and parameters computed in accordance with the Subsidence Engineering Handbook of National Coal Board (NCB).

Table 3 lists the computed semi-major and –minor axes values of an ellipse enveloping possible subsidence affected areas of old and new production panels in Kozlu Seaport under residual and active subsidence effects for plotting purposes

Precise leveling and GPS measurements in Kozlu seaport

In order to determine subsidence magnitudes in the aforementioned region just under the engineering structures, three periods of precise leveling and GPS measurements were conducted in August 2009, May 2010 and November 2010. The one hour static GPS data were collected at the subsidence monitoring points with an observation epoch of 2009.58 in the first period, 2010.40 in the second period and 2010.90 in the third period, avoiding any multipath creating surroundings (Mekik and Can 2010). This study focuses on the subsidence monitoring measurements carried out only in the Kozlu Seaport sections of an extensive research enveloping the whole region (Can, 2011a,b). Table 4 lists horizontal displacement vectors of subsidence monitoring points T34, T35, T36, T37, T38, T39 and T40 in Kozlu Seaport.

Figures 4 depicts Ikonos satellite images containing horizontal displacement vectors obtained using the three periods of GPS measurements on the subsidence monitoring points in Kozlu Seaport. It is hard to imply that horizontal displacements have caused any visual deformations or functional defects in the seaport during the three periods of GPS and precise leveling measurements in the region. As for the vertical displacements, Tables 5 lists the findings obtained from the three period pairs of precise leveling measurements for Kozlu Seaport.

Figures 5 depicts Ikonos satellite images containing vertical displacement vectors obtained using the three periods of precise leveling measurements on the subsidence


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Table 2: The maximum possible subsidence magnitudes and parameters computed in accordance with the NCB in Kozlu Seaport region.

Panel name	S_{max} (vertical)	Subsidence type	γ_{lower}	γ_{medium}	γ_{upper}
E.U.2 (old)	0.4cm	Residual	28°	55°	85°
E.U.3 (old)	0.2cm	Residual	28°	55°	85°
E.U.4 (old)	1.1cm	Residual	29°	55°	84°
E.U.5 (old)	1.3cm	Residual	29°	55°	83°
E.U.6 (old)	9.5cm	Residual	32°	55°	81°
E.U. 10 (old)	1.9cm	Residual	30°	55°	83°
E.U.12 (old)	5.9cm	Residual	30°	55°	82°
E.U.13 (old)	0.6cm	Residual	38°	55°	75°
Y.U.2 (new)	3cm	Active	30°	55°	82°
Y.U.3 (new)	1cm	Active	37°	55°	76°
Y.U.4(new)	0.3cm	Active	27°	55°	85°

Table 3: Elliptic parameters for possible subsidence influence areas of old and new production panels in Kozlu Seaport region

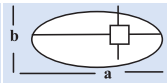
Panel name	 Semi-major and –minor axes of subsidenceinfluence areas		
	a(m)	b(m)	Area (km^2)
E.U.2 (old)	1002m	748m	0.59 km^2
E.U.3 (old)	961m	668m	0.50 km^2
E.U.4 (old)	1091m	994m	0.85 km^2
E.U.5 (old)	1147m	870m	0.78 km^2
E.U.6 (old)	1052m	750m	0.62 km^2
E.U. 10 (old)	693m	476m	0.26 km^2
E.U.12 (old)	591m	588m	0.27 km^2
E.U.13 (old)	565m	558m	0.24 km^2
Y.U.2 (new)	1142m	784m	0.70 km^2
Y.U.3 (new)	736m	652m	0.38 km^2
Y.U.4(new)	959m	720m	0.54 km^2

Table 4: Horizontal displacement vectors of subsidence monitoring points in Kozlu Seaport with their RMSE values for the period pairs.

Point #	Point #	Y (Easting) (m)	X (Northing) (m)	Horizontal Disp. Vector (m)	RMSE (±) (m)
Differences between periods I and II (August 2009-May 2010)					
T.34	T.34	-0.063	0.014	0.065	0.0042
T.35	T.35	-0.069	0.008	0.070	0.0045
T.36	T.36	-0.056	-0.013	0.058	0.0058
T.37	T.37	-0.051	0.005	0.051	0.0063
T.38	T.38	-0.070	0.027	0.075	0.0037
T.39	T.39	-0.068	0.037	0.077	0.0036
T.40	T.40	-0.073	0.051	0.089	0.0054
Differences between periods II and III (May 2010-November 2010)					
T.34	T.34	-0.021	0.012	0.024	0.0040
T.35	T.35	-0.016	0.025	0.029	0.0031
T.36	T.36	-0.022	-0.004	0.022	0.0037
T.37	T.37	-0.028	0.004	0.029	0.0028
T.38	T.38	-0.017	0.002	0.017	0.0036
T.39	T.39	-0.017	0.028	0.033	0.0035
T.40	T.40	-0.051	0.039	0.064	0.0034
Differences between periods I and III (August 2009-November 2010)					
T.34	T.34	-0.085	0.026	0.089	0.0043
T.35	T.35	-0.085	0.033	0.091	0.0050
T.36	T.36	-0.078	-0.017	0.080	0.0054
T.37	T.37	-0.080	0.009	0.080	0.0063
T.38	T.38	-0.087	0.029	0.092	0.0043
T.39	T.39	-0.085	0.065	0.107	0.0039
T.40	T.40	-0.124	0.089	0.153	0.0052

Influencing production panels: Old Panels: E.U.2,3,4,5,6,10,12,13; New Panels:Y.U.2,3,4

monitoring points in Kozlu Seaport. Similar to horizontal displacements, it has not been observed that the vertical displacements resulted from residual and active subsidence effects have caused any visual deformations or functional defects in the seaport during the three periods of precise leveling measurements in the region.

Conclusions

Kozlu mining production region with extensive mining activities houses, many crucial engineering structures, such as Kozlu Seaport, which are the core of this study and there are plans for new constructions on daily basis in the region. In order to maintain the mining operations along with urban developments in a healthy way, the subsidence monitoring measurements and observations play an important role in mitigating or even preventing the damages that possibly will occur in future and in giving way to desired urban development in the region. In the study, it has been determined that the horizontal displacements in Kozlu Seaport vary from 8.0cm to 15.3cm with their RMSE values of 3.9 mm to 6.3 mm, respectively, obtained from the GPS measurements between the periods of I (Aug 2009) and III (Nov 2010). On the other hand, the vertical displacements obtained from the three periods of precise leveling measurements have been found to deviate from 6.0 cm to 9.7 cm in the seaport region

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Table 5: Vertical displacement vectors of subsidence monitoring points in Kozlu Seaport with their RMSE values for the period pairs.

Point #	Vertical Displacements (m)					
	Period pair I-II (Aug 09-May 10)	RMSE (m)	**Period pair II-III** (May 10-Nov 10)	RMSE (m)	**Period pair I-III** (Aug 09-Nov 10)	RMSE (m)
T34	-0.067	0.003	-0.027	0.003	-0.094	0.004
T35	-0.065	0.003	-0.026	0.003	-0.091	0.004
T36	-0.045	0.003	-0.020	0.003	-0.065	0.004
T37	-0.042	0.003	-0.019	0.003	-0.061	0.004
T38	-0.045	0.003	-0.015	0.003	-0.060	0.004
T39	-0.045	0.003	-0.019	0.003	-0.064	0.004
T40	-0.066	0.003	-0.031	0.003	-0.097	0.004

Figure 4: Horizontal displacement vectors obtained from GPS measurements in Kozlu Seaport.

Figure 5: Vertical displacement vectors obtained from the precise leveling measurements in Kozlu Seaport.

with 3.0 and 4.0 mm RMSE values. Since the mining operations under Kozlu Seaport and Road will also be active in the future, in the light of the findings obtained from this study, it is suggested that an extensive subsidence monitoring measurements with longer periods should be carried out to mitigate and even prevent functional problems that may arise in these engineering structures in the future.

Acknowledgement

This study was funded by Bulent Ecevit University, Scientific Research Projects Unit (2009-45-05-02). The authors would like to express their gratitude to Bulent Ecevit University for their financial support. The authors are grateful to the Turkish Hard Coal Enterprise for its assistance.

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J-Shield

You can either hope that interferences will never happen; or get a GNSS receiver that has protection against interferences.

You can either hope that special interest groups, and Coalitions, who cannot build a good filter, will always be successful in lobbying to offer mediocre technology, keep the precious bands near GNSS wasted and prevent systems like LightSquared authorization, or get a GNSS receiver that has protection against such systems while offering better performance too.

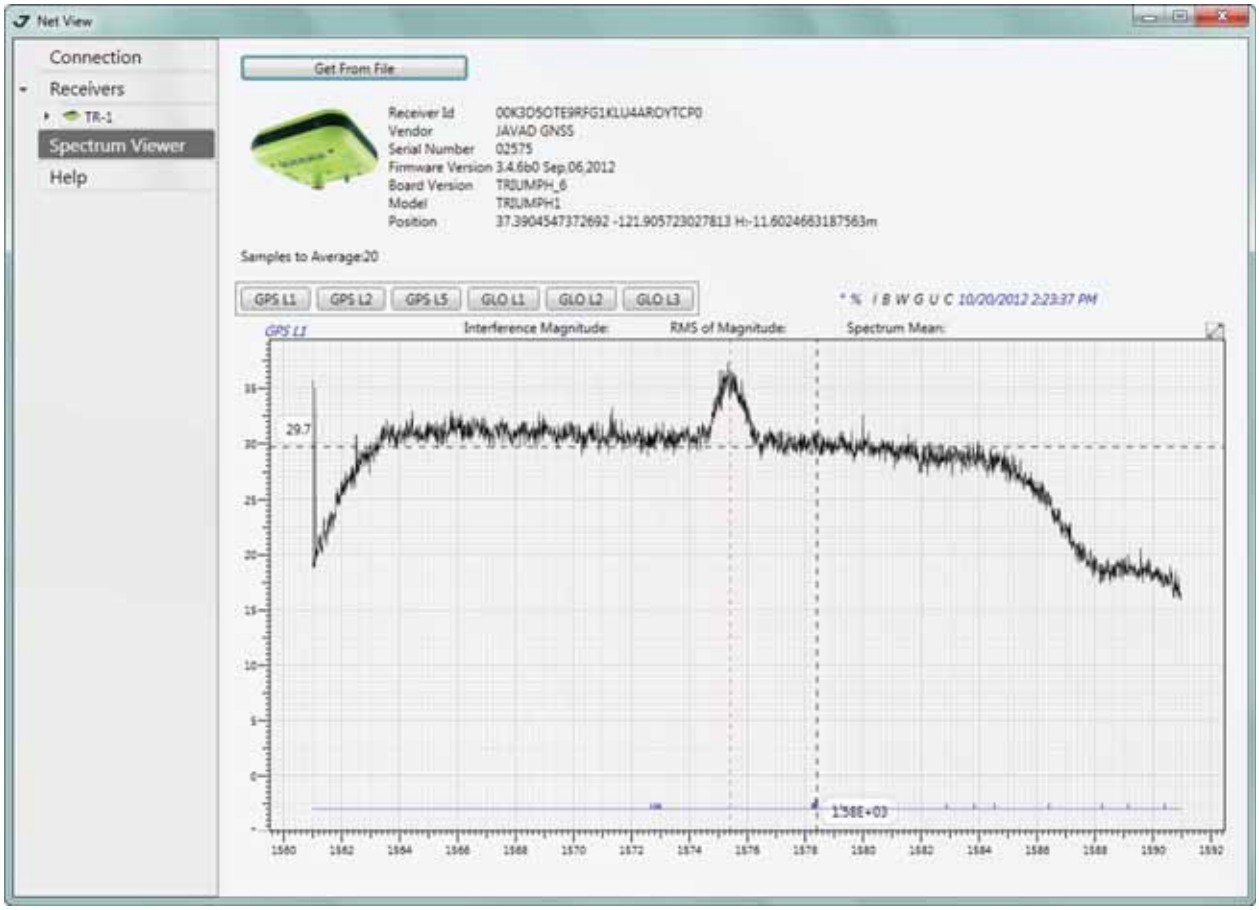
The United States of America is currently ranked 16th on broadband wireless connectivity. We are proud that our technology not only protects and improves the performance of the GNSS system, but also helps to support proper usage of the precious bands to improve broadband wireless communication and reduce user costs to 1/3 of what is today.

You can either trap yourself by owning defective GNSS receivers which forces you to support coalitions preventing progress of wireless broadband in the United States, or you can own a GNSS receiver that performs better, has protection against such interferences and frees you from such political games.

Our team has been bringing you the latest GNSS technology for the past 30 years. We were working on defending against in-band and out-of-band interferences ten years before the LightSquared issue surfaced.

You can either listen to some folks who do not have sufficient knowledge about GNSS technology, but give advice and testimony to Congress, or analyze the technical details that we present in the next few pages which are backed by our GNSS receivers in mass production today.

NetView Monitors Interferences



- Ability to get interference spectrum from any of our receivers
- Display interference characteristics by AGC vairations
- Supported bands: GPS L1/L2/L5 GLONASS L1/L2/L3 *
- Store to file / Plot from file

SNR	Nsat	Nsat aver	Sat %	Timei	Nslip	Nslip aver	Slip / hour
50	5	4.54	53.78	3581	0	0.00	0.00
45	1	1.84	19.59	3213	0	0.00	0.00
40	2	1.88	20.28	3267	0	0.00	0.00
35	1	1.12	5.72	1547	1	NA	NA
30	0	1.00	0.48	146	15	NA	NA
25	0	1.00	0.12	37	26	NA	NA
20	0	1.00	0.02	6	6	NA	NA
0	0	0.00	0.00	0	0	NA	NA

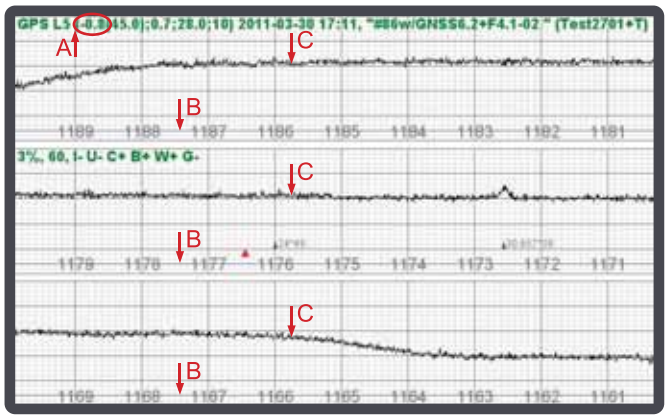
Real time cycle slip detection is a powerful tool to see the effect of interferences.

* - depends on enabled options SPECTRUM, SCIENTIFIC, GALILEO

Interference Analyzer ...

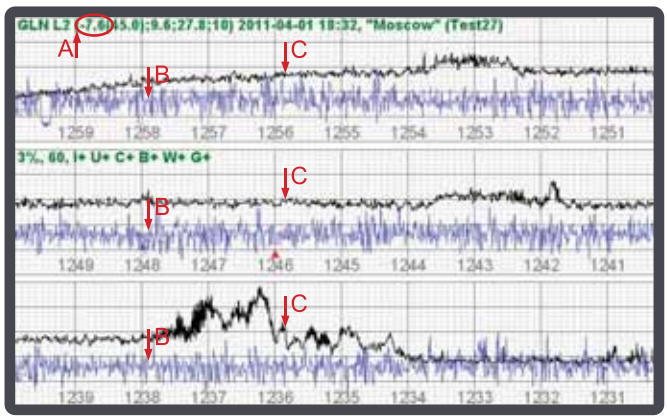
Click the “Spectrum” icon on the Home page to see the vast amount of information on interferences. See www.javad.com for details of screens which follows.

Next to the “Spectrum” icon is the “Cycle Slip” icon which is discussed later.



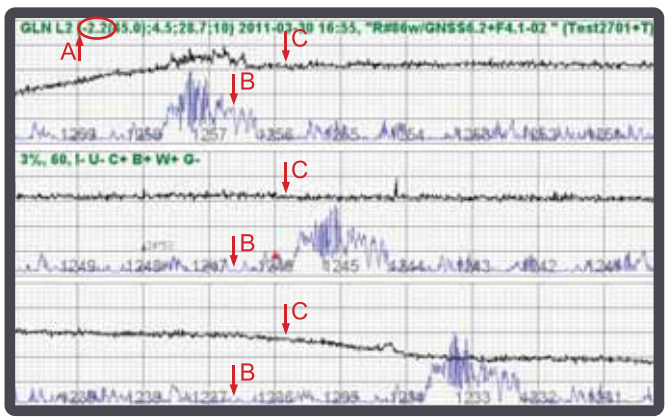
Numbers marked “A” on top left of the spectrum screens show the power of interference. The interference may be in-band or out-of band or a very wide “white noise”.

The shape of the spectrum (marked “C”) shows the location of in-band interference.



We have assigned 60 of our 216 GNSS channels to monitor the 6 GNSS bands and report interferences in four different ways. You can check interferences in your environment before starting your job to ensure your environment is clean.

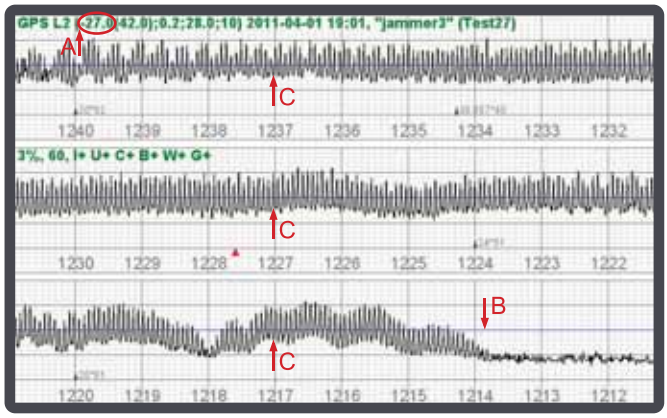
The blue line (marked “B”) is the control voltage and fluctuations there shows the presence of unwanted signals with some visual quantification.



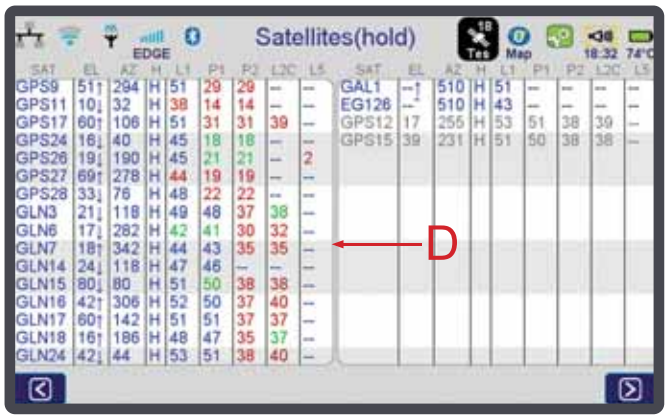
First screen shows no interference and the two figures below it show some interference as shown by A, B and C designations.

... Monitoring/quantifying Interferences

In this figure the band has been completely jammed by a $400 jammer.

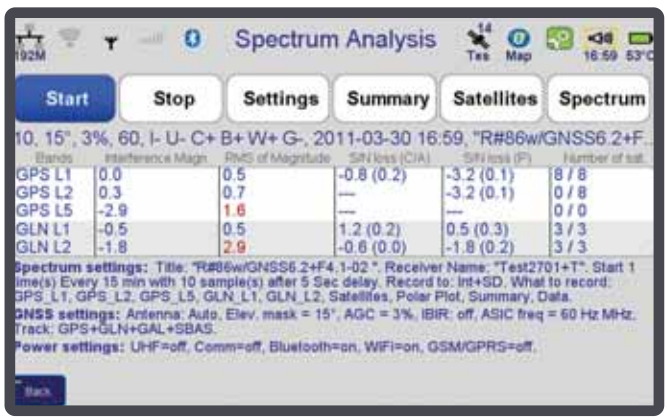


This figure shows color coded satellite signal strength after signal processing. Blue: Perfect, green: 3dB less, red: at least 6 dB less.



This figure shows the same color coded information in polar coordinates of satellites. This helps to verify if satellites have been blocked by obstruction(s).

This figure shows the summary of the spectrum analysis before and after the signal processing. See details in a 22-minute video at www.javad.com in “video lesson” section.



Real-Time Cycle Slip Detection...

Tracking and measuring carrier phases of satellites are the foundation for all GNSS precision applications. This is why high precision GNSS receivers are much more complicated and more expensive than low precision receivers which only measure code phases. Any internal deficiency in design and/or manufacturing of high precision GNSS receivers; or the effect of any external phenomena (like interference and multipath) can cause carrier phase tracking to jump from one cycle of carrier to another. This is called carrier "Cycle Slip". You may call it missing a "heartbeat".

Unlike "loss of lock" which is obvious to detect, carrier cycle slips may have no apparent effect on satellite signal tracking and producing navigation solutions. They can be discovered and repaired in post processing software or in RTK engines after enough data is processed. Erroneous results in high precision solutions (post processed or RTK) are the result of undetected cycle slips.

If the ultimate objective of any high precision receiver is to track carrier phases of satellites correctly, it is highly desirable that any test that is intended to monitor the effect of interferences of other signals on GNSS, should also focus on monitoring and quantifying cycle slips. It is much like monitoring the "heartbeat" of a GNSS receiver in real-time.

We are proud to announce that we have been able to provide this feature in our GNSS receivers and monitor cycle slips in real-time as the ultimate way to determine the quality of a GNSS receiver and the effect of interferences.

Part of our confidence in the excellent performance of our J-Shield filters is based on monitoring the heart beat and observing that J-Shield does not cause even one cycle slip after 24 hours of tracking. Not even missing one "heartbeat" in 24 hours!

An interesting feature of our innovation is that it is available in our GNSS receivers and users by a simple click can access screens and features that we are going to explain next.

... Monitoring the "Heartbeat"

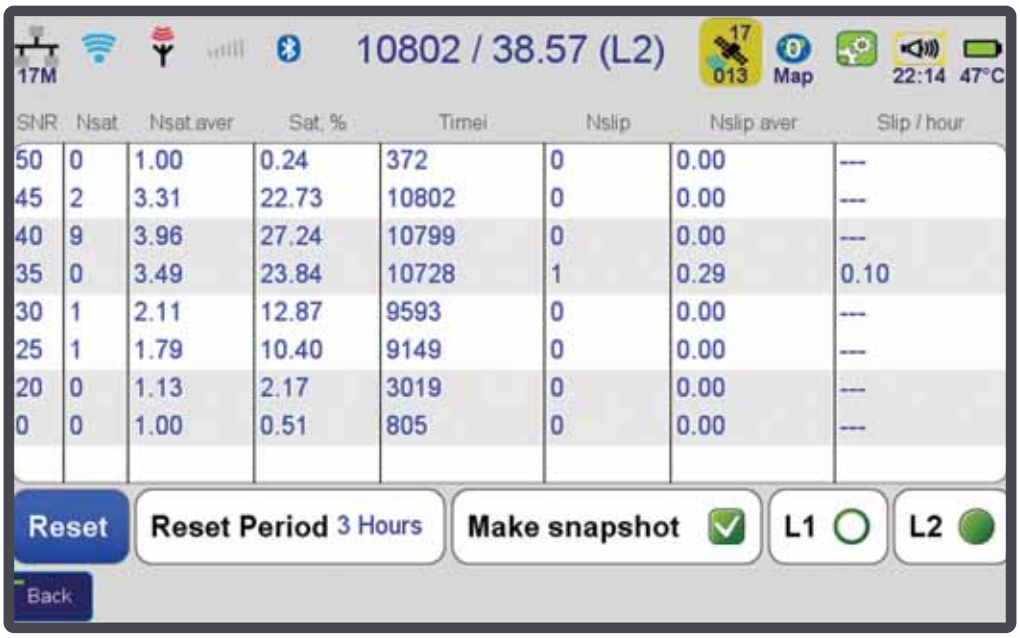


Figure above shows the cycle slip screen which is updated every second and records the number of satellite cycle slips grouped according to their signal strengths.

Col 1 (SNR) is the signal strength of satellites grouped from 0 to above 50 dB/Hz. Col 2 (Nsat) is the current number of satellites with strength in each bin. Col 3 (Nsat aver) is the average number of satellites with strength in each bin since test started or reset. Col 4 (Sat %) is the percentage of satellite signals in each bin during test period. Col 5 (Timei) is accumulative time that any satellite has strength in that bin. Col 6 (Nslip) is the total number of cycle slips form all satellites during the test period. Col 7 (Nslip aver) is the average number of cycle slips per satellites during the test prior. Col 8 (Slip/hour) is the average number of cycle slip per satellite per hour during the test period (N/A is shown during the first 30 minutes).The number on the top left (10800) is the elapsed time since test started. The number on the top next to it (47.65) is the average of all satellite signal strengths during the test period. Reset button restarts the test; Reset Period selection option restarts test automatically after this elapsed test time; and Make snapshot checkbox records this screen after each test period (if checked). L1 and L2 buttons select screens for L1 and L2 signals.

Figure on the right side shows similar items for the L2 band. Note that the average signal strength of the L2 band is about 9 dB less than the L1 band (47.65 - 38.57). This is because the GPS L2 signals are encrypted.

With comprehensive test features that we have embedded in our receivers users can monitor the environment and gain detailed information about possible interferences and their spectral characteristic. They can also look at the heartbeat of a receiver by looking at the cycle slip screen.

All such tests are being performed in the background without any interruption to the normal operation of the receiver in performing survey and RTK tasks.

Several ways to report interferences

GNSS receivers in reference stations should have Interference monitoring and reporting features.

Via Wi-Fi to Victor-VS

Victor-VS can connect to TRIUMPH-1 or TRIUMPH-VS anywhere in the world and get direct report about interferences.

Via Wi-Fi to NetView

NetView, running on any PC, can connect to TRIUMPH-1 or TRIUMPH-VS anywhere in the world and get direct report about interferences.

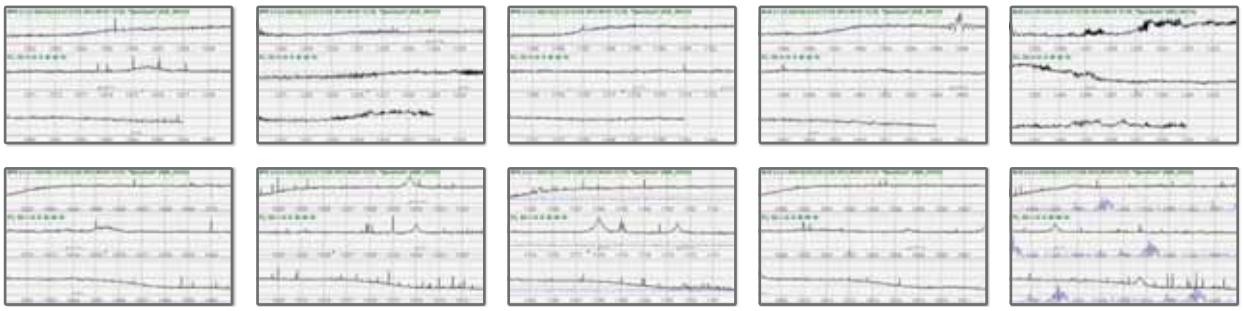
Via Wi-Fi to NetHub

NetHub, running on any PC, can connect to several TRIUMPH-1's or TRIUMPH-VS's anywhere in the world and get direct report about interferences.

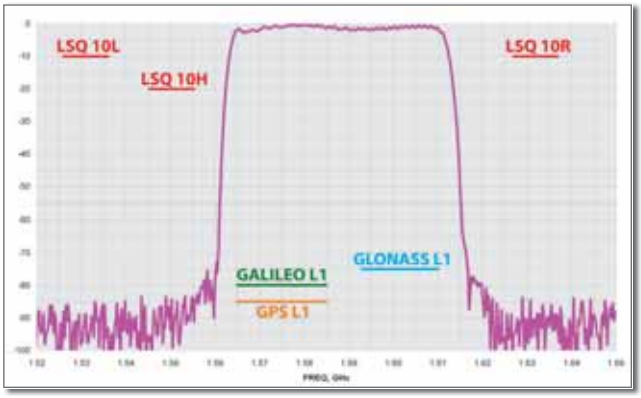
Via Wi-Fi to FTP or E-mail

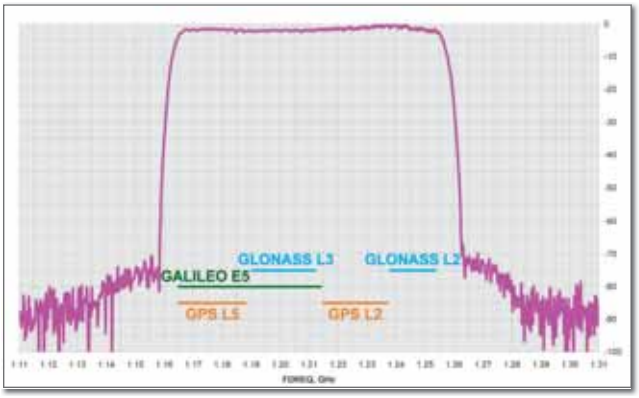
TRIUMPH-VS and Victor-VS can send interference reports to FTP sites and authorized persons can view them via browsers (computers, iPhones, etc). It can also e-mail reports to intended people.

Monitor interference in any area before performing task; like pilots check the weather before take off.



J-Shield For All GNSS Bands





A good GNSS receiver should bring in ALL of wideband GNSS signals and reject all other unwanted signals. We announced the existence of this technology months ago for the L1 band. Now we have improved this filter and added similar protection for all other GNSS bands.

The figure left above shows the frequency response of our filter for L1. As shown in this figure, it allows complete, undisturbed L1 signals in and defends against any other signals outside this band. In particular it defends against LightSquared signals of 10L, 10H, and 10R (Handsets). The filter drops down quickly, at the rate of 12 dB/MHz outside the GNSS band.

The figure right above shows the frequency response of our filter for other GNSS bands. Although there are no requests for other systems near these GNSS bands yet, our filters have protection if this happens in future.

Interference is not limited to wideband wireless systems. Harmonics of other transmitters can occur anywhere and we see it as an essential requirement to protect all GNSS bands in our receivers against all interferences as much as possible. Our technology allows us to do a better job today.

Our effort in protecting the GNSS bands did not end with designing appropriate filters. We needed to a) prove that these filters work, b) prove that these filters not only do not degrade the performance of GNSS receivers but improve performance, c) devise features that any person can use to test our receivers, and d) devise features where users can readily see the effect of interferences that may fall within the GNSS bands in some areas or see the effect of intentional jammers that are marketed these days with prices as low as $400.

Without proper equipment and knowledge any technical issue can turn political and lobbyists, politicians, bloggers and editors will take over and stars of generals and titles of people will eclipse the scientific facts.

To study the effect of interferences in some official tests, they had to use very expensive equipment in highly sophisticated laboratories, employ experts, and then wait for several weeks to get the test results. These results were not conclusive and therefore were open to interpretation.

It is our claim that these new innovative test features that we have embedded in our GNSS receivers a) are much more comprehensive than those done in laboratories with a roomful of equipment, b) can be used by any novice user in the field, and c) provide instantaneous results.

Leveraging National Laws to Protect Community Land Rights

To investigate how to best support communities to protect their customary land claims by completing national land documentation procedures, the International Development Law Organization and local partner agencies undertook the "Community Land Titling Initiative," a randomized control trial

Rachael Knight
Director, Community Land Protection Program
Namati

In recent years, governments across Africa, Asia and Latin America have been granting vast land concessions to foreign investors for agro-industrial enterprises and resource extraction. Often, the concessions are made with a view to furthering development and strengthening the national economy. Yet in many cases, these land concessions dispossess rural communities and deprive them of access to natural resources vital to their economic survival. When communities operate under customary law and have no formal legal title to their lands, they often have little power to contest such land grants. In this context, strong legal protection for community lands and natural resources are urgently needed, alongside expedient implementation of clear, simple and easy-to-follow legal processes for the documentation of customary land rights.

Various nations have passed legislation that makes it possible for rural communities to register their lands as a single legal entity and act as decentralized land administration and management bodies. However, due to various political, financial and capacity constraints, these laws are often not implemented successfully.

Research design & methodology

To investigate how to best support implementation of such laws and help communities to successfully complete formal land documentation procedures, the International Development Law Organization (IDLO) undertook a randomized control trial entitled the 'Community Land Protection Initiative'. The investigation was carried out from 2009 to 2011 in Uganda, Liberia and Mozambique in cooperation with national NGO partners: the Land and Equity Movement in Uganda (LEMU), Centro Terra Viva (CTV) in Mozambique and the Sustainable Development Institute (SDI) in Liberia.

The primary objectives were to:

1. Facilitate the documentation and protection of customarily held community lands through legally established community land titling processes;
2. Understand how to best and most efficiently support communities to successfully protect their lands; and
3. Devise strategies to guard against intra-community injustice and discrimination during community land titling processes, and to protect the land interests of vulnerable groups.

To undertake the objectives, 20 communities in Mozambique worked to complete the

community land delimitation process set out in Mozambique's *Lei de Terras (1997)*, and 18 communities in Uganda worked to form Communal Land Associations and then seek a freehold title or Certificate of Customary Ownership (CCO) for their lands according to the procedures set out in the *Land Act (1998)*. In Liberia, due to the President's moratorium on public land sale (as set out in the *Public Lands Act 1972-1973*), the 20 study communities followed a skeletal process set out in an MOU signed between IDLO, SDI and the Land Commission of Liberia.

These communities were randomly assigned to one of four different treatment groups, each of which received a different level of legal services provision. The various treatments were:

- Monthly legal education;
- Monthly legal education and paralegal support;
- Monthly legal education and the full assistance of lawyers and technical professionals; and
- A control group that received only manuals and copies of relevant legislation.

While the three nations' legal and administrative procedures differed significantly, the community land documentation processes followed by the study communities included the following six general steps:

1. Creation and election of a coordinating committee;
2. Boundary harmonization with neighbors (to define the limits of the land being documented) and its physical demarcation; (*In Liberia and Mozambique, the communities worked to document the perimeter of the entire community (the meta-unit), including within it both privately held family lands as well as all communal lands, water sources and forests. In Uganda however, the project was working to document and protect only communities' large common grazing lands.*)
3. Drafting and adoption of community by-laws/constitutions to govern intra-community land administration;
4. Drafting and adoption of community land and natural resources management/zoning plans;
5. Election of a 'Governing Council'; and
6. Administrative steps, including formal surveying or geo-referencing and completion of application forms, etc.

Project researchers tracked each community's progress through the community land documentation process. They recorded all obstacles confronted and their resolutions; intra- and inter-community land conflicts and all internal community debates. To supplement the observational data, a pre- and post-service survey of over 2,225 randomly selected individuals was undertaken.

Unfortunately, due to the time it takes to facilitate community land documentation processes as well as political, administrative and resource-related obstacles, none of the study communities have yet to receive a document for their customary lands. Phase II of the Initiative will continue to support the study communities until they have all successfully attained documentation. Phase II will be carried out by Namati, in partnership with SDI, LEMU and CTV, under the aegis of the Community Land Protection Program. For further detail, see http://namati.org/work/community-land-protection/.

Findings and observations

The investigation's central finding is that community land documentation activities should combine the technical task of mapping and titling community lands with the peace-building work of land conflict resolution and the governance work of strengthening land and natural resource management. The findings indicate that when these efforts are joined, community land documentation processes have the potential to:

- Resolve long-standing land disputes;
- Improve community governance and establish mechanisms to hold local leaders downwardly accountable;
- Encourage transparency and equality in rule enforcement;
- Stimulate communities to sustainably manage their natural resources;
- Align community norms and practices with national law; and
- Strengthen the rights of women and other vulnerable groups.

While the data and observations from Liberia and Uganda indicate significant changes in the study communities resulting from community land documentation efforts, in Mozambique very little change was noted. The primary difference between the processes followed in Liberia and Uganda and that in Mozambique was the inclusion of an extended, iterative, and fully participatory process of cataloguing, discussing and adopting a set of community rules/bylaws and a plan for natural resources management.

To achieve and sustain such impacts, the process must be outlined in a clear land policy and legal framework and supported by implementation efforts backed by strong political will and the allocation of sufficient resources.

Conflict resolution and prevention

The boundary harmonization process comprised the following activities: community mapping; boundary negotiation and conflict resolution with neighbors; and boundary demarcation (tree planting, GPS mapping, and MOU-signing ceremonies). Taken together, the communities' boundary harmonization experiences yield three important lessons:

1. Communities' desire to obtain documentation for their lands created a strong impetus for them to peacefully resolve boundary disputes. They adopted a wide range of conflict-resolution strategies.
2. Resolving these conflicts both appeared to have an overall positive impact on land tenure security.
3. The boundary demarcation exercises underline that community land documentation is a conflict-resolution exercise, and should be treated as such. Facilitating agencies should prepare for land conflict resolution to be a central component of the process and should craft curricula and trainings designed to support open, non-violent communication, a range of creative compromise strategies and mediation/dispute resolution tactics.

Intra-community governance

The field teams established rigorous four-part processes for the by-laws/constitution-drafting process that communities were asked to adhere to. These were:

1. A "shouting out" of all existing laws in an uncensored, community-wide brainstorming session;
2. Analysis of these rules in light of national legal frameworks and evolving community needs;
3. The writing of second and third drafts of these rules; and
4. Formal adoption by full community consensus or super-majority vote.

Community members of all study communities reported that they had never before publicly debated and evaluated community rules, and that the process gave them the opportunity to discuss community rules, norms and practices for the first time. The field teams observed that throughout the exercise, community members had the opportunity to both stand up and argue against rules they felt to be arbitrary and discriminatory as well as to advocate for the inclusion of rules that would protect or promote their interests and use of community land and natural resources. The process appears to have made four significant shifts in various facets of local governance in the Liberian and Ugandan study communities. The findings indicate that the process:

- Effected a transfer of decision-making authority from local and state leaders to the community members themselves;
- Created the opportunity for community members to institute new mechanisms to hold local

leaders downwardly accountable;
- Allowed communities to establish consistent norms and institute clear, publicly known penalties for infractions.
- Helped to align local custom with national law.

Unfortunately, because the Mozambican communities did not progress past a first draft of their community rules, the Mozambican data does not show similarly positively impacts on intra-community governance. Such findings add support to the conclusion that a community land documentation process that does not include mechanisms to improve local governance and land administration may at best be described as a lost opportunity to effect powerful intra-community change, and at worst may make land dealings more unjust. The aim of a community land claim formalization process should not only be to obtain documentation, but also to stimulate a community-wide, democratic and fully participatory review of how the community will manage community lands and natural resources going forward.

Conservation and sustainable natural resources management

The Ugandan and Liberian community land documentation processes include the drafting and adoption of community land and natural resources management plans. The field teams noted that as a result of the process of discussing and amending their rules for land and natural resources management, two main shifts in community members' consciousness of natural resources management occurred:

1. Community members reported a growing sense of conservation, associated with a concurrent revival of "old" rules designed to protect community resources; and
2. Communities created rules that more closely control and monitor outsiders' use of community lands and natural resources.

These shifts were reflected in the content of communities' land and natural resources management plans. which included rules to promote and enforce: conservation of key resources like firewood, thatch and other building materials; forest conservation; water sanitation/maintenance of clean drinking water sites; sustainable hunting and fishing; and other protections.

> The process appears to have shifted community members' perceptions that land is "men's business;" women reported that they felt that their opinions were taken seriously during the by-laws/constitution drafting discussions

Interestingly, evident in the land and natural resources management plans is communities' receptiveness to outside investment, but within a framework that ensures:

1. The community itself is involved in discussing and negotiating all aspects of the investment project;
2. Restrictions ensure community health, as well as environmental and cultural protections;
3. Benefits/fair compensation accrue to the community; and
4. A contract is drafted to ensure that all community benefits are paid.

Optimal level of legal and technical support required

Statistical analysis of all study communities' progress suggests that the level of service had a statistically significant impact on the stage attained in the land documentation process. The analysis found:

- Control Group: average completed 19% of the process.
- Legal Education-Only Treatment: average completed 50% of the process.
- Paralegal Support Treatment: average completed 58% of the process.
- Full Legal Services Treatment: average completed 34% of the process.

These outcomes lead to various analyses. First, the finding that the full-service treatment group communities performed more poorly than both the legal education-only and paralegal treatment group communities across a range of indicators may indicate that leaving communities with the responsibility of completing most project activities on their own motivated them to take the work more seriously, integrate and internalize the legal education and capacity-building training provided more thoroughly, address intra-community obstacles more proactively, and claim greater "ownership" over the community land documentation process than when the work is done for the community by outside lawyers and technicians.

Second, it appears that the particular strength of the paralegals may be related to their ability to help communities navigate through intra-community tensions or obstacles that a full-services team of outside professionals may either inadequately address, fail to perceive, or accidentally exacerbate.

Third, the relative success of the education-only and control groups neighboring paralegal group communities leads to the conclusion that well-trained and rigorously supervised paralegals may not only help their own communities, but also may have wide-ranging impacts throughout the region where they are based.

Fourth, the findings indicate that while motivated communities can perform much of this work on their own, they need targeted legal and technical assistance to successfully complete community land documentation efforts. The field team's experiences indicate that legal and technical professionals must actively provide the following

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Community land documentation activities should combine the technical task of mapping and titling community lands with the peace-building work of land conflict resolution and the governance work of strengthening land and natural resource management

supports throughout the community land documentation process:

- Introducing the land documentation process and providing periodic legal education and capacity-building training;
- Providing mediation and conflict-resolution support during any particularly contentious land conflicts that communities are unable to resolve;
- Providing legal and technical assistance during the completion of the community's second and third drafts of their by-laws/constitutions;
- Implementing a women's empowerment/participation strategy and working to ensure women's full involvement; and
- Providing assistance to communities during all administrative components of the land documentation process, including: liaising with government agencies, contracting professional land surveyors, compiling all necessary evidentiary proof of community land claims, and completing all relevant application forms.

Furthermore, the field teams' experiences indicate that a legal and technical team must closely supervise community paralegals' efforts, to ensure that their work is of high quality, and to step in when necessary to demonstrate that the community's efforts are supported by a team of lawyers who have the capacity to take legal action.

The findings also suggest that a paralegal-driven process may be less costly – and more scale-able – than the full-service approach, as the model allows a few professionals to supervise multiple community-based paralegals.

Protecting women and other vulnerable groups' rights

Throughout the community land documentation activities, the field teams adopted specific measures to ensure the participation of women and other vulnerable groups during community land documentation activities. After experimentation with various strategies, the field teams found that to ensure that women's voices are heard, it is necessary to proactively take action to promote women's participation in project activities, including:

- Carrying out community-specific gender analysis and crafting strategies to address gender inequities that have the potential to negatively impact community land documentation activities;
- Being respectful of women's responsibilities by scheduling community land documentation meetings at times and locations convenient for women (after women have completed their house and farm work); and
- Convening special women-only meetings to identify and address issues that affect women's land rights.

The data and statistical analysis also show that paralegal support is likely the minimum support necessary to ensure that women participate meaningfully in community land documentation activities.

Finally, the field teams observed that the by-laws/constitution drafting process was the central driver of changes to women's substantive and procedural rights. Cross-nationally by treatment group in Uganda and Liberia, statistical analysis of the communities' bylaws/constitutions found that:

- The control group communities included an average of 0.8 provisions;
- The legal education-only treatment communities included an average of 4.0 provisions;
- The paralegal treatment communities included an average of 5.5 provisions; and
- The full legal services groups included an average of 2.8 provisions.

Procedurally, the process appears to have shifted community members' perceptions that land is "men's business;" women reported that they felt that their opinions were taken seriously during the by-laws/constitution drafting discussions. Furthermore, many communities' by-laws/constitutions include new provisions that women and youth must have elected representatives on permanent governing bodies responsible for community land and natural resources management.

Substantively, the process provided an opportunity for women and other vulnerable groups to actively challenge discriminatory customary norms. Their efforts resulted in:

- The strengthening of women's rights overall;
- The maintenance of women's land and natural resources rights;
- The rejuvenation of customary norms that had existed but have recently eroded or abused; and
- The alignment of local rules with national laws that protect women's land rights.

Unfortunately, many of the first draft lists of the Mozambican communities' rules for land and natural resources management included rules that undermine women's land rights and directly contravene the Mozambican Constitution. However, due to the lack of intra-community governance procedures in the land delimitation process set out in the *Lei de Terras,* there were no community discussions of how to concretely take action to remedy gender-based injustices. Such findings lead to the conclusion that a process of cataloguing, discussing and amending community rules is central to efforts to protect women's rights during community land documentation activities.

The by-laws/constitution-drafting process also illustrated that custom does not necessarily undermine or weaken women's land rights; rather, a well-facilitated process of reviewing and amending custom to align with national laws opened a space of dialogue in which it was possible to strengthen women's existing land rights within customary legal constructs. To this end, customary leaders may be important allies in the enforcement of women's land rights, as the data indicate that community members consider them to be primarily responsible for the protection of women's and widows' land rights.

Obstacles to successful community land documentation efforts

The study communities confronted a wide range of obstacles over the course of the initiative. Analysis of the various administrative and intra-community obstacles faced leads to the following conclusions: first, administrative or bureaucratic inefficiencies linked to lack of necessary staffing and state resources, lack of political will, and other institutional obstacles are the greatest impediments to successful community land documentation.

Second, an unhealthy or dysfunctional community may not be able to successfully complete the complex process of documenting community land claims. The field teams' observations illustrate that communities that struggle with elite sabotage, intractable boundary disputes, and weak leadership or power struggles between leaders may not be able to successfully progress through community land documentation processes, irrespective of how much support they are offered.

Relatedly, should a dysfunctional community initiate land documentation efforts and not be able to complete them, the process may invigorate tensions and create or exacerbate conflict, leaving the community in a worse situation than before the intervention began. Before beginning an intervention, facilitating NGOs or government agencies should carry out an analysis to determine whether the community can work together productively and is willing to authentically address and resolve intra- and inter-community land conflicts. Supplemental conflict resolution training, community-building and leadership-enhancement activities may need to be provided before a community can undertake land documentation efforts. In instances where weaker community members initiate land documentation efforts in order to protect their land from being grabbed by local elites, it is important that legal advocates proactively address intra-community conflicts before launching community land documentation activities; civil society and government advocates should address and resolve any underlying intra-community conflicts at issue before beginning the community land documentation efforts.

Community land documentation should be prioritized

Documenting or registering the community land as the "meta-unit" may be the least costly means of protecting rural households' land claims. The research found that even when providing full legal services support to communities, community land documentation efforts cost only a few thousand dollars per community. Specifically, in Mozambique, the total costs of land delimitation per community were at most US$3,968, with full legal support. In Liberia, it was $7,700 USD per community. (*In Uganda, these figures have not yet been calculated.*) Considering that between 100 and 1,000 families live in each of the study communities, community land documentation processes appear to be an economical way to protect large numbers of families' land claims at once. Although cost estimations vary widely, one multi-country analysis found average costs of first-time individual/household land registration to sometimes be above US$100 per parcel, with average costs between US$20 and US60 per parcel. (*Tony Burns, Land Administration Reform: Indicators of Success and Future Challenges, Agriculture and Rural Development Discussion Paper 37 The International Bank for Reconstruction and Development, 2007.*) As undertaken in this investigation, for a hypothetical community of 500 families and large common areas, registering the tenurial shell would cost less than half of efforts to register individual or family lands, and would be far more time efficient.

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It is important to note that the conclusions of the Community Land Titling Initiative's two-year investigation are preliminary. Additional investigation is necessary to determine the long-term social and economic impacts of documenting community land rights. Moreover, it will be critical to provide on-going support and monitoring to understand how to best support community efforts to implement their newly-adopted by-laws/constitutions and land and natural resources management plans, and to discern what assistance is necessary to ensure that even documented community lands claims are protected over the long-term.

However, the data illustrate that if well-facilitated, community land documentation exercises may result in important impacts that go beyond increased land tenure security; communities' desire for documentation and protection for their land claims appear to be prompting them to undertake authentic discussions and make real changes.

As described by one Liberian man:

> I don't care what anyone says, this project is the best thing to happen in our history. Imagine: now we know our borders; we know our resources; we know our rules, and they are written down for everyone to see and know; people are attending clan meetings; and our clan feels stronger together. This has never happened before! Now it is easy for us to organize and ask the government or [foreign investors] for things we want or refuse things we don't want in our community.

Once a community has successfully documented its land claims, the hope is that it may then work hand-in-hand with government agencies and civil society organizations to leverage its lands for locally-driven development, prosperity and human flourishing.

Recognising indigenous community rights

Indian Forest Rights Act, 2006, examined with its Spatial Dimension

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Considering its commitment to highlight the user rights issues, Integrated Spatial Analytics Consultants (ISAC) has teamed up with Portuguese and Dutch academicians to focus in the current paper on the Indian Forest Rights Act from 2006 as the Use Case of indigenous property rights. United Nations Declaration on the Rights of Indigenous Peoples reaffirmed the importance of the protection of indigenous property rights in Articles 25-29. This is important to international scale projects such as REDD+ and VCM, as many PES programmes are implemented on customary or indigenous lands over which the land tenure and rights to resources are complex and informal.

Historically, India has a large number of forest dwelling tribes or which are largely dependent on forest products for their livelihood. However, after gaining independence, Indian forests became property of the state and thus, the right of residing or traditional collection of forest produce became illegal in many areas designated as reserved or protected forest areas by the government. This denied the forest dwelling tribes and other related tribes their historical rights to earn their livelihood based upon forest produce. Finally, in 2006 through an extraordinary gazette, the Indian government declared Indian Forest Rights Act for recognizing the traditional rights of such tribes to reside in and earn their livelihoods through forests. The background and current situation regarding the forest rights on ancestral lands and their habitat is first examined by literature review, followed by a modelling approach supported on the Land Administration Domain Model. The existing legislation is examined for its land administration aspects and related spatial dimensions with the aim to derive a specialized model applicable to the Indian Forest: IFR_LADM (Land Administration of Indian Forest). Initially, a set of relevant definitions is extracted from the Indian Forest Rights Act, 2006. The following list shows the LADM classes sharing overlapping concepts with the IFR Act 2006 definitions as mentioned in table 1.

ISAC highlights spatio-temporal dimensions of the research issues as part of its focus on spatial technologies usage to provide scientific input to policy issues. In the IFR Act, such dimensions are not explained explicitly but some statements could be easily described under this section. This includes:

1. Rights for conversion of leases or grants issued by any local authority or any state government on forest lands to titles. This means land titles to a defined spatial unit. However it does not state the extension of rights in the third dimension i.e. subsurface.
2. Gram Sabha shall be the authority to initiate the process for determining the nature and extent of individual or community forest rights by preparing a map delineating the area of each recommended claim.
3. Right of ownership, access to collect, use and dispose of minor forest produce which has been traditionally collected

Table 1: LADM classes sharing overlapping concepts with the IFR Act 2006 definitions

Forest Land	LA_SpatialUnitGroup
Habitat and Villages	LA_SpatialUnitGroup; LA_SpatialUnit
Gram Sabha	LA_GroupParty
Nodal Agency	LA_Party
Forest Dwelling Scheduled Tribes and Other Traditional Forest Dwellers	LA_GroupParty, LA_Party
Rights	LA_Rights
Responsibilities	LA_Responsiblities
Restrictions	LA_Restrictions, AdministrativeServitude
Source	LA_SpatialSource, LA_ AdministrativeSource

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within or outside village boundaries. This describes the spatial limits of rights related to minor forest produce. It also has a vague time-spec element by referring to traditional collection.

4. Other community rights of uses or entitlements such as fish and other products of water bodies, grazing (both settled or transhumant) and traditional seasonal resource access of nomadic or pastoralist communities. This refers to temporal element in resource access by nomadic or pastoralist communities during particular seasons.
5. The Act empowers the holders of any forest right, Gram Sabha and village level institutions to ensure that adjoining catchments area, water sources and other ecological sensitive areas are adequately protected. This empowerment clearly gives a spatial (2D and 3D) extension to the forest rights of the holders beyond their village or habitat limits.
6. The recognition and vesting of forest rights under this act shall be subject to the condition that mentioned tribes or dwellers had occupied forest land before the 13th day of December, 2005.

These spatial dimensions can be extended further in LADM framework. It is not clear and seems to be most unlikely that Forest Rights Act, 2006 allows the holders to raise credit against the entitled individual/community land holdings. This rules out the possibility of working with Case C27 of LADM i.e., Spatial Unit with Micro Credit. However, the formal rights granted to the holders of ownership, access to collect, use and dispose of minor forest produce within or outside village spatial demarcation; community rights or entitlements such as fish and other products of water bodies, grazing etc., can be considered as a basis for raising credit. Slight modification of Case C10 of LADM i.e., Mortgage on Ownership (Formal Rights), considering above mentioned formal rights equivalent to Parcel Ownership rights, will enable credit rising for the right holders.

From an initial set of definitions extracted from the Act, a functional, aspect-driven approach is followed. Each different aspect is first considered on its own iteration, before producing a comprehensive model where relationships and constraints are identified. To finalize the modelling, a number of Instance Level diagrams is depicted and described, in order to demonstrate the IFR_LADM model's ability to answer to specific, expected situations on the ground.

No Model Driven Architecture (MDA) methods and tools were applied at this first modelling stage in deriving a specialized model for IFR_LADM. The modelling tools offered by Eclipse Modelling framework (EMF) [7] were used to manually derive specialized classes from their respective LADM super-classes [8], by considering, in a first iteration, a total of four packages and functional groupings. These were:

- Party package;
- Administrative package (includes Rights and Restrictions from the Legal Profile);
- LADM Source classes (functional group);
- Spatial Unit package

The study of the Act concerning the identification of the participating Actors and their roles in the administration of Indian Forest Land, led to the creation of two specialized classes, one for Group Parties, and other for individual Party elements, having each a dedicated enumeration type, respectively 'typeIFR' and 'roleIFR'. Each one is examined in turn.

- IFR Group Parties: All the identified types should have the role of (individual) indigenous as their members. But it could be impractical to consider for very large groups, like a Scheduled Tribe, except if some sort of hierarchical grouping is considered, given that is typically formed of many Gram Sabha communities;
- IFR Parties: A number of LADM roles are not directly or explicitly considered in the Act, so the choice was to create a specialized enumeration where only the roles expressed or implied in the Act were included. Note that a number of roles do not imply that the Party is a holder of rights, like the administration (except for certain cases), the tax collector or the chartered surveyor.

For the Administrative package of LADM, and within this first iteration, only the classes from the core class representing Rights, Restrictions and Responsibilities (LA_RRR) were considered for examination. No specialized 'IFR' classes were created. The individual hold of forest land is represented by the Property rights, while the shared use for habitation and self-cultivation is represented by the remaining rights of Use & Habitation, Superficies or Usufruct. Those derived rights, however, do not have to be shared and can be held by a single member.

Under IFR Source Classes section, the 'Source' refers to the LADM specializations from the base LA_Source class, representing any legal or technical documents which support the definition of other model objects, such as Rights, Basic Administration Units or any Surveying documents. According to LADM, one should differentiate between any sources confirming the Nature of the Rights, from those confirming the corresponding Extent where those Rights (or Restrictions or Responsibilities) apply. The section 6, item 1 of the Act is clear about which types of Land Parcels should be defined by the Gram Sabha (and confirmed by the local government): those are the Private Property Rights and those held in Common. Also according to LADM, the Extent or Spatial Source (in IFR_LADM is represented by IFR Forest Rights Extent) belongs to the Surveying sub-package from the Spatial Unit, and is a technical document to be prepared with the participation of Land Surveyors. Although this is not explicit in the Act, it is proposed to include in this procedure the participation of some method of surveying to be validated by credited surveyors, but which can be sufficiently fast and affordable for such communities. Regarding the Administrative Source document, represented in IFR_LADM by the class IFR Forest Rights Nature, should be adapted to the specifics of the Indian Forest and respective Parties, according the flexibility granted by LADM (as a Domain Model). As for the Extent source document, a specific regulation must be prepared, taking into account the specifics of the Forest Land, and with the participation of members designated by the Gram Sabha.

Under Spatial Unit Package, a total of three hierarchical groups can be identified. Firstly, at a basic, individual

level, there are a number of different types of individual Spatial Units. It is considered that the following classes should share a Planar Partition, that is, there should be no overlaps between them (IFR prefix is omitted):

- Public Domain, Forest Land Parcel and Forest Commons.

In a sub-Parcel level and to be contained within Forest Land Parcels, there exists Forest Dwelling Units. All these should be considered as specializations from the LA_SpatialUnit class. The Critical Wildlife Habitats not considered being Public Domain can overlap any of the different types in the Planar Partition.

From here, several Grouping Levels can be considered, and in the case of the IFR Act, a first hierarchical level should comprise the following classes:

- Habitat, which can comprise more than one Critical Wildlife Habitat, together with elected Forest Commons, and a Village, comprised from Forest Land Parcels and Forest Dwelling Units (eventually some Commons parcels can be considered here).
- A second level groups these first group level objects into a single object of the Forest Land type (as a Spatial Unit Group), which can group more than one Habitat and Village, plus individual Forest Commons, Forest Land Parcels and even Public Domain in a single Forest Land. This can thus be considered as an administrative unit managed by the lower level of local government, like a Cadastral Section in many Continental Europe jurisdictions.

Later, an overview class diagram was produced, depicting all the classes having the 'IFR_' prefix, to which a number of classes from the source LADM and the Legal Profile were added (these last ones are used without modification at this time). To produce such diagrams, all the supporting types, namely Data Types, Enumerations and LADM parent classes, as well as abstract classes from the Legal Profile, were all omitted for clarity. The Use Cases use just classes within this overview diagram.

In terms of the object-oriented software development methodology, this procedure corresponds to a 'flattening' of the preceding diagrams, where just the more specialized classes in the specialization chain are preserved. Finally, three instances of LADM Use Cases were prepared to depict an individual indigenous right among the overall group party rights held by the Gram Sabha; A Forest Land and Village administered by a Gram Sabha Group Party, and finally a Critical Wildlife Habitat with the State as a Party.

In the first Use Case, the individual holds a derived right of Superficies over a Forest Land Parcel owned by the Gram Sabha, while it holds another type of derived right over a dwelling unit. Both rights are shared among members of the family or tribe. The holder of the Property Right is in both cases the local community formed by the Gram Sabha.

The second Use Case shows the different hierarchy levels amongst the Spatial Units which belong to a Gram Sabha. The higher hierarchy corresponds to the Forest Land, which can include one or more Villages.

The third Use Case shows how a State imposed Administrative Servitude can determine the extent of a Critical Wildlife Habitat which can extend over individual or local communal parcels of land.

The resulting IFR_LADM shows that the underlying Domain Model (LADM) is flexible enough to translate the relation of people to land through rights for specific land use related categories. It can thus facilitate the design of a Land Administration System supporting poor and marginalized groups, like the forest dwellers in India here reported.

We recommend conducting new Case Studies for other developing countries (such as Brazil or China) for future research. The temporal aspects deserve further research, as well as cost effective survey methods and administrative procedures. The results obtained for the Indian Forest Rights, at this detailed level, should then be compared to the new Case Studies, which could lead to the identification of widely applicable modelling patterns.

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China launches 16th Beidou-2 satellite

The latest satellite in China's Beidou-2 navigation system has been launched in Xichang. The system is expected to start providing positioning and navigation services for China and neighboring areas by the end of this year. And once the system is fully established by 2020, it will play a major role in the country's economic development and national security. *http://news.xinhuanet.com/english/*

ERA-GLONASS: Russia unlocks EUR 20.7 million

Russia unlock nearly 20.7 million in 2012-2013 for the establishment and operation of the emergency system assisted by ERA-GLONASS satellite. The completion of the contract will be funded to the tune of 400 million rubles (EUR 10 million) in 2012 and 430 million rubles (10.7 million EUR) in 2013. ERA-GLONASS, an automated emergency call related to the Russian system GLONASS satellite navigation , will automatically alert the police and emergency in case of serious automobile accident by providing the coordinates of the vehicle. All new cars produced or imported in Russia will eventually equipped with this system called for reducing the rate of road deaths. *http://fr.ria.ru/science/*

Peru to track drug production chemicals via satellite

PERU has begun using satellites to track trucks carrying legally-purchased chemicals that can be used to make cocaine. Vehicles belonging to companies authorised to import the chemicals for legal purposes must have a GPS satellite tracking system and travel on routes previously authorized by police. *www.theaustralian.com.au*

Tracking live status of trains

Indian Railways has launched Rail Radar, a live train tracking service that runs on Google Maps. Available at *http://railradar.trainenquiry.com/*, the service allows you find out the exact location of a train. This is an improved version of the earlier tracking system 'Spot Your Train'. The opening screen of Rail Radar has a map of India that gives you the details of the trains running. On the top right is a display that shows the number of trains tracked at that point of time and the percentage of trains that are on time. *www.thehindubusinessline.com*

SIMRAN scrapped

In a sudden move, the Indian Railways has scrapped its successful real-time train tracking system SIMRAN (Satellite Imaging for Rail Navigation) developed by IIT-Kanpur, and has decided to create a similar website on its own. Sources said that the decision to remove IIT-Kanpur from the project was a sudden one since a section within the Railways has been lobbying to transfer the job to CRIS and Indian Railways Project Management Unit. *www.indianexpress.com*

Karl Kovach Receives Kepler Award

The Institute of Navigation's (ION) Satellite Division awarded Karl Kovach its Johannes Kepler Award on 20 September 2012 at the ION GNSS Conference (Nashville, TN, USA) for his contributions to the development of the Navstar Global Positioning System Satellites, Operations, Signals, Receivers and Standards. Karl Kovach is a senior project leader with The Aerospace Corporation, supporting the Systems Engineering branch of the Global Positioning Systems Directorate.

EU to meet with China on nav dispute

The European Union (EU) and China will be meeting in December in Paris to discuss overlapping radio frequencies both plan to use for their future encrypted government/military satellite navigation services, according to a joint statement from both parties, reports Space News. The December meeting will be conducted under what the Joint Statement on Space Technology Cooperation specifies as the ITU Framework. ITU is the International Telecommunication Union of Geneva, a United Nations affiliate that regulates satellite orbital slots and frequencies. The statement was signed as an annex to a broader EU-China summit held September 20 in Brussels. As Space News reports, the two sides are continuing collaboration on satellite navigation despite the signal conflict, which has been a subject of debate for at least two years. The 27-nation EU and China have agreed to continue the China-Europe GNSS Technology Training and Cooperation Center.

LightSquared pitches new plans to FCC

LightSquared Inc., sought regulatory approval for a plan it believes will overcome the technical problems that have postponed its launch of a next-generation network and tipped the company into bankruptcy protection. In a filing with the Federal Communications Commission, LightSquared said it would use its broadband network in a way that would address concerns that its signals interfere with GPS. In a second filing, the company said it would forgo using the airwaves that triggered those GPS interference worries in the first place. *http://online.wsj.com/*

Rockwell Collins to develop GPS Jamming and Spoofing detection technology

The Office of Naval Research, USA has awarded Rockwell Collins a contract to develop technology to locate and classify an adversary's attempts to interfere with GPS signals and disrupt military operations. The three-year contract for the Modernized Integrated Spoofer Tracking (MIST) program calls for Rockwell Collins to develop technology and prototype system concepts to detect and locate the sources of transmitted signals that are intended to disrupt the warfighter's ability to navigate and communicate. *www.defpro.com*

China's expanding GPS protecting fishing

The Beidou Satellite Navigation System, is helping to improve fishing safety and saves lives after being installed onall finhery patrol vessels. The number of urgent alerts received by the South China Sea fishery administration, affiliated to the Ministry of Agriculture, has reached 200 since the Beidou system was first installed in 2008. *www.chinadaily.com.cn*

Bhuvan:Gateway to Indian Earth Observation

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Indian Formula One "Buddha International Circuit" by Cartosat-2 (1m Panchromatic)

National Remote Sensing Centre, Balanagar, Hyderabad-500037. www.nrsc.gov.in sales@nrsc.gov.in

China builds accurate navigation system

According to the National Remote Sensing Center of China a new navigation system has been successfully tested to pinpoint positions within 0.1 meters in outdoor areas and 3 meters in indoor areas. The Xihe system, named after a God in ancient China, has already been tested on fieldwork devices. The center plans to develop an urban positioning system, first in large cities like Shanghai, and then across the country by the end of the 12th Five-Year Plan (2011-15). The system is based on a technology known as CRP, or Cooperative Real-time Precise positioning, which is designed to enhance the accuracy of navigation satellite systems. There are four major navigation satellite systems: GPS, Glonass, Galileo and China's Beidou. *www.chinadaily.com.cn*

BSNL India ties up with Russian major

Russian major Sistema is looking to partner with Bharat Sanchar Nigam Ltd for offering navigation system through GLONASS. BSNL is expected to sign a MoU to utilise this service. BSNL may initially start a pilot project to test the service before going commercial. There are a number of applications for this service, including police patrol monitoring, transport monitoring, city bus fleet management and accident emergency response system. Recently, NIS GLONASS opened a showroom in Mumbai. While the main focus for NIS GLONASS would be in commercial projects, the company is also looking at projects aimed at the social sector. According to Russia & India Report, the company is looking to implement a system in India similar to the ERA-GLONASS project in Russia, an accident and emergency response system. *ww.thehindubusinessline.com*

Microsoft sues Motorola

Microsoft is suing Motorola Mobility in Germany over a mapping patent that Microsoft alleges covers the Google Maps app that ships on Motorola phones. According to Microsoft, some products sold by Google-owned Motorola Mobility infringe on a patent that describes a method of obtaining the map from one database, resource information such as Starbucks locations from a second database, and overlaying the two sets of data. A technique like this is used in Google Maps, which is installed on Motorola's Android devices. *www.computerworld.com*

Baidu establishes LBS business department

Chinese search engine company Baidu Inc. announced the establishment of a new location-based service business department and launched a new scheme named "smart life". Based on the "smart life" plan, Baidu's LBS business department will implement cooperation with hardware makers, operators, websites, and vendors in China. Baidu's map service has reportedly gained over 77 million users, realized data cooperation with over 40 vendors, and established a new marketing platform for more than 4,000 vendors. Baidu said that the establishment of the new LBS business department is based on the development of the industry and its own products. *www.chinatechnews.com*

MapmyIndia launches 'Don't Panic'

MapmyIndia has launched Don't Panic, a full-featured maps and GPS navigation app for iPhone, iPad and iPod touch users in India. The USP of the app is that it stores maps offline and does not require mobile data connectivity for navigation. We also like the fact that the app offers different versions for different states, in addition to an all-India version, and has priced them economically. *www.medianama.com*

Esri moves into Smartphone Mapping

Ramping up efforts to serve the growing market for mobile Web geocoding services, GIS provider Esri has purchased mobile location-based services provider Geoloqi. Esri plans to combine Geoloqi's Web 2.0 technology with its own traditional GIS capabilities in order to offer advanced mobile location services for smartphone applications. *www.cio.com*

Etisalat and GAPCorp FNI to deliver GPS mobile telecom solutions

With the objective of providing mobile telecommunications solutions for GPS services, Etisalat has signed a partnership agreement with GAPCorp FNI. It will allow Etisalat to offer a wide range of positioning services such as hourly vehicle positioning, monitoring, follow up with emergency assistance, a geographical barrier service, automatic warning in case of theft, emergency cases warning facility, low battery warnings and other services. *www.ameinfo.com*

GAGAN User Interaction Program

Airports Authority of India and Indian Space Research Organization have organized a one-day GAGAN User Interaction Program on 05th October, 2012 in New Delhi.
The inaugural session was chaired by Chairman, AAI and addressed by Member (ANS), AAI; PD(GAGAN), ISRO; and ED (CNS-P), AAI. The session impressed upon the use and benefits of GAGAN Signal-In-Space (SIS) for both aviation and non-aviation users. Accord Software provided demo on various GAGAN enabled chips manufactured by them & their usability. The technical session provided detail on GAGAN system configuration, current status & its benefits for railways, survey, urban transport, agriculture, marine & coast guard. The presentations made during the day are attached herewith alongwith some photographs. An interactive session was organized where in users shared their views and obtained clarifications from ISRO/AAI/DGCA on the process of implementation of GAGAN.

Following decisions were arrived at during the course of the day. It was proposed to :

- Form a GAGAN user forum
- Conduct more such user interaction meetings to broaden the user awareness.
- Provide a link from AAI website to M/s Accord Software site (who have developed FAA certified SBAS receiver in India)
- Update GAGAN status information on AAI web page.

The Power of RTK level accuracy backed up by StarFire

Our LAND-PAK complete survey system offers the power of RTK level accuracy with the added benefit of 5cm global accuracy when RTK corrections are not available. With StarFire GNSS, users can now achieve 5cm accuracy worldwide, without a base station. For applications that require RTK accuracy, the LAND-PAK system is built around a powerful combination of advanced survey tools that also helps reduce communication outages while providing extended coverage with Ultra RTK & RTK-Extend™.

We understand that to do the job right, you need all the right tools. The LAND-PAK system includes full GNSS support, an online video training library, all hardware & accessories, plus field, office & GNSS post processing software. For additional piece of mind, LAND-PAK is covered by our industry leading three year warranty.

LAND-PAK is your more complete survey system, with all the right tools to get the job done right.

www.LAND-PAK.com

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ISRO plans 58 space missions

Indian Space Research Organisation (ISRO) plans to launch 58 space missions, including sending spacecraft to moon and Mars, an exclusive satellite to keep a round-the-clock watch on the country and deploy 500 transponders in the next five years. The space agency also aims to deploy its own version of the GPS by putting into orbit a constellation of seven satellites which would form the Indian Regional Navigational Satellite System (IRNSS).

The space agency is also designing a special 'eye-in-the- sky' – Geo-Imaging Satellite or GISAT - to be stationed 36,000 km above to maintain round-the-clock vigil and assist state authorities to tackle natural disasters, floods and forest fires and keep a watch over the country's sensitive borders.

Missions initiated in the 11th Plan like Chandrayaan-II, Astrosat-1 and Aditya-1 are also expected to set forth on their respective destinations into space over the next five years. As part of Chandrayaan-II, ISRO plans to land a rover on the lunar surface and put a satellite in an orbit around the moon. The mission is expected to be launched in 2014.

Also part of the 12th Plan is the development of the next generation satellite launcher, the GSLV Mk-III, which will help ISRO put heavier satellites into orbit. *http://zeenews.india.com/news/*

LiDAR technology for land survey in Mumbai

In an attempt to modernise its method of land survey, the Brihanmumbai Municipal Corporation's roads department is now planning to adopt the Light Detection And Ranging (LiDAR) technology for a more accurate mapping of the land surface area. Using this GPS-enabled technology, civic officials and elected representatives will be able to determine where road repairs and constructions are necessary, and identify the nature of structures, such as encroachments, that may be causing bottlenecks. *www.expressindia.com*

DigitalGlobe unveils Integrated Cloud Services Platform

DigitalGlobe has unveiled its My DigitalGlobe cloud services platform. It unlocks the power of the world's largest online library of high-resolution imagery by giving customers access to the most current imagery and geospatial information from desktops, portals, intranets and mobile devices around the world. *www.digitalglobe.com*

GeoEye delivers additional Web Hosting Service Networks

GeoEye, Inc has announced the delivery of new capabilities to the National Geospatial-Intelligence Agency (NGA). GeoEye's EnhancedView Web Hosting Service (WHS) is now connected to additional government networks. This new capability will provide warfighters and intelligence analysts around the world easy access to unclassified, high-resolution Earth imagery through classified and unclassified U.S. government networks. *http://geoeye.mediaroom.com*

China launches 2nd satellite built for Venezuela

China has launched a second satellite built for Venezuela's government. The remote sensing satellite soared into orbit atop a rocket from the northwestern Chinese province of Gansu. The launch came more than a week ahead of Venezuela's October 7 presidential election, in which Chavez is seeking another six-year term. The satellite is named after Venezuelan independence hero Francisco de Miranda. *www.google.com/hostednews/*

South Africa to develop new EO satellite

The Department of Science and Technology (DST) has reported that South Africa is considering constructing a 250 kg to 400 kg Earth observation satellite, as the country's contribution to the proposed African Resource and Environmental Management satellite constellation (ARMC). The ARMC project was launched, on paper, in 2009 with the signing of a MoU between Algeria, Kenya, Nigeria and South Africa. It is hoped that the ARMC will be composed of at least three low Earth orbit imaging satellites. *http://www.engineeringnews.co.za/article/*

Astrium to manufacture 3-m resolution video from geo-orbit

Astrium Satellites said that after five years' work, it is within reach of being able to manufacture a geostationary-orbiting Earth observation satellite offering persistent 3-meter resolution video for military and civil-security customers. The company said technology development work remains before such a satellite is built, especially since the design effort up to now has been self-funded. Astrium has been shopping the idea to European governments for several years, with no luck so far. *http://www.spacenews.com/civil/*

Taiwan asks Apple to blur satellite images of "secret" military base

Taiwan is asking Apple to blur a map image of its new $1.4 billion early warning radar station that can detect aircraft and missiles coming from as far as western China. Defense Ministry spokesman David Lo said that Apple should follow its rival Google in using only low-resolution satellite pictures to show sensitive facilities. *http://www.cbsnews.com/*

Satellites keep an eye on Dutch dikes

In the Netherlands, local authorities are looking to satellite observations as a promising option for dike monitoring and to protect against dike failures. Cut off from the Wadden Sea by a causeway, the shallow IJsselmeer lake is lined by dikes that protect the surrounding land from rising water levels. In a recently completed Terrafirma study, the IJsselmeer dikes were checked using Envisat radar data for the period 2003–10. Results show that a large stretch of the dike near the town of Medemblik is subsiding up to 5 mm per year. *http://www.esa.int/esaEO/*

Galileo update

Second pair of Galileo IOV Navigation Satellites takes off successfully

A Soyuz ST-B launcher carrying two Galileo in-orbit validation (IOV) satellites took off as scheduled at 18:15 GMT (20:15 CEST; 2:15 p.m. EDT) on October 12 from the European Spaceport in French Guiana. All the stages of the Soyuz vehicle performed as planned and the Fregat-MT upper stage released the Galileo satellites into their targeted orbit close to 23,200 kilometer altitude, three hours 45 minutes after liftoff.

CYPRUS and EU sign agreement on hosting of a MEOLUT station

The Republic of Cyprus and the EU signed an agreement recently on setting up a Galileo ground station in Cyprus. The ground station will be one of a network of three so-called Medium Earth Orbit Local User Terminals (MEOLUT) that will relay distress signals received by the Galileo satellites to rescue teams throughout the European Union. The agreement was signed by Vice-President of the European C omission Antonio Tajani and the Cypriot Minister of Communications and Works, Efthemios Flourentzou. *http://www.financialmirror.com/*

CEVA partners with Galileo Satellite Navigation

CEVA Inc, the leading licensor of silicon intellectual property (SIP) platform solutions and DSP cores, and Galileo Satellite Navigation, Ltd. (GSN), a developer of multi-system GNSS receiver technology have announced a partnership to offer software-based GNSS solutions for the CEVA-XC and CEVA-TeakLite-III DSP platforms. These solutions are available for demonstration, on real silicon with integrated RF, and consume as low as 10mW in a 40nm process node. *www.galileo-nav.com*

Europe's satellite navigation market is surging

During Intergeo on 10 October Carlo des Dorides explained that slowly but surely, Europe's global navigation satellite system (GNSS) was coming together, with businesses showing more and more interest in both the forthcoming Galileo satellite system and the operational EGNOS, Europe's satellite-based augmentation system. "It is true that Galileo has had ups and downs in recent years, but everything is in place for real success from 2014, when the Galileo satellites will be at initial operating capability," des Dorides said. "We are seeing more and more offerings in this sector." The new GNSS services promise huge savings in time and money for both customers and businesses, des Dorides said. *www.gsa.europa.eu*

Tokyo slams Survey of India for not recognising 'Sea of Japan'

An upset Tokyo has lodged a protest with New Delhi against the Survey of India not indicating 'Sea of Japan' on its maps by that name. India's official map-making agency, the Survey of India has omitted naming the water body in its English version, though the Hindi one calls the area 'Japan Sagar' on its maps. A marginal sea of the western Pacific Ocean, lying between the Asian mainland, the Japanese archipelago and Sakhalin, it is bordered by Japan, North Korea, Russia and South Korea. The reason for Japan taking offence is that the name 'Sea of Japan' is a bone of contention between it and the Koreas. While Seoul prefers the name 'East Sea' to be used instead of or in addition to 'Sea of Japan', North Korea wants it called 'East Sea of Korea'. Japan has also given documents to the MEA saying the UN recognised 'Sea of Japan' as the standard geographical term in March 2004. "The simultaneous use of both — 'Sea of Japan' and 'East Sea' — infringes on the neutrality of the UN," Japan has argued. *www.indianexpress.com*

Sri Lanka sets up GIS-based environmental data bank

The Central Environmental Authority (CEA) developed an environmental data bank including environmental and industrial information with their geographical distribution and location for the first time in Sri Lanka. In addition to the data collected from regional CEA officers, it has also included data received from Wildlife, Forest Conservation, Census and Statistics, Survey and Archaeological Departments, National Building Research Organization and various other institutions. *www.dailynews.lk*

Rolta anf Esri Gold partners

Rolta International, Inc. has announced its selection as a Gold Partner in the Esri Partnership Network in North America, Europe and the Middle East. Rolta extends the benefits of traditional GIS to the enterprise through its deep Oracle and IT services expertise. This breadth of expertise is uniquely required to provide the integrated IT, GIS and Analytics/ Business Intelligence solutions that businesses need to achieve operational performance objectives and to support critical decision making. *www.rolta.com*

WB funds for Pakistan land project

The World Bank has agreed for additional financing of Rs7.5 billion for the computerisation of land record and the contract signing, in this regard, is expected in next month. Board of Revenue Punjab spokesperson said the implementation of World Bank Project i.e. Land Records Management and Information System will not only secure the records, improve service delivery but will also stabilize and improve the economy and land market throughout Punjab. *www.nation.com.pk*

Speech and Sketch Interfaces with Google Earth

Adapx has announced new speech and sketch interfaces to speed mission planning data capture with Google Earth, Command Post of the Future (CPOF), and The Army's Replay Application Framework. With speech and sketch interfaces from Adapx, soldiers can enter intelligence and planning data into existing C4ISR and Command and Control (C2) systems by simply sketching standard military symbols and speaking standard jargon. *www.marketwire.com*

Águas de Portugal Group Selects Bentley Software

Águas de Portugal (AdP) Group has selected Bentley's water software technology to streamline the operation and management of its water and wastewater systems while also making them more efficient and reliable. AdP Group's water and wastewater collection and treatment systems and water supply networks serve 80 percent of Portugal's population. *www.bentley.com/WaterSoftware*

OS urges professionals to use licensed map data

Ordnance Survey, Great Britain, is reminding land and property professionals to ensure that they are not risking their professional reputation by using unlicensed mapping data. Over the last 10 years the use of digital location-based information has changed significantly, from being used by only a small number of organisations to becoming an essential business decision-making tool. This increased reliance on, and recognition of, digital mapping data has also resulted in customers demanding the most up-to-date information available. However, it is not only important for organisations to have the most up-to-date data, but also vital that they have the appropriate licence to effectively use it. *www.ordnancesurvey.co.uk*

WorleyParsons signs Global Alliance Agreement with Intergraph®

WorleyParsons has signed a long-term Global Alliance Agreement (GAA) with Intergraph®. It covers the Intergraph SmartPlant® and SmartMarine® Enterprise software suites, including SmartPlant 3D, SmartMarine 3D and SmartPlant 3D Materials Handling Edition (collectively known as Smart 3D), SmartPlant Foundation, SmartPlant Construction, SmartPlant Enterprise Engineering & Schematics applications, CADWorx®, CAESAR II® and numerous other solutions. *www.intergraph.com*

Dubai Municipality to apply open geospatial standards

The GIS Department at Dubai Municipality has recently organized a joint session for the project to apply the open geospatial standards of Geographical Information System as per ISO TC/211 & OGC in the presence of representatives of the Strategic Partners of this project from Dubai Police, DEWA, RTA, Dubai Land Department, Etisalat and representatives of the relevant departments of the Municipality.

Adopt GIS for planning, monitoring development: Knowledge panel

The Karnataka Knowledge Commission (KKC), India has recommended to the Karnataka government to adopt the Karnataka Geographic Information System (K-GIS) for spatial planning, area-based development assessment and goal-based performance monitoring.

NavCom introduces StarFire over IP

NavCom Technology, Inc has announced a new feature for its GNSS receivers, StarFire Over IP. It allows users to access StarFire corrections over the Internet, giving them access to the same reliable five centimeter global positioning accuracy without the need for a base station. NavCom's StarFire Network, a Global Satellite Based Augmentation System, provides five centimeter horizontal accuracy worldwide and the freedom and flexibility that a DGPS solution offers. It offers 99.999% uptime, a seven satellite constellation, and now internet delivery for redundancy to ensure system availability and position accuracy.

New wide-band data link for field communications by Pacific Crest

Pacific Crest has introduced the new XDL Rover, an advanced, high-speed, wireless data link built to withstand the rigors of GNSS/RTK surveying and precise positioning. It is a lightweight, ruggedized UHF receiver designed for digital radio communications between 403 and 473 MHz in either 12.5 or 25 kHz channels. It utilizes Pacific Crest's latest generation XDL modem technology while remaining backward compatible with existing Pacific Crest products enabling users to instantly communicate with GNSS precise positioning receivers that share the same protocols throughout the world. *www.PacificCrest.com*

GNSS Surveying Solution by Trimble

Trimble® R10 is the smallest and lightest receiver in its class. It combines powerful features and groundbreaking technologies including Trimble HD-GNSS, Trimble SurePoint™, Trimble 360, and Trimble xFill™ to provide surveyors increased productivity. User-friendly features such as a quick-release adaptor and the ability to configure the receiver from a smart phone make it easy to deploy and use as a base station or rover. Trimble also released new versions of its field and office software — Trimble Access 2012.20 and Trimble Business Center 2.80 to extend Trimble's Connected Site® survey solution. *www.trimble.com*

Topcon's Latest GNSS Technology – Vanguard

Topcon's patented Vanguard™ technology sets a new industry standard in satellite signal tracking and performance. With Universal Tracking technology and 226 channels available, all current and upcoming GNSS constellations can be tracked. TPS recently announced the new HiPer SR, an advanced GNSS RTK receiver based around Vanguard technology, with the most compact and lightweight design of any fully integrated precision receiver available worldwide.

New ProMark 120 and ProMark 220 GNSS receivers

The new ProMark 120 and ProMark 220 GNSS receivers, powered by Ashtech, provide surveyors with an expanded set of capabilities and enhancements, and replace the ProMark 100 and ProMark 200. Both the models are equipped with an updated hardware platform that includes the latest Ashtech GNSS chipset with Z-Blade GNSS-centric technology. In addition, both come with the Microsoft Windows Embedded Handheld 6.5 Professional operating system. The new ProMark 120 features enhanced ProMark Field software v3.0, which introduces a large, custom virtual keyboard; enables the import and export of user-defined text file formats; enhances voice information and guidance features; among other improvements.

The dual-frequency and dual constellation ProMark 220 RTK Rover also features an internal L2 GLONASS receiver.

senseFly announces eBee

senseFly has announced the eBee, the UAV that is resistant to high winds yet remains inherently harmless and is transported in a single carry-on luggage-sized box. It weighs only 630g. Its optimized aerodynamics and increased efficiency of the powertrain allows the eBee to fly its missions in strong breezes of up to 12m/s (45 km/h). It fits into a single case that conforms to carry-on luggage standards. After the mission is complete, the eBee uses its industry-first ground-sensing technology to perform a linear landing on a preset ground coordinate. All images are then directly processed in the included most advanced UAV image processing software[3]to high-resolution orthomosaics and DEM. *www.sensefly.com*

RIEGL launches new airborne laser scanner

RIEGL Laser Measurement Systems has launched the new long range airborne laser scanner LMS-Q780. With an operating flight altitude of up to 10,000 ft at 100 kHz laser pulse repetition rate (PRR) it opens new perspectives in airborne laser scanning. The laser wavelength qualifies the scanner for glacier and snowfield mapping, its digital waveform processing capabilities for high-altitude topographic mapping.

Septentrio announces first GNSS receiver with full support of TERRASTARTM services

Septentrio has announced the full support of TERRASTARTM wide-area differential and Precise Point Positioning (PPP) capabilities in some of its receivers. The Septentrio AsteRx2eL is an all-in-view dual-frequency GPS/GLONASS receiver, featuring an integrated L-band modem to receive TERRASTARTM data transmitted by satellite and field-proven dm-accurate positioning using this data. It also features GNSS+™ technology, a unique combination of industrial grade performance algorithms, to better serve high-precision positioning needs even in the most severe conditions.

MicroSurvey® releases embeddedCAD 2013

MicroSurvey has announced a major update to MicroSurvey embeddedCAD, a standalone application that is powered with Autodesk Technology™ and contains the MicroSurvey suite of enhanced tools for land surveyors. It provides users with a slick interface on a complete survey drafting toolkit, including COGO, DTM, traversing, adjustments, volumes, contouring and more.

RTK Network-Compatible S320 Survey System

Hemisphere GPS has announced the new S320™ network rover and XF2™ handheld data collector. With support for network RTK corrections, the S320 network rover is an integrated solution that simplifies land surveying applications by eliminating the need for a base station and radio modem. XF2 combined with Carlson SurvCE software provides a familiar and proven interface to the S320. *www.hemispheregps.com*

New Vector™ GPS Compass Products by Hemisphere GPS

Hemisphere GPS has introduced the Vector VS330™ and Vector VS131™ GPS compass products that provide high performance heading, position, heave, and attitude data. The new Vector products are designed for professional marine applications such as hydrographic and bathymetric surveys, dredging, oil platform positioning, and buoys that demand the highest level of 3D positioning accuracies. *www.hemispheregps.com/marine*

TC5D from Adtollo

TC5D has been released by the company Adtollo. A web interface that allows you to easily view and spin your maps in 3D, directly in your web browser. It mixes all kind of positioning data on the web, vectors, raster's, point clouds, terrain models and others. Adtollo develops software for mapping, design and GIS, and Topocad is the most well-known product.

Chilean National Military Mapping Institution selects Summit Evolution

The Chilean National Military Mapping Institution (IGM), has contracted with DAT/EM Systems International's reseller GeoTooBox Ibérica S.L. (GTBi) to purchase 24 Summit Evolution licenses. The IGM is currently involved on a large project called "Latitud Sur" which aims at mapping the entire country with1:25000 scale cartography. The 3D data will be captured with Summit Evolution under ArcGIS environment directly.

New Geneq GPS/GLONASS receiver to use OmniSTAR Service

Geneq Inc has announced the SXBlue III-L GNSS, a palm-sized L1/L2/ GLONASS GNSS receiver that is designed to use OmniSTAR's G2 or HP service to attain 10cm accuracy in all regions of the world. It connects wirelessly to smartphones, handhelds, tablet or notebook computer that are Bluetooth-compliant. Optionally, the SXBlue III-L GNSS receiver is fully RTK capable (1cm real-time accuracy) when using an RTK network or other RTK reference station.

u-blox' acquires Fastrax

u-blox acquired Fastrax Oy, a company that specializes in a broad range of GNSS positioning and antenna modules. The company brings additional products to u-blox' portfolio, including software GNSS solutions used for consumer and industrial applications, and advanced GNSS modules that include integrated antenna.

ATLANS, New Geo-referencing and Orientation System

ATLANS, a new cost-effective geo-referencing and orientation system from iXBlue, has been designed specifically for land and airborne mapping applications being conducted within a limited budget. Significantly, the unit is ITAR-free. The user gets a compact, lightweight gyrocompass and motion sensor that consumes very little power and yet provides all of the required data for demanding navigation, stabilization and control applications.

SPAN® MEMS enclosed receiver

NovAtel Inc has announced the addition of a new commercially exportable single-enclosure SPAN MEMS receiver to its line of SPAN GNSS/INS products. Available Q1 2013, the low power, lightweight SPAN MEMS enclosure incorporates a diminutive Micro Electromechanical Systems (MEMS) Inertial Measurement Unit (IMU) and a NovAtel high precision OEM615 GNSS/INS SPAN receiver to provide continuously available position, velocity and attitude (roll, pitch, yaw) in a small, single-unit form factor. *www.novatel.com*

Sat Nav simulator integrates with complex motion testing and simulation systems

Spectracom, a business of the Orolia Group now supports high-end motion simulation systems with a new capability for its GPS and GNSS simulators; real-time scenario generation. The capability to leverage dynamic scenarios in real-time to drive the output of simulated GPS and other global navigation satellite signals opens a wide range of applications for the company. The demand for real-time GPS simulation is increasing due to the need to improve the performance in complex navigation systems that combine different position detection technologies.

Veripos Inertial-Aided GNSS Service for DP Vessels

Veripos has introduced Verify Axiom, a new inertially-aided solution for dynamically positioned vessels combining latest GNSS positioning technology advances with high integrity inertial measurements for enhanced and more reliable positioning performance.

It exploits long-term precision characteristics of GNSS positioning with the continuous availability and rapid update rates of inertial sensors. It thus bridges any GNSS disruptions typically caused by ionospheric irregularities and physical obstructions while detecting position outliers due to common mode failures which can otherwise affect vessel systems simultaneously. *http://worldmaritimenews.com/archives/66760*

TeeJet RX510/RX610

TeeJet Technologies has announced the availability of a new line of high-precision GNSS receivers for use in the most demanding ag applications. The RX510 is compatible with OmniSTAR

Introducing our new easier-to-hide OEM6.

The new OEM615 GNSS receiver from NovAtel provides the industry's leading GPS+GLONASS dual frequency RTK positioning performance – in our smallest form factor – so you get all of NovAtel's reliability but in a more discreet, easy-to-integrate card. For more info, visit novatel.com/oem6 or call you-know-who. **Integrate success into your [redacted].**

NovAtel

XP, hp and G2 services for 4-6" pass-to-pass accuracy. It features an internal cellular modem for use with CORS/Network RTK signals providing 1-2" pass-to-pass accuracy and year-to-year repeatability. It is factory configured for either GSM or CDMA signal to support the cellular provider of choice. *www.teejet.com*

Leica ScanStation P20, Leica Zeno CS25 GNSS, Cyclone 8.0 Software

Leica ScanStation P20 provides three world's firsts in a compact terrestrial laser scanner: Onboard Check & Adjust functionality, sub-millimeter range noise at 120 m, and modern Waveform Digitizing (WFD) technology delivering 1 million points per second.

The Leica Zeno CS25 GNSS is a Tablet Computer which packs full GNSS functionality into an ergonomic and portable device with a large screen, making it the industry's most powerful GNSS/GIS handheld. It doesn't require a backpack or a pole mount, or any additional batteries. A compact L1/L2 antenna is attached on the CS25 GNSS. For high accuracy data collection, it can connect with an external GNSS Antenna mounted on a pole.

Leica Geosystems has also made a next major release of its flagship software, Leica Cyclone 8.0. It gives users powerful, new capabilities that can now directly connect point cloud data with other spatial data sources (such as 3D models) and readily share and re-use modeled data. *www.leica-geosystems.com*

Geospatial investments help utilities boost productivity

In a recent Esri study of electric utility professionals, nearly half reported a more than 10 percent increase in productivity due to the use of GIS technology. The study was designed to assess electric utility geospatial technology in terms of return on investment. Results were analyzed and compiled into a benchmark.

MARK YOUR CALENDAR

November 2012

8th Fig Regional Conference
26 - 29 November
Montevideo, Uruguay
www.fig.net/uruguay

The 33rd Asian Conference on Remote Sensing
26 - 30, November
Pattaya, Thailand
http://acrs2012.gistda.or.th

December 2012

OGC Technical and Planning Committee Meeting
2 - 6 December
Bombay, India
www.opengeospatial.org

European LiDAR Mapping Forum
4 - 5 December
Salzburg, Austria
www.lidarmap.org

NAVITEC 2012
5 - 7 December
Noordwijk, Netherlands
www.congrexprojects.com/12c13/introduction

4th Asia Oceania Regional Workshop on GNSS
9-10 December
Kuala Lumpur, Malaysia
www.multignss.asia

8th International Conference on Geo-information for Disaster Management
13-16 December
Enschede, Netherlands
www.isrse35.org/

January 2013

9th Annual Geospatial Intelligence Conference and Exhibition
21-23 January
QEII Conference Centre, London
www.geoplace.com

ION International Technical Meeting
27 – 29 January
San Diego, California, United States
http://ion.org/meetings/

February 2013

Second High Level Forum on Global Geospatial Information Management
4-6 February
Doha, Qatar
http://ggim.un.org/

The International LiDAR Mapping Forum
11-13 February
Colorado, USA
www.lidarmap.org

ACSER
19 February
Sydney,Australia
www.acser.unsw.edu.au/oemf/workshop.html

The Munich Satellite Navigation Summit 2013
26 – 28 February
Munich Germany
www.munich-satellite-navigation-summit.org

March 2013

ASPRS 2013 Annual Conference
24 – 28 March
Baltimore, Maryland USA
www.asprs.org

April 2013

The Eighth National GIS Symposium in Saudi Arabia
15-17 April
Dammam, Saudi Arabia
www.saudigis.org/

Pacific PNT
22-25 April 2013
Honolulu, Hawaii
www.ion.org

35th International Symposium on Remote Sensing of Environment
22 - 26 April
Beijing, China
http://www.isrse35.org

European Navigation Conference ENC 2013
23 -25 April
Vienna, Austria
www.enc2013.org

The 7th International Satellite Navigation Forum
24 – 27 April
Moscow, Russia
http://www.expocentr.ru/en/events/glon

May 2013

Intergeo East 2013
2 – 4 May
Istanbul, Turkey
http://www.intergeo-east.com/

The 8th International Symposium on Mobile Mapping Technology
1-3 May
National Cheng Kung University, Tainan
http://conf.ncku.edu.tw/mmt2013/

FIG Working Week 2013
6–10 May
Abuja, Nigeria
www.fig.net/fig2013/

June 2013

TransNav 2013
19 - 21 June
Gdynia, Poland
http://transnav2013.am.gdynia.pl

Hexagon 2013
3- 6 June
Las Vegas, USA
http://www.hexagonmetrology.us

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