ISPRS Technical Commission VIII

Remote Sensing Applications and Policies

2010 Annual Report

President: Haruhisa Shimoda (Japan)
Scientific Secretary: Kohei Cho (Japan)
Administrative Secretary: Yoshiaki Honda (Japan)

State of Science and Technology

Applications of remote sensing are rapidly expanding. In the early age of remote sensing, most of the applications were related to operational applications, e.g. land use mapping, geological applications, etc. However, these application areas were expanded to ocean and air applications with the launches of new sensors. Now, the largest operational application area is meteorology. Most of the meteorological offices of developed countries use many remote sensing data for their numerical weather prediction. Other areas include fisheries, ship navigations, wild fire detections, etc.

Also, after the global change problems became apparent, global observations and analyses of obtained data occupies a large area. The Commission VIII covers all the areas of remote sensing applications from global change research to operational applications. These applications will support decision making, forecasting and monitoring. In this field, recent researches are not only based on a single sensor data, but based on multiple sensor data as well as models. This kind of new method reveals much deeper insight to the sciences.

Another point of view which should be considered is the establishment of GEOSS (Global Earth Observation System of Systems). GEO (Group on Earth Observation) has issued the 10 year implementation plan of GEOSS, and 9 societal benefit areas were established. The Commission VIII for 2008-2012 has set up total of 10 working groups to promote and clarify the role of ISPRS, and also to respond to the societal benefit areas of GEOSS.

Science and Technology of these areas are advancing, but still we need further advancement to understand the global change and develop new areas of operational applications. ISPRS Commission VIII will provide the answers to these requirements.

Accomplishments

The 2010 Commission VIII symposium was successfully held in Kyoto, Japan from 9 to 12, August. The symposium was co-sponsored by JAXA, NICT and GEO. Around 350 people from31 countries attended the symposium, and excellent papers were presented. Good papers in this symposium are planned to be published as a special edition of International Journal of Remote Sensing.

WG VIII/1: Disaster Management
Chair: Piero Boccardo (Italy)
Co-Chairs: T. Srinivasa Kumar (India), Robert Backhaus (Germany)
Secretary: Fabio Giulio Tonolo (Italy)
Web Master: Paolo Pasquali (Italy)

The mission of TC VIII/WG1 aims at informing and activating people involved in disaster monitoring, mitigation and damage assessment both from institutions and private companies. We are focused on promoting the goals of the WG as expressed in its terms of reference by means of various activities and events and in co-operation with ISPRS, other national and international organizations and satellite image-related firms. Right now, more than 100 scientists and researchers coming from more than 35 different countries are members of the WG.

State of Science and Technology
The earthquake occurred in Haiti in January 2010 and the Pakistan flood in August-September 2010, highlighted how impressive could be the impact of such disasters when related to manmade artifacts. Haiti and Pakistan have shown how geomatics could help people in need and how fast and effectively the humanitarian community could react in case of major emergencies. Different scientific symposia organized this year, such as GI4DM 2010, VALgEO 2010, where all the concerned organizations, scientists and practitioners discussed the main outcomes, outlined how many things should still be done. In particular, when facing the request to proceed with Post Disaster Need Assessments (PDNA) where the evaluation of damages is one of the major outcomes, it has been statistically demonstrated that methodologies based on a simple usage of monoscopic aerial multispectral acquisitions used for Haiti allows to determine only the 60-65% of the possible damages occurred (especially when buildings and infrastructures are involved). Concerning Pakistan, the availability of multitemporal acquisitions/surveys could allow to cope with two of the major concerns of the Organizations deployed in the affected areas: the first related to the possibility to give crucial information to search and rescue teams, the second, to represent the dynamic of flooded areas in order to organize the logistics devoted to humanitarian assistance. This means that the future road map, from the acquisition and data processing point of view, should take into account the possibility to make available multiple (both in the temporal and spectral domain) satellite images (and also stereo couple), LIDAR and interferometric radar acquisitions (for infrastructure damage assessment and more precise DSM extraction useful for basin identification) and ground surveys (all these data were, at least, partially acquired during the mentioned emergencies, but not fully exploited). In addition, a continuous and operational presence on the ground of technical teams equipped with basic acquisition devices (jointly organized with local authorities to enhance any possible disaster response capacity) should be envisaged for future emergency activations, with the aim to countercheck satellite-based analysis.

Accomplishments

Organized Conferences

Gi4DM 2010 Geo Information for Disaster Management (February, 2010, Torino, Italy)

The sixth edition of Gi4DM Conference was jointly organized by ASITA (Federazione Italiana delle Associazioni Scientifiche per le Informazioni Territoriali e Ambientali) and ISPRS (International Society for Photogrammetry and Remote Sensing).

Gi4DM Conference was divided in:

- 5 Plenary Sessions: Opening, The International Organization approach to Disaster Management, GIS Solutions for Emergency Response and Preparedness, New Perspectives in Satellite and Aerial Data Acquisition, Public and Private Programmes in the Field of Emergency Response;
- 14 Oral Parallel Sessions: Climate Change, Coastal and Water Analysis, Data Acquisition for Early Impact Stage, Drought Early Warning Systems, Early Warning and Impact Tools for Floods, Earthquake Early Impact, Fires and Technological Hazards Global SDI, Landslide Monitoring and Data Processing, Monitoring and Processing, Thematic and National SDI, Urban Analysis, User Requirements, Web/GIS Applications;
- 2 Poster Sessions: Emergency Preparedness and Response, Early Warning and Impact Systems.

The conference attendees came from more than 30 countries worldwide and a broad discussion did raise especially on early warning and impact systems, the role of Spatial Data Infrastructure (SDI) and the collaborative approach to disaster management. In particular, representatives from the main operational UN Agencies (WFP and UNOOSA) explained their approach to emergencies, presenting, in the meantime, different projects related to the coordination of the intervention (UN-Spider, SpaceAid, GMES/Safer). Data providers and software vendors (E-Geos. ESRI and Integraph) describes the potentialities of their data and hardware and software solutions while Google presented the map maker project devoted to a collaborative approach to map updating (in a crowdsourcing environment).

In the framework of the conference itself, very successful was the cartographic session titled "Maps created by the international community for the earthquake that occurred in Haiti on January 12th, 2010". More than 50 different maps produced by several Institutions were displayed and, very interesting considerations were done concerning quality and effectiveness (from the operational point of view) of the mapping products.

From the technical discussion some topics were debated:

- The necessity to standardize the procedures both in terms of data description (completeness, availability and metadata) and of reliability of the proposed methodologies (a global approach is considered a must from the Un Agencies);
- The lack of automated methodologies when value added information should be extracted. A proposal concerning the availability of a comprehensive and complete dataset to be delivered free-of-charge to concerned researchers and practitioners, as proposed by ISPRS representatives,

could be, in the mid term perspective, a very useful way to take into account different and more reliable automatic procedures tested on ground truth ancillary data (Haiti emergency is definitely considered the most reliable example);

- The lack of coordination during emergencies is always a problem, causing multiple and overlapping data acquisitions, redundant analysis and misleading information delivered to concerned Organizations;
- Data sharing, when possible, was considered essential especially when a participatory and voluntary effort is needed;
- A more effective collaboration between International Organizations, National research centers and Governmental bodies should be encouraged in all the disaster management different phases (from preparedness, to early warning and impact approach to reconstruction phase).

Organized workshop

3S 2010 (International SUMMER STUDENT SEMINAR) (September, 2010, Novosibirsk, Russia)
The aim of the Seminar was the intensification of international and youth scientific contacts focusing on geo-sciences issues. The program of the 3S was designed to give visitors the maximum opportunity to enjoy attractions of Novosibirsk, as well as providing a rich cultural and technical program. The 3S covered aspects of Remote Sensing, Photogrammetry and Spatial Information Sciences related to disaster management. Specifically, tThe session "Geomatics supporting Disaster Management" was divided in two different modules; the first one more theoretical and descriptive while the second one devoted to the simulation of a rapid mapping activation related to a real flood event.

Publications/Reports

"Geoinformation for Disaster and Risk Management. Examples and best practices" (ISBN 978-87-90907-88-4). The new booklet published by the Joint Board of Geospatial Information Societies (JBGIS) and the United Nations Office for Outer Space Affairs (UNOOSA) outlines the potential uses of geo-information technologies to reduce the impact of natural or manmade disasters and risks. The publication brings together concise scientific contributions from experts around the world and creates a decision support forum based on their knowledge. The articles in the booklet cover natural disasters like earthquake, flood, volcano outbreak, tsunami, landslide, dust storm and wildfire, as well as societal issues like health care, refugee camps, urban sprawl and traffic infrastructure security. According to UNOOSA's Takao Doi, UN Expert on Space Applications, the publication is a „must-read" for all decision-makers involved in risk and disaster management, as it clearly shows that „those technologies offer little-known and rarely-used solutions that could help us reduce disaster risks and losses and mitigate damages to livelihoods and property associated with disasters". The complete booklet is available for download on
http://www.un-spider.org/jbgis-unoosa-booklet

Participation to Conferences

ENHANS Project (focus on Latin America and Brazil) at the Meeting of the Americas

(August, 2010, Iguassu, Brazil, **Attendee:** Piero Boccardo, WG VIII/1 Chair)

Symposium "International Collaboration in Earth and Space Sciences: Present Status,Needs, and Future Perspectives"

The symposium organized by the American Geophysical Union (AGU) and International Union of Geodesy and Geophysics (IUGG) was aimed to present recent achievements in international collaboration and to discuss new opportunities, especially those related to Latin America and the Caribbean countries.

Symposium "Natural Hazards and Disaster Risk in Latin America and the Caribbean"

The symposium was the central event of the "Extreme Natural Hazards and Societal Implications – ENHANS" project sponsored by the International Council for Science (ICSU) and co-sponsored by several international and intergovernmental organizations. The symposium was convened by O. Cordona (Colombia), A. Ismail-Zadeh (Germany), and V. Kossobokov (Russia).

Town Hall meeting: "Natural Hazards in Latin America and Caribbean (LAC): FromRisk to Opportunity by Partnership of Science and Society"

The meeting addressed the following major topics: (i) how science (both natural and social) and society can form partnership for disaster reduction? (ii) how science and society partnership can convert natural disaster risk to opportunity? And (iii) what are the urgent issues of disaster risk in LAC cities and regions under intensifying natural and social pressure?

ISPRS TC VIII Symposium (August, 2010, Kyoto, Japan)

As part of this symposium, the ISPRS WG VIII/1 organised 4 Technical Sessions and 1 Interactive Session focusing on the use of remote sensing and geospatial technologies for mitigation of disasters. The details of the sessions organized are as follows:

- SAR Applications: This session was chaired by Dr Shintaro Goto. Four papers were presented in this session covering Circularly Polarised SAR (CP-SAR) for analysing natural hazards, oil spill monitoring, volcano monitoring, etc.
- Disaster management and data processing: Chaired by Dr Kohei Arai, the session had 3 papers that focused on change detection studies for disaster monitoring, hot mud flow disaster simulation and open source web based disaster information sharing platform.
- Earthquakes and Landslides: This session was chaired by Dr Srinivasa Kumar. 5 papers were presented in this session that focused on latest techniques for monitoring of earthquakes, hurricanes and landslides.
- Water related hazards: Chaired by Dr Srinivasa Kumar, the session had 3 papers focused that focused on real-time information for tsunami early warning, development of Tsunami evacuation routes and Flood hazard mapping.

- Interactive Session: During the Interactive Presentation Session the use of satellite images for disaster damage detection, LIDAR DEMs for estimating ground movement during volcano eruption and the other services for disaster mitigation system were showcased.

In addition to the above, Dr Srinivasa Kumar made a presentation of the WG VIII/1 activities to the ISPRS TC VIII Board meeting held on August 11, 2010. The activities of the Working group were highly appreciated by the Board.

Working Group News

GI4DM2011 (Geographic Information for Disaster Management) (May, 2011, Antalya, Turkey)

Conference Chair: Orhan Altan, İstanbul Technical University, Turkey

Co-Chairs: Robert Backhaus, UN-SPIDER, Germany - Piero Boccardo, Politecnico di Torino, Italy- David Stevens, UNOOSA, Vienna, Austria - Sisi Zlatanova, Delft, The Netherlands

For the seventh time, the International Symposium on Geo-information for Disaster Management (Gi4DM) brings together researchers, developers, data providers and users from all over the world to discuss geomatics and disaster management challenges. Papers that deal with any aspect of geomatics technologies suitable for crisis management are invited. Authors should focus on the methodologies, tools, functionality, and/or interfaces that are being or should be provided to National and/or International Organizations involved with crisis response and management.

ENHANS International Workshop on Extreme Natural Hazards and Disaster Risk in Africa (Jan, 2011, Pretoria, South Africa)

The Pretoria Workshop will provide an opportunity to the research community of the African countries and international experts to discuss and analyze major topics related to extreme natural events and disaster risk:

WG VIII/2 : Health

Chairs: Amelia Budge (USA)
Co-Chairs: Richard Kiang (USA)
Secretary: Stanley Morain (USA)

Status of Science and Technology:

Applying Earth observing models and products to routine practices in the public health community introduces scientific and technological challenges. Advancements are being made in using Earth observations to monitor environmental conditions that affect human health and well-being. For example, geospatial data are contributing information to early warning systems that are being developed and implemented for malaria, meningitis, and respiratory diseases in many locations around the globe. These include MEWS, PHAiRS, MERIT, SDSWAS, among others. Another aspect of public health is the epidemiological studies, which require long-term data records and finer

gridded geospatial datasets. Earth observing scientists and epidemiologists are coming together to understand, address, and hopefully bridge some of these technological gaps

Accomplishments:

Website and membership:

The website continues to be maintained. Since the previous annual report, seven new members have joined the working group, including a representative from GEO. There are now 53 members in the working group from ten countries. Most are scientists and medical specialists from government and academic sectors, including medical facilities at universities and government hospitals.

Conferences, symposia, workshops, and committees:

Commission VIII Symposium, Kyoto Japan: One technical session was organized which was attended by approximately 25 participants. WG officers reported activities of the working group at the Commission business meeting.

GEOSS: Several working group members served on the organizing committees and participated in the GEOSS workshop on *Health and the Environment*, held 27-29 July 2010 in Paris, France. Several members continue to participate in and contribute to the GEOSS User Interface Committee.

TUBITAK: Organizing committee participant on "Space Technology Applications for Socio-economic Benefits held 14-17 September 2010 in Istanbul, Turkey.

ISRSE: Organizing 2 oral technical sessions and 1 oral interactive session for ISRSE34 to be held 10-15 April 2011 in Sydney, Australia.

WG-2 Workshop: Developing program for WG workshop to be held in Santa Fe, NM USA 9-13 September 2011.

Collaborations:

Within ISPRS:

1. WGVIII/2 collaborated with WGVIII/1 (through Piero Boccardo) by contributing a chapter entitled *Suggested Practices for Forecasting Dust Storms and Intervening Their Health Effects* to the "Best Practices Booklet on Geo-information for Risk and Disaster Management." This booklet is a product of the Joint Board of Geospatial Information Societies and UNOOSA/UN-SPIDER.
2. Invited working group members to contribute to GI4DM 2011 via individual presentations and/or organizing a session.

With Other Organizations:

1. Members of the working group continue to participate in and contribute to the GEOSS User Interface Committee. Collaborated with GEO's Health and Environment Community of

Practice by linking websites and contributing to their workshop held 27-29 July 2010 in Paris.

2. Collaborated with IEEE to organize a workshop on "Global Health Information" held 31 August 2010 in conjunction with the Engineering in Medicine and Biology Society (EMBS) annual meeting, Buenos Aires, Argentina.
3. Developed a link to the new IUGS Dust Working Group by appointing Captain Mark Lyles as our working group's liaison.
4. Collaborated with UNOOSA to propose a new UN working group on health. This is an outcome of our participation in the Space Technology Applications for Socio-economic Benefits Workshop (Istanbul, 14-17 Sep 2010).

Publications, books, and articles:

- *Geoscience: Bedrock of Science for Health and Wellbeing* submitted to GIM on 23 Sep 2010
- Morain, S.A. and A.M. Budge. *Suggested Practices for Forecasting Dust Storms and Intervening Their Health Effects*. Chapter 8 in Geo-information for Disaster and Risk Management: Examples and Best Practices. Joint Board of Geospatial Information Societies, ISBN 978-87-90907-88-4. Pgs 45-50.
- In progress: Environmental Tracking for Public Health Surveillance (ISPRS Book series)

Papers published by working group members:

Najibullah Safi, MD (co-investigator). Genetic structure of Palsmodium vivax from two malaria endemic areas in Afghanistan. In: *Acta Tropica* 113 (2010) 12-19.

Najibullah Safi, MD (co-investigator). Molecular surveillance of Plasmodium vivax dhfr and dhps mutations in Isolates from Afghanistan. In: *Malaria Journal* 210, 9:75.

Najibullah Safi, MD (co-investigator). Contracting out of primary health care services in Pakistan: Is up-scaling a pragmatic thinking? In: *J Pak Med Assoc*. Vol. 60, No.5, May 2010, 387-389

Najibullah Safi (co-investigator). Toward Malaria Risk Prediction in Afghanistan Using Remote Sensing. In: *Malaria* Journal. 2010, 9:125

Working Group News/Plans for Upcoming Activities:

- Working Group 2 plans to continue collaborating with other organizations regarding health and the environment, including IUGS, GEO, ICSU, and UNOOSA.
- Working group members will be organizing technical sessions for ISRSE-34 in 2011.
- A workshop on health and the environment will be held in Santa Fe, NM USA in Sept 2011.
- Working Group 2 will collaborate with other working groups to develop technical sessions and a workshop/tutorial for the 2012 Congress.

WG VIII/4: Water

Chair: Taikan Oki (Japan)
Co-Chair: Wesley Berg (USA)
Co-Chair: Peter Troch (USA)
Regional Coordinator: Christian D. Kummerow (USA)
Secretary: Shita Seto (Japan)

Status of Science and Technology

The WG relevant physical parameters expected to be monitored by satellite remote sensing are various to trace the whole history of global hydrological cycles: water vapor and cloud liquid water content in the atmosphere, precipitation, incoming radiation at ocean/land surfaces, sea surface temperature, sea surface wind, sea ice concentration, sea surface height, water table of large water bodies such as lakes and large rivers, soil moisture, snow depth, vegetation, land use/land cover, and the gravity field in order to estimate the change in total terrestrial water storage. Because other working groups cover atmosphere, ocean, land, and cryosphere, working group VIII/4 focuses mainly hydrological cycles over land in terms of water resources management, however, there are many cross-cutting issues and topics with other working groups particularly disaster management and agriculture.

Accomplishments

Website and membership:

The website (http://hydro.iis.u-tokyo.ac.jp/ISPRS/wg4/index.html) was prepared following the general format provided by ISPRS in order to disseminate the activities of ISPRS Commission VIII - Remote Sensing Applications and Policies Working Group VIII / 4 - Water. The web page was located under one of the web servers at Institute of Industrial Science, The University of Tokyo. IIS is one of the core centers of satellite remote sensing research in Japan, and the web server is one of the well-established servers dedicated to distribute information relevant for hydrological science since 1993.

Membership of the working group is currently limited, however, there are large potential members for the working group through various satellite missions such as GCOM-W (Global Change Observation Mission - Water), which the chair of WG VIII/4 is in charge of the science plan, and GPM (Global Precipitation Measurement) Mission, which the Regional Coordinator of WG VIII/4 chairs science program panel.

Conferences, symposia, workshops, and committees:

An international symposium "2nd Hydrology delivers Earth System Science to Society" was held 22nd through 25th in June in 2010 in Tokyo with a liaison among GEWEX/GLASS/Global Soil Wetness Project Phase 3, AsiaFlux/FLUXNET, and ISLSCP/LandFlux-EVAL projects.

Commission VIII Symposium in Kyoto, Japan: More than 30 participants with approximately 10 presentations were made in August, 2010.

News/Plans for Upcoming Activities

Several members of the working group will be organizing a meeting at the occasion of GCOM PI Workshop to be held in December 2011 in Tokyo, which the chair of WG VIII/4 chairs most of the GCOM-W related sessions. In addition to ISPRS, WG VIII/4 plans to work closely with IEEE, American Geophysical Union, and American Meteorological Society on hydrological sciences initiatives.

WG VIII/5: Energy and Solid Earth

Chair: Thomas Cudahy (Australia)
Co-chair: Yoshiki Ninomiya (Japan)
Co-chair: Carlos Roberto de Souza Filho (Brazil)
Secretary: Ian Lau (Australia)

Status of Science and Technology

Last year's annual report described some of the impediments to global-scale mapping and monitoring of the Earth's land surface composition (at high spatial resolution), including the paucity of suitably designed satellite-based sensors and the time taken between launch of such satellites and the public delivery of derived geoscience information products. It was suggested that significant value could be generated from the current global archive of multi-spectral satellite ASTER imagery (http://www.gds.aster.ersdac.or.jp/gds_www2002/index_e.html) by the generation of publicly web-accessible, land surface composition products. This adding new information, especially mineralogy that is not currently available from SPOT, Landsat TM and MODIS. To help achieve this opportunity, CSIRO in collaboration with Australian government geoscience agencies negotiated access to the complete ASTER archive of Australia (2000-2010) with ERSDAC and NASA in order to establish a case history demonstration of this opportunity for the Australian continent (http://c3dmm.csiro.au/ASTER%20Map%20of%20Australia%20EOI%20flyer.pdf). If successful, this could then be expanded to other parts of the globe, ideally under the umbrella of GEO and/or similar organisations. This would also help to establish much needed geoscience product standards that are traceable and with validated product accuracy/error assessments.

Beyond the limited geoscience information available from multispectral systems are a range of potential science applications opening up with the arrival of satellite hyperspectral (HS) imaging sensors in 2014, including the German EnMap, Japanese HISUI and Italian PRISMA HS systems. Others HS satellites are planned including those from the USA, China and India. Efforts to achieve

global coordination of these systems is underway (www.isiswg.org), including data standards, data capture scheduling and input into global science priorities.

The above HS satellites span the reflected visible to shortwave infrared (0.4 to 2.5 μm) wavelengths, which are useful for measuring dry vegetation, iron oxides and clays. Not captured by these wavelengths are the non-hydroxyl-bearing silicates, including the different varieties of silica (including quartz) which can instead be measured at thermal infrared wavelengths (7 to 12 μm). Planning for thermal infrared satellite sensors, especially those with sufficient spectral and radiometric resolution (~32 channels), is underway though it will be 8-12 years before these become an operational reality. Airborne hyperspectral thermal sensing systems are now becoming operational making it possible to build the application opportunities (SPECIM-OWL - http://www.specim.fi/media/aisa-datasheets/aisaowl-ver3-10.pdf, ITRES TASI-600 - http://www.itres.com/assets/pdf/TASI-600.pdf). Chief among the opportunities for these and the VNIR-SWIR wavelengths are:

- quantitative characterisation of surface soil properties, especially the mineralogical and non-green vegetation biomass components; and
- mineral, petroleum, geothermal and groundwater exploration and related environmental management.

Accomplishments

ISPRS VIII/5 accomplishments this year include:

- Contribution to the success of the ISPRS Commission VIII Symposia in Kyoto. Both the WG5 Chair, Dr Tom Cudahy, and the Co-Chair, Dr Yoshiki Ninomiya, actively participated in this Symposia and related meetings. An event flyer was also generated (http://www.commission8.isprs.org/wg5) and distributed by email;
- A ½ ISPRS workshop was held at the 5th Australasian Remote Sensing Conference in Alice Springs, 15th September on "Towards global, publicly-accessible geoscience composition maps from remote sensing data" (http://www.15.arspc.com/images/program_final_bs_10.9.10.pdf). The aim of this workshop was to begin the process of collectively developing a shared vision and strategy for better capturing continental-scale (global), publicly-accessible, geoscience information (especially geology and soils) from current and future field, airborne and satellite (multi- and hyper-) spectral data. The focus being on the Australian government geosurveys to help generate a successful test case for then extending to the global opportunity (through GEO?). There were 28 participants from Australia (including most of the government geosurveys), United States, Namibia, Canada, Saudi Arabia. The associated workshop report was completed and submitted (03/11/2010) for inclusion in ISPRS highlights. An event flyer was also generated (http://www.commission8.isprs.org/wg5) and distributed by email;
- WG5 member Cindy Ong (Australia) was selected as a Session Chair for "Soil information from remotely-sensed data" at the 34th ISRSE in Sydney April, 2011 (http://www.isrse34.org/);

- Planning is underway with the Geological Survey of Namibia and AEGOS (http://www.aegos-project.org/en/what-is-aegos.html) for a joint 2-day workshop with ISPRS on "Proximal and Remote Hyperspectral Sensing for Resources and the Environment". This workshop to be in conjunction with the Geosciences Information Conference (GIC) in Windhoek, Namibia from 30 (May to 4 June 2011 - http://www.mme.gov.na/gsn/gic26). Approvals have not yet been issued for this to be listed by ISPRS and AEGOS as an official event.
- The possibility for an ISPRS workshop at the next Brazilian Remote Sensing conference as part of the Geologic Remote Sensing session is being investigated;
- Continuing discussions with both the ISPRS and 34IGC (http://www.34igc.org) organising committee to see if the 22ISPRS Congress in Melbourne (25 August to 1 September 2012) and the 34IGC in Brisbane (5 to 10 August 2012), which are only two weeks apart and potentially attract the same people in the field of geo-sensing, can be run as joint events for the overlapping Themes and related workshops. Note that Tom Cudahy has also been selected to be the Theme Leader for the 34IGC's Geoscience information from proximal and remote sensing technologies Theme (32);
- Involvement in current GEO task DI-09-01b;
- Contributed to the ISPRS VII/3 workshop on "Quantitative Applications of Soil Spectroscopy", in Potsdam, April 2010, including Tom Cudahy Chairing a Session and providing a session oral and written reports;
- Planning for GEO task submissions for 2012-2015, including: (1) follow-on task to ONE-GEOLOGY (DA-09-03c); and (2) new soil tasks that involve land surface composition mapping.
- Working group web page (http://www.commission8.isprs.org/wg5) is kept up to date with new events, links, members.

WG VIII/6: Agriculture, Ecosystem and Biodiversity

Chair: Shibendu S. Ray, Chair (India)
Co-Chair: Yoshiaki Honda (Japan)
Co-Chair: Ross S. Lunetta (USA)
Secretary: N. R. Patel (India)
Webmaster: Chakrapani Patnaik (India)

Status of Science and Technology

Agriculture

Agriculture has the prime role to provide food security to the ever-increasing global population, especially those from developing and under-developed countries. With the limitations such as scarce water supply for irrigation, land degradation, loss of land due to urbanization & industrialization, reduction in biodiversity and impact of changing climate, there is now a significant stress on agriculture to provide more food from less area. In this context, remote sensing has a great role to play in understanding the process of agriculture towards better management of food security situation. The current trends of applications include development and utilization of RS driven process based models for crop production forecasting, cropping system characterization and modeling towards long-term sustainability, understanding energy and mass exchange in agro-ecosystems using ground observation network and satellite data, carbon and nitrogen cycling in agriculture, developing an ideal observation system for global monitoring of agriculture, impact assessment of climate change on agriculture and adaptation measures, etc.

Ecosystem and Biodiversity

Mangroves, Coral reefs and Wetlands are some of the very fragile ecosystems. These ecosystems are slowly getting degraded due to human interference and impact of climate change. Their diversity or richness is getting reduced day by day. In order to sustain the ecosystem diversity, it is essential to regularly monitor them and thereby protect them. Thus the research issues include characterization (functions and services) of different ecosystems using high-spatial and hyperspectral data, species identification, biodiversity assessment, monitoring and change modeling, understanding of ecosystem processes and biogeochemical cycles, land ecosystems-hydrology-atmospheric interaction, vegetation stress analysis, ecosystem responses to climate change and anthropogenic impacts and ecological foot printing analysis for sustainable development.

Accomplishments

Website and membership:

- The website of the working group was developed as per the ISPRS format. The URL of the website is www.commission8.isprs.org/wg6/. The website has all the web pages defined by ISPRS. The website is regularly updated and the various activities like delegate's registration, abstract and paper submission, logistics etc for the International Workshop (ICCA-2009) was also handled by this website.
- The working group comprises of 26 members from sixteen counties (Australia, Canada, China, France, India, Italy, Japan, Kazakhstan, Lao PDR, Malaysia, Mexico, Netherlands, Russia, Rwanda, Thailand and USA) of five continents. Most of them are scientists from research organizations, institutes and universities, including one from UN organization.

Workshop/ Symposium

Sessions in Commission VIII Symposium: Working Group 6 conducted 5 Technical sessions (Agricultural Assessment & Monitoring-1&2; Biodiversity & Land Use; Ecosystem Assessment and Ecosystem Modeling) and one interactive presentation session at the ISPRS Commission VIII Symposium on 'Networking the World with Remote Sensing' held during 9-12 August, 2010 at Kyoto, Japan. A total of 24 papers were presented in technical sessions and 4 papers were presented in interactive session. The papers were critically evaluated for giving awards to young authors.The co-chair of the working group, Prof. Honda, actively contributed in organizing the symposium.

Joint Session in ISRS Symposium*:* In the National Symposium of the Indian Society of Remote Sensing held at Lonavala, India during 1-3 December, 2010 a joint session on "India and ISPRS' was conducted by ISPRS WG IV/1, WG IV/3, WG VI/4, WG VIII/1 and WG VIII/6, This session was organized to commemorate the ISPRS Centenary being celebrated in 2010. The session highlighted India's role in ISPRS activities: Past, Present and Future.

Planned Events

The planned activities include:

- A 2-day workshop during December 2011 on "Earth Observation for Terrestrial Ecosystem" at Ahmedabad, India, jointly with Working VIII/8.
- 4 sessions have been planned in the ISPRS congress, 2012 at Melbourne, including one joint session with Working Group VIII/8.All the background activities like, call for abstracts, selection of abstracts and planning technical sessions will be carried out during 2011.

Publications

- A special issue of the Journal of the Indian Society of Remote Sensing on "Earth Observation for Climate Change Studies" is being brought out during June 2011. This would incorporate 16 selected papers from the ICCA-2009 Workshop Proceedings.
- A printed version and softcopy of the Proceedings of the Planned International Workshop to be conducted during December 2011.

WG VIII/8: Land

Chair: Alfredo Huete (USA)
Co-Chair: Carsten Juergens (Germany)
Co-Chair: Ryutarou Tateishi (Japan)
Secretary: Dennis Dye (USA)

In this year, Commission VIII Working Group 8 on "Land" has a few accomplishments. This working group is focused on numerous application areas of remote sensing and earth observation in land degradation, urban areas, land cover and land cover change, and ecohydrology of arid lands. The

breadth of this group is both a strength and a weakness. In some respects, the 'Land' Working Group attempts to envelop several, and apparently disparate, remote sensing science and application communities. For example, there is a very strong and well-organized Land Cover community; there is an emerging Urban Systems community; and there remains a fairly well-organized Land Degradation community, which "Land" has traditionally represented. In other respects, a broad spectrum of interests adds difficulty in building a solid single-focus community.
The team established a website and is actively inviting colleagues to become members of WG 8 and to propose and participate in events, colloquia, and meetings that concern the topic of remote sensing of "Land".

Accomplishments

Website and membership

Website and membership: membership is at 20 members but recent activity for this year has not yet been summarized yet.

Workshop/ Symposium

We drew the largest #sessions at Kyoto meetings. 7 sessions on the following: Land Cover (2 sessions); Land-climate; Land Validation; Multitemporal Monitoring; Urban Remote Sensing; Vegetation and Soils

We are co-sponsoring 2 sessions at Sydney (ISRSE).

- Co-organizing one session on Vegetation dynamics and phenology for the 34th ISRSE, Sydney, April 2011.
- Co-organizing two oral sessions on Ground observation networks for the 34th ISRSE, Sydney, April 2011.

Planned Events

We have requested 4 sessions for Melbourne ISPRS 2012.

We are considering a joint WG (VIII/6 and VIII/8) International workshop with Shibenda Ray (WG8/6) on Agric & Ecosystems, which is planned for Dec. of 2011 on "Earth Observation for Terrestrial Ecosystem", Ahmedabad, India

WG VIII/9: Ocean

Chair: Tim Liu (USA)
Co-Chair: Joji Ishizaka (Japan)
Co-Chair: Samantha Lavender (United Kingdom)

Status of Science and Technology

The main concerns of Working Group 9, in concert with international organizations, e.g., Global Climate Observing System (GCOS), Global Ocean Observing System (GOOS), World Climate Research Program (WCRP), Joint

WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM), is the advocacy and implementation for continuous and consistent observations of high quality ocean-related parameters from space for both operational and scientific applications.

NASA has no Earth observing mission launch in 2010. The launch of Aquarius to measure ocean surface salinity has slipped from April to June 2011. With the anticipated launch of GCOM, SMAP, and GPM in the next few years, they will advance the study of global water cycle. The Ice-bridge project, with aircraft flights in co-ordination with Icesat is enhancing the understanding of the cryosphere. The failure of OCO is a setback to the study of carbon cycle; but we saw a fast start of OCO-2, which is scheduled to be launched in 2013. In 2010, data from European Missions, Cryosat-2, SMOS, and GOCE became available. Some preliminary data from the India Mission Oceansat-2 are being examined.

Accomplishments

Working Group 9 sponsored a special session in Pan-Oceanic Remote Sensing Conference in Keelung Taiwan, with strong international participation. Our co-chair Samantha Lavender participated in the GEO Inland and Near-Coastal Waters Working Group – inputs to a review meeting held in advance of the ESA CoastColour Workshop & summary report.

We have organized special session "Ocean-atmosphere coupling from mesoscale to basin-scale with application of satellite observations" in American Geophysical Union's Ocean Science Meeting in Portland and in Fall Meeting in San Francisco

We have participated in many other conferences and satellite mission science team meetings in 2010, including:

NASA Sea Surface Temperature Science Team Meeting in Seattle, November
NASA Precipitation Measuring Mission Science Team Meeting, in Seattle, November
Global Change in East Asian Pacific Conference, Hong Kong, October
International Geoscience and Remote Sensing Conference in Honolulu, July
NASA Sea Surface Salinity Science Team Meeting in Seattle, July
Global High Resolution Sea Surface Temperature Meeting in Lima, Peru, June
Interagency Atlantic Meridional Overturning Current Science Team Meeting in Miami, June
PACON International conference in Hilo, June
International Ocean Vector Wind Science Team Meeting, Barcelona, May
Oceans from Space, Venice, April
High Latitude Air-sea Interaction Workshop, Boulder, March
GCOM Meeting in Tokyo, January 2010
American Meteorological Meeting, in Atlanta, January

Upcoming Working Group Activities

Climate Change and Ocean Carbon-A joint International Workshop of OCCOS and CHOICE-C, in Xiamen China, April, 2011

Eumetsat Scatterometer Workshop in Darmstadt, Germany, April 2011
34th International Symposium on Remote Sensing Environment, Australia, April 2011 (Participation at session linked to GEO Inland and Near-Coastal Waters Working Group)
International Geoscience and Remote Sensing Symposium, Special Invited Session on Wind Stress, in Sendai, Japan, August 2011

WG VIII/10:Cryosphere

Chair: Josefino Comiso (USA)
Co-Chair: Beata Csatho (USA)
Secretary: Kohei Cho (Japan)

Status of Science and Technology

The cryosphere has been one of the key areas of climate change studies because it is expected to provide early signals of global warming as may be attributed to the increasing percentage of greenhouse gases in the atmosphere. The main reason is "ice-albedo feedback" which is associated with the large contrast of the reflectivity of the snow and ice covered surfaces compared to other surfaces that would amplify global signals. Modeling studies have postulated that the amplification can be as high as 3 to 5 times in the Arctic region. Such amplification may already be occurring since the results of analysis of thermal-infrared data have indicated that the surface temperature of snow and ice covered areas in the Northern Hemisphere has been increasing at 3- times the rate of increase of global temperatures in the last 28 years. Concurrently, the area covered by snow, sea ice, and glaciers have been declining at the rate of about 2 to 4% per decade in the Northern Hemisphere. Moreover, the area that gets melted in the Greenland ice sheet has been increasing and mass loss of its outlet glaciers through dynamic processes is accelerating. The most remarkable change, however, is the rapid decline of the perennial sea ice cover. The area covered by perennial ice, which consists mainly of multiyear ice floes that survives the summer, has been observed to be declining at the rate of 12% per decade and reached a dramatically low value in 2007 when the area was almost 40% lower than the average over the last three decades. Remote sensing methods play a critical role in monitoring ongoing changes and in developing better ice sheet models to predict future sea level rise.

In the Southern Hemisphere, observations from satellite data show practically no trend or an opposite trend. The sea ice cover of the Southern Ocean has been shown to be increasing at the rate of about 1% per decade and some cooling, especially at the Antarctic plateau has been observed by satellite microwave and thermal infrared sensors, respectively. Meanwhile, record size icebergs have come out of Ross Ice Shelf, the Ronne Ice Shelf, the Larson Ice Shelf, Pine Island and other shelf regions. New insights are needed including the possible impact of the Ozone Hole on the climate of the region. The continuing role of remote sensing in the study of this phenomenon is undoubtedly critical. The impact of changes in the cryosphere is expected to be profound since it is an important component of the climate system and has been regarded as the heat sink and a prime source of bottom water that is part of the global thermohaline circulation. The sea level equivalent of the Greenland Ice Sheet and Antarctica is about 70 to 80 meters while the glaciers have been the source of drinking water of millions of people located in the vicinity.

Among various satellite remote sensing sensors, passive microwave sensors are arguably the most useful for

cryospheric sciences studies. Data from these sensors have been used extensively for large scale characterization of the sea ice and snow cover including persistence and melt patterns. The data are useful during day/night and almost all weather conditions and for monitoring the distribution of snow and ice at relatively high temporal resolution on global basis. A long time series of the data is now available, starting with the ESMR (1973 to 1976), SMMR (1978 TO 1987), SSM/I (1987 to the present) and AMSR-E (2002) to the present. To ensure continuity of the time series which has been shown to be useful for climate change studies, JAXA is planning to launch the advanced passive microwave sensor AMSR-2, which is similar to AMSR-E) on board GCOM-W1 in 2011. Some members of the working group are involved in developing sea ice algorithms for extracting geophysical parameters from GCOM-W1 data. The relatively long time series for sea ice extent and area has been used for sea ice cover and trend studies. However, we basically do not have similar capabilities for assessing the changes in the thickness. Ice thickness in the Arctic has been determined primarily through the use of submarine upward-looking sonars and although thousands of km of data exist, the transects have been basically random in time and space. Since sea ice is very dynamic, some biases in these measurements are also possible. The situation has been improved through the use of ICESat laser ranging data which measures the freeboard of the ice which can be used to estimate the thickness. The system, however, have had some instrumental problems and measurements could only be made only twice a year, one usually in the month of March and the other in the month of November. Furthermore, the system has been slowly deteriorating and provided the last useful data in 2009. A replacement called ICESat-2 has been approved but date of launch is expected to be after 2015. Meantime, the series is being continued with the launch of the ESA/CryoSat-2 which carries a delay/Doppler radar altimeter which has been claimed to provide more accurate measurements of the ice freeboard than the ICESat laser altimeter. Both CryoSat and ICESat sensors actually complement each other since one provides top of the snow topography and freeboard information while the other provide snow/ice interface freeboard information. All these instruments have good potential applications in other regions of the cryosphere as well. Satellite gravimetry and laser altimetry are the main missions that currently monitor interannual, annual and decadal mass balance of polar ice sheets. Gravity Recovery and Climate Experiment (GRACE) measurements indicate accelerating ice loss from both ice sheets. Repeat coverages using a combination of satellite and airborne laser and radar altimetry, including InSAR and in situ GPS observations has been used for detecting changes in ice sheet surface elevations and ice sheet velocities, needed for investigating the dynamic behavior of outlet glaciers that might trigger rapid ice loss with a warming climate. The ICESat-2 laser system will employ multiple beams of very high pulse repetition frequency photon counting lasers arrayed across track, thus providing unprecedented resolution for topographic mapping and change detection of the cryosphere. Several working group members are participating in the definition of the ICESat-2 mission science goals and design parameters as well is in assessing the potential of the single photon counting laser systems for ice sheet altimetry.

Results from studies of the polar regions using satellite data have been used to define the key objectives of the International Polar Year (IPY) program from 2007 to 2008. The IPY program consisted of detailed in situ observations of the polar regions. Although analyses of the data are still in progress, preliminary results already provide new insights into the changes that have been observed from satellite sensor data.

Accomplishments

Website and membership:

The website was established following the general format provided by ISPRS. We chose to use a content management system rather than the standard html template so that each of the officers could update the site easily on their own without relying on a web master. This approach has proven to be effective so far. The site includes all of the elements required by ISPRS, plus several additional ones that are relevant specifically to the topics of the working group. The site is maintained at Tokai University and links to ISPRS and other pertinent web sites. Complementary information about the state of the cryosphere is also provided on a weekly manner at a NASA website (http://neptune.gsfc.nasa.gov). There are currently only a few members but the team will strive to expand the memberships to get good representation of countries that are directly affected by changes in the cryosphere.

Conferences, symposia, workshops, and committees:

Commission VIII Symposium in Kyoto, Japan: Several papers were presented at the special session on Cryospheric Sciences during the symposium. Officers also met separately to discuss strategies on how to best serve the community and fulfill the objectives of the commission.

News/Plans for Upcoming Activities

Several members of the working group were heavily involved in the GCOM PI Workshop meeting held in 6-9 December 2010 in Tokyo. During the same period, the chairman of the working group also gave an invited presentation at the 2nd International Symposium on Arctic Research (ISAR-2) held at approximately the same period, also in Tokyo. In October 2010, he was also a plenary speaker at the workshop on "Rapid Change in Arctic Sea Ice," held in Fairbanks, Alaska. In addition to ISPRS, WG VIII/10 plans to work closely with IEEE, Remote Sensing Society of Japan(RSSJ), International Glaciological Society and American Geophysical Union on cryospheric sciences initiatives, including workshops and opportunities as they occur.

The WG Chair has recently been selected as a coordinating lead author of the chapter on "Cryosphere Observations," of the IPCC/WG1 AR5 report which is expected to be completed in 2013. Such activity is very relevant to the objectives of ISPRS working group 10.

The WG co-chair was selected to be a science team member of NASA"s IceBridge mission. IceBridge, a six-year NASA mission, is the largest airborne survey of Earth's polar ice ever flown. It will yield an unprecedented three-dimensional view of Arctic and Antarctic ice sheets, ice shelves and sea ice. These flights will provide a yearly, multi-instrument look at the behavior of the rapidly changing features of the Greenland and Antarctic ice. The co-chair was of a co-convener of a session, entitled Evolution and Stability of the Greenland Ice Sheet at the American Geophysical Union Fall meeting (San Francisco, December, 2010).