

# ISPRS Technical Commission VIII Annual Report 2009

**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. 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.

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

Year 2009 was the first step of the new Commission VIII for searching the ways to solve the various subjects of the commission. Main activities of the Commission have been devoted to the coming midterm Symposium. First call for papers and the first countdown newsletter were sent to the relevant people. Also, co-sponsorship of the midterm symposium is now under discussion with GEO and JAXA. The details of the accomplishments of each WG are described in each WG report as follows.

### 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.

### **Accomplishments**

In the last year the working group was (and will be) particularly active in different events as follows.

- Third United Nations International UN-SPIDER Bonn Workshop  
“From Concepts to Application”, October 21-23, 2009, Bonn, Germany
- 6th UN-wide Meeting on the Use of Space Technologies for Emergency Response and Humanitarian Assistance  
“From Concepts to Application”, second half of 2009, New York, USA
- UN-SPIDER Regional Workshop  
“Promoting the Use of Space-based Solutions for Disaster Management and Emergency Response in Latin America”, second half of 2009, Ecuador
- UN-SPIDER/GEOSS Spring School  
“II Escuela de Primavera sobre Soluciones Espaciales para el Manejo de Desastres Naturales y Respuestas de Emergencias”, October 2009, Argentina
- UN-SPIDER Regional Workshop  
“Building Upon Regional Space-based Solutions for Disaster Management and Emergency Response for Africa”, December 2009, Addis Ababa, Ethiopia

### Summary Report of the Workshop

**Title of the Workshop:** Joint International Workshop of ISPRS WG IV/1, WG VIII/1 and WG IV/3 on Geospatial Data cyber Infrastructure and Real-time Services with special emphasis on Disaster Management

**Period:** 25-27 November, 2009

**Venue:** Indian National Centre for Ocean Information Services (INCOIS), Hyderabad, India.

#### **Themes of the Workshop:**

- Geospatial Data Applications for Disaster Management; Legal Issues & Challenges
- Predictive Modeling and Analysis of Geospatial Data; DSS & SOP for Early Warning
- Geospatial Data Cyber Infrastructure; High Resolution Mapping & Applications
- Geospatial Data Management and Web-based Geospatial Services
- Vulnerability and Hazard Mapping for Disasters

**Participants:** 88 participants from 4 countries were represented in the Workshop.

#### **Summary:**

This ISPRS Workshop was a highly successful blending of the focus areas of the three primary organizers of the event and provided delegates an in-depth look at Cyber-infrastructure (CI – particularly geospatial CI), High-Resolution Mapping, and Hazard Warning & Disaster Management. The synergy of these topical areas pointed out the preeminent need for, and use of, spatial data as a driver for an information culture. The workshop was organized by two working groups of Technical Commission (TC) IV, Geodatabases and Digital Mapping, and one working group of TC VIII, Remote Sensing Applications and Policies. The working groups of TC IV were Geospatial Data Infrastructure (WG IV/1) and Mapping from High-Resolution Data (WG IV/3). The TC VIII working group was Disaster Management (WG VIII/1). The workshop was hosted by the Indian National Centre for Ocean

Information Services (INCOIS) and ISRS-Hyderabad Chapter.

There were 88 participants from 4 countries (India, Turkey, US, and Ghana) represented at the workshop. There were 10 invited or lead talks that were delivered by eminent scientists and a total of 54 technical papers were received, although only 32 of them were able to be orally presented during the three days. The presentations and deliberations showed the importance of spatial data, particularly their reliance on enabling Web technologies, and real-time or near-real-time telecommunications to make these data especially useful to society.

Dr. Shailesh Nayak, Secretary of Ministry of Earth Sciences of India lighted the lamp in the Opening Ceremony and delivered the keynote address. Mr. M. Shashidhar Reddy, Member of the Disaster Management Authority of India inaugurated the workshop. Dr. S.S.C. Shenoi, Director of INCOIS and Mr. D.S. Jain, Chairman of the Indian Society of Remote Sensing – Hyderabad Chapter delivered the Opening Remarks. In addition, during this session the India Tsunami Early Warning System (EWS) Website was inaugurated.

Geospatial data applications were discussed with special emphasis on disaster management in six technical sessions. Each technical session was highlighted by a lead talk that set the stage for that session. A few examples of the many excellent technical presentations include high resolution satellite data for drought monitoring in Iran, coastal flood hazard zonation map for Eastern India, and forest fire mapping in western parts of India. The presenters represented INCOIS, India's National Remote Sensing Centre, a broad array of academic institutions, and private industry (particularly from the Open Source community within industry). Different web-based services which provide geospatial data and information were presented. These included, for example, web-based Argo (a global array of 3,000 free-drifting profiling floats) data services, web-based interface for in-situ ocean data and information, and interactive web services for Tsunami EWS.

The workshop papers will be further reviewed and selected papers will be published as proceedings in ISPRS format. The presentations of the speakers have been uploaded at [http://www.incois.gov.in/Incois/isprs\\_presentations.jsp](http://www.incois.gov.in/Incois/isprs_presentations.jsp).

### **News/Plans for Upcoming Activities**

#### **Conference**

**Title of the Conference:** GI4DM (Geographic Information for Disaster Management). Jointly organized by ISPRS and ASITA (Italian Federation of Geomatics Scientific Associations), with the support of UN-WFP, UNOOSA, CIPA, the National Research Council, Politecnico di Torino ([WWW.GI4DM-2010.ORG](http://WWW.GI4DM-2010.ORG)).

**Period:** 2-4 February, 2010

**Venue:** Centro Congressi “Torino Incontra”, Torino, Italy.

#### **Themes of the Conference:**

The indicative topics of interest will at least cover the fields of enterprise crisis management, public security and crisis management in city development, geo-information systems for disaster management, industrial crisis management, incident management systems, etc. The following themes are for reference:

- User Requirements
- Monitoring and processing
  - Early Warning systems

- Early Impact systems
- Spatial Data Infrastructures

**Summary:**

Anticipating the obvious and growing importance of geoinformation for disaster and risk management a separate group of researchers, professionals and vendors have begun a worldwide discussion on collection, management, analysis, sharing and visualization of geo-information. The Gi4DM is coordinated by the ISPRS Ad hoc Committee on Risk and Disaster Management, Working Group 1 (Disaster) of the ISPRS Commission VIII (Remote Sensing and Policies) and Working Group 8 (3D Spatial Data Integration for Disaster Management and Environmental Monitoring) of the ISPRS Commission IV (Geodatabases and Digital Mapping).

Workshop

**Title of the Workshop:** ISPRS Joint Workshop, “Core Spatial Databases - Updating, Maintenance and Services - from Theory to Practice”

**Period:** March 15-17, 2010

**Venue:** Haifa, Israel

**WG VIII/2 : Health**

**Chairs:** Amelia Budge (USA)

**Co-Chairs:** Richard Kiang (USA)

**Secretary:** Stanley Morain (USA)

During the past year, Commission VIII Working Group 2 on Health has been very active on several fronts. As a new working group in this Commission, we are focused on applications of remote sensing and other Earth observing technologies to understand how the natural environment contributes to environmental and infectious/zoonotic diseases. The first order of business was to establish leadership for the working group. Officers are: Amelia Budge, Chair (University of New Mexico, USA); Richard Kiang, Co-chair (NASA, USA), and Stanley Morain, Secretary (University of New Mexico, USA). The team went to work immediately establishing its website and inviting colleagues to join the group, soon followed by active participation in several events and projects.

**Status of Science and Technology**

ICSU SHWB: The International Council on Science (ICSU), Science for Health and Wellbeing (SHWB) provided funds to ISPRS to collaborate with the other GeoUnions in a project called *Mapping GeoUnions to the ICSU Framework for Sustainable Health and Wellbeing: Focus on Sub-Saharan African Cities*. Each of the GeoUnions has a representative to the Joint Science Program Team (JSPT) in this project; ISPRS is represented by WG VIII/2. The JSPT met with ICSU-ROA and other African experts via a workshop in Pretoria, South Africa in January 2009 to initiate the project. The JSPT conducted a survey to identify currently available Earth science models and modeling systems that could be adapted for decision makers in sub-Saharan urban environments. Colleagues in Africa contributed additional information on health issues for these African cities. A report was delivered to ICSU in September 2009.

ICSU-ROA Projects: The ICSU Regional Office for Africa (ROA) issued an invitation to organizations,

institutes, and companies to participate in the implementation of projects developed from its four science plans. One set of projects addressed Health and Human Wellbeing. This invitation was circulated to our working group members; several working group members responded with interest in two of the health projects (WB 01 and WB 02). This information was forwarded to Jide Kufoniyi, the ISPRS Regional Representative for Africa, for further consideration by ISPRS Council. Most recently, ICSU-ROA has initiated a dialog with our working group members who are interested in the projects.

## **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 the University of New Mexico and links to ISPRS and other pertinent web sites. The URL is: <http://isprs-wg8-2.unm.edu>.

There are 47 members in the working group from nine countries (Afghanistan, Brazil, Germany, India, Indonesia, Israel, Peru, Switzerland, and USA). Most are scientists and medical specialists from governments and academic sectors, including medical facilities at universities and government hospitals. Officers from two foundations and one United Nations organization also have joined the working group.

### Conferences, symposia, workshops, and committees

ISRSE: Two invited technical sessions were organized by the working group for the International Symposium on Remote Sensing of Environment (ISRSE) that was held in Stresa, Italy in May 2009. The first session focused on *Regional Capabilities for Forecasting and Monitoring Air Quality for Human Health and Well-being*; the second addressed *Science for Health and Well-being* which reported on early outcomes of the ICSU-SHWB project (described below).

GEOSS: Several working group members served on the planning committees and participated in the GEOSS workshop on *Health and the Environment*, held 7-9 July 2009 in Geneva, Switzerland and *Earth Observations for Health: A Workshop of the GEO Health and the Environment Community of Practice* was held on 12-13, November 2009 in Washington, DC USA.

GEOSS User Interface Committee: Members of the working group continue to participate in and contribute to the GEOSS User Interface Committee. Most recent was the UIC meeting in Washington, DC USA on 15-16, November 2009.

Commission VIII Symposium: Call for abstracts has been sent to working group members and attendees of the GEOSS workshops on health.

### Publications, books, and articles

Risk and Disaster Management Booklet: Working group 2 collaborated with WGVIII/1 by contributing a short article 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 will be a product of the Joint Board of Geospatial Information Societies and UNOOSA/UN-SPIDER.

ISPRS Book Series: Progress is being made on the *Environmental Tracking for Public Health Surveillance* book that will be part of the ISPRS book series. A contract has been signed with Taylor

and Francis, with an expected publication date in July 2011. Working group members and others have been invited to organize and/or contribute chapters and sections to the book. Currently, the book outline contains four parts and a total of 14 chapters. Authors/editors have been confirmed for 12 of these chapters.

#### **News/Plans for Upcoming Activities**

- Working Group 2 plans to work closely with IEEE on health initiatives, including workshops and opportunities as they occur.
- The working group will be organizing technical presentations and posters for the Commission VIII Symposium in Kyoto (9-12 August 2010).
- Plans are under discussion for a workshop on health tentatively to be held in Santa Fe, NM USA in fall 2011. A program plan will be submitted to ISPRS Council for approval in early 2010.

### **WG VIII/3 - Atmosphere, Climate and Weather**

#### **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)

The Commission VIII Working Group 4 on “Water” aims at informing and activating people interested in utilizing remote sensing for Water. 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 organisations and Geomatics-related firms.

#### **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:

Commission VIII Symposium in Kyoto, Japan: Call for abstracts has been sent to working group members, and distributed through relevant mailing lists and various workshops/meetings the core member of WG VIII/4 participate.

**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 January 2010 in Tokyo, which the chair of WG VIII/4 chairs most of the GCOM-W related sessions. An international symposium “2<sup>nd</sup> Hydrology delivers Earth System Science to Society” is under preparation as a liaison among GEWEX/GLASS/Global Soil Wetness Project Phase 3, AsiaFlux/FLUXNET, and ISLSCP/LandFlux-EVAL projects for 22<sup>nd</sup> through 25<sup>th</sup> in June in 2010 in Tokyo.

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**

Two impediments currently challenging global-scale mapping and monitoring of the composition of the non-vegetative component of the Earth's land surface (e.g. soils and rocks) at high spatial resolution (~30 m pixel) are 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. The only current satellite imaging systems are the operational Japanese multispectral (14 channel) ASTER (<http://asterweb.jpl.nasa.gov>), launched in December 1999, and the US science hyperspectral technology demonstrator called Hyperion (<http://eo1.gsfc.nasa.gov/Technology/Hyperion.html>), launched in 2000. Ten years after the launch of these sensors, there remain no satellite-based replacements though a number of hyperspectral imaging sensors are in development/planning ([www.isiswg.org](http://www.isiswg.org)) with a number

scheduled for launch in 2013/2014. To date, local/regional requirements for geoscience remote mapping have been met in part through commercial airborne systems (e.g. [www.hyvista.com](http://www.hyvista.com); [www.itres.com/index.php](http://www.itres.com/index.php); [www.specim.fi](http://www.specim.fi); [www.neo.no/hyspex](http://www.neo.no/hyspex)), though typically at greater cost to users and with associated problems of variable geoscience products due largely to the lack of agreed standards.

This lack of geoscience product standards also extends to the existing ASTER data even though the ASTER Global Mapping archive now spans three complete mosaics of the Earth's land surface. That is, the only current publicly available ASTER multispectral data products are the Level 1 (radiance at sensor) and Level 2 (reflectance, emissivity, temperature) products. These are unsuitable for most geoscience users unfamiliar with how to use image processing systems to extract the higher level compositional information. Note that an ASTER global digital elevation model (GDEM) was publicly released this year ([www.ersdac.or.jp/GDEM/E/index.html](http://www.ersdac.or.jp/GDEM/E/index.html)). This GDEM is at same/better spatial resolution (~30 m pixel) and covers a larger land surface area compared to Shuttle RADAR Topography Mission DEM data set ([www2.jpl.nasa.gov/srtm](http://www2.jpl.nasa.gov/srtm)).

The lost opportunities for the global community not having public access to standard, high spatial resolution, global surface compositional information, include:

Hydrocarbon and mineral resource exploration, especially in Africa, Asia and south America where successful developments could assist local economies (see reference below);

- Soil mapping and monitoring, especially recognizing more favorable conditions for food production as well as managing any emerging soil degradation issues ([www.globalsoilmap.net](http://www.globalsoilmap.net)).
- Water catchment management, especially recognizing impermeable versus porous soil cover for managing surface versus subs-surface water flow ([www.earthobservations.org/geoss\\_wa\\_wpa.shtml](http://www.earthobservations.org/geoss_wa_wpa.shtml)).

#### Key reference

Remote Sensing and Spectral Geology (2009), In Reviews in Economic Geology, Editors: Richard Bedell, Alvaro Crósta and Erick Grunsky. Volume 16, 266 pages ([www.segweb.org](http://www.segweb.org)).

#### **Accomplishments**

ISPRS VIII/5 has been actively working towards addressing these fundamental issues, firstly through discussions/proposals with:

- GEOSS ONEGEOLOGY Task to try and establish a global ASTER Geoscience Map;
- ASTER Science Team for access to the ASTER Global Mapping archive to begin building a global ASTER geoscience Map with the proposed first demonstration being a map of the Australia;
- Australian geosurveys to support the establishment of a publicly accessible ASTER Geoscience Map of Australia;
- Other international geosurveys (e.g. Japan, China, India, Namibia) regards their support for the development of global geoscience information products, such as that derived from ASTER data; and
- International hyperspectral satellite development teams to consider using their sensors to build compositionally-detailed global geoscience maps of the Earth's land surface, especially for the mapping and monitoring of surface soil composition/condition.

From these efforts have emerged a number of related activities, including:

- Memorandums of Understanding signed (involving CSIRO);
- A public demonstration ASTER geoscience information project has been established in Australia; and
- A joint ISPRS/C3DMM forum/workshop on “Towards global, publicly-accessible geoscience composition maps from remote sensing data” has been organized for the 15 Australasian Remote Sensing and Photogrammetry Conference, Alice Springs, 13-17 Sept, 2010 (<http://www.15.arspc.com>). This forum aims has a number of themes including:
  - + Publicly accessible remote sensing geoscience products – the roles/aspirations of government geosurveys.
  - + Creating geoscience value from remote sensing data - what are some of the key geoscience information products required by end-users?
  - + Surface (2D) to 3D (depth) to 4D (time) – integrating data/products.
  - + Transferable, traceable, JPEG or measured data - what is achievable?
  - + Information delivery systems – seamless and interoperable?
  - + Can we better design geoscience information needs into the specifications of future instruments?
  - + Cross agency/country co-ordination – is it of value and if so what are the necessary steps to capturing the shared vision - can GEOSS and other science/technology assist in this process.
  - + The collective challenge of maximizing information uptake/benefit by end users.

#### **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

The major issue for agriculture is providing food security to ever increasing population of the world. The problem of food security has been made more complex with the impending impact of climate change on agricultural productivity. Though earth observation data has been regularly used for agricultural monitoring, many research issues are still to be addressed. Development of better crop models using RS & GIS, physiological process based models for crop condition assessment, site specific agricultural management, understating the sustainability of cropping systems, nutrient cycling in agro-ecosystems, carbon auditing from agricultural areas, impact assessment of climate change on agriculture are a few of the research topics which need to be taken up.

##### 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 by 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 of different ecosystems using high-spatial and hyperspectral data, species identification, biodiversity monitoring and change modeling, vegetation stress analysis, understanding 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 website is [www.commission8.isprs.org/wg6/](http://www.commission8.isprs.org/wg6/). The website has all the web pages defined by ISPRS. The website is regularly updated and the International Workshop was also managed by this website. There are 23 members of the working group from fourteen countries (Australia, Canada, China, France, India, Italy, Japan, Kazakhstan, Lao PDR, Malaysia, Netherlands, Russia, Thailand and USA). Most of them are scientists from research organizations, institutes and universities, including one from UN organization.

#### Workshop/ Symposium

Working Group Workshop: An International Workshop on “IMPACT OF CLIMATE CHANGE ON AGRICULTURE” was organized at Space Applications Centre (ISRO), Ahmedabad during December 17-18, 2009. The workshop was jointly organized by the ISPRS (International Society of Photogrammetry and Remote Sensing) Working Group VIII/6 on “Agriculture, Ecosystem & Biodiversity”, GEO (Group on Earth Observations) Task AG-07-03 on “Global Agricultural Monitoring System of Systems” and Indian Society of Remote Sensing. The workshop was hosted by SAC and ISRS-Ahmedabad Chapter. 127 delegates, including 11 international delegates from 9 countries, participated in the workshop. The Indian participants were from 45 organizations. In the technical programme of the workshop there were two invited lecture sessions, 7 technical sessions and 3 short presentation sessions during the two day period. The seven technical sessions on themes of Earth Observation for Climate Change Studies, Climate Change Impact on Agriculture, Agricultural Monitoring, Long Term Changes, Climate Variability and Agriculture and Mitigation and Adaptation Measures had 36 presentations, while the three short presentation sessions had 28 presentations.

Commission VIII Symposium: Call for abstracts has been sent to working group members and attendees of the ISPRS WG VIII/6 International Workshop.

#### Publications

- All accepted papers in the above workshops have been published as the ISPRS Archives both in form of Hard and Softcopy. This ISPRS Archive Volume XXXVIII Part 8/W3 on “Impact of Climate Change on Agriculture”, which was released during the Ahmedabad workshop, includes 76 technical papers.
- A special issue of the Indian Society of Remote Sensing Journal on "Earth Observation for Climate Change Studies " is proposed to be brought out during 2010 taking selected papers from the workshop Proceedings
- A special issue in ISPRS Journal of Photogrammetry and Remote Sensing on "Monitoring Agriculture: New Developments " has been planned.

### **News/Plans for Upcoming Activities**

The major emphasis of this working group will be to coordinate with concerned GEO tasks to have joint activities.

Some of the planned activities include:

- A 2-day workshop during September 2011 on "Carbon & Nutrient Cycle in Vegetation" at Dehradun, India.
- A joint workshop with GEO Task Ag-07-03 during 2011 on "Towards an Operational Crop Yield Forecasting System"
- Conducting special sessions/pre-symposium tutorial in ISPRS TC VIII symposium (Kyoto, August, 2010) and ISPRS Congress (Melbourne, 2012).

### **WG VIII/7:Forestry**

**Chair:** Haruo Sawada (Japan)

**Co-Chair:** Yousif Hussing (The Netherlands)

**Co-Chair:** Ronald McRoberts (USA)

**Secretary:** Yasumasa Hirata (Japan)

During the past year, Commission VIII Working Group 7 on Forestry has been active on several fronts. As a new working group in this Commission, we are focused on applications of remote sensing and other Earth observing technologies to understand how the natural ecosystems contribute to global environment from the point of forestry. The first order of business was to establish leadership for the working group. Officers are: Haruo Sawada, Chair (University of Tokyo, Japan), Yousif Hussing, Co-chair (ITC, Netherland), Ronald McRoberts, Co-chair (US Forest Service, USA), and Yasumasa Hirata, Secretary (FFPRI, Japan). The team went to work establishing its website and inviting colleagues to join the group, soon followed by active participation in several events and projects.

### **Status of Science and Technology**

In the field of remote sensing for forestry there are a set of important research challenges and trends. First of all, operational methodologies are more and more designated to carry out a study to understand what information, expertise, equipment and infrastructure are required to effectively monitor the world's forests, especially in tropical countries. For automatic processes it is of vital importance to evaluate the quality of the results. Methods for quality evaluation but also for integration of quality issues into the whole generalization process have to be studied.

Operational methodologies and tools are required for estimating emissions from deforestation with an acceptable level of certainty. Satellite remote sensing is an important tool for monitoring changes in forest cover, and it contributes to provide information for reporting changes in forest carbon stocks. A consensus perspective on methodologies is required from the global community of earth observation and carbon experts relating to quantifying carbon impacts of implementation activities to reduce emissions from deforestation and degradation in developing countries (REDD).

In order to develop operational methodologies for forest management, not only the forest area and carbon stocks have to be considered but also the ecosystem services which forests play important roles. Important issues here are the adequate semantic descriptions of the ecosystem services to solve a complex task in forestry. To this end various methods for data interpretation and integration, including ground observation data, are needed.

#### **News/Plans for Upcoming Activities**

- The working group will be organizing technical presentations and posters for the Commission VIII Symposium in Kyoto (9-12 August 2010).
- Working Group 7 plans to work closely with GOFC-GOLD on forestry initiatives, including workshops and opportunities as they occur.
- Plans are under discussion for IUFRO to be held in Seoul, Korea in August 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 Officers are: Alfredo Huete, Chair (University of Arizona, USA); Carsten Juergens, co-Chair (Urban Systems, Ruhr Univ. Germany); Ryutarou Tateishi, co-Chair (Land Cover, Chiba University, Japan); and Dennis Dye, Secretary (U.S. Geological Survey, USA). 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

The website was established following the general format provided by ISPRS. The membership was started in November 2009 and has resulted in approximately 12 members.

##### Conferences, symposia, workshops, and committees

Commission VIII Symposium: Call for abstracts has been sent to working group members and

attendees of past Land Degradation Conferences.

Publications, books, and articles

Final publication of ISPRS Book on "Recent Advances in Remote Sensing and Geoinformation Processing for Land Degradation Assessment", by Röder, Achim ; Hill, Joachim (April 2009)

**News/Plans for Upcoming Activities**

Working Group 8 plans to work closely with the UNCDD on land degradation initiatives, including workshops and opportunities as they occur.

The working group will be organizing technical presentations and posters for the Commission VIII Symposium in Kyoto (9-12 August 2010).

Plans are under discussion to work more closely with GEOSS related working groups.

**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. In this respect, we have seen several ups and downs in 2009.

For high accuracy of ocean surface dynamic topography from radar altimeter, from which surface geostrophic current and ocean steric changes could be estimated, we saw the demise of Jason-1 and the approval of Jason -3 in 2009. Jason-2 is the sole sensor now. It will be followed by Jason-3, a joint mission by European and U.S. operational agency, which will be launched in 2013. Medium accuracy data could also be obtained from European ENVISAT, which will be followed by the approved Sentinel-3. Other approved missions include the joint France-India mission Saral/Altika, the Chinese missions Haiyang-2A to be launched in 2010-2011 time frame, and Haiyang 2-B, and US Navy's Geosat Follow-On to be launched in 2013-2014 time frame.

For high accuracy and resolution surface wind-stress vectors from microwave scatterometer, we saw the demise of QuikSCAT and the launch of India's Oceansat-2 in 2009. The U.S. QuikSCAT mission has been in operation for a decade. The advanced scatterometer (ASCAT) on European operational platform Metop-A, has provided wind-stress vectors, albeit with lower resolution and coverage, since launched in 2006. Approved scatterometer missions include China's Haiyang 2 to be launched in 2011 and Russia's Meteor M3 to be launched in 2012. The proposed U.S. scatterometer on Japanese GCOM-W2 mission is still awaiting approval.

For surface salinity, we saw the launch of the European Soil Moisture and Salinity (SMOS) mission and

the delay of the Aquarius Mission from 2010 launch to 2011.

### **Accomplishments**

The chair of the working group on ocean is new to ISPRS and spent most time establishing communication and learning about the organization. A working group website has been established. Many special sessions in international conferences, although not directly sponsored by ISPRS but related to the theme of the working group, were convened, particularly in upcoming American Geophysical Union, Ocean Science Meeting. The Kyoto Symposium has been announced and promoted to the scientific community.

### **WG VIII/10:Cryosphere**

**Chair:** Josefino Comiso (USA)

**Co-Chair:** Beata Csatho (USA)

**Secretary:** Kohei Cho (Japan)

The Commission VIII Working Group 10 on the “Cryosphere” is a relatively new working group, founded in 2004. Its mission is focused on optimizing the accuracy of algorithms in retrieving snow and ice geophysical parameters and expanding the utility of satellite remote sensing in quantifying seasonal and decadal changes in the polar regions.

### **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. Recent studies suggest that such amplification may already be occurring as has been observed from satellite remote sensing data. Data from thermal-infrared sensors 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. Finding insights into this phenomenon was one of the key objectives of the International Polar Year program from 2007 to 2008.

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 80 meters while the glaciers have been the source of drinking water of millions of people located in the vicinity.

Among various remote sensing sensors, passive microwave sensor has an advantage of monitoring the distribution of snow and ice every day on global basis. JAXA is planning to launch the advanced passive microwave sensor AMSR-2 on board GCOM-W1 in 2011. Some members of the working group are involved in developing sea ice algorithm for GCOM-W1.

Although we have had excellent time series of sea ice extent and area mainly derived from passive micro wave sensors, 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 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 is slowly deteriorating and may not be able to take data in the near future. A replacement called ICESat-2 has been approved but date of launch is expected to be after 2015. Fortunately, a new satellite of ESA, CryoSat-2, will carry 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 would actually complement each other since one provides top of the snow information while the other provide ice elevation 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. Combination of satellite and airborne laser and radar altimetry with repeat satellite imagery, InSAR and in situ GPS observations are capable for resolving changes in ice sheet surface elevations and velocity for investigating the dynamic behavior of outlet glaciers that might trigger rapid ice loss with a warming climate.

The ICESat-2 laser systems unique measurement model 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 as in assessing the potential of the single photon counting laser systems for ice sheet altimetry.

## **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. 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: Call for abstracts has been sent to working group members and distributed through relevant list servers

#### **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 January 2010 in Tokyo.

In addition to ISPRS, Working Group 10 plans to work closely with IEEE, Japan Remote Sensing Society, International Glaciological Society and American Geophysical Union on cryospheric sciences initiatives, including workshops and opportunities as they occur.

#### **ICWG IV/VIII: Updating and Maintenance of Core Spatial Databases**

**Chair:** Ammatzia Peled (Israel)

**Co-Chair:** Costas Armenakis (Canada)

**Co-Chair:** Zhao Renliang (China)

**Secretary:** Andrea Ajmar (Italy)

Report was submitted to TC IV.