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Coordinating International Efforts to Address Global Environment Change

— Report from the 35th International Symposium on Remote Sensing of Environment

By SONG Jianlan (Staff Reporter)

The 35th International Symposium on Remote Sensing of Environment (ISRSE35) convenes in Beijing from April 22 to April 26, hosted by the CAS Institute of Remote Sensing and Digital Earth (RADI). (Photo by courtesy of RADI)

A team of Peking Opera warriors appeared on the stage in colorful costume and played drums accompanied by impassioned music in jazz-like, modern tempo — you might suspect that this was a scene from an opera theatre though the somewhat westernized music could be a bit confusing, but actually this was the herald of a brief ceremony to celebrate the 50-year glory of remote sensing as a scientific discipline and, the opening of the 35th International Symposium on Remote Sensing of Environment (ISRSE35), which occurred from April 22 to 26 at the Beijing International Convention Center, hosted by the CAS Institute of Remote Sensing and Digital Earth (RADI).

"Beijing Style" Opening: A team of female Peking Opera warriors heralds the opening of the 35th International Symposium on Remote Sensing of Environment, with the sound of drums. (Photos: SONG J)

Jigsaw puzzle of ISRSE35 LOGO: At the opening ceremony, distinguished guests each put a piece of zigzag patch on the board to rebuild a complete LOGO for the Symposium, commemorating the footprints of remote sensing over the past 50 years. (Photos: SONG J)

Celebrating 50-Year Glory

The drums, in a fusion of western and oriental style, also marked the first occurrence of the symposium series of ISRSE in China. Every other year, a symposium of this series is convened by the International Center on Remote Sensing of the Environment (ICRSE) under the guidance of an international committee comprised of remote sensing experts from major national space agencies across the world.

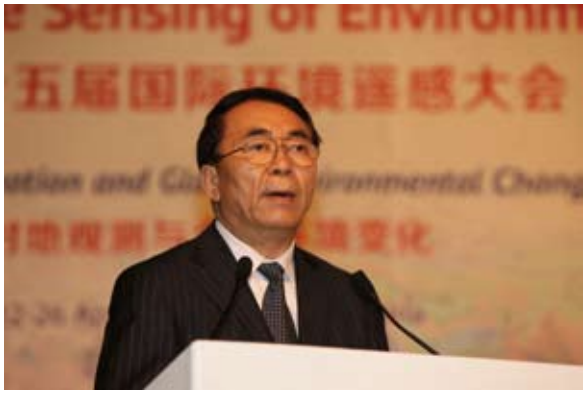
The first ISRSE, which was convened in 1962 in Ann Arbor of Michigan, the United States, marked the formal emergence of "remote sensing" as a scientific concept for a technology rendering human beings ability to observe their mother planet from high-altitude aircraft and ultimately spacecraft: for the first time "remote sensing" was formally accepted by the scientific community as a scientific term.

The symposium series has since developed into a major international academic forum for global issues in this field, with long-term support from major space agencies including the National Aeronautics and Space Administration (NASA) of USA and the European Space Agency (ESA), as well as related international scientific organizations. With the launch of the Intergovernmental Group of Earth Observations (GEO), which is committed to coordinating efforts to build the Global Earth Observation System of Systems (GEOSS), this symposium series has also become one of the major academic platforms for the latter. Now at the ISRSE35, representatives of the international remote sensing community would review milestones along the 50-year journey of this technology, share outlooks of its future and exchange ideas on global issues of common concern popping out from this field against the backdrop of global environmental change, revolving around the theme "Earth Observation and Global Environmental Change".

The ceremony kicked off with Chair of the ISRSE35, CAS Member Prof. GUO Huadong, who is also head of the host institute RADI, welcoming the distinguished guests and the participants. CAS President Prof. BAI Chunli and Mr. WANG Qinmin, Vice Chairman of the National Committee of the Chinese People's Political Consultative Conference each gave an address. BAI commented that convening the ISRSE35 in China marked a historic event both for Chinese and worldwide remote sensing community. WANG emphasized that Chinese Government and scientific community have attached great importance to space technologies, interdisciplinary research and original science innovations, which are embodied by remote sensing, and have been enhancing their support to research in the fields of global change, resources and environment, and Digital Earth.

Mr. WANG Qinmin, Vice Chairman of the National Committee of the Chinese People's Political Consultative Conference gives an address. (Photo by courtesy of RADI)

Prof. XU Guanhua, Chair of the ISRSE35 International Steering Committee, CAS Member and former Chinese Minister of Science and Technology addresses the opening ceremony. (Photo: SONG J)



CAS President BAI Chunli addresses the opening ceremony. (Photo by courtesy of RADI)

Audience at the opening ceremony. (Photo: SONG J)

Distinguished guests, including Ms. Barbara Ryan, Secretariat Director of GEO; Prof. XU Guanhua, former Chinese Minister of Science and Technology and Chair of the ISRSE35 International Steering Committee; Dr. Per Erik Skrovseth from Norwegian Space Center; Prof. CHEN Jun, President of International Society for Photogrammetry and Remote Sensing; Dr. Frederick Campbell, President of the Canada FC Consulting Firm; and Dr. Achim Steiner, Executive Director of the United Nations Environment Programme (UNEP) and Under-Secretary-General of the United Nations attended the ceremony and presented their congratulation messages to the symposium to celebrate this historic moment.

At the opening ceremony, two invited plenary speeches reviewed the glorious history of remote sensing as well as its contributions to human society, and shared outlooks on its future benefits and challenges. In his speech "China's Earth Observation in the Global Context", Prof. GUO Huadong gave a review of the rise and development of remote sensing in China, including its emergence, development trajectory, and applications in different fields ranging from agriculture, meteorology, natural and cultural heritages, to disaster evaluation and mitigation. He also shared with the audience the roadmap of China's remote sensing satellite program. In her speech "GEO — Building a Global Earth Observation System of Systems", Ms. Barbara Ryan emphasized the vision of GEO: "To realize a future wherein decisions and actions, for the benefit of humankind, are informed by coordinated, comprehensive and sustained Earth observations and information". She reviewed the birth of GEO in response of calls for coordinated efforts to build GEOSS, and the latter's components and benefits to human society, illustrating its important role in improved applications of Earth observation in different fields, including crop and weather forecast.

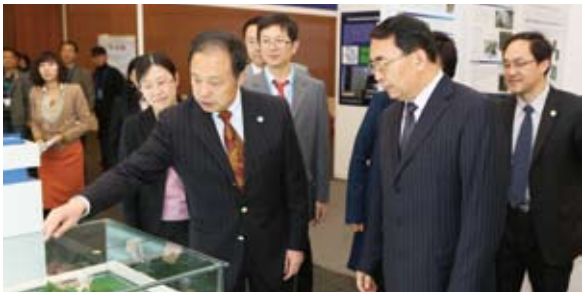
ISRSE35 Chair GUO Huadong, CAS Member and head of the CAS Institute of Remote Sensing and Digital Earth (RADI) gives an invited plenary speech titled "China's Earth Observation in the Global Context" at the opening ceremony. (Photo: SONG J)

Ms. Barbara Ryan, Secretariat Director of the Intergovernmental Group of Earth Observations gives an invited plenary speech in the title "GEO — Building a Global Earth Observation System of Systems" at the opening ceremony of the ISRSE35. (Photo: SONG J)

Addressing Global Environmental Change via Remote Sensing

The ISRSE35 offered an opportunity for remote sensing experts and international scientific organizations all over the world to exchange ideas on how to address environmental change, which is gaining increased concern. The Symposium included a scientific program arranged in five plenary sessions, one panel discussion, 15 parallel oral sessions, and a poster session, all revolving around the theme "Earth Observation and Global Environmental Change". Also arranged were some special sessions including one for the "ABCC Program", which is an international initiative for research on global environmental change pooling scientific resources from Australia, Brazil, Canada and China.

At the five plenary sessions 18 keynote speakers were invited to give keynote speeches, and particularly at the panel discussion held on the morning of April 23, eight distinguished guests would have a chance for brainstorming on issues of common concern under the theme "Remote



During the session of the ISRSE35, an exhibition for high technology and equipment was held at the venue. More than 30 organizations and enterprises attended the event to promote their technologies and products in areas of remote sensing and space information. Above: Opening of the exhibition; Middle (Photo by courtesy of RADI): CAS President BAI Chunli (right front) visits the exhibition accompanied by ISRSE35 Chair GUO Huadong (left front). Below: Young visitors to the exhibition.

Panel discussion on "Remote Sensing and Global Environmental Change": Representatives of major international organizations in the field of remote sensing are invited to the brainstorming session to discuss applications of remote sensing in research on global environment change and related issues, including the role of governments and international cooperation, data sharing, use of data, and interactions between research institutions, government and users. The session was chaired by Dr. Mario Hernandez (first left) from the International Society for Digital Earth, and invited panelists included Prof. GUO Huadong (second left, RADI, CAS), Ms. Barbara Ryan (third left, GEO), Dr. Stephen Briggs (forth left, ESA), Dr. Douglas Bancroft (fifth left, Canada Centre for Remote Sensing), Dr. Anond Snidvongs (sixth left, Geo-Informatics and Space Technology Development Agency, Thailand), Dr. Gunter Schreier (third right, German Aerospace Center (DLR)), Dr. Ghassem R. Asrar (second right, World Climate Research Program) and Prof. Manfred Ehlers (first right, University of Osnabruek, Germany). (Photo by courtesy of RADI)

Sensing and Global Environmental Change". The 15 parallel oral sessions covered academic research in climate, oceanography, forestry, agriculture, water resources, urban environment, disaster mitigation, natural and cultural heritage, remote sensing technology and remote sensing education & capability building.

In total, the symposium received 1,249 abstracts and 429 full papers from 56 countries and regions, among which over 360 were selected for oral presentations at 63 parallel sessions, and over 340 posters were presented. In process of the Symposium, a committee evaluated the oral and poster presentations and voted for the excellent ones. Also it elected the Best Young Scientist for the symposium. Eventually the winners were announced and awarded at the closing ceremony on the afternoon of April 26.

In addition to the scientific program, a special Side Meeting for GEO was held on April 21 before the formal opening to address issues on ecosystems and biodiversity; besides workshops on certain issues were also included in the pre-symposium program.

Observing Earth from Space

On the days following the opening ceremony of the Symposium, four more plenary sessions unfolded along four themes: "International Space Agency Program", "Earth Observation for Climate Change and Global Environmental Research", "Roles of Earth Observation in Disaster Mitigation, Terrestrial Ecosystem and Land Dynamic Change" and last, "Remote Sensing Retrospective and Future Prospects".

On April 23 at the plenary session on "International Space Agency Program", speakers from major space agencies reported the efforts of their organizations and the latest progress in terms of space-based Earth observing programs or initiatives. Dr. Stephen Briggs, former Head of the Department of Earth Observation Science, Applications & Future Technologies of ESA and current Head of Earth Observation Programme Planning and Coordination based in ESA Headquarters reviewed the development of Earth observing satellites since the 1970s and ESA's pioneer role, with emphasis on its three programs and future Earth observing explorer missions. In response to global change he also outlined ESA-sponsored research to deal with related issues including the rise of sea level and the melting of glaciers.

Dr. Stephen Briggs, former Head of the Department of Earth Observation Science, Applications & Future Technologies of European Space Agency (ESA) and currently Head of Earth Observation Programme Planning and Coordination based in ESA Headquarters gives a keynote speech titled "ESA Earth Observation Programme". (Photo by courtesy of RADI)

Gunter Schreier, Deputy Director of the German Remote Sensing Data Center (DFD) of the German Aerospace Center (DLR) gives a keynote speech "Mapping Global Change: Big Data and Earth Observation". (Photo by courtesy of RADI)

In his keynote speech "Mapping Global Change: Big Data and Earth Observation", Dr. Gunter Schreier, Deputy Director of the German Remote Sensing Data Center (DFD) of the German Aerospace Center (DLR) reviewed the latest developments of global change mapping as an effort to extract information from the massive data from Earth observations. He proposed that with diversified sensors the existing satellites could be connected into a unified Earth observing system.

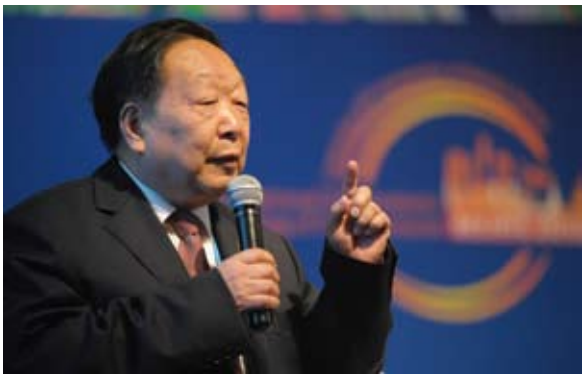
At the same plenary session, Dr. Douglas Bancroft from Canada Centre for Remote Sensing gave a keynote speech in the title "Harnessing Space Based Earth Observations for Public Good Decision Making: Selected Canadian Experiences", and Dr. Anond Snidvongs, Executive Director of Geo-Informatics and Space Technology Development Agency of Thailand gave a keynote speech titled "Delivering Values from Space: Thailand Earth Observation System Phase 2 (THEOS-2)".

Addressing Global Environment Change Hand in Hand

At the session on "Earth Observation for Climate Change and Global Environmental Research", Dr. Ghassem R. Asrar, Director of the World Climate Research Program (WCRP) gave a keynote speech titled "Observing, Understanding and Predicting the Earth System: Foundation for Global Development", sharing the latest progress of and early results from the efforts made by WCRP to improve seamless data sharing and effective, free release of information. Noting that nowadays global and regional Earth observing technology has been widely applied to the observation of the Earth as a system, he emphasized that the outcome would not only benefit the scientists, but also the public.

Dr. Ghassem R. Asrar, Director of the World Climate Research Program (WCRP) gives a keynote speech titled "Observing, Understanding and Predicting the Earth System: Foundation for Global Development". (Photo by courtesy of RADI)

Dr. LIAO Xiaohan, Director of the National Remote Sensing Center of China, Ministry of Science and Technology introduces global eco-environment monitoring projects run by China. (Photo by courtesy of RADI)



Prof. LI Deren, dual Member of both CAS and the Chinese Academy of Engineering, introduces the Framework Design of the "Chinese National Disaster Reduction System of Systems (CNDRSS)", which is an initiative inspired by the idea of GEOSS. Given just days after a major earthquake in Lushan area, Sichuan, China, his report gained a lot of attention and inspired enthusiastic discussion. (Photo by courtesy of RADI)

In his speech titled "Annual Global Eco-environment Monitoring by Satellites: China's Contributions", Dr. LIAO Xiaohan, Director of the National Remote Sensing Center of China, Ministry of Science and Technology introduced the global ecosystem and environmental monitoring projects run by China, with details about four programs of Earth observing satellite systems of China. He asserted that under the framework of GEO, China would further promote the applications and services of Earth observation in the field of global eco-environment monitoring.

The theme "Roles of Earth Observation in Disaster Mitigation, Terrestrial Ecosystem and Land Dynamic Change" attracted extra attention as a major earthquake just occurred only two days before the opening of the Symposium in Lushan area, Sichuan, China. The keynote speech by Prof. LI Deren, dual Member of both CAS and the Chinese Academy of Engineering interested lots of participants. LI introduced the Framework Design of "Chinese National Disaster Reduction System of Systems (CNDRSS)", which is an initiative inspired by the idea of GEOSS to connect different remote sensing networks of China to build a unified system of systems. This will help enhance ability to make quick responses to emergencies, promote data/information sharing for decision making and improve interoperability between systems majoring in different observations, according to LI.

Looking into the Future

On April 26 morning at the last plenary session focused on the theme "Remote Sensing Retrospective and Future Prospects", ICSU Executive Director Dr. Steven Wilson gave a keynote speech titled "Future Earth – Research for Global Sustainability", introducing a new 10-year research programme for global sustainability called "Future Earth", which aims to mobilize the global environmental change science community to work with policy-makers and other stakeholders to deliver the knowledge needed to enable societies to meet their sustainable development goals. This program will provide an overarching interdisciplinary research and collaboration framework for mobilizing global research efforts. According to Dr. Wilson, the "Future Earth" is now approaching the end of its design phase and entering its interim operations. It is expected that it will be put into full operation by mid-2014.

ICSU Executive Director Dr. Steven Wilson introduced a new 10-year research programme for global sustainability, the "Future Earth". (Photo by courtesy of RADI)

Prof. LIANG Shunlin from Beijing Normal University and the University of Maryland reported the progress of an "863" Key Project of China called "Generation and Application of Global Products of Essential Land Variables". (Photo by courtesy of RADI)

Under the same theme, Prof. LIANG Shunlin from the Beijing Normal University and the University of Maryland reported the progress of an "863" Key Project of China called "Generation and Application of Global Products of Essential Land Variables" from 2009 to 2012 as an effort to monitor, understand and predict environment changes to meet the economic, social and environmental needs, introducing its major outcome, the five Global LAnd Surface Satellite (GLASS) products. He also analyzed the long-term environmental changes detected from GLASS products and other data sources at both global and local scales, with emphasis placed on some regional hotspots, such as Greenland, Tibetan Plateau, and northern China, where environmental changes have been mainly associated with climate warming, drought, land-atmosphere interactions, and human activities.

In his "Reflections on 50 Years of Remote Sensing: Looking Back, Looking Forward", Dr. John van Genderen from University of Twente, Netherlands presented his personal views on the 50-year history and developments of remote sensing since1962, and gave assessment of some of the milestones, achievements and problems encountered in the process. In the end he remarked on some future challenges and opportunities for this discipline.

The ISRSI35 closed on the afternoon of April 26 with inspiring news from China: Chair GUO Huadong announced that just hours before the beginning of the closing ceremony, China launched a new satellite for remote sensing. In the water of remote sensing, China could be seen as a latecomer to some extent: it did not launch its first remote sensing satellite until 1988. The past 30-odd

Dr. John van Genderen from University of Twente, the Netherlands presented his personal views in his "Reflections on 50 Years of Remote Sensing: Looking Back, Looking Forward". (Photo by courtesy of RADI)

years, however, witnessed a big boom of this country's remote sensing career. "It is very impressive," commented Dr. Ghassem Asrar on the development of remote sensing in China: "If you look at the number of satellites that China is building, those for weather monitoring that China Meteorological Agency is launching, those in the polar or in the geostationary orbit, and the boats over the past decades, and look at the plans for next decades, it is very impressive, very comprehensive."

Best Young Scientist for the symposium. Eventually the winners were announced and awarded at the closing ceremony on the afternoon of April 26. Best Young Scientist for the symposium. Eventually the winners were announced and awarded at the closing ceremony on the afternoon of April 26.

In three decades this country has developed a comprehensive network of remote sensing satellites covering resources, environment, meteorology, and oceanography observations and monitoring, with ambitious future plans still to unfold. And China is just one of the emerging forces in this community of remote sensing, which is feeling unprecedented needs to embrace closer with each other to face common challenges in a world that is getting smaller and smaller. While closer cooperation is called for and actions visible, a new era for remote sensing dawns on the horizon.

At the closing ceremony on the afternoon of April 26, winners for the Best Young Scientist, Best Oral presentation, and the Best Posters for the symposium are announced and awarded. (Photo by courtesy of RADI)