CONTENTS
APRSAF-18 to be held in Singapore....................2-3
Space Seed returns to the earth......................4
Report of GIS Tool Kit for Schools....................5
Feature: Great East Japan Earthquake ...............6-8
Message from Secretariat .............................8
**APRSAF-18 to be held in Singapore**

The eighteenth session of the Asia-Pacific Regional Space Agency Forum (APRSAF-18) will be held from December 6 to 9, 2011, in Singapore. This will be the first time for Singapore to host APRSAF. In this issue of the APRSAF Newsletter, two Singaporean co-host organizations, the Singapore Space and Technology Association (SSTA) and the Centre for Remote Imaging, Sensing and Processing (CRISP) of National University of Singapore, introduce their profiles and activities. SSTA, CRISP, and the APRSAF Secretariat are looking forward to seeing you in Singapore in December.

---

**Welcome Message from SSTA President**

I am very honored to welcome all of you to the upcoming 18th Asia Pacific Regional Space Agency Forum (APRSAF). The forum will be held in Singapore, a first for APRSAF, and I hope not the last. Together with the Centre for Remote Imaging, Sensing, and Processing (CRISP), our organizations will be your co-hosts of the event, and we look forward to a highly engaging session in December.

This year will see greater cooperative efforts and initiatives among the region, hopefully in all four working groups that have been formed to enhance space activity for Asia. As partners, we will need to work hand in hand to discover how we can best utilize our combined knowledge and talent in satellite applications, imagery, technology, and education to propel our various economies in the region.

It’s certainly a challenge, one that I believe we can overcome and gain ground in. It gives me great pleasure to welcome a crowd of professionals, dedicated to finding and delivering solutions for tomorrow’s environment, and ultimately, mankind.

The APRSAF is an important platform that we should all leverage on to accomplish all the above, and we thank our colleagues from JAXA for supporting this effort.

I hope that you will share with us your knowledge and expertise through your active participation. Let’s make APRSAF-18 significant, and one that breaks new ground in space applications for tomorrow’s world.

Jonathan Hung
President
Singapore Space and Technology Association
(Developing People, Technology and Industry Making Space for the Future)

---

SSTA is Singapore’s lead, non-profit association focused on developing Singapore’s space technology industry. It also acts as a neutral platform to facilitate information and communication for government, industry, and academia.

SSTA spearheads major initiatives with the aim of advancing Singapore’s space ecosystem, thus catalyzing Singapore’s drive to be a regional space hub. On the domestic front, SSTA drives educational and outreach programs to encourage careers in the expanding aerospace/space industry. SSTA’s projects are multi-faceted and developed to achieve objectives catered to meet the needs of our partners, members, as well as professionals and students interested in Space and its related technologies. Please visit our website at www.space.org.sg for more details.
Overview of SSTA Educational Initiatives

Space Academy Singapore

Space Academy Singapore (SAS), jointly organized by SSTA and TriVector International (TVI), is Singapore’s premiere space training program conducted with a special focus to create public awareness in the space industry and to promote science and engineering among students. All-rounded students aged 14-21 years old are selected to participate in this 5-day intensive program conducted by former NASA engineers/scientists, currently consultants to NASA’s projects. The rigorous course follows the coveted astronaut selection program. These space engineers were involved in projects such as the Hubble Telescope, Ares I, Apollo Missions, International Space Station, and advanced NASA space missions. Students will definitely stand to gain with the rich curriculum that includes an academic core of astronautics, biology, rocketry, and systems engineering (to name a few), practical elements where they put their classroom work to the test, and experiential components (such as putting projects together underwater, or working under extreme environments at subzero temperatures). The participants also get the chance to visit related industries and have close and personal feel of the industry and the people working in them.

Singapore Space Challenge

The Singapore Space Challenge (SSC) is an annual, nationwide space-themed design competition currently in its fourth year running. Targeted at students aged 15 to 25, it aims to motivate space and technology interests among the young and to promote participation in space-related activities. Stretching over a period of 8 months, teams comprising students from various engineering and entrepreneurial backgrounds undergo a rigorous schedule of training, team projects, lectures, and industry site visits.

SSC continues to be a highly realistic team-based competition for students that train various aspects of student development through space-related projects. Underlying the competition is a systems approach to executing the project, good communication among the diverse team members, and an overall passion to explore advance technologies in the cutting-edge field of space.

Global Space & Technology Convention

Global Space & Technology Convention (GSTC) is Asia’s Premier Space & Technology Event.

Providing a platform for the latest technology in space engineering and design, GSTC 2011 is well positioned to give you an edge over the rapidly developing space industry in Asia. A modern, vibrant city with state-of-the-art infrastructure, Singapore is the ideal location to attract global industry leaders and research organizations to showcase their latest space products and design concepts right at the heart of Asia.

The “Rise of the rest” theme holds true...Asia is a critical market in the area of space technology.

With the space industry estimated to be worth over US$270 billion, many Asian companies and agencies are indefinite at the forefront. Home to a majority of the global population, there is increasing demand for space-related services, and a strong push toward technology advancement and new applications.

Growth and development of the space industry in this region presents many untapped opportunities, and GSTC serves as a neutral forum for business-to-business networking and interaction.

GSTC also continues to play an active role in bridging the gap between East and West.

Looking forward to seeing you at GSTC 2012, February 9 –10, 2012, in Singapore!
**Space Seed returns to the earth**

The APRSAF Space Environment Utilization Working Group (SEUWG) has launched its first space mission on its own, the Space Seed for Asian Future (SSAF) 2010-2011. Seeds prepared by each participating country had been launched by "KOUNOTORI2" (HTV2) in January 2011, and were retrieved by Space Shuttle Endeavour (STS-134) in June 2011. Retrieved seeds are utilized by each participating country – Indonesia, Malaysia, Thailand, and Vietnam - for education, outreach, and research purposes.

In the course of the project, the participating countries have overcome many difficulties and learned valuable lessons. Their staffs told the APRSAF Secretariat about their experience and future plans.

**Vietnam**

Because sending seeds into space has to fulfill many requirements, each country had to deal with plenty of issues. "It took three months for sending and selecting seeds due to insufficient experience in the field of biology. Besides, the implementation of scientific research cooperation in the field of space technology in Vietnam is being constructed and developed." said Nguyen Huu Diep of the Space Technology Institute of the Vietnam Academy of Science and Technology (VAST/STI), looking back at their preparation process. He provided us with the points they have handled in each process of the preparation as follows:

1. Flight certified instruments:
   - Not only the materials to be flown, but tools and instruments, even a marker pen, used for preparing flight items had to be the certified one. Most of them were hardly available in Vietnam.

2. Shipping:
   - The seeds needed to be disinfected and also the relevant paperwork such as phytosanitary certificate and export permit was required to be complete. Each procedure needed many days to complete. The seeds shipped first were sent back due to some mistake. One should have contingency plans such as backup seeds.

3. International regulations:
   - There is a need to consider appropriate seed selection and avoid seeds that are banned for export and import by international regulations such as CITES or by local rules of either Japan or Vietnam. "Finally, as recommendations for the project, we would like to propose that establish the guideline and also Standard Operating Procedure (S.O.P) for receiving the seeds after comeback from space, e.g. quarantine process, and that JAXA can organize courses about the utilizations of Kibo module and combine with the Asian Winter School program*, for example, for promotion and referral to those who participate in the program."

*Pan-Asian collaborative effort of Korea, India, China, and Japan.

**Malaysia**

"The National Space Agency of Malaysia (ANGKASA) established a local committee to conduct this program." ANGKASA staff explained its preparation. "The committee consists of the Malaysian Agricultural Research and Development Institute (MARDI), the Ministry of Education (MOE), and the Department of Agriculture (DOA). We had selected 100 grams of a Malaysian chili cultivar, Capsicum annum (MC11) seeds to be sent to ISS. MC11 was selected because it is a variant developed by our local scientists at MARDI."

They also mentioned about their plan to utilize the retrieved seeds. "After receiving the seed from Japan, MARDI will conduct all necessary testing, quarantine and research program. Since this is their first "astro-seed" program, Malaysian Nuclear Agency is invited to conduct the screening test at the Kuala Lumpur International Airport before handing over to MARDI. An education and awareness program will be conducted by MOE next year (2012) in competition base. Secondary students from all Malaysia will monitor and compare the growth of the seeds sent to ISS and the ground control seeds. The progress of the study will be reported on a portal site hosted by ANGKASA."

**Indonesia and Thailand**

Other participating countries also experienced various problems in addition to the space-specific difficulties. Efforts are made to improve the plans to overcome all these difficulties.

Local activities in education and outreach are planned to make full use of the retrieved seeds. In Indonesia, its National Institute of Aeronautics and Space (LAPAN) plans to hold a series of lectures on this topic to promote space awareness in collaboration with the Bandung Institute of Technology (ITB).

The National Science and Technology Development Agency of Thailand (NSTDA) invites Thai students who are eager to nurse the plants retrieved from space.

**Japan**

In Japan, a number of engineers from JAXA and other organizations have played their roles in this project. The APRSAF Secretariat spoke with members of the project regarding their efforts and difficulties. "JAXA is in charge of coordination work, which mainly includes the following three phases; (1) forming a plan and coordinating an integral plan with each participating country, such as seed preparation, transportation, launch, and events utilizing retrieved seeds, (2) preparation for the launch, and (3) delivery of retrieved seeds, data analysis, etc." said Mr. Naoki Nagai, Associate Senior Engineer of the Space Environment Utilization Center, JAXA. "More specifically, the preparation for the launch consists of the following stages;

- Preparation of verification documents for launch (compatibility assessment for HTV, Space Shuttle, and ISS),
- Preparation of materials for safety review and procedure for authorization,
- Packing of seeds received from each country, cargo delivery,
- Preparation of onboard guidance (photograph),
- Coordination for photograph on-orbit, and
- Coordination to mount the seed on the return flight."

Mr. Shigeki Kamigaichi, the Director of the Kibo Utilization Office for Asia told that he hoped participating space agencies in Asia would build their capacity to take charge of the above-mentioned procedures and conduct their own space missions in the future.
Workshop on GIS Tool Kit for Schools
May 24–25, 2011
Organized by
Geo-Informatics Space Technology and Development Agency (GISTDA)
Thailand

The Geo-Informatics and Space Technology Development Agency – GISTDA has organized a Workshop on GIS Tool Kit for Schools on May 24–25, 2011 in Thailand. An objective of the workshop was to enhance teaching skill in geoinformatics and geography, of teachers in high schools and junior high schools. The target group was teachers of geoinformatics and/or geography, and participants were 27 Thai teachers and 7 observers from GISTDA and Japan Aerospace Exploration Agency (JAXA). Lectures were experts from Institute for the Promotion of Teaching Science and Technology, Schools, and GISTDA.

On May 24, 2011, the workshop was held at GISTDA Head Office. The participants took various topics of lecture on Concept of GIS Tool Kit for Schools and Workshop Overview, Youth Awareness on Science & Technology Education (Global Learning and Observations to Benefit the Environment: GLOBE Project), GIS Tool Kit for School Prototypes, and Edutainment Creation: How to Push Youth Geo-informatics Awareness Forward.

On May 25, 2011, there were site visiting activities for the participants. For morning session, the participants went to National Science Museum, Technopolis, Pathumthani, Thailand, to learn on Youth Awareness Project: activity arrangement and event preparation, and then in the afternoon, they observed activities of Thailand Youth Space Camp with 6 learning stations, including Remote Sensing, GIS, GPS, 3S, Space, and Geography and Mapping Stations.
**Great East Japan Earthquake**

On March 11, 2011, a massive magnitude 9.0 earthquake hit the north-eastern part of Japan (Tohoku Region). A huge tsunami followed the earthquake. A wide area of Japan was devastated by the disasters. Considerable rebuilding efforts have been made so far, and space technology also has played an important role in disaster countermeasures. For example, observation images provided from overseas satellites, such as Cartosat-2 (India), FORMOSAT-2 (Taiwan), and THEOS (Thailand) through Sentinel Asia, were effectively utilized. On the other hand, Japanese satellites also worked for the disaster; the Advanced Land Observation Satellite (ALOS*) provided emergency observations and imaging of the affected area, and the Wideband InterNetworking engineering test and Demonstration Satellite (WINDS) as well as the Engineering Test Satellite-VIII (ETS-VIII) supplied the area with communications services.

JAXA staff told the APRSAF Secretariat in late May regarding their efforts against the disaster.

* ALOS finished its operation in May 2011.

**ALOS**

An example of value-added products (Satellite image of the devastated area overlaid with pre-disaster image and geospatial information)

**Secretariat: What is the role of the Disaster Management Support Systems Office?**

With the objective of using the satellite for disaster management, we demonstrate the satellite applications for disaster management, aiming to promote satellite-derived information based on benefits of satellites such as wide-area observation, repetitive observation, and observation during night-time or bad weather. In line with a schedule we made based on the ALOS mission period (its 3-year regular operation phase and the 2-year post operation phase), involving other disaster management organizations including central government offices as well as local authorities, we started with feasibility study, collected user needs, and then applied to actual disaster management operations and assessed their performance.

To use satellite images efficiently on an emergency, users should accustom themselves to satellite images on a routine basis, so we have provided some images for government agencies, etc. when they held disaster drills. This is also a good opportunity for potential users to realize the way they use satellite images. We also participated in some
drills to tighten our partnership, and provided products such as images and value-added products as well as disaster observation information through the special website established for the demonstration of ALOS applications.

When a disaster happens, as a unique point of contact, we accept and coordinate data requests from users, coordinate implementation of emergency observation, and provide products for users.

Secretariat: Please tell us how ALOS worked on the Great East Japan Earthquake.

ALOS took more than 60 times of emergency observation. From overseas, Sentinel Asia and the International Disaster Charter have supplied their satellite data and analyzed images. We processed the received data and, in addition, did higher-level processing such as adding geospatial information, and also information extraction including analysis of inundation area, to supply them for disaster management agencies. Images processed by analysis of inundation area, for example, were used for considering a plan of drainage, etc. Although ALOS was the land observation satellite, it provided information on drifts on the sea surface and wreckage to the seashore as well. Also, because the entry into the surroundings of the nuclear plant in Fukushima prefecture was prohibited even by airplane, many requests to view its situation through satellite images were received.

Secretariat: Did the data diffusion go smoothly?

For organizations that have participated in our disaster management demonstration activities and the ones that have used satellite images on disaster drills on a routine basis, we could provide information smoothly. This is mainly because how and when to request data has become definite and the way each organization uses received information has been incarnated through our disaster management demonstration activities to date. On the other hand, some organizations that requested data for the first time remarked that if they had received the data at initial operation they could have used them more efficiently.

Secretariat: What is the problem that you encountered while working on the earthquake?

To avoid the situation that only those who already know that satellite data are usable at the time of disaster are able to access the data, we realized that promotional activities and more organized data provision would be necessary. In addition, higher-resolution data, shorter-interval data, and quicker data provision were requested by on-site staff.

Secretariat: Could you tell us about information provision from overseas?

Through Sentinel Asia, observation data from Indian Cartosat-2, Taiwanese FORMOSAT-2, and Thai THEOS were provided. Further, the International Disaster Charter supplied about 5,000 scenes of images acquired by overseas satellites. The observation period of both frameworks is about 2 weeks in principle because “initial response” is supposed to be their function. However, for this disaster, because of additional nuclear plant problem, some agencies had observed for more than one month.

Secretariat: Do you have any messages to APRSAF Colleagues?

Through the experience of working on this earthquake, we realized that the information that each disaster management organization was familiar with on a daily basis could be only utilized efficiently when an actual disaster occurred. It would be great to promote utilization of space technology at the time of disaster through the framework of APRSAF. It cannot be achieved exclusively by space agencies, so it is important that we use necessary information when needed by coalition with disaster management organizations on a daily basis.

WINDS

Secretariat: What is the role of the Satellite Applications and Promotion Center?

We implement experiments with WINDS and develop new users. To date we have carried out experiments with limited users such as national institutes and universities, but now we are finding a wide range of users including the private sector to expand the user base.

Secretariat: How did WINDS support for the earthquake?

Ordered by the disaster countermeasures headquarters in Iwate Prefecture through the Ministry of Education, Culture, Sports, Science and Technology (MEXT), JAXA installed portable ground antennas for WINDS at the headquarters in the Iwate Prefectural Office and the local disaster countermeasures offices in Kamaishi City and Ofunato City, both in Iwate Prefecture, and supported to provide temporary communication lines for sharing information between the disaster measures headquarters and the local disaster measures offices as well as the transmission/confirmation of information from the local offices. In addition to the ground antennas for WINDS, high-definition teleconference systems, wireless LANs, and Skype were installed there.

Secretariat: What is the problem that you encountered while working on the earthquake?

To avoid the situation that only those who already know that satellite data are usable at the time of disaster are able to access the data, we realized that promotional activities and more organized data provision would be necessary. In addition, higher-resolution data, shorter-interval data, and quicker data provision were requested by on-site staff.

Secretariat: Could you tell us about information provision from overseas?

Through Sentinel Asia, observation data from Indian Cartosat-2, Taiwanese FORMOSAT-2, and Thai THEOS were provided. Further, the International Disaster Charter supplied about 5,000 scenes of images acquired by overseas satellites. The observation period of both frameworks is about 2 weeks in principle because “initial response” is supposed to be their function. However, for this disaster, because of additional nuclear plant problem, some agencies had observed for more than one month.

Secretariat: Do you have any messages to APRSAF Colleagues?

Through the experience of working on this earthquake, we realized that the information that each disaster management organization was familiar with on a daily basis could be only utilized efficiently when an actual disaster occurred. It would be great to promote utilization of space technology at the time of disaster through the framework of APRSAF. It cannot be achieved exclusively by space agencies, so it is important that we use necessary information when needed by coalition with disaster management organizations on a daily basis.

WINDS

Secretariat: What is the role of the Satellite Applications and Promotion Center?

We implement experiments with WINDS and develop new users. To date we have carried out experiments with limited users such as national institutes and universities, but now we are finding a wide range of users including the private sector to expand the user base.

Secretariat: How did WINDS support for the earthquake?

Ordered by the disaster countermeasures headquarters in Iwate Prefecture through the Ministry of Education, Culture, Sports, Science and Technology (MEXT), JAXA installed portable ground antennas for WINDS at the headquarters in the Iwate Prefectural Office and the local disaster countermeasures offices in Kamaishi City and Ofunato City, both in Iwate Prefecture, and supported to provide temporary communication lines for sharing information between the disaster measures headquarters and the local disaster measures offices as well as the transmission/confirmation of information from the local offices. In addition to the ground antennas for WINDS, high-definition teleconference systems, wireless LANs, and Skype were installed there.

Interviewee:
Noriko Aso, Senior Engineer
Disaster Management Support Systems Office
Satellite Applications and Promotion Center
Space Applications Mission Directorate
JAXA

Ground antenna installed at Kamaishi City
(Movable USAT, Antenna diameter 45cm)

The teleconference system via WINDS was used for the regular liaison conferences for information management between the offices to share information and assess the situation in the coastal area, which incurred especially severe damage. We also made Internet access via wireless
LAN available to the public, which enabled them to search for disaster-related information, the restoration status of infrastructure, and so on, as well as daily life information such as apartments and used cars.

**Secretariat: What was the hardest thing?**

To transport staff and equipment to the devastated area was difficult; the earthquake caused some damage also to the Tsukuba Space Center and its surrounding area, which made us deal with the emergency with less staff. In addition, in a chaotic situation just after the earthquake, supplies such as gasoline and water ran short and transport trucks were not available to rent. Moreover, highways were blocked except for emergency vehicles, so we applied for that, which we had never done before through our past experiments.

**Secretariat: What is the current status and future plans?**

The experiment of offering communication lines via WINDS to the Iwate Prefectural Office had been completed by April 24; one of the reasons for that was retrieval of terrestrial communication lines. The Iwate Prefectural Office remarked that if it knew about WINDS earlier, it could have ordered immediately after the earthquake. Also, the Japan Disaster Medical Assistance Team (DMAT) commented that during 3 days just after the earthquake, commercial satellite communication lines had been often occupied, almost unavailable, so stable communication lines were required to save more human lives. On receiving these comments, we are planning to promote the utilization of WINDS to liaise with local authorities, DMAT, etc. which are to operate in the devastated area just after the disaster.

**Secretariat: Do you have any messages to APRSAF colleagues?**

First of all, we would like to express our deep gratitude for tremendous support from countries in the Asia-Pacific region immediately after the earthquake. Far beyond our assumptions regarding disaster countermeasures we had developed, the earthquake killed a number of precious human lives and also inflicted considerable damages on infrastructure.

In this information-oriented society, communication infrastructure is essential and the important role of Internet at the time of disaster was re-recognized through the backing for disaster countermeasures by WINDS. This earthquake proved that communication satellite technology including satellite phone was of great service. We think, in preparation for future major disasters, we should use the knowledge we have gained to develop the following communication satellite missions.

**Message from APRSAF Secretariat**

We would like to express our gratitude for messages of sympathy and warm encouragement addressed to the APRSAF Secretariat following the earthquake and tsunami that struck Japan on March 11, 2011.

We, in the Secretariat in Japan, are all safe. While there are some issues to be resolved for the reconstruction of some of our facilities, our office is getting back to normal.

In this issue, we featured how the space applications had worked in our efforts to deal with this disaster. We realized the importance of developing and maintaining frameworks for countermeasures against disasters on a regular basis. Taking this opportunity, we would like to express our deep appreciation to the participating countries and region of the Sentinel Asia for promptly providing JAXA with their assistance through this initiative of APRSAF.

Thank you once again for the thoughtful messages and continuous cooperation. We are looking forward to seeing you all at APRSAF-18.

APRSAF Secretariat

c/o Japan Aerospace Exploration Agency
1-6-5 Marunouchi, Chiyoda-ku
Tokyo 100-8260 Japan
Tel: +81-50-3362-5880
Fax: +81-3-6266-6908
Email: secretariat@aprsaf.org
Web: http://www.aprsaf.org

For further information for APRSAF, please visit http://www.aprsaf.org