Innovative Space Technology for Evolving Needs

Venue: Sheraton Towers Singapore

Co-Organizers:
  Singapore: Singapore Space and Technology Association (SSTA)
  Japan: Ministry of Education, Culture, Sports, Science and Technology (MEXT)
  Japan Aerospace Exploration Agency (JAXA)

Registration
Please visit the following registration website and complete your registration online no later than October 5, 2018:
http://www.aprsaf.org/annual_meetings/aprsaf25/registration.php

Overall Schedule of APRSAF-25 and Related Projects

<table>
<thead>
<tr>
<th>DATE</th>
<th>EVENT</th>
<th>Venue</th>
</tr>
</thead>
</table>
| 2-4 November 2018     | Water Rocket Event                         | 2 Nov 2018: Bunc Hostel
                                                                      3 Nov 2018: Temasek Junior College (TJC)
                                                                      4 Nov 2018: Bedok South Secondary School (BSSS) |
| 5 November 2018       | SAFE Workshop                              | Nanyang Technological University           |
| 6 November 2018       | Kibo-ABC Workshop Academic Space Policy Workshop | Sheraton Towers Singapore                |
| 6-9 November 2018     | APRSAF-25                                  | Sheraton Towers Singapore                |
|                       | Working Group Sessions                     |                                            |
|                       | 8-9 November Plenary Session               |                                            |
|                       | Poster Contest                             |                                            |
|                       | Exhibition                                 |                                            |
| 8 November 2018       | 25th Anniversary Event of APRSAF            |                                            |

For most updated program of APRSAF-25, please refer to our website:
http://www.aprsaf.org/annual_meetings/aprsaf25/program.php
Greetings from Singapore!

In 2011, Singapore first hosted the 18th edition of the Asia-Pacific Regional Space Agency Forum (APRSAF) and we are pleased to host APRSAF-25 again this year. As the largest space-related conference in the Asia-Pacific region, APRSAF is the prime platform for sharing ideas and engaging in discussion with the industry experts in the government, commercial and academic sectors.

Jointly organised by the Singapore Space and Technology Association (SSTA), the Ministry of Education, Culture, Sports, Science and Technology of Japan (MEXT), and the Japan Aerospace Exploration Agency (JAXA), APRSAF’s silver jubilee will take place from 6 to 9 November 2018 at Sheraton Towers Singapore with the theme “Innovative Space Technology for Evolving Needs”.

This theme highlights the need for the space industry to keep up with today’s rapid technological advancements so as to make the greatest impact upon our society.

Since hosting our first APRSAF, Singapore’s space ecosystem has come a long way in promoting greater interest and awareness about space in Singapore. In 2016, we saw the start of the Asian Try Zero-G Challenge, a SSTA and JAXA collaboration where winning student proposals are performed by JAXA astronauts aboard the International Space Station (ISS). In 2017, we saw our first satellite launch from the ISS, under a joint project by Singapore’s Nanyang Technological University and Japan’s Kyushu Institute of Technology.

I hope that APRSAF-25 will be a platform for delegates to not only strengthen the existing ties between you and your international neighbours, but also a place for you to forge new bonds and establish novel partnerships. I wish that you have a fruitful time here at APRSAF-25 and once again, it is my pleasure to welcome you to Singapore.

Dear APRSAF community members:

The Asia Pacific Regional Space Agency Forum (APRSAF) is a historic forum that has continued annually for 25 years since its launch in 1993, and the discussions held at the forum have greatly contributed to the field of space development and utilization in the Asia-Pacific region. I am truly privileged to serve as general co-chairperson of APRSAF-25 with Singapore.

The main theme of APRSAF-25 will be “Innovative Space Technology for Evolving Needs.” Space development and utilization have become more and more familiar to many countries through expansion of Sentinel Asia and nano-satellite development. Space development and utilization is expected to support global needs, such as prompt assessments of the situation after natural disasters, through big data analysis and IoT development. These activities will be useful in achieving the UN-adopted Sustainable Development Goals (SDGs). It is important to share information and current activities relating to rapid technology development and space development and utilization at APRSAF, and discuss how we can jointly work in the field of space.

Space technology development is directly relevant to our lives, and should be discussed among many countries, regardless of their technological capability differences. Furthermore, advancement of space technology is based on various actors, such as governments and space agencies (traditional, new, commercial, etc.) As more players enter the space field, more synergy can be expected.

Concerning international space exploration, Japan recently hosted the 2nd International Space Exploration Forum (ISEF2) and related side events in March 2018. Through the fruitful discussion, the participants adopted three outcome documents as a basis to engage in dialogue to promote international cooperation and long-term space exploration endeavours that will deliver benefits to humanity. All nations actively interested in space exploration are always welcome to participate in international space exploration. It will be a great timing for every actor to discuss how to utilize space technology strategically at APRSAF-25, in accordance with the results of ISEF2. Participants will be able to discover benefits provided by participation in the exploration of outer space.

I am enthusiastically looking forward to discussing the program topics with members from the Asia-Pacific region at APRSAF-25.
The Space Applications Working Group (SAWG) was established following the 20th anniversary of the APRSAF, and its first meeting was held at APRSAF-21 in Tokyo in December 2014. Part of the motivation for forming the SAWG was to foster enhanced cooperation with local operational agencies in each country of the Asia-Pacific region, as well as with development aid agencies and international organizations, through the promotion of sustainable operation of space applications.

The SAWG of APRSAF-25 to be held in Singapore will be co-chaired by National University of Singapore and JAXA, and will provide a discussion opportunity about space technology as an enabler (regional platform) for societal development. More specifically, space technology can supply information and inputs to find solutions that address the Global Agenda (Sendai Framework, the Paris Agreement and the Sustainable Development Goals) and that also support Spatial Data Infrastructure through value addition, dissemination and data sharing frameworks such as Open Data Cube efforts by Australia, India and Vietnam; data/information sharing portals such as JASMIN (JAXA), MOSDAC, BHUVAN (India), and MANTAP (Indonesia), etc.

SAWG initiatives, namely, Sentinel Asia for disaster monitoring and Space Applications for Environment, and SAFE for environmental applications including agriculture (GEOGLAM-Group on Earth Observations Global Agricultural Monitoring) and integrated water and land resource management, will be discussed in detail to improve and enhance services to end users in the Asia-Pacific region. These two initiatives, Sentinel Asia and SAFE, are both in advanced phases of maturity as technical demonstration endeavors of SAWG. In addition, commercial sector participation on advanced IT technologies, such as big data analysis and cloud computing that are playing a key role for delivering information services using space-based data, will be planned.

In conclusion, we are looking forward to seeing you in Singapore to discuss the latest space applications that can support a safe, prosperous Asia-Pacific region by using advanced space technologies and IoT.

The Space Technology Working Group (STWG) aims to enhance and support space technology development in the Asia-Pacific region through active information exchange among experts from space agencies, academic institutions, as well as from the private sector in the region. Based on the achievements at APRSAF-24 in India, the program structure of the STWG for this year’s session is given below. The STWG co-chairs are pleased to call for presentations on each topic.

- **Recent trends in space technology development status**
  - Introduction to own nations’ current trends in space technology development and efforts in capacity building, or lessons learnt from capacity building courses are expected. The main topics of interest are as follows: (a) Current and future space technology development roadmap and its function, (b) Advanced, cutting-edge and innovative technologies (satellite bus, devices, components, or relevant facilities), and (c) Capacity building at “higher education” (university or working engineer) level.

- **Space industry participation**
  - Space industries including small and medium enterprises, and/ or governments, institutes and space agencies that support such industries are invited. Presenters are expected to introduce advanced, cutting-edge, and innovative technologies that can be applied commonly or solve common technological barriers in the region. In particular, presenters from Singapore are welcomed.

- **Space debris countermeasures**
  - This session will share space debris countermeasures focusing on technical issues. Nations which launch satellites, and institutes or agencies from spacefaring nations are most welcome to introduce their activities.

- **Status report for the “Joint development of Innovative Small and Cube Satellites”**
  - The current status for the preparation of the “Joint development of Innovative Small and Cube Satellites” proposed in APRSAF-24 will be reported.
The Space Environment Utilization Working Group (SEUWG) was formed to encourage countries in the Asia-Pacific region to utilize the Japanese Experiment Module, also known as “Kibo,” which means “hope” in Japanese. The Kibo module on the International Space Station (ISS) is a manned space facility that provides unique research capabilities in a microgravity and in-orbit space environment. Various scientific and engineering research activities are conducted on Kibo that take advantage of the exceptional environment, in the fields of life science, medical science, materials science, space environment monitoring, astronomical observation, Earth observation, and advanced technologies.

One key capability of Kibo is small-satellite deployment that employs the JEM Small Satellite Orbital Deployer (J-SSOD). Approximately 220 satellites have been deployed from Kibo up until now, and J-SSOD has been gathering global attention as a new space transportation system for satellites. Kibo also commands the Experiment Handrail Attachment Mechanism (ExHAM) and the IVA-replaceable Small Exposed Experiment Platform (iSEEP) that together provide easier and more frequent opportunities for small-sized technical experiments and exposed experimental hardware (e.g., new device tests for satellite and Earth observation using HDTV camera). Furthermore, Kibo’s Pressurized Module is used not only for science and technology, but also for capacity building like the Asian Try Zero-G program.

At this time, we look forward to presentations on current activities and interesting utilization ideas/proposals for submission to the SEUWG. Topics of space environment utilization other than Kibo utilization (parabolic flight experiments, sounding rocket experiments, etc.) are also welcome. Private companies will be invited to introduce their activities and plans that incorporate capabilities currently provided by Kibo, in addition to those for the ISS.

Through discussions held following the presentation of relevant topics as described above, the SEUWG aims to contribute to introducing new projects for Kibo utilization. We welcome the participation of many countries from the region, and look forward to sharing and discussing the future of space environment utilization for the Asia-Pacific region.

On behalf of the Space Education Working Group (SEWG), we would like to welcome everyone to the 25th Asia-Pacific Regional Space Agency Forum. The SEWG aims to inspire, nurture, motivate and develop young talent in order to support future space programs. Through various space educational activities, we strive to spark the intellectual curiosity of young minds, not only in the Asia-Pacific region but throughout the world.

This year, the SEWG will hold its annual Water Rocket Event from November 2nd to 4th in Singapore, right before the APRSAF-25. The event is co-organized with SpeedB as our local organizer. During the Water Rocket Event, students and educators from more than 12 countries in the Asia-Pacific region will test their skills in making and launching water rockets, as well as interact with each other to foster cultural exchanges between countries. At the annual Poster Contest, selected works from participating countries will be exhibited at the APRSAF-25 session venue, with the winner being selected based on the votes by APRSAF-25 participants.

In this year’s working group meeting, the SEWG would like to put a spotlight on “Innovative Space Education Programs”. With the advent of new techniques for teaching and communicating space science, the topic is timely and fitting. These innovations can come in the form of new technologies used, online space education or new pedagogies. We hope that SEWG members would share their respective innovative and unique programs, create a dynamic exchange of ideas, and share best-practices in teaching space to our youth. New trends in global space education will also be introduced, including the movement from STEM (Science, Technology, Engineering and Math) to STEAM (Science, Technology, Engineering, Art and Math) learning, which aims to foster human resources with broader knowledge and creativity. We hope that through these discussions, it would serve as a preview for future trends for space education in the Asia-Pacific region.

As part of this year’s output, the SEWG looks forward to contributing ideas and innovations to enhance member countries’ space education activities based on their respective educational policies. In order to achieve this, it is important for us to be creative and think out-of-the-box in developing, utilizing and promoting space-related educational materials and activities. We look forward to your active participation at the next SEWG meeting. See you in Singapore!
INTER-REGIONAL SPACE POLICY DIALOGUE BETWEEN ASIA-PACIFIC AND EUROPE

In the evening of 22 June 2018, the APRSAF Secretariat and European Space Policy Institute (ESPI) co-organized an event titled, "Inter-Regional Space Policy Dialogue between Asia-Pacific and Europe - Towards Space Policy for Socioeconomic Development" at ESPI in Vienna, Austria during the United Nations COPUOS session this year. Approximately 60 space policy experts from 25 countries participated in this first-ever event.

As many countries in the Asia-pacific region have started developing their own space policy, APRSAF has begun to organize opportunities to exchange views at the policy level, and organized the "Space Policy Session" at APRSAF-24 for the first time last year. The Joint Statement of APRSAF-24 noted the importance of space policy practitioners to regularly gather and exchange views, and this event at ESPI was an opportunity to follow up on the Statement.

The event was designed to provide a number of representatives from both regions with the opportunity to exchange views on space policy for socio-economic development, and to learn more about the respective approaches taken towards the development and implementation of space policies in other countries.

During the first session, representatives of the co-organizers, Mr. Akira Kosaka, APRSAF Executive Secretary, and Mr. Jean-Jacques Tortora, Director of ESPI, each presented an overview of the space policy communities in their respective regions.

During the second session, space policy experts from Asia-Pacific and Europe respectively presented their national space policies and activities, and discussed actions to be taken in order to make use of space technologies toward national development issues.

As the first opportunity for dialogue between Asia-Pacific and European space policy communities, the event was successful.

APRSAF will continue to promote space policy discussions within the Asia-Pacific region, as well as space policy dialogues with other regions.

ENHANCEMENT OF HIGHER EDUCATIONAL PROGRAMS

To follow-up on the Joint Statement adopted at AP-24 in India, the APRSAF Secretariat has been working to enhance higher educational programs and has held the following two space science seminars so far.

   From December 12 to 15, 2017, the International Conference on Space Science & Technology was held at Vietnam National University in Ho Chi Minh City, Vietnam. One of the main goals of the conference was to promote research activities of space science and technology in Asian countries. The other important goal was to onset space science in APRSAF, in terms of high-level education and research activities. The conference counted 70 participants, including 22 undergraduate students. Professional participants from Vietnam, Japan, Korea and Taiwan gave technical presentations and exchanged information actively. The 22 students enthusiastically took part in discussions and actively put forward many questions on the applications and the technical issues.

   On April 5th, 2018, the first space science seminar for Indonesia organized by the APRSAF Secretariat was successfully held between the Institute of Space Astronautical Science (ISAS), the Japan Aerospace Exploration Agency (JAXA) and Lembaga Penerbangan Dan Antariksa Nasional (LAPAN) via video conference system in an initial trial. The seminar was aimed to enhance the knowledge about space science and contribute to improving regional space capability. Two professors from ISAS of JAXA respectively provided an overview of ISAS research activities and an explanation of the scientific results of solar observatory mission HINODE. Thirty-one active participants from LAPAN asked many intensive questions and showed their strong interest and eagerness to participate in further activities.

The APRSAF Secretariat will continue promoting activities such as the above seminar with the aim to improve regional space capability.
BENEFITS FOR YOUNG PROSPECTIVE ASIANS: ‘ASIAN TRY ZERO-G 2018’ ONBOARD ISS

On February 13th, Asian Try Zero-G 2018 was held onboard the “Kibo” Japanese Experiment Module of the International Space Station (ISS). Out of 169 proposals from 361 applicants, JAXA astronaut Norishige Kanai performed eight experiments comprising a variety of scientific ideas incubated by students and young scientists from among Kibo-ABC member nations: Indonesia, Japan, Malaysia, Philippines, Singapore, Thailand, and Vietnam. The participating space agencies had screened the proposals, provided the flight items, and prepared for these physics experiments. At the JAXA Tsukuba Space Center, the proposers were glued to the live downlink screen showing their experiments and communicated with astronaut Kanai.

After the experiments were finished, many students exclaimed how amazing the space experiments were, because everything in space was so different from what they expected. And Kanai concluded with his encouragement for the prospective scientists from Asian countries, “Nowadays, space is getting closer and closer to everyone. I hope Kibo becomes an opening door for you to utilize the space environment.”

A half year later, most of the proposers gathered again to report and discuss the results of their experiments. Fortunately, astronaut Kanai was also able to join. Approximately 100 people representing seven countries - proposers, representatives of each space agency, teachers, friends and parents - were connected via the web conference network to join this final event. The proposers shared creative insights toward the outcomes of all of the microgravity experiments.

Since 2011, the Asian Try Zero-G program has been open to Asia-Pacific countries under the collaborative framework of Kibo-ABC initiative, which aims to promote space experiments and create Kibo utilization projects. For more details, visit http://iss.jaxa.jp/en/kuoa/tryzerog/.

APRSAF-25 IN SINGAPORE

APRSAF’s silver jubilee will be held in the city-state of Singapore, an island nation located off of the tip of the Malay Peninsula. With tropical weather throughout the year, the towering trees and greenery line the sidewalks as part of the ‘City in a Garden’ vision, and provide a much-needed reprieve from the sweltering heat.

The mixing of diverse cultures and traditions in Singapore, a secular, immigrant country, has resulted in a flourishing gourmet scene, creating many local dishes such as Hainanese chicken rice, and chili crab. While creating our own unique Singaporean identity, the rich heritage of Singapore’s founding immigrant groups are not lost, being preserved in ethnic neighbourhoods such as Kampong Glam, Geylang Serai, Little India and Chinatown.

In addition to our rich heritage and culture, Singapore is known for being one of the most business-friendly regulatory environments, boasting a strong financial and manufacturing industry. Ranked as one of the world’s most competitive economies, Singapore has also set her eyes on becoming a ‘Smart Nation’, seeing the immense potential for technology in changing our lives for the better.

Our country continues to draw visitors from all over the globe, and we hope that you will likewise enjoy what Singapore has to offer. Have a pleasant time here for APRSAF-25!
The UAE space sector has grown significantly in the four years since the UAE Space Agency was established in 2014, with a mandate to fund and oversee space-related activities within a consistent regulatory framework that encourages growth and partnerships.

In the past year, a range of exciting new developments have further established our leading regional position in space affairs.

A public call for astronaut candidates received more than four thousand submissions from Emiratis with a broad range of relevant experiences, from pilots to scientists. Nine candidates are currently undergoing training, with the first Emirati astronaut set to travel to the International Space Station in April 2019. This is a major step for our national space program that will provide us with advanced capacities for space exploration.

Higher education support and youth engagement also represent central facets of our long-term strategies to develop our local space industry. In this vein, this year saw Emirati undergraduates from leading universities in the UAE working together to design, develop, test and operate a 3U CubeSat that will detect and monitor levels of greenhouse gases in the Earth's atmosphere.

This project — and the many others like it — will provide our burgeoning space industry with highly-skilled graduates that have vital hands-on experience. It also highlights the relevance of space to other vital areas of public life, such as climate change, resource management and environmental protection, as well as research and development of advanced technologies.

Underpinning all of our activities are the close relationships that we have formed with the international space community. Our participation in APRSAF has been an exceptional platform for expanding our relationships with some of our most important partners in the global sector, allowing us to build robust capacity development programs and cutting-edge deep space exploration missions. This includes our flagship Hope Probe mission to Mars, set to launch in 2020.