The Asia-Pacific Regional Space Agency Forum (APRSAF) was established in 1993 to promote and expand peaceful uses of space activities and their applications for socio-economic development in Asia-Pacific region.

Space agencies, governmental bodies, international organizations, development assistance agencies, private companies, universities, and research institutes from over 40 countries and regions take part in the APRSAF, the largest space-related conference in the Asia-Pacific region. The increasing attendance of high-ranking officials at APRSAF events provides opportunities for the discussion of concrete plans for international cooperation on space activities.

APRSAF currently organizes four working groups—Space Applications, Space Technology, Space Environment Utilization, and Space Education—to share information about the space activities, policy, future plans, and ideas for space technological development of each country and region in these respective areas. APRSAF also supports the establishment of international projects as solutions for common issues, such as disaster management and environmental protection, so that participating parties will benefit from mutual cooperation.

### About APRSAF

- **In view of the diversity of needs in the Asia-Pacific region, APRSAF is an open forum which everyone who has interest in cooperation in the field of space may attend.**
- **The open framework of the APRSAF enables various entities to participate in its activities.**

### Features of APRSAF

**Open and flexible regional cooperative framework**

- Participating parties carry out their projects in a cooperative and voluntary manner.
- Working groups actively organize workshops throughout the year.

**Voluntary and cooperative activities**

- APRSAF establishes international initiatives to deal with common issues in the Asia-Pacific region and implement concrete actions:
  - Sentinel Asia for disaster management
  - SAFE (Space Applications For Environment)
  - Kibo-ABC (Asian Beneficial Collaboration through “Kibo” Utilization)
The Space Applications Working Group (SAWG) was established to promote various space applications that address socioeconomic issues in the Asia-Pacific region, such as disaster management and environmental issues, through the use of space technology (Earth observation, communication, and navigation). The SAWG aims to approach common region-wide issues while ensuring global cooperation among space agencies, user organizations, development aid agencies, and the private sector. As part of the SAWG, specific international cooperative activities such as Sentinel Asia for disaster management and Space Applications For Environment (SAFE) for environment monitoring have been promoted.

Objectives

The SAWG recognizes the importance of the integration of Earth observations (geostationary orbit and low Earth orbit satellites), public, academic, and private micro and small satellites, Multi-GNSS and ICT to resolve national and regional socioeconomic themes (e.g. disaster management, agriculture, forest management, water resource management and ocean monitoring) in the Asia-Pacific region, and discusses how to promote integrated applications.

Activities

Discussion and information exchange toward solutions to regional issues utilizing space technologies

- The SAWG recognizes the importance of the integration of Earth observations (geostationary orbit and low Earth orbit satellites), public, academic, and private micro and small satellites, Multi-GNSS and ICT to resolve national and regional socioeconomic themes (e.g. disaster management, agriculture, forest management, water resource management and ocean monitoring) in the Asia-Pacific region, and discusses how to promote integrated applications.
- In the WG, representatives of participating countries are invited to present how they utilize satellite data for the formulation of policies on disaster management and climate change mitigation. The WG also appreciates the sharing of experiences, the results of regional cooperation in satellite data utilization, capacity building, and so forth.
- The WG further promotes space applications that address regional socioeconomic themes in the Asia-Pacific region in collaboration with international/regional organizations and international development aid agencies. In recent years, collaboration within regional frameworks (e.g. ASEAN*, APEC*), international organizations (e.g. UNESCAP*, FAO*) and international development aid agencies (e.g. JICA, ADB) has proved to be indispensable for making contributions to Sustainable Development Goals (SDGs) as defined by the United Nations, and the promotion of space applications in climate change adaptation/mitigation as discussed by the Intergovernmental Panel on Climate Change (IPCC) and the Conference of the Parties (COP) to the UN Convention on Climate Change (UNFCCC).
- During APRSAF-25, the SAWG shared and discussed information on the integrated use of multi-satellite data and ground data on platform, inter comparison of satellite products, timely delivery of validated data and information tailored for needs, and the necessity of knowledge sharing among countries and agencies. In addition, the WG discussed the further enhancement of APRSAF initiatives such as Sentinel Asia and SAFE, and the further strengthening of cooperation with user organizations, development aid agencies, and international organizations to seek solutions to societal issues such as natural disaster, climate change, food security, water resource management, and urban issues, which are listed in three global agendas (the U.N., SDGs, the Sendai Framework, and the Paris Agreement) and then for realizing social implementation that meets user needs.
- For SAFE activities, a new framework named “SAFE Evolution”, with multi-lateral cooperation based on the SAFE project activities was recommended.

Promotion of specific international cooperative activities

- Specific international cooperative activities to solve socioeconomic issues are carried out under the SAWG. Progress reports made by participating agencies in the SAWG, and future directions to promote these initiatives are discussed:
  - Activities of Sentinel Asia (P. 7)
  - Activities of SAFE (P. 8)
  - Association of South East Asian Nations (ASEAN)
  - Asia Pacific Economic Cooperation (APEC)
  - United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)
  - Food and Agriculture Organization (FAO)

Objectives

The Space Technology Working Group (STWG) was established to support space technology development in the Asia-Pacific region by active information exchange among experts from space agencies, academic institutions as well as from the private sector in the region. The STWG aims to share the best practices of technology, resources and programs and also promote international cooperation to answer and solve the evolving needs and challenges the Asia-Pacific region faces in terms of space technology development.

Activities

During APRSAF-25 in Singapore, participants exchanged the latest information on space technology research and development, capacity building, active industry participation/promotion, and space debris. Furthermore, productive discussions were held on the initiative “Joint development of Innovative Small and Cube Satellites,” which was proposed among Asia-Pacific regional space agencies in APRSAF-24.

The goal for the STWG in APRSAF-26 is to add value to this working group by turning the STWG into a core information hub for the collection, exchange and discussion of a wide variety of information for space technology development in the Asia-Pacific region.

A) Introduce market, technology and application trends that will enable participants to deepen their understanding of the overall status of the industry in the region.
B) Share best practices/successful examples and challenges for attaining space technology, leading to future discussions for solutions and new international cooperation and joint programs in the region.

Based on these targets, the outline of the STWG in APRSAF-26 is structured as follows: (1) Recent Trends in the Space Industry, (2) Activities and Challenges of Space Technology Development, (3) Activities for a Sustainable Environment in Space, (4) Status report for the “Joint Development of Innovative Small and Cube Satellites.” The STWG will have keynotes and panels this year to enhance interaction among participants.

Through these sessions with their respective participants, the STWG will continue further discussions to increase space development capacity in the Asia-Pacific region and establish new cooperative activities.

STWG (APRSAF-25)
The Space Environment Utilization Working Group (SEUWG) was established as an opportunity for countries in the Asia-Pacific region to use the Japanese Experiment Module "Kibo" on the International Space Station. For further utilization of the space environment, the WG shares needs and exchanges information on subjects related to the advantages and framework of using Kibo's special function. Through discussions among the participating nations, the WG aims to contribute to building cooperative projects for the utilization of Kibo and to provide a variety of benefits for the Asia-Pacific region.

Objectives

- Effectively using space-related education materials to enhance education for young people.
- Providing education and training opportunities for young people in space science and technology.
- Helping enhance mutual understanding among countries in the region through exchange opportunities for young people.

Activities

- J-SSOD / Opportunities for launch and deployment of microsatellites from Kibo: Kibo has a unique system for deploying microsatellites into space called J-SSOD (JEM Small Satellite Orbital Deployer). More than 200 satellites have been successfully deployed from Kibo using this system, including CubeSats in sizes ranging from 1U (10x10x10cm) to 3U (100x100x100cm) and the first Philippine 50-kg-class microsatellite (DIWATA-I). Deployment missions of microsatellites from Kibo using J-SSOD have been gathering global attention as a new transportation system for satellites. The 3U CubeSat of Singapore, a participant in the Kibo-ABC initiative, was deployed from Kibo in June 2019.
- ExHAM / New exposed experiment system of Kibo: ExHAM (Experiment Handrail Attachment Mechanism) enables experiments to be carried out for a short period of time with a lightweight experiment sample, and is therefore useful for satellite design. It is currently gaining wide interest among Asian countries, with Malaysia beginning a dosimetry exposure experiment using ExHAM in May 2019.
- Microgravity science in Kibo's Pressurized Module: Since experiments in microgravity represent specialized fields of research, proposals for Kibo utilization from Asian countries, although valuable, were previously limited in number. However, significant progress has recently been observed. Malaysia started a new passive dosimetry experiment in Kibo in May 2019. In addition, Thailand conducted its first space experiment, a protein crystal growth experiment for an antimalarial drug, in July 2019. Furthermore, an Emirati astronaut performed a science education mission in Kibo under collaboration between the UAE and Japan in September 2019.

Promotion of space environment utilization in the region

- Activities of Kibo-ABC (P. 9): Space Environment and Kibo Utilization Workshop (SEKUW): The SEKUW is an international workshop whose purpose is to discover potential space experiments to be conducted in Kibo. Based on the success of the first workshop held by LAPAN in 2015 in Jakarta, Indonesia, the second workshop was held by ANGKASA in 2016 in Kuala Lumpur, Malaysia and the third workshop by GSTDA/NSTDA in 2017 in Bangkok, Thailand.
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Space Education Working Group (SEWG)

Objectives

- Effectively using space-related education materials to enhance education for young people.
- Providing education and training opportunities for young people in space science and technology.
- Helping enhance mutual understanding among countries in the region through exchange opportunities for young people.

Activities

- Annual Meeting: The SEWG holds its annual meetings in conjunction with the APRSAF annual sessions. Delegates from participating countries and organizations make presentations based on their space education activities over the past year and their future plans, and exchange views on space education. Additionally, they have open discussions on how they can further promote SEWG activities in the Asia-Pacific region. During the APRSAF-25 meeting, innovative space educational materials and methods including programming, CanSats, and robots were shared among participants.
- Water Rocket Event: The Water Rocket Event has been held prior to the APRSAF session annually since 2005, and is attended by approximately 60 students aged 12 to 16 and their educators from more than 15 countries. In the competition, participants try to launch their rockets so they land closest to the target, through designing, building, and modifying them to improve their performance. The program also gives students an opportunity to interact with participants from different cultures and further recognize their own backgrounds.
- Poster Contest: The Poster Contest has been held during the APRSAF session since 2006 for children aged 8 to 11. Its aim is to encourage the imagination through the respective annual space-related theme; the theme for the next year’s Poster Contest is generated and selected at the WG’s annual meeting. Delegates to the annual meeting of the APRSAF are encouraged to vote for the best poster.
- Space Education Seminar/Educator Workshop: The Space Education Seminar and the Educator Workshop provide valuable opportunities for teachers and educators to gather and trade experiences, insights and achievements from their own space education activities. The aim is to enhance the quality of teaching, nurturing the kind of next-generation talent capable of true innovation. SEWG holds its Space Education Seminar for Educators once a year to promote space education within the region, organized in close collaboration with the host agency to meet the specific needs of the host country. The WG considers it important to make the seminar both participatory and practical, so that attendees can incorporate what they learn into their everyday curricula.
- CanSat (small satellite having the volume and shape of a soft drink can): The working group promotes CanSat activities for secondary-school, university and graduate students arranged on various occasions.
- Social Media Usage for Educational Purpose: The WG opened a Facebook page in December 2012 for exchanging information on space education.

Space Education Seminar

Water Rocket Event

Poster Contest

Educator Workshop
Just after disaster

Reduction Center (ADRC), show that Asia has suffered serious damage from natural disasters. The region accounted for 57 percent of global fatalities in the Natural Disasters Data Book 2003, published by the Asian Disaster Reduction Center. The objective is to showcase the value and impact of Earth observation technologies when such disasters happen. In light of this, APRSAF proposed Sentinel Asia in 2005 to further joint operation by the Joint Project Team (2013–Present).

Background

The Asia-Pacific region is prone to natural disasters. Statistics presented in the Natural Disasters Data Book 2003, published by the Asian Disaster Reduction Center (ADRC), show that Asia has suffered serious damage from natural disasters. The region accounted for 57 percent of global fatalities from natural disasters and 90 percent of the total number of victims of such disasters. In light of this, APRSAF proposed Sentinel Asia in 2005 to showcase the value and impact of Earth observation technologies when such disasters happen.

Preparedness:

Minimizing the number of victims and socioeconomic losses

Monitoring:

Emergency monitoring by Earth observation satellites upon request in cases of major disasters

Mitigation:

Emergency monitoring by Earth observation satellites upon request in cases of major disasters

More group activities focusing on specific disasters such as wildfires, water-related disasters, and tsunamis

Capacity building and human resources development for effective disaster management

A step-by-step approach was adopted for the implementation of Sentinel Asia as follows:

Step 1: Implementation of a data dissemination system as a pilot project to form the backbone of Sentinel Asia and showcase the value and impact of technology using standard Internet dissemination systems (2006–2007)

Step 2: Expansion of the dissemination backbone with new satellite communication systems and enhancement of activities based on requirements and experiences acquired during Step 1 (2008–2012)

Step 3: Support for the entire disaster management cycle, namely, mitigation/preparedness and response and recovery activities through the utilization of various satellites, including Earth observation, communications, and navigation satellites, based on the human network and further joint operation by the Joint Project Team (2013–Present)

The steering committee (SC) was established in 2015 to ensure the formation of a development plan for strategic management. Currently, under the leadership of SC, Sentinel Asia is drafting the strategic plan for the next decade and addressing activities to strengthen the link with Sendai Framework for Disaster Risk Reduction.

SAFE Prototyping Activities

SAFE prototyping refers to a trial application of earth observation data for solving environmental issues in the Asia-Pacific region. A SAFE prototyping operation consists of Prototyping Executors, Technical Supporters, and Data & Application Creators. By getting face-to-face technical support from experts, prototyping executors aim to construct a system that supports decision-making activities.

SAFE Project Activities

The SAFE project entails multilateral collaboration with space agencies, research institutions, and international organizations in the Asia-Pacific region, developing the achievements of SAFE prototyping by sharing the earth observation data, application, and knowledge among the organizations, the SAFE project contributes to solving environmental problems in the Asia-Pacific region. SAFE is currently promoting two projects: the Rice-Crop Monitoring Project, and the Agromet Project.
Utilization Working Group (SEUWG) under the APRSAF, aiming to promote the utilization of the Japanese Experiment Module “Kibo” on the International Space Station in the Asia-Pacific region and to share and build on the outcomes of the utilization of Kibo. The objectives include accumulating scientific experience and the enhancement of capacities among participating space agencies through the implementation of projects utilizing Kibo, and the creation of bilateral cooperation projects on Kibo utilization between member countries and Japan. These activities are conducted jointly with member countries that have consented to the Terms of Reference (TOR) of Kibo-ABC.

The utilization of Kibo is progressing under the Terms of Reference (TOR) stipulated by the APRSAF Executive Committee. The utilization of Kibo is conducted through Kibo-ABC programs, and activities are implemented with the participation of member agencies. The activities are divided into those of Kibo-ABC Workshop and Monthly Web-Meeting.

Kibo-ABC Workshop

- Discussions and consideration of the creation of Kibo utilization missions
- Development and implementation of multilevel cooperative programs among participating countries in the field of space science and technology
- Learning about the Kibo experiment operation process
- Talks sessions with JAXA’s experts on microgravity science or other fields
- Sharing each country’s activities, and holding discussions for improvement

Kibo-ABC Multilateral Programs

- Microgravity Experiment Program on the ground
- Parabolic Flight Experiment Program (2005–2016)
- Young researchers and engineers in Asian countries are invited to test their ideas regarding flight experiments, which are normally first implemented for on-ground verification and testing purposes prior to full experimentation in space.
- MicroDrop Tower Demonstration Program (2012–Present)

The third mission of this program, “Asian Herb in Space (AHIS),” was presented by Malaysia/ANGKASA. Feasibility studies and ground experiments have been conducted from both scientific and technical perspectives with the aim of conducting a plant growth experiment. Preparatory activities and a flight experiment plan are under consideration among participating countries.

Asian Try Zero-G (2001–Present)

With the goal of promoting manned space experiments aboard Kibo, Japanese astronauts have been conducting selected small experiments regarding themes proposed by youth in the Asia-Pacific region. This program also develops the skills needed for feasibility studies related to creating Kibo experiments.

Kibo-ABC member agencies screen the proposals according to an agreed selection process. After a safety review and a feasibility assessment by JAXA, the final selection is determined by member agencies. Ultimately, the selected experiments are performed by an astronaut onboard Kibo. The 6th Asian Try Zero-G mission was successfully conducted by Japanese astronaut Norishige Kanai in February 2018 with participation from seven Asian countries: Indonesia, Japan, Malaysia, Philippines, Singapore, Thailand, and Vietnam.

Kibo Robot Programming Challenge (2002–)

This is an educational competition program to grant the next generation of scientists and engineers access to space-related activities and to gain knowledge of space technology and programming. They will solve various given problems by using a real space robot in the ISS. JAXA will present this program in collaboration with NASA under the Japan-U.S. Open Platform Partnership Program [J-US OPI]. The first competition tournament will be conducted in 2020.

SSAF/ Space Seeds

This is a small experiment program that has been devised to be optimal for missions among participating countries in the field of space science and technology.

Activities

- Creation of Bilateral Projects
- New Space Experiment mission
- Parabolic Flight Experiment Program (2005–2016)
- Space Seeds for Asian Future (2010–Present)
- Young researchers and engineers in Asian countries are invited to test their ideas regarding flight experiments, which are normally first implemented for on-ground verification and training purposes prior to full experimentation in space.
- Mini Drop Tower Demonstration Program (2012–Present)

Activities involve conducting microgravity experiments using a handmade mini drop tower, whereby a microgravity environment is created, and holding seminars.

Utilizing and Sharing the Benefits of ISS/Kibo

Kibo-ABC Goals, Activities, and Objectives

- Based on a Bilateral Agreement between JAXA and the proposed country (mutually beneficial collaboration)
- Creation of Bilateral Projects New Space Experiment mission
- Feasibility Study, Technical and Engineering Review... more works!
- Process understanding of Kibo utilization... innovating ideas
- Monthly Meetings, Workshops... Planning the Small Space Experiment by Kibo ABC Multilateral Programs
- Terms of reference (TOR)

APRSAF History

In response to the declaration adopted at the Asia-Pacific International Space Year Conference (APYC) in 1995, APRSAF was established in 1997. APRSAF has been holding annual meetings, jointly organized by Ministry of Education, Culture, Sports, Science and Technology in Japan (MEXT), Japan Aerospace Exploration Agency (JAXA), and organizations of host countries.
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