The 26th Session of the Asia-Pacific Regional Space Agency Forum (APRSAF-26)

Space Environment Utilization Working Group (SEUWG)

Concept Note

1. Scope and Objectives

The Space Environment Utilization Working Group (SEUWG) was formed to encourage countries in the Asia-Pacific region to use the Japanese Experiment Module (JEM), also called “Kibo,” which means “hope” in Japanese. Kibo is a manned space facility that provides unique research capabilities in the International Space Station (ISS).

Kibo consists of the Pressurized Module, the Exposed Facility, a Logistics Module, and a Remote Manipulator System. Various scientific and engineering research activities are conducted onboard Kibo that take advantage of the unique environment of the low Earth orbit. Research is currently being conducted aboard Kibo in the fields of life science, medical science, materials science, space environment monitoring, Earth observation, and demonstrations of advanced technology.

The SEUWG promotes the utilization of Kibo in the Asia-Pacific region in the above fields, as well as for other areas and topics, through information exchange and discussion at WG sessions among participants. In addition to promoting the use of Kibo, the SEUWG aims to create multilateral cooperative programs for its utilization among participating countries by using the framework of the Asian Beneficial Collaboration through Kibo utilization (Kibo-ABC) initiative.

2. Activities and Discussion Points

Through discussion among participating nations, the SEUWG aims to contribute to building cooperative projects for Kibo utilization and to provide a broad range of benefits for the Asia-Pacific region.

Special Session 1

“Kibo-Robot Programming Challenge - new program of the Kibo-ABC initiative -”

The Kibo-Robot Programming Challenge (KRPC) is an educational competition mainly for university students in which they solve various problems by using real robots in Kibo. JAXA will begin KRPC with the cooperation of NASA. The contents of KRPC will be discussed at the Kibo-ABC Workshop to be held by Kibo-ABC member countries on November 25, 2019, one day before the SEUWG.
In Special Session 1, JAXA will explain the overview of KRPC to SEUWG participants as well as informing non-participating countries of this educational opportunity. Furthermore, the 7th Asian Try Zero-G program and the 3rd Space Seeds for Asian Future Program, to be conducted in the near future, will be introduced to participants at the WG session. These programs contribute to human resource development and capacity building for Kibo utilization.

■ Special Session 2
“ISS as a technical demonstration platform toward Moon and Mars exploration”
Working with U.S. companies and international partners, NASA will push the boundaries of human exploration forward to the Moon and on to Mars. At this very moment, NASA and international partners including JAXA are taking steps to begin this next era of exploration. Toward the Moon and Mars exploration, the ISS/Kibo will be utilized as a technical demonstration platform.
In Special Session 2, JAXA will present some experiments to be conducted onboard Kibo. All agencies will be invited to introduce their activities and future plans related to these topics.

■ Microgravity science using Kibo’s Pressurized Module and other opportunities
Proposals for Kibo utilization from Asian countries were previously limited in number. However, significant progress has been observed recently. Indonesia, Malaysia, and Thailand have developed plans for space experiments using the Pressurized Module and Exposed Facility of Kibo. Currently, the dosimetry experiment samples of Malaysia launched on SpX-17 in 2019 are stored onboard Kibo for the measurement of radiation dosage. In addition, the Geo-Informatics and Space Technology Development Agency (GISTDA) in Thailand has started Thailand’s first space experiment on Kibo on the Crystallization of Protein Target for Anti-Malarial Drug.
Any experimental proposals for Kibo’s Pressurized Module are welcome and open for discussion at this WG session. Information on microgravity science using a small rocket, parabolic flight, and a drop tower will also be shared in order to further expand experiment opportunities.

■ Opportunities for launch and deployment of microsatellites from Kibo/J-SSOD*
The demand from Asia-Pacific nations for microsatellite deployment has been increasing. Many Asian satellites (of Bangladesh, Bhutan, Malaysia, Mongolia, Nepal, the Philippines, Singapore, Sri Lanka, Turkey, and Vietnam) have been deployed from Kibo, and the deployment system/J-SSOD attracts global attention as a new transportation system for satellites. Project teams will be invited to introduce their activities and future plans.
Concurrently with these microsatellite deployments, KiboCUBE collaboration between JAXA and the United Nations Office for Outer Space Affairs (UNOOSA) is in progress to provide opportunities to deploy one unit (1U) CubeSat from Kibo to educational and research institutions of developing countries. The SuryaSat Project of Indonesia was selected for the third round of KiboCUBE.
In 2018, JAXA selected two private companies as the providers of small satellite deployment services from Kibo to promote independent activities by the private sector on Kibo. JAXA will explain how to use the J-SSOD system.

* J-SSOD: JEM Small Satellite Orbital Deployer

■ New exposed experiment system of Kibo/ExHAM*
Using an Exposed Facility (EF) and a robotic arm, ExHAM enables experimentation for a short period of time with a lightweight existing experiment sample, and is therefore useful for satellite design. It is currently gaining wide attention from countries in the Asia-Pacific region. Universiti Putra Malaysia has started a new dosimetry experiment using ExHAM with the Malaysian Space Agency (ANGKASA) and JAXA. The SEUWG will organize discussions regarding opportunities for the use of ExHAM.

* ExHAM: Experiment Handrail Attachment Mechanism

■ Space Environment and Kibo Utilization Workshop (SEKUW)
The SEKUW is an international workshop whose purpose is to find potential space experiments to be conducted onboard Kibo as part of the activities of the APRSAF/SEUWG. The 3rd SEKUW was successfully held in Bangkok, Thailand, in 2017. As a result, feasibility studies on space environment utilizations were initiated in Thailand. The achievements and future plans of the SEKUW will be discussed at the SEUWG.

3. Draft Agenda

1) Opening session
2) Review of the last SEUWG meeting at APRSAF-25 in Singapore in 2018
3) Activity reports and discussion
   ✓ Launch and deployment of microsatellites (Kibo and launch vehicles)
   ✓ Projects using the Exposed Facility of Kibo
   ✓ Microgravity science (Kibo, small rocket, parabolic flight and drop tower)
   ✓ Kibo-ABC initiative
   ✓ Space Environment and Kibo Utilization Workshop
   ✓ Other topics
4) Special Session 1: Kibo-Robot Programming Challenge and other Kibo-ABC programs
5) Special Session 2: ISS as a technical demonstration platform toward Moon and Mars exploration
6) Overall discussion, future work, conclusions and recommendations

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