



REPORT OF
**JAXA
SPACE
EDUCATION
CENTER**

On Its Activities in 2015 – 2016



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(Information as of March 2016)

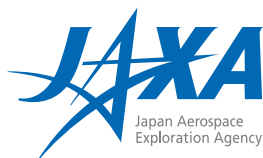


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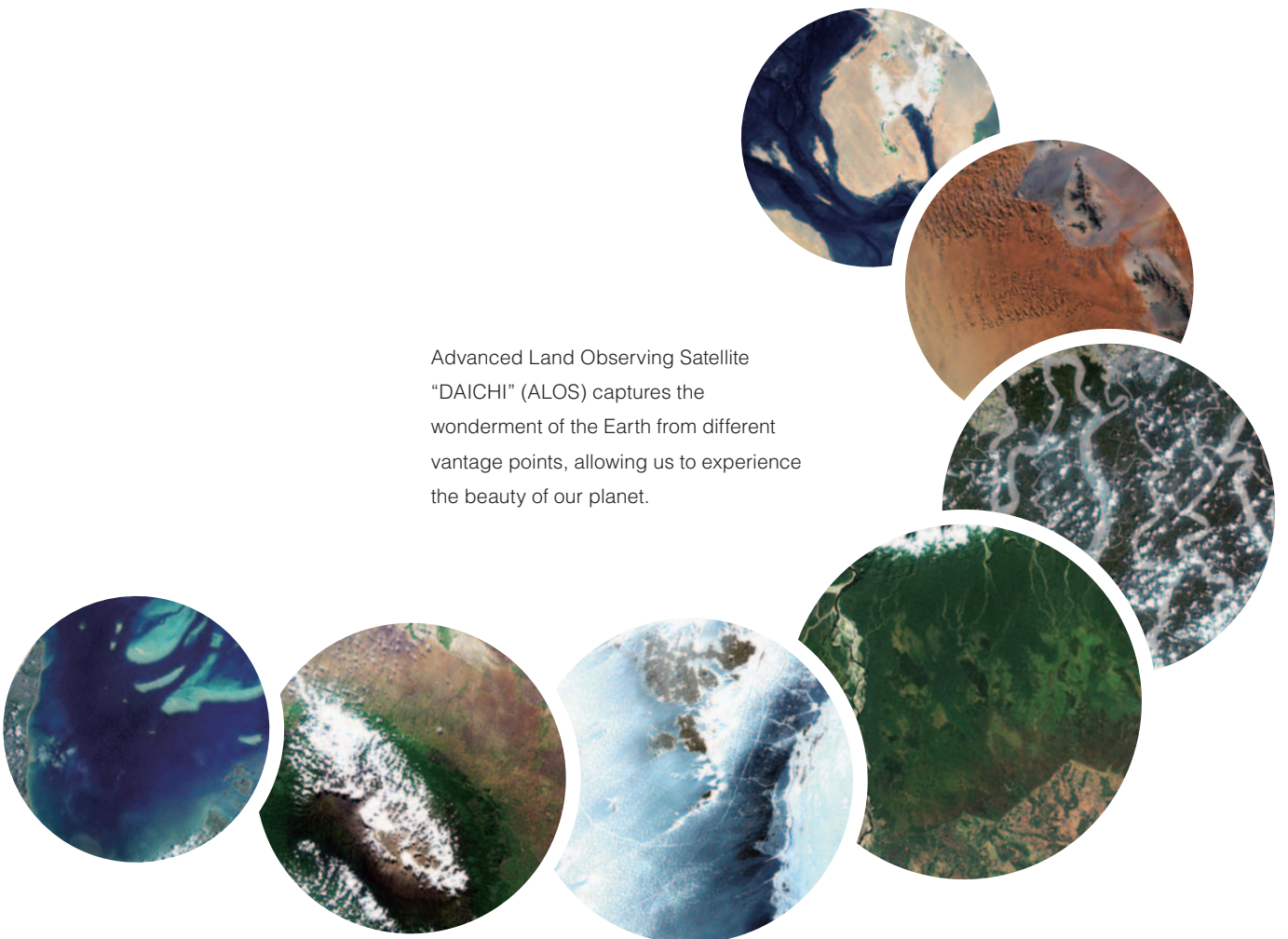
I. INTRODUCTION

As the Space Education Center, formally known as the Space Education Office, of Japan Aerospace Exploration Agency (JAXA) enters its eleventh year of operation following its establishment in May 2005, it continues to enhance its activities both in terms of quantity and quality to ignite children's curiosity toward nature, life and the universe and to inspire them to achieve higher goals. Recognizing "space" as the unique source of interest, imagination and inspiration, the Center has continued to demonstrate the effective use of space subjects, materials and resources at schools in local communities and at home to stimulate children's interest in not only science and technology but also various human conducts and their surrounding environment.

A growing number of individuals, groups and organizations within and outside Japan are now sharing the Center's goals and principles in carrying out space education activities, resulting in the increased partnerships and strategic alliances with various entities to reach out to more young people. The time between the year 2015 and the year 2016 could be marked as the period of strategic expansion of space education efforts based on the systematic support provided by the Center to all stakeholders.

This report reflects the major developments in the activities of the Space Education Center and its achievements in up to March 2016 and indicates directions to be pursued in the coming year.

Advanced Land Observing Satellite "DAICHI" (ALOS) captures the wonderment of the Earth from different vantage points, allowing us to experience the beauty of our planet.



II. BASIC FACTS

A. Establishment of the Center

The Space Education Center was established on 1 May 2005 by an executive decision by the President of the Japan Aerospace Exploration Agency (JAXA). The Center formally opened on 19 May 2005 at JAXA Sagamihara Campus.

JAXA, as well as its predecessors before its establishment in October 2003,¹ had carried out educational activities as part of the public relations and outreach activities. Those activities focused on increasing public awareness, understanding the work of JAXA and highlighting societal benefits of space activities, with the aim to gain public support for the activities of JAXA.

The recognition of the fundamental difference between public outreach and education resulted in the establishment of a separate group dedicated to space education activities. Originally located within the Public Affairs Department, the space education group carried out activities using attractive space materials to stimulate young people's interest in science and other subjects relevant to their daily lives and ultimately to have positive impact on their growing-up process. This group served as the predecessor to the Space Education Center and, to some extent, laid the foundation for the work of the Center.

¹ JAXA was established by merging the following three institutions: National Space Development Agency (NASDA), Institute of Space and Astronautical Science (ISAS) and National Aeronautics Laboratory (NAL).



Opening of the Space Education Center: Prof. Y. Matogawa, the first director of the Center (left), and former president of JAXA K. Tachikawa (right)



JAXA Sagamihara campus

B. Goals and principles

Space subjects, resources and materials inherently have a unique power to attract young people's attention, to encourage them to take on challenges and aims for higher goals. While the Space Education Center considers it important to attract young people to pursue career options in space-related areas, so as to expand the pool of future space scientists and engineers, the key mission of the Center is to effectively use space materials to have a positive impact on the minds of young people in their development process, helping them to expand their potential and to become socially responsible individuals. This is done by carrying out activities to bring out the spirit of "curiosity," "craftsmanship" and "adventurous spirit" in the young people. The development of these three "spirits" is the core philosophy of the Space Education Center.

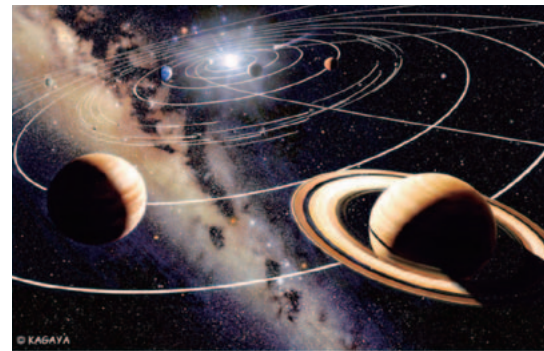
The three main principles that the Space Education Center follows in its activities are to 1) Enhance the understanding of the thinking process behind knowledge, 2) Increase the appreciation of science and technology and 3) Increase the awareness of the importance of "building a prosperous future" together.

Children tend to have a sense of curiosity toward things that are new and different. The Center aims to utilize that innate passion inside these children toward the mysteries of the universe. The interest that is kindled in the children will precede

the concepts and principles they will eventually learn.

The Center considers it important that the young people understand the thinking process behind what they acquire as knowledge. Taking advantage of their simple curiosity toward nature, life and environment that surrounds them, the Center offers them with opportunities to experience the joy of discovering something new and previously unknown to them and solving mysteries by themselves. In this process, the Center also aims to increase young people's appreciation of science and technology and to enhance their capacity for logical thinking.

Having an adventurous spirit succeeds the curiosity these children have. The Center allows children to take healthy risks, experiment and continually make improvements to find the best results in their given tasks.

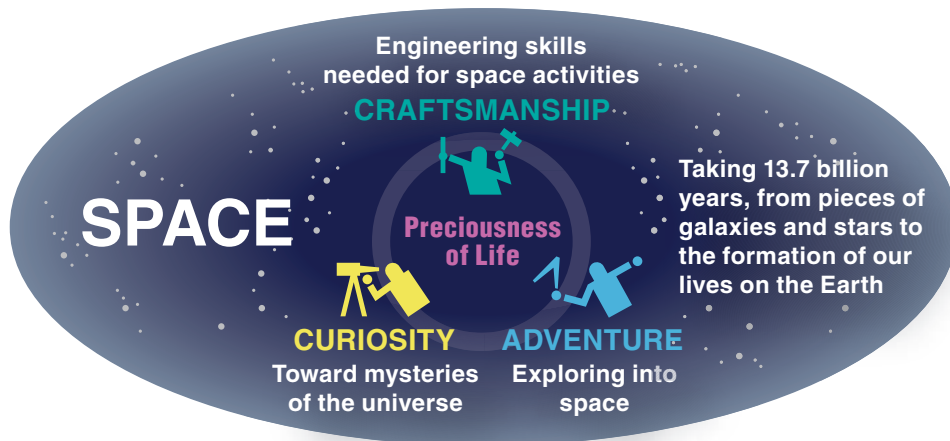


The spirit to "Never Give Up" is another important message always emphasized in the activities of the Center, as this spirit is considered essential for anybody who wants to achieve something significant in this challenging world. The history of space exploration is full of examples that show how important this is.

The Center provides children with ample opportunities to develop their spirit of craftsmanship to accompany their curiosity and spirit of adventurism. Many of the materials and lectures for the children include hands-on activities where they make crafts and conduct experiments which help engineer their skills needed for various fields including space activities.

"Preciousness of life" continues to be the most important message to be conveyed to young people through all activities of the Center.

SPACE = Unique source of interest, imagination & inspiration



Space Education

Stimulating children's curiosity toward the nature, universe and life
WHILE STRESSING THE PRECIOUSNESS OF LIFE

Human Development using Space

The abundance of goods and services that meet various needs of people in Japan might indicate the richness of the society. However, that may not necessarily be true if one pays close attention to the minds of people, especially the young ones. An alarming number of young people in Japan have been observed to have limited motivation to do anything, to be pessimistic about their own future and even to treat people's lives lightly, including their own lives, which subsequently gets them involved in serious crimes. The people involved in the establishment of the Space Education Center had become deeply concerned about those young people and wanted to do something about it.

Space subjects and materials were found to offer an excellent tool to inspire and motivate young people, to start gaining self-confidence and aiming for higher goals in their lives. It was observed that after learning

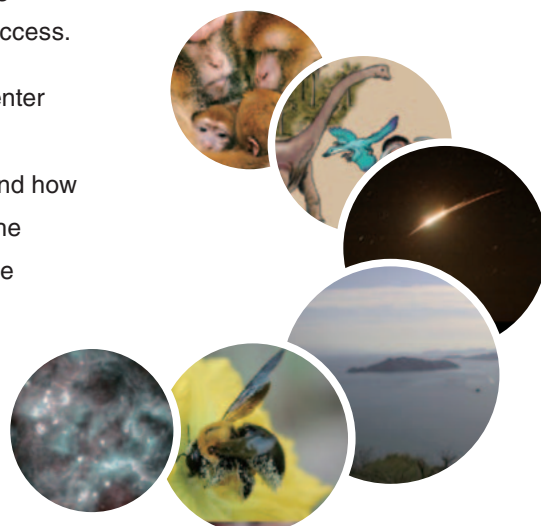
that there had been a lengthy chain of relays of one life to another before a certain life was born and that the lives on the Earth today had come a long way from pieces of galaxies and stars, many of the young people started to think deeply about the origin and evolution of lives and gained appreciation of the importance of life.

The Center aims to increase their appreciation of all forms of life on Earth by having young people learn about the origin and evolution of the universe and life and showing how long we have been searching for Earth-like planets without success.

Through its activities, the Center also guides young people to understand how important and how rewarding it is to be part of the society to build a better future together. No individual can carry out space activities by themselves, but together, a large

number of people with various backgrounds can even build global systems that could benefit large populations around the world. The Center aims to increase young people's appreciation of the power of collective efforts toward common goals.

With the above goals and principles, the Center carries out its activities to help young people become full of curiosity, adventurous spirit and craftsmanship, always aiming for the best at whatever they do.



C. Organizational structure and major activities

The Space Education Center consists of a group of experts who administratively belong to other offices and departments but have been appointed as technical advisers to assist in the planning and execution of the Center's activities. As of March 2016, the Space Education Center consists of 21 staff members, including 6 regular staff and 15 invited or contracted staff.

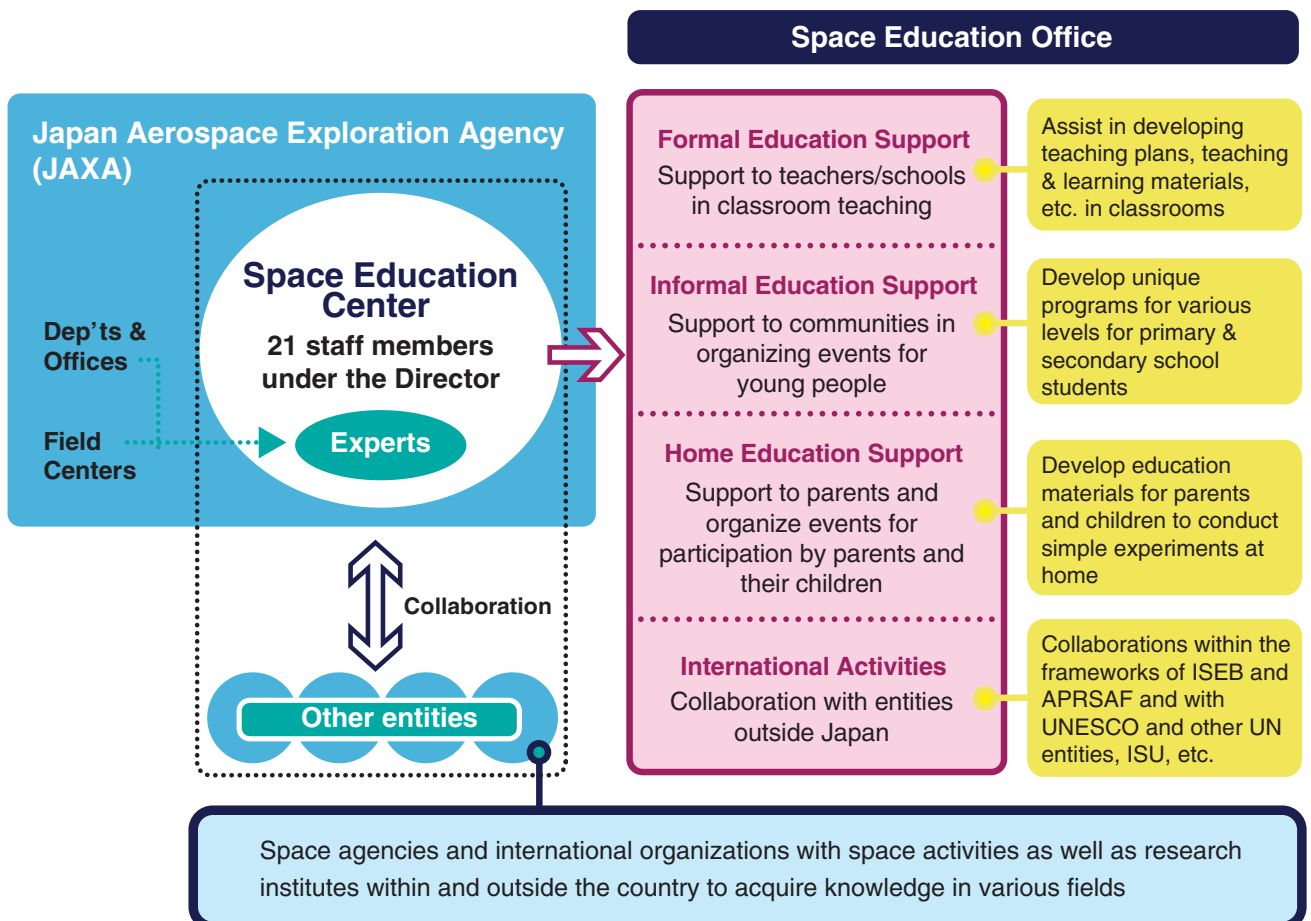
The Center carries out the following four major activities:

i) Formal education support, to assist teachers and schools in carrying out classroom activities using space materials;

ii) Informal education support, to assist local communities in organizing educational events for young people on non-school days to learn about space-related subjects and to participate in hands-on activities;

iii) Home education support, to assist parents in enhancing communication and interaction with their children at home through joint hands-on activities using space-related materials and resources;

iv) International activities, to promote and support space education activities outside Japan through collaborations with other countries and international organizations.



Major Activities



Formal education support



Home education support



Informal education support



International activities: Space Education Seminar in Cambodia

D. Collaborations with other offices and departments within JAXA

Other offices and departments of JAXA also carry out activities that have educational elements. The Space Education Center collaborates with those offices and departments.

For example, the Center works in cooperation with the planning and outreach group of the Public Affairs Department. This Department is responsible for sending JAXA staff as lecturers to give talks on a range of space-related topics on various occasions upon request.

The Space Education Center also works in cooperation with the Space Environment Utilization Center, which carries out education-related activities in association with Space Shuttle flights and the use of the International Space Station (ISS). The Space Education Center has recently announced the opportunities for schools to participate in the “Seeds in Space” project. This project allows the participating schools to compare the growing process of those seeds that have been flown on the International Space Station with normal seeds on the Earth by using seeds of the flowering plant named “Miyakogusa”, or Japanese lotus corniculatus, and “Asagao”, or morning glories.

Resulting from the collaborations with the Human Space Systems and Utilization Mission Directory of JAXA, the Space Education Center continues to provide opportunities for teachers of kindergartens, primary and secondary schools in

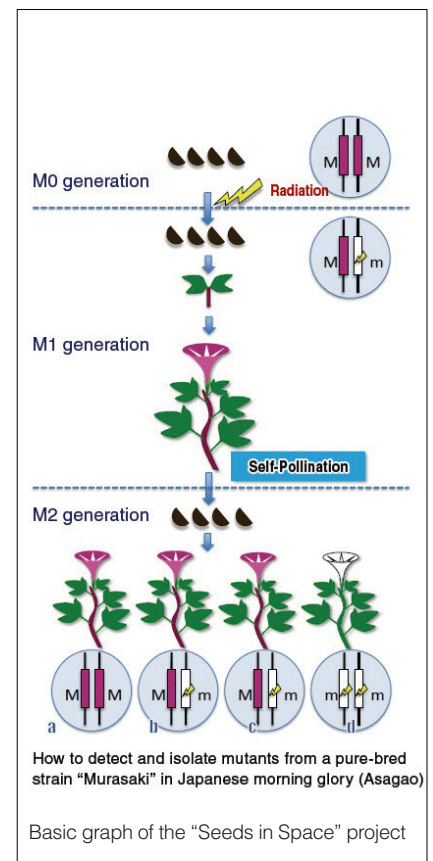
Japan to participate in the annual Space Exploration Educators Conference (SEEC), held at Space Center Houston, in Houston, Texas of the United States of America. The Conference offers opportunities for teachers to learn about and exchange information and experiences on using space materials to teach across the curricula, not only for science, but also for language, arts, mathematics, history and other subjects. JAXA has also provided the Japanese teachers with the opportunity to perform a lecture at a local school in Houston since SEEC2011.

The Satellite Applications and Promotion Center produces useful information materials with images taken by JAXA-operated satellites for distribution to the public. The Space Education Center works in collaboration with the Satellite Applications and Promotion Center to carry out educational activities that use images taken by JAXA satellites.

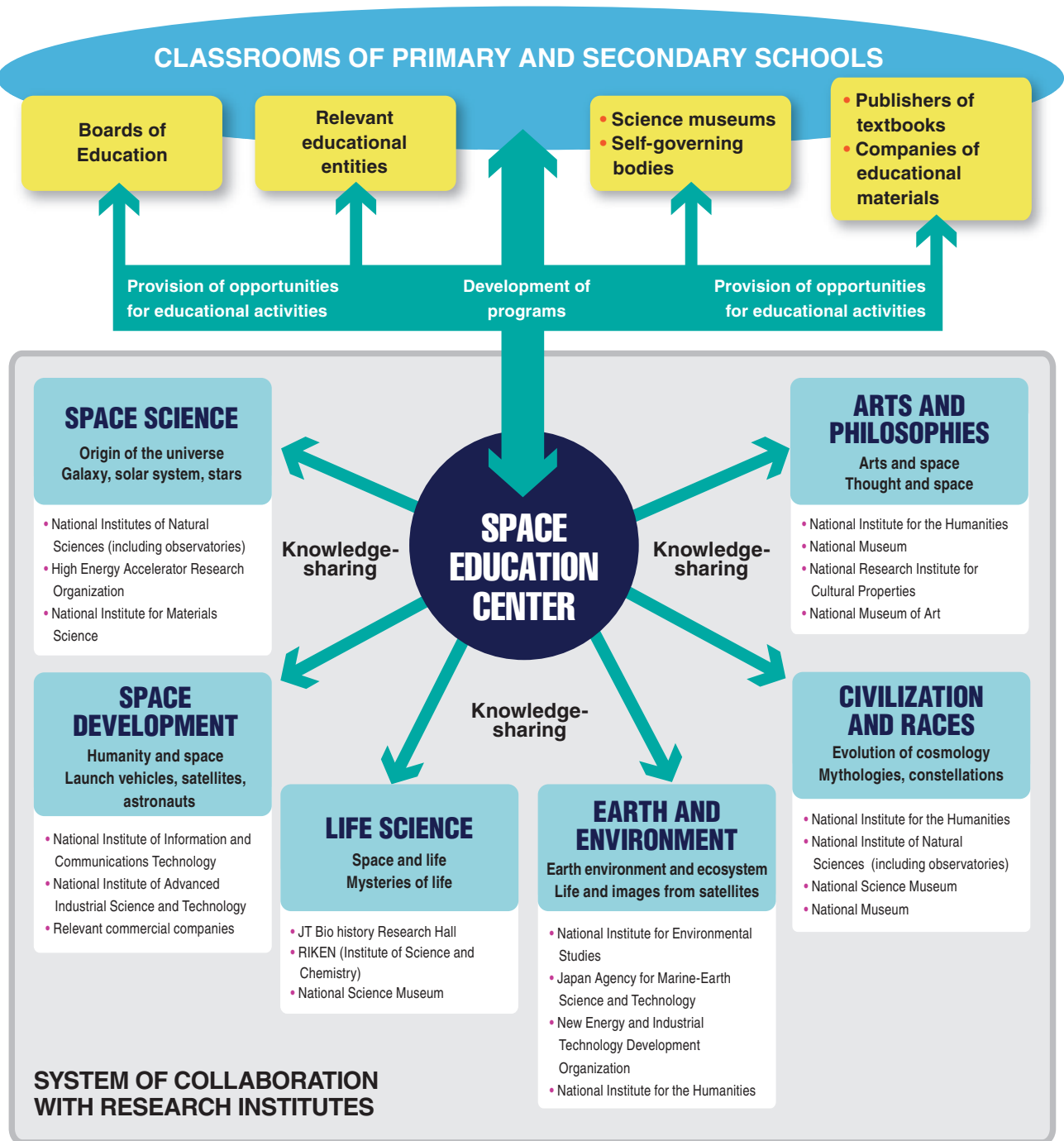
The Space Education Center seeks for collaborations with various entities outside JAXA that are engaged in education. Close collaborations with teachers and schools are considered most essential. The Center has continued to explore opportunities for collaborations with associations of teachers, boards of education as well as publishers of textbooks and companies of educational materials,

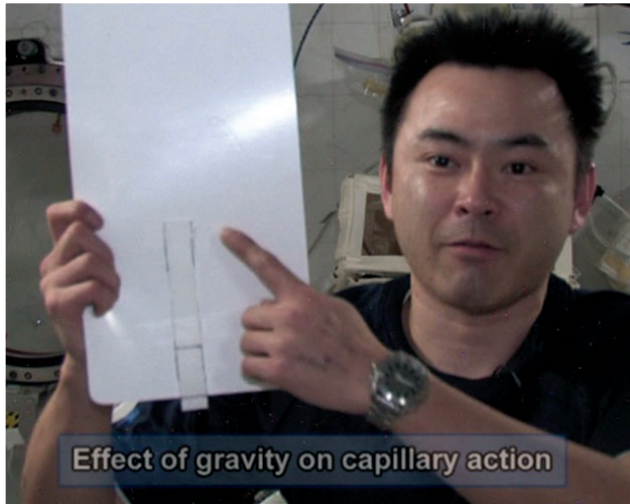
in its efforts to better integrate space subjects and materials into the existing curricula for formal education and to produce education materials that better meet the needs of schools and teachers. Significant progress has been made in this area particularly in the past years.

The Center takes a comprehensive approach in pursuing collaborations to expand space education activities. The Center seeks for collaborations not only with those entities that have direct links with space activities by being involved in space science and technology, life science and Earth science, but also with others that are engaged in studies on humanities, civilization, arts and philosophy.



Education support system

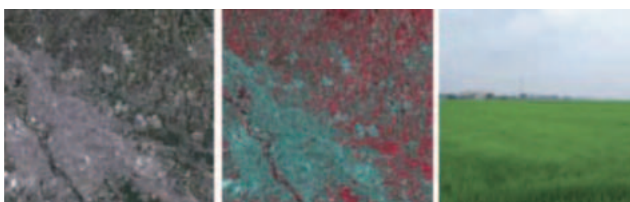




Astronaut A. Hoshide performs an experiment submitted by a Pakistani student for the Try Zero G educational experiment



Teaching about the microgravity through drop experiment, demonstrated by a Japanese teacher at John F. Ward Elementary School on the occasion of SEEC



Supporting senior high school class in learning about the local environment in collaboration with Satellite Applications and Promotion Center



SEEC session with teaching demonstrations by Japanese teachers supported by the Space Education Center

III. OBJECTIVES AND STRATEGIES OF CENTER ACTIVITIES

A. Support for Formal Education

Space activities encompass the accumulation of human knowledge and provide a common thread that links many different aspects of human activities. Many materials that resulted from space activities catch the attention of young people and appeal to their curiosity. The challenge is to find the best way to make those materials available under the most conducive learning environment for young people.

Through its formal education support, the Space Education Center aims to expand and enhance the use of attractive space materials by schools and teachers to assist the students in learning various subjects according to the curriculum guidelines. The Center considers it essential to work closely with school teachers as they are in a better position to understand young people's needs and feelings through their daily interactions.

There are several strategies pursued by the Center to achieve that goal.

In light of the recently revised curriculum guidelines issued by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) in March 2008 for all levels from kindergarten to senior high school, the Center has been strengthening its efforts to help teachers to adjust the teaching contents and focus as well as methods to follow the revised guidelines by using relevant space materials.

With the idea to foster “the strength to live”, the revised guidelines aim to help the students develop independent minds to identify issues, analyze, think, judge and take appropriate actions while caring about and collaborating with others. In terms of substantive content, the revised guidelines have expanded the subjects relating to science and mathematics. It presents an excellent opportunity to introduce its space education materials for a wider use by school teachers for the Center.



Space food produced by students of Obama Fisheries High School, Obama, Fukui

The revised guidelines were instituted to coincide with the principles of the Center, which has developed a number of teaching materials, methods and programs through its support to teachers and schools in the past years particularly for science classes.

While some parts relating to mathematics and science have already been implemented at schools from April 2009, the revised curriculum guidelines were implemented in entirety for the elementary schools from 2011 and for the junior high schools in 2012.

Textbook companies have begun to produce new textbooks and their supplementary learning materials that follow the revised guidelines. This presents a good opportunity for the Center to introduce space subjects and materials into classroom teaching in a systematic manner. The Center has been actively offering its support to textbook companies and those companies producing supplementary learning materials to use, for example, images taken by JAXA satellites and spacecraft or photographs of space activities of JAXA.



Supporting the class for environmental education, Kudan Junior High School, Chiyoda, Tokyo



Supporting the Japanese language class Junior High School attached to Nagasaki University



Teachers training course



Collaborating with the Faculty of Education, Nagasaki University to train future teachers



B. Support for informal Education

Supporting informal education continues to be another pillar of the activities of the Space Education Center. Using unique programs and materials that it has developed, the Center supports educational activities carried out by other entities rather than schools outside the formal curricula, normally during non-school days.

Through its informal education support, the Center aims to maximize the synergies of space education efforts undertaken by various entities, including local governments and relevant non-governmental and non-profit entities. The Center aims to achieve this objective while ensuring that its goals and principles continue to be followed by those entities involved in space education activities around the country and building upon what has been achieved by its “Cosmic College”.

Based on its belief that the responsibilities of fostering local children lie with the local communities, the Center encouraged more local communities to take the lead in organizing space education events for local children while the Center itself plays only a supportive and advisory role. This is to allow for the massive expansion of space education activities to reach out to all parts of Japan without increasing the level of resource requirements of the Center. By ensuring that the local communities are involved from the

beginning of the planning, the Center has made efforts to increase the sense of ownership and responsibilities among the local communities organizing those events.

The Center has increased its efforts to establish partnerships with interested industries to organize space education activities. Ways and means to establish partnerships have varied depending on the interest of the industries and the circumstances of the activities concerned.

The Center’s efforts have shifted from the planning, organization and management of events to the enhancement of its support system for space education instructors and leaders, who play key roles in space education events organized around the country. In addition to sharing the principles of Space Education, the Center has begun to provide material support to those instructors and leaders who are active in carrying out space education activities.

C. Support for Education at Home

As natural evolution of its support for informal education through collaborations with local communities, the Space Education Center has increased its efforts to bring space home. Its support for home education is provided mainly through its collaborations with Kodomo-Uchu-Mirai Association (KU-MA)² in organizing “Space Schools for Families”, for participation by parents and children together.

The “Space Schools for Families” programme consists of several gatherings throughout the year,

² “Kodomo”, “Uchu”, “Mirai” mean “Children”, “Space”, “Future” in Japanese language.

called “schooling”, where the participating parents and children learn together about various space-related subjects and conduct basic experiments. They are given homework assignments to be done between sessions using the learning materials distributed during the “schooling.” While similar to the programme of regular schools, this programme is unique in providing opportunities for the parents and their children to share time together at home to discuss space-related topics and to conduct experiments as homework. Through “Space Schools for Families”, the Center aims to enhance parent-child relationships and help create a conducive learning environment at home.



D. International Activities

The Space Education Center continues to expand collaborations with entities of other countries and international organizations to promote space education. In this effort, the Center uses as much as possible the existing frameworks for cooperation in space activities and endeavors to create synergies of efforts made through different frameworks.

Through its international activities, the Center places emphasis on enhancing benefits for primary and secondary school teachers and children through space education, particularly in Asia and the Pacific. The space education initiatives taken within the framework of the Asia-Pacific Regional Space Agency Forum (APRSAF) for primary and secondary school teachers and students, therefore, are given high priority.

While recognizing benefits of introducing programs and materials developed by other space agencies with established education programs for use by Japanese teachers and schools, the Center also makes efforts to share its space education principles and approaches as well as materials particularly with developing countries that are increasingly interested in and capable of carrying out space activities.

Cooperation with space-faring nations in space education activities

is pursued mainly through the framework for cooperation provided by the International Space Education Board (ISEB).



Waiting for the countdown – APRSAF-22 Water Rocket Event in Bali, Indonesia, 2015



Teachers conducting microgravity experiment using drop tower – APRSAF Space Education Seminar in the Philippines, 2016



Students ask questions to the Heads of Agencies – ISEB Student Program, IAC 2015, Jerusalem, Israel



APRSAF Space Education Working Group annual meeting in Indonesia, 2015

E. Dissemination of Information and Publications

The Space Education Center uses Internet-based services and publications as its main tools to disseminate information.

As for the Internet-based services, the Center shares information on its activities, including announcements for upcoming events, campaigns, and reports on past activities and distributes updated online education materials and programs. Information and explanatory notes on various space-related topics are also available through the Space Information Center, an on-line information service that can be accessed through the Center's website.

The website of the Center (<http://www.edu.jaxa.jp/en>) aims to achieve the

following objectives: i) to serve as the focal point to disseminate information on space education activities and to provide a forum for exchanging ideas and information among educators; ii) to provide education materials, images and pictures that can be easily downloaded for use by educators in classroom teaching; iii) to make the teaching and learning materials developed through the Center's support to schools as well as reports on the classroom activities supported by the Center. The website continues to be upgraded, and it now contains movie files and video clips.

In the past years, the Center focused on the following strategies: i) to create

a conducive environment for school teachers, leaders and instructors of space education activities as well as any individuals interested in space education to communicate and interact with each other and to exchange ideas and education materials; ii) to actively pursue other means of disseminating information rather than on-line services; iii) to use movie clips to report on the activities so as to make the users of the website feel as if they were at the venues of those activities; iv) to reorganize the Space Information Center to make it more user-friendly and to make the content easier to understand by the general public.

The screenshot shows the website for the Space Education Center. At the top left is the JAXA logo and the text "SPACE EDUCATION CENTER 宇宙教育センター". To the right are language selection buttons for "English" and "Japanese", and a link to the "JAXA website". Below the header is a navigation menu with "Home", "About us", "Activities", and "Publications". The main content area features a large image of students and staff working together. To the right of this image is a section titled "About us" with a brief description of the center's mission and a "detail" link. Below this is a section titled "Activities" with four sub-sections, each with a representative image and a caption: "Support for Formal Education", "Support for Informal Education", "Space School for Families", and "International Activities".

Website of the Space Education Center: <http://edu.jaxa.jp/en>

IV. PROGRAM STRUCTURE OF THE MAJOR ACTIVITIES

A. Establishing Strategic Footholds

As part of the executive directions set by the management of JAXA, the Space Education Center has been tasked since the fiscal year 2008 to establish strategic footholds in all nine regional blocs of Japan, i.e. Hokkaido, Tohoku, Kanto, Hokuriku and Shinetsu, Tokai, Kinki, Chugoku, Shikoku, Kyushu and Okinawa, by March 2012. This is to ensure that the kind of classroom support provided by the Center continues to be expanded and further enhanced in an effective manner to benefit each of the primary and secondary schools without requiring direct and intense support by the Center itself. While it does not need to be a school, and it could well be a science museum or a board of

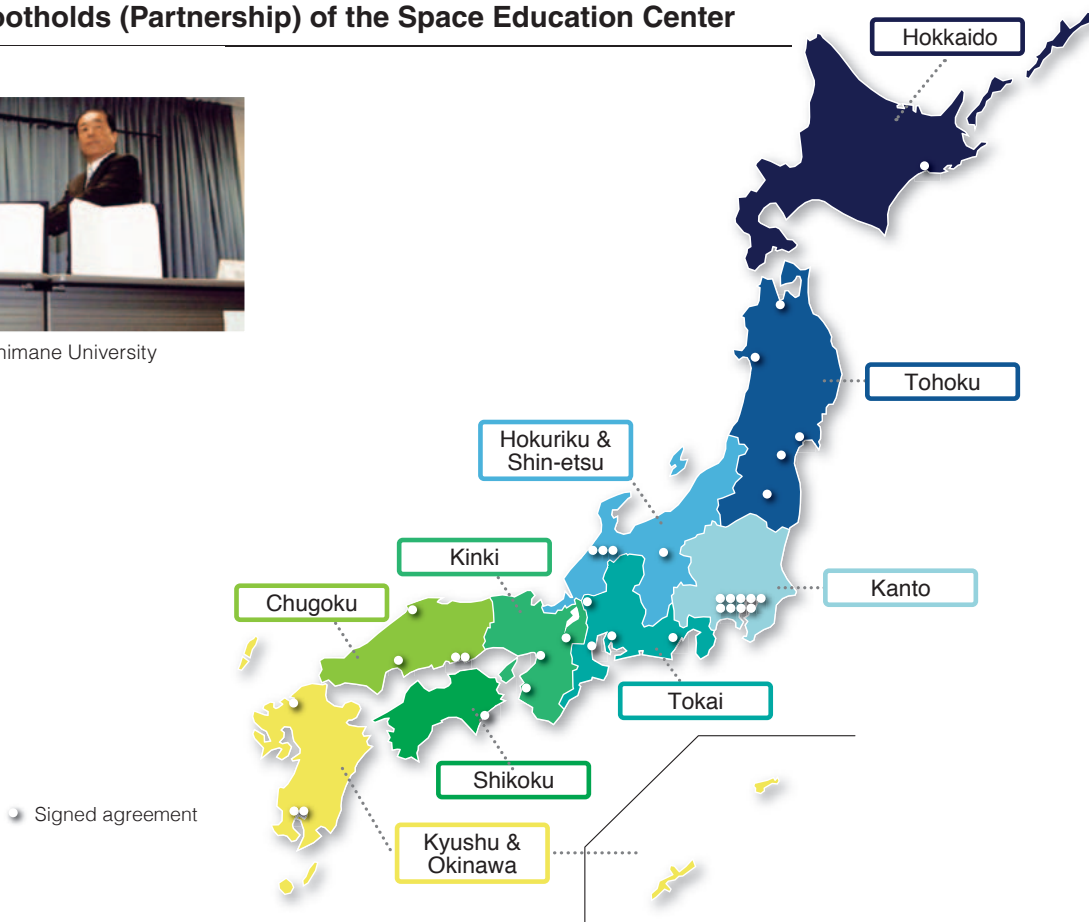
education in the local community, a strategic foothold should endorse the goals and principles of the Center and should actively pursue the development of space education materials and teaching methods to be introduced to schools within the block under its responsibility. The Center was also tasked to ensure the steady increase in the number of schools that newly introduce aerospace subjects into their classroom teaching by using the materials or teaching methods developed by the strategic foothold in their bloc.

As of March 2016, the Center has concluded agreements with 34 entities to serve as its strategic footholds in all nine blocs.

Strategic Footholds (Partnership) of the Space Education Center



Agreement with Shimane University



List of strategic footholds (as of March 2016)

Bloc	Area	Entity	Date of Signature
Tohoku	Akita	Akita University	21-Mar-08
Chugoku	Shimane	Shimane University	27-Oct-08
Hokkaido	Kushiro	NPO Kodomo Yugakukan Shimin Stage*	2-Dec-08
Hokuriku/Shinetsu	Shimosuwa-Town	Shimosuwa-Town - Board of Education	2-Dec-08
Kanto	Sagamihara-City	Sagamihara-City	4-Dec-08
Kanto	Tokyo	Waseda University	29-May-09
Tohoku	Aomori-City	Aomori-City Junior High Schools Working Group on Science	1-Aug-09
Hokuriku/Shinetsu	Komatsu-City	Komatsu-City - Board of Education	1-Dec-09
Kyusyu/Okinawa	Kagoshima-City	Kagoshima-City- Board of Education	10-Jan-10
Kyusyu/Okinawa	Fukuoka	Kyusyu University	8-Mar-10
Kanto	Tokyo	Tokyo-Gakugei University	10-Mar-10
Kanto	Kokubunji-City	Kokubunji-City - Board of Education	1-Apr-10
Tokai	Shizuoka	Shizuoka Science Museum - RU·KU·RU	12-Jun-10
Chugoku	Kurashiki-City	Kurashiki-City- Board of Education	1-Jul-10
Chugoku	Kure-City	Kure-City Yamato Museum	18-Aug-10
Kinki	Wakayama	Wakayama-Prefecture Board of Education	15-Nov-10
Kinki	Osaka	Osaka-Prefectural Education Center	20-Dec-10
Tokai	Ogaki-City	Ogaki-City Board of Education	24-Mar-11
Kanto	Tokyo	Keio University	24-Mar-11
Shikoku	Anan-City	Anan-City Board of Education	25-Jan-12
Kanto	Kanagawa	Japan Agency for Marine-Earth Science and Technology	4-Feb-12
Tokai	Nagoya-City	Nagoya-City Science Museum	18-Jul-12
Tokai	Yokkaichi-City	Yokkaichi-City	24-Oct-12
Kinki	Kobe-City	Kobe-City – Board of Education	10-Mar-13
Chugoku	Okayama	Okayama-Prefectural Board of Education	12-Apr-13
Hokuriku/Shinetsu	Kanazawa-City	Kanazawa-City	29-Jun-13
Hokuriku/Shinetsu	Fukui-City	Fukui-City	5-Oct-13
Kyusyu/Okinawa	Kagoshima	Kagoshima-Prefectural Board of Education	14-Nov-13
Kanto	Saitama	Japan Science and Technology Agency	19-Feb-15
Kanto	Hachioji-City	Hachioji-City Board of Education	23-Mar-15
Tohoku	Kakuda-City	Kakuda-City	12-Dec-15
Kinki	Kyoto-City	Kyoto-City Board of Education	15-Dec-15
Tohoku	Fukushima	Fukushima-Prefecture Board of Education	25-Mar-16
Kanto	Yokohama-City	Yokohama-City Board of Education	29-Mar-16

* Kodomo = Children, Yugakukan = Study House, Shimin = Civic/Citizen

B. Support for Formal Education

The support for formal education provides customized support to the teachers who have contacted the Center with a request for support. After the initial contact, the Center's staff hold numerous consultations with those teachers to articulate their needs and interests, identify goals and develop plans for activities for their classes. Once the plan has been developed with the teacher, the Center identifies appropriate experts of JAXA from a range of space science and technology fields as well as experienced educators and pedagogy experts and calls upon them to provide knowledge and expertise to develop teaching and learning materials. When the teacher carries out classroom activities according to the plan, the Center sends its staff and appropriate experts to provide on-site support to the teacher. Upon request by the teacher, the Center assists the teacher in evaluating the results of the activities. Depending on the interest and request by the teacher or the school, the Center also assists in establishing partnerships with other schools or

promoting collaborations with relevant entities in the local community.

Through this entire process of support (see the chart for "School Support: Process" below), the Center ensures that initiatives come from the teacher, and not the Center.

The Center's support is not limited to science classes. It covers a wide range of disciplinary fields taught at school, including social science, Japanese language and the arts. The Center's support covers various types of classroom activities depending on the needs of and objectives pursued by the teachers. Such activities cover normal classes according to the curricula guidelines, integrated learning classes as well as extracurricular activities. Since the expansion of its support to include kindergartens from 2007, the Center has been supporting an increasing number of kindergartens, elementary schools, junior high and senior high schools, as well as faculties of education of universities.

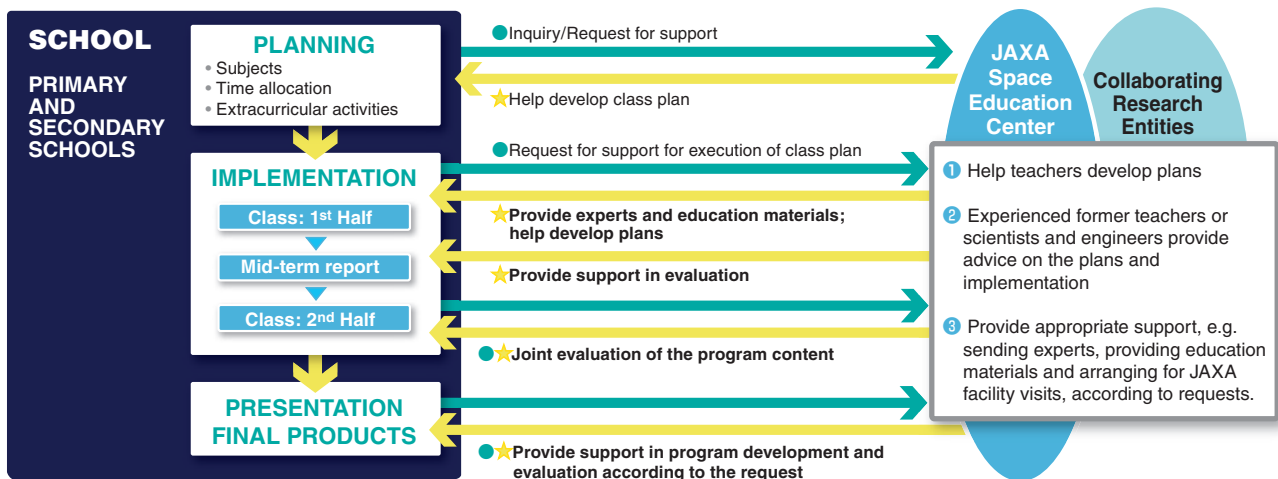
The Center has strengthened its efforts to establish collaborations

with boards of education in the local communities to jointly provide training opportunities for teachers to learn about space education and to acquire skills to bring space into classrooms. This has been done in order to ensure that the efforts made by those teachers and schools that have received support from the Center to expand space education activities would not be isolated and that their efforts would be supported by the supervisory bodies overseeing the school management and activities.

Such training opportunities are also provided to potential candidates for teachers who are studying in the faculties of education at universities. The Center pursues collaborations with faculties of education as it is considered more desirable that the school teachers already know about the benefits of space education and have basic skills to conduct classroom activities using space materials before they become too busy to meet regular teaching requirements and to deal with administrative work required at their schools.

SCHOOL SUPPORT: PROCESS

TEACHERS IN THE DRIVING SEAT. JAXA to assist the teachers



C. Support for Informal Education

i. For young people: from kindergarten to high-school students

Most of the activities for young people that the Center supports continue to be carried out as part of “Cosmic College”, which aims to achieve the following objectives: i) to increase interest of young people in science and technology; ii) to help establish voluntary groups of young people that are fond of science and technology; iii) to motivate young people to raise questions, think and find solutions by themselves; iv) to encourage collaborations with others; v) to lead young people to appreciate the importance of life. The Cosmic College offers three courses, covering from kindergarten to high school students. In addition to the Cosmic College courses, the Center also supports a few other recurrent space education events and special events for young people.

In supporting the organization of Informal Education activities, the Center has continued to work closely with the Young Astronaut Club (YAC)-Japan, an incorporated foundation originally established in 1986, to carry out educational activities addressing space and science.

COSMIC COLLEGE: KIDS COURSE

The “Kids Course” is for children younger than the second-year in elementary school and their parents to participate. The programme uses principles founded in space as it aims to increase interest of the participating children in and their familiarity of the surrounding nature. Through hands-on activities involving observations, experiments and handicraft work, the programme is designed to cultivate young children’s scientific thinking and to build the basis for logical thinking process.



Kids Courses

COSMIC COLLEGE: FUNDAMENTAL COURSE

The “Fundamental Course” is for the school students between the third-year in elementary school and the third-year in junior high school. The programme aims to localize students’ perspective of space while enhancing their interest in surrounding natural objects and phenomena. Through hands-on activities involving scientific observations, experiments and handicraft work designed for the study of nature, the programme aims to enhance students’ scientific and logical thinking capabilities.



Fundamental Courses

SPACE SCHOOL

The “Space School” is primarily for high school students (a part of program is for junior high school students). The program takes place over multiple days and participants stay in JAXA’s field centers and research institutes while spending the nights in the dormitories with their peers. The participants are divided into several groups and given a space related mission to discuss within their team. They also have the opportunity to observe first hand, the space development team at the state-of-the-art facilities. Through hands-on activities involving scientific observations, experiments and making prototypes, the program leads the students to pose scientific questions and come

up with answers themselves. The students present their findings from the mission on the final day. This program’s purpose is to provide an opportunity for the students to explore their path in life.

The Center encourages the participants to share their experiences in their local communities. These impassioned speeches powerfully communicate the excitement and wonderment to the audience.



Space School

OTHER RECURRENT ACTIVITIES

At Sagamihara Campus, the Space Education Center organizes a five-day training program for high school students, during their summer vacation period, to learn how to design scientific missions through teamwork and to experience the mission evaluation, requiring them to present their missions and respond to questions from the audience, including leading space scientists and engineers of JAXA. This program is known as “Space Mission High School”, or “Kimission”, which is a combination of “Kimi”, meaning “you” in Japanese, and “mission”.

ii. For educators and instructors of space education

The Center has been offering Space Education Leaders Seminars for instructors of space education activities. The support system for the Space Education Leaders (SEL) who have participated the Seminars has also been enhanced to facilitate communication among them and to provide material support for their space education activities.

SPACE EDUCATION LEADERS SEMINAR

The Space Education Leaders (SEL) Seminar is for any individual interested in carrying out space education activities with or without experience in informal education activities. The program aims to transfer to the participants basic information and the principles of Space Education.



Group discussions and presentations during “Kimission”

SPACE EDUCATION LEADERS SUPPORT SYSTEM

As part of its support to the Space Education Leaders(SEL), the Space Education Center has a rental system for its education materials and equipment for use during their space education activities. After the completion of the activities, the users are requested to provide feedback to the space education center on the financial support or rented materials and equipment they utilized.



Space Education Leaders Seminar

D. International Activities

i. Focusing on children in Asia: Asia-Pacific Regional Space Agency Forum

SPACE EDUCATION WORKING GROUP

The Space Education Center has supported educational activities of Asia-Pacific Regional Space Agency Forum (APRSAF) since 2005 and has served as the Secretariat of APRSAF Space Education and Awareness Working Group since 2006. The working group has since been renamed to the Space Education Working Group as of July 2014. Members from 15 countries and 2 international organizations³ attended the Working Group events and meetings in 2014. The Working Group has become increasingly active in the past few years with the aim of: i) effectively using space materials to enhance education for young people; ii) providing education and training opportunities for young people in space science and technology; iii) contributing to enhancing mutual understanding among countries in the region through exchange opportunities for young people; and iv) increasing

public awareness of the societal benefits and importance of space activities.

In addition to organizing space education events for primary and secondary school teachers and students, the Working Group has strengthened efforts toward: i) making more teaching and learning materials available in local languages; ii) aligning its space education efforts with global educational initiatives taken by the entities of the United Nations system and other international organizations; and iii) contributing to enhancing inter-regional cooperation by making it possible for countries of other regions to benefit from its space education initiatives.

³ Australia, Bangladesh, Indonesia, Japan, Malaysia, Mongolia, Nepal, New Zealand, Pakistan, Philippines, Republic of Korea, Romania, Singapore, Thailand, Vietnam, Space Generation Advisory Council (S-GAC), and Asia-Pacific Space Cooperation Organization (APSCO)



Space Education Working Group members attending the APRSAF-22, held in Indonesia, Bali, December 2015

WATER ROCKET EVENT

Starting from 2005, the Working Group has organized the Water Rocket Event each year, immediately following the APRSAF session. This annual regional Event has provided opportunities for young people between 12 and 16 years old not only to learn about basics of rocket science and space activities in general, but also to learn about other countries and their cultures, to build lasting friendships beyond national borders based on the common interest in space.



Students making water rockets – APRSAF-22 Water Rocket Event, held in Bali, Indonesia, 2015



Cultural exchange is also an important aspect – APRSAF-22 Water Rocket Event



Launch of water rockets – APRSAF-22 Water Rocket Event



Teacher Program provides the opportunity to share the efforts towards space education with the colleagues from across the Asia Pacific Region – APRSAF-22 Water Rocket Event

POSTER CONTEST

The Working Group has organized a Poster Contest under a selected theme each year since 2006 during the APRSAF session, for children between 8 and 11 years of age. From among those posters submitted by the participating countries, the participants of the APRSAF session vote to select the best poster, for APRSAF Best Poster Award, and the second and third best posters for APRSAF Special Poster Awards. A special award is given to posters selected by the agencies that serve as the Co-Chairs at the APRSAF sessions.



Calendar for 2016, with posters submitted to APRSAF-22 Poster Contest

SPACE EDUCATION SEMINARS

The Working Group convened space education forums and seminars in Vietnam and Indonesia in 2006, Sri Lanka in 2009, Bangladesh in 2011, Nepal in 2012, Cambodia in 2013, New Zealand in 2014 and Philippines in 2015 as a response to the need for providing opportunities for students and teachers of primary and secondary schools particularly in developing countries. The aim is to enhance their understanding of space science and technology and their applications and to participate in hands-on space education activities.



Teachers conducting vacuum experiments at the Space Education Seminar in the Philippines, 2016

ii. Collaboration with advanced space-faring nations: International Space Education Board

The Space Education Center represents JAXA in the International Space Education Board (ISEB) and collaborates with other ISEB members to promote space education. Established in October 2005 by the Canadian Space Agency (CSA), the European Space Agency (ESA), the National Aeronautics and Space Administration of the United States (NASA) and JAXA as its Founding Members, ISEB now includes Centre National d'Etudes Spatiales (CNES), the French space agency, as Member from October 2006, the Victorian Space Science Education Centre (VSSEC) of Australia as Associate Member from October 2010, Korea Aerospace Research Institute (KARI) as Member from June 2012, the South African National Space Agency (SANSA) as Member from October 2012 and Agencia Espacial Mexicana (AEM) from September 2013. The objectives of ISEB are: i) to increase science, technology, engineering and mathematics literacy achievement in connection with space; and ii) to support the future workforce needs of space programs. While ISEB meets once a year with the participation of heads of education of its member agencies during the annual IAC, the activities of ISEB are being carried out and coordinated by its Representative Working Group, consisting of one

officer each from the ISEB member agencies. The membership is open to any public organization carrying out space activities and pursuing education programs.

a) Activities

Since 2011, the following projects were carried out within the framework of ISEB: i) international student programs at the International Astronautical Congresses (IAC's); ii) international participation in NASA Academy; iii) CanSat activities. The use of the International Space Station for educational purposes is also recognized as an important initiative that needs to be undertaken.

The Space Education Center continued to support the activities of ISEB by participating in the organization of IAC Student Programs, and sending Japanese students for those Programs and supporting the participation of Japanese graduate students in NASA Academies, held at Goddard Space Flight Center in summer 2008, 2010 and 2011, and Ames Research in summer 2009, 2012 and 2013.

The term of the chairmanship is one year, and it rotates among the Founding members shown below.

ISEB Chairmanship

Agency	Chairmanship Years
ESA	2005 - 2006, 2009 - 2010, 2014 - 2015
NASA*	2006 - 2007, 2010 - 2011, 2013 - 2014, 2015 - 2016
CSA	2007 - 2008, 2011 - 2012
JAXA	2008 - 2009, 2012 - 2013

*Currently serving as ISEB Chair



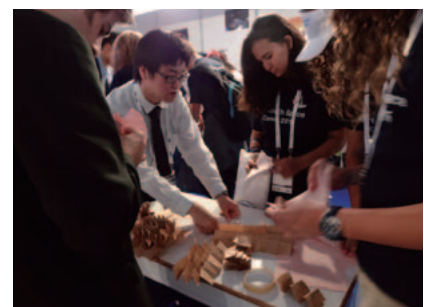
Establishing ISEB in October 2005



International Student Zone, IAC2015, Jerusalem, Israel



JAXA students' presentation at International Student Zone, IAC2015



ISEB students conducting outreach activities for local students (Miura-Ori) at International Student Zone, IAC2015

V. RECENT ACHIEVEMENTS

A. Support for Formal Education

i. Introducing space education at schools across the country

Providing customized support to teachers and schools consumes a large amount of staff time and effort. A classroom activity plan normally consists of more than one class, and the period required to implement the plan could last for one full academic year, requiring at least several visits by the Center's staff and experts.

The Center has, nonetheless, continued this labor-intensive approach to support school education with a team of five staff members.

It should be noted that in previous years, some schools that have received support from the Center have continued classroom activities with the use of space materials

independently. Through administered transfers from one school to another, some of those teachers who had been supported by the Center in the past have continued their classroom activities with the use of space materials at their new schools on their own. Thus, more schools than the above statistics indicate have started or are carrying out classroom activities using space materials.

Another major development is increased opportunities for teachers to train in space education through collaboration with, for example, boards of education or faculties of education. The Center commenced its support for faculties of education with the organization of a space education training session in 2007.

Numbers of schools supported by the Center and the students who have benefited from the program

	FY 2005		FY 2012		FY 2013		FY 2014		FY 2015	
	Schools	Students	Schools	Students	Schools	Students	Schools	Students	Schools	Students
Kindergarten	0	2	10	338	3	146	5	264	3	207
Elementary Schools	1	14	58	6,970	95	12,947	69	7,180	74	6,669
Junior High Schools	5	14	26	3,870	36	6,287	25	4,663	24	5,714
High Schools	14	20	18	1,385	28	3,185	18	1,273	17	1,450
TOTAL	20	50	112	12,563	162	22,565	117	13,380	118	14,040

NOTE: The Japanese fiscal year is from April 1 to March 31.

Number of teacher training sessions and participants

	FY 2005		FY 2012		FY 2013		FY 2014		FY 2015	
	Sessions	Students/Teachers	Sessions	Students/Teachers	Sessions	Students/Teachers	Sessions	Students/Teachers	Sessions	Students/Teachers
For candidates for teachers	Nil	3	2	260	3	239	1	200	4	350
For teachers	1	39	31	1,126	29	1,897	28	1,020	35	1,929
TOTAL	1	42	33	1,386	32	2,136	29	1,220	39	2,279

ii. Comparing space food with everyday food: Making big discoveries in daily life in Uda city's Murou-Higashi Elementary School

In December 2015, the students of Uda city's Murou-Higashi Elementary School in Nara Prefecture, which is the one of the oldest cities in Japan, received a lesson in dietary education regarding space food. In space, many changes happen to the human body. For example, astronauts may be at risk of brittle bone disease, which is caused by a drain of calcium from the body and the decline of muscle strength in microgravity conditions. It is difficult for astronauts to stay healthy while they are in space. Through learning about the environmental differences between Earth and space, the effects of being in space on the human body, and the lifestyle of astronauts living at the International Space Station (ISS), which orbits the earth 400km above its surface, the students were able to acknowledge how important exercise and food are for human health.

As an activity, the students compared normal curry with "space curry," which is eaten at the ISS. At the beginning of the activity, the students ate both curries slowly and carefully using their five senses. Everyone's face was very serious when they were eating. After, they continued eating the curries while

sharing their opinions with their group members. "Space curry is spicier than the usual one!" "There are lots of mushrooms in space curry," and "I prefer the usual curry to space curry." Finally, the facilitator showed the students the packages of both curries, so that they could read the ingredients. They inspected the packages closely, and reported their analyses to the teachers. "Space Curry includes red wine and sautéed onions." "Normal curry includes high-fructose corn syrup, but space curry doesn't." The teachers were very surprised by their keen analyses.

The facilitator asked, "Has anybody ever eaten curry so seriously before?" Usually, we care about the taste of food, but we do not care about its ingredients and the effects of the ingredients on the human body.

One of the purposes of this lesson was for the students to understand that daily life also contains big discoveries. Big discoveries are not limited to food; for example, flowers along a path or the lights in a room that we can turn on and off, also offer many mysteries and discoveries when carefully considered.

Throughout the activity, the students of Murou-Higashi Elementary School seemed to be interested in enjoying the new discoveries.



Students compared normal curry with "space curry," which is eaten at the ISS

iii. Grade six students become the teachers: Shimosuwa town's Shimosuwa-Kita Elementary School

In March 2016, the grade six students of Shimosuwa town's Shimosuwa-Kita Elementary School in Nagano Prefecture taught a 45-minute lesson to the grade four students on space science as the conclusion of their six years of science classes. First, the grade six students separated the grade four students into groups. The topic of the lesson was the moon, the sun and the planets. The grade six students had already learned about the topic of the moon and the sun in science class. The lesson was separated into several interesting activities such as: focusing on the phases of the moon using newspaper balls covered in yellow and black tape, and a comparison of the sizes of the planets using balls of different sizes (an "Odama," which is a large rubber ball often

used at the school sports festivals; a marble; a basketball; and a baseball). The grade four students seemed to really enjoy the activities.

Some groups made a cross-section model of the sun after researching the structure of the sun. A grade six student, playing the role of a teacher, explained "The temperature of the sun's surface reaches about 6,000 degrees Celsius, and the temperature of the center of it reaches about 15,000 degrees Celsius." Although it was snowing and very cold outside, the classroom was filled with an air of excitement. The grade six students did a fantastic job teaching the younger students and it is obvious that they will be very successful in junior high school as well.



Lesson of the phases of the moon



Lesson of the comparison of the sizes of the planets



Cross-section model of the sun

iv. Creating an ideal society: Shimane prefecture's Matsue-Higashi High School

“What is the ideal society?” There are an infinite number of answers to this question. The grade one students of Shimane Prefecture's Matsue-Higashi High School explored the theme of the ideal society in groups during term one. In the spring, each group decided on their own subject and proceeded to make a poster, researching global problems and methodologies for creating the ideal society, engaging in discussion throughout the process. The completed posters were presented to the class and then displayed in the school. For helping them proceed their subjects, JAXA Space Education Center gave a lecture about water recycling system in the International Space Station in the middle term. One example of the water recycling system is that the astronauts drink

their own urine after filtering it. With the essence of space viewpoint, students could broaden their ideas for each topic.

In 2015, the students selected a variety of topics (the environment, love, work, health, poverty, food shortages, etc.). One of the groups focused on the fact that there are many students who cannot go to school around the world, so they decided on the theme of “Making a mobile school.” They wrote down the advantages and disadvantages of a mobile school and engaged in discussion. Finally, they reached a solution. Another group advocated that if more people around the world fell in love, the world would be more peaceful, and described the best means of connecting people by age group in their presentation. Another group selected diseases as their theme and researched its causes. They suggested daily habits that can prevent diseases, and presented medicines in development for its

treatment, and concluded with steps that they could take in their own lives for better health.

In their groups, the students researched their own themes and searched for solutions in the aim of creating the ideal society. We are certain that the students succeeded in exploring broad themes and experienced authentic learning regardless of whether clear answers or solutions were found.



Students presenting their own ideal society

B. Support for Informal Education

Reflecting the success of the Center's strategy to transfer the central responsibilities as the organizers to the local communities, the number of space education events organized around the country has remained stable despite the reduction of financial and manual resources.

As the number of space education events continues to increase, the demand for use of the teaching materials developed by the Center also increased. In the past year, the Center reorganized its system of

managing its numerous learning and teaching materials, packaging some materials for ready-use and immediate rental for selected activities and monitoring the frequency of use. The packaged materials include those activities to make and launch water rockets, syringe rockets, umbrella-bag rockets and hot-air balloons, conducting micro-gravity experiments and experiments with atmospheric pressure and comparing models of the Moon and the Earth, to name a few examples.

Number of events and participants of Cosmic College courses

	FY 2012		FY 2013		FY 2014		FY 2015	
	Events	Participants	Events	Participants	Events	Participants	Events	Participants
Kids Course	80	5,594	107	7,767	86	5,342	137	6,525
Fundamental Course	166	12,956	153	11,396	194	13,256	191	11,659
Space Camp	7	203	8	144	7	104	12	222
TOTAL	253	18,653	268	19,307	287	18,702	340	18,406

NOTE: Japanese Fiscal year starts from April 1 to the following March 31

Space Education Leader Seminar Participants

FY 2012	FY 2013	FY2014	FY2015
1005	972	645	583

C. Support for Education at Home

The series of “Space Schools for Families” in collaboration with KU-MA (Kodomo Uchu-Mirai Association) began as a separate and distinctive program since April 2009. During the last fiscal year, 53 courses were organized totalling 4,595 participants.

The success of this program is reflected not only in terms of the quantity of the courses and participants, but also in the feedback from the parents who participated in the schools. The Center has received positive comments from a

number of parents who appreciated the opportunities to do something to think, to conduct simple experiments and to discuss with their children at schooling sessions and at home. Through the program offered by the Space Schools for Families, some parents discovered and treasured what their children really enjoy doing.

For the Space Schools for Families, series of teaching guides on typical hands-on activities continue to be produced, covering various scientific topics under the following 12

themes: i) flight and floating; ii) light; iii) soil and sand; iv) water; v) air (atmosphere); vi) heat, temperature and combustion; vii) electricity and magnetism; viii) force and motion; ix) breeding of animals and cultivation of flower and plants; x) field observations; xi) sound; and xii) Sun and its companions. As of March 2016, 104 sets of family worksheets have been developed and 37 of them are also available in English. These worksheets can be downloaded from the Center’s website. (<http://edu.jaxa.jp/en/publications/>)

Number of Space Schools for Families courses

	FY 2012	FY 2013	FY 2014	FY 2015
Course	42	49	51	53
Participants	4,438	4,768	4,987	4,595



D. International Activities

i. ISEB Student Program

During IAC2015 in Jerusalem, Israel, ISEB student program sponsored students from each agency organized academic presentation sessions and participated in lectures presented by specialists, Q&A Sessions with respective Heads of Agencies, outreach activities at the International Student Zone (ISZ) inside the IAC Exhibition area and were able to network with other students and professionals to help them diversify their contacts both personally and academically.



Q&A session with the Heads of Agencies, IAC2015, Jerusalem, Israel



ISEB students conducting outreach activities for local students (distances between planets) at International Student Zone, IAC2015



JAXA students' presentation at International Student Zone, IAC2015

ii. APRSAF Water Rocket Event

In 2015, the eleventh APRSAF Water Rocket Event was held in Bali, Indonesia on 28 and 29 November 2015, in conjunction with APRSAF-22. 58 students and 24 educators and 40 observers from 13 countries participated in the event. The twelfth APRSAF Water Rocket Event is planned to be held in Philippines on 12 and 13 November 2016, immediately preceding APRSAF-23.



Participants from across Asia Pacific region – APRSAF-22 Water Rocket Event in Bali, Indonesia, 2015



Launch of water rockets at Niti Mandala Field – APRSAF-22 Water Rocket Event



Japan team and JAXA staff – Students and teachers from Kosadagaoka Junior High School (Wakayama Prefecture) and Karatsu-Higashi High School (Saga Prefecture) – APRSAF-22 Water Rocket Event

iii. APRSAF Poster Contest

In 2015, the APRSAF Poster Contest was held at APRSAF-22. The Working Group had produced a calendar for January – December 2016 using the posters submitted for the APRSAF-22 Poster Contest, held with the theme “Careers in Space”. 32 posters were submitted from 11 countries and the winners of the Awards were announced during APRSAF-22. The next Poster Contest will hold the theme of “My Dream Planet”.



Best Poster Award: Koetkan Koonlapatkunanon, Thailand – APRSAF-22 Poster Contest



Special Poster Award: Shanjia Oiu & Yu Zhuo, China – APRSAF-22 Poster Contest



Special Poster Award: Clio Zhen Ni Lau, Malaysia – APRSAF-22 Poster Contest



Teachers making “robot hands” using paper cups and kite strings – APRSAF Space Education Seminar in the Philippines, 2016



Participants and staff of the APRSAF Space Education Seminar in the Philippines, 2016

iv. APRSAF Space Education seminar

The Space Education Center held a two-day seminar entitled “Exploring Space Science in the Classroom” with National Space Development Program (NSDP) and Science Education Institute Department of Science and Technology (SEI-DOST) in Pampanga, Philippines in February 2016.

The Seminar was attended by 25 teachers from Philippine Science High School (PSHS). JAXA representatives gave lectures and demonstrated hands on activities, including microgravity experiments,

learning about robot arms on the ISS and crafting a robot hand, vacuum experiments, experiencing time delay simulation using rovers and processing and analyzing satellite images. On the second day, the teachers were given the opportunity to teach each other what they had learned during the seminar, taking turns to be a teacher and students. It proved to be very effective for teachers to learn how to implement the contents of the seminar to their teaching curriculum.



1-3 graders building and flying “umbrella bag rockets” – Special classes for students at Japanese supplementary school in Bali, Indonesia, 2015

v. Special classes for APRSAF host country

The Space Education Center conducted special classes for the Japanese supplementary school in Bali, Indonesia in December 2015. It was the first attempt to reach local teachers and students in the APRSAF host country with the goal of igniting the students’ curiosity by using the wonder of space. JAXA representatives held three classes for elementary and secondary students, which included hands on activities: the umbrella bag rockets for 1-3 graders, the solar mobile crafting for 4-6 graders and vacuum

experiments for 7-9 graders. One of the teachers from the school commented that “The students had the precious experience and we all feel closer to space than before.”



4-6 graders making solar mobiles



7-9 graders conducting vacuum experiment using marshmallows

E. Dissemination of Information and Publications

The Space Education Center develops many materials to correspond with its various activities. Examples of such materials include: Activity manuals that will help participants become more conscious of their connection to space, Instruction manuals to help local teachers and leaders educate students and their community about space, Materials on how to introduce the subject of space in the classroom in a manner which will stimulate students' interest and "Space School for Families" materials that will give parents and their children opportunities to learn about space together and perform experiments using household items.

There are over 400 materials that have been archived into an online database. With the improved layout of the webpage and updated search engine, materials have become more accessible to users.

In 2015, new educational material named as "Train your communication skill!" was launched for training a communication skill which is one of the most important skills of astronauts. This educational material includes know-how of space education built by Young Astronauts Club (YAC). In this training, Astronaut Akihiko Hoshide

gives a specific image of shape in oral only and participants build the shape using various shaped small paper pieces.

As alternative means to Internet-based services, the Center has continued to issue paper-based publications on a regular basis. The Center has continued to distribute the quarterly journal, "Sora no Tobira" ("Door to Space" in Japanese). The purpose of the journal is to deliver the most recent Space News and to report on recent Space Education Activities. JAXA Space Education Center started to send the quarterly journal to schools and public libraries which have partnership with JAXA Space Education Center for spreading opportunity to read the journal for children.

Space Education TV is a broadcasting program distributed by the internet in the JAXA-TV. The TV program, one of the materials of space education, broadcasts reports of public open day and hands-on education program. In 2015, The TV program broadcasted about public open day, Space schools and "One Day Space Journalist" which school students cover the launch of rockets in Tsukuba Space Center Tanegashima Space Center.



Train your communication skill!



Quarterly magazine, "Sora no Tobira" ("Door to Space")



Space Education TV Channel

VI. STRATEGIC ALLIANCES AND ESTABLISHMENT OF FOOTHOLDS

The Center further strengthened its collaborations with industries and national research institutes while continuing its collaborations with the non-governmental, non-profit organizations engaged in space education activities by reaffirming its conviction that the collaborations with all stakeholders would be the key to success in further expanding space education activities at various levels of school education and many different places and occasions.

As a result of its increased efforts to collaborate with interested industries, one of the courses of the Cosmic College was co-organized with Discovery Channel. In the case of the Discovery Channel, which broadcasted advertisements of the Cosmic College courses.

Significant progress has been made in the collaborations with publishing companies producing textbooks and supplementary learning materials. In response to numerous requests from such companies, the Center has provided images and data resulting from space activities and projects of JAXA for use in the textbooks and supplementary learning materials for not only science but also other classes, including those for Japanese and English languages, geography, agriculture and homemaking.

To provide a systematic framework of support by leading researchers and experts from various disciplinary areas who are committed to space education efforts, the Center is establishing the Space Education Advisory Board. The Advisory Board would provide advice on the overall executive directions to be pursued by the Center as well as its major policies concerning the implementation of its programs, support for space education leaders and development of educational materials.



Collaborations with Discovery Channel

VII. CONCLUDING REMARKS

2015 was another successful year for JAXA. Three major initiatives were launched and successfully completed over the past 12 months.

The first accomplishment was the capture of Kounotori 5. In July, Japanese astronaut Kimiya Yui went to the ISS as a participant of Expeditions 44 and 45. While he was aboard the ISS, JAXA launched the H-II Transfer Vehicle Kounotori 5, which is an unmanned resupply spacecraft for the ISS. (Kounotori means stork in Japanese.) While aboard the ISS, Astronaut Yui was responsible for the important role of manipulating the robotic arm in order to capture the Kounotori 5. While Yui was doing this work in space, Japanese astronaut Koichi Wakata assisted the docking as lead CAPCOM (capsule communicator) on the ground. This was the first time that two Japanese astronauts, one in space and one on Earth, teamed up to accomplish the mission.

The second key accomplishment was the “Earth swing-by” of Hayabusa 2. JAXA developed Hayabusa 2 as the second generation of the asteroid probe Hayabusa. The first Hayabusa mission was successful in transporting particles from the asteroid Itokawa back to Earth. This was the first time this had ever been done. Hayabusa 2 was launched in December of 2014 and, in December 2015, Hayabusa 2 completed its Earth swing-by. It is currently en route to the asteroid 1999JU3, which was named “Ryugu” by the International Astronomical Union. Ryugu is the name of a Japanese castle that transcends time in Japanese folklore. Hayabusa 2 will touch down on Ryugu in 2018 and return to Earth with samples in 2020. There is much excitement around this mission, as it will allow us to learn more about the universe.



H-II Transfer Vehicle 5 (KOUNOTORI 5)



Asteroid Explorer “Hayabusa2”

Finally, our third key accomplishment was the successful injection of the Venus Climate Orbiter “Akatsuki” into the Venus orbit. Akatsuki was initially launched in May 2010 with the goal of circling Venus in December 2010. However, the main engine failed and the mission was in serious jeopardy. JAXA subsequently did an extensive investigation into the cause of the failure, while studying feasibility plans for a second attempt. On December 7, 2015 JAXA successfully injected Akatsuki into the Venus orbit. The orbiter is currently flying in the elliptical orbit at the apoapsis altitude of approximately 440,000km and periapsis altitude of approximately 400 KM from Venus. Akatsuki is expected to elucidate the mysteries of Venus, Earth’s twin sister.

JAXA Space Education Center has been an important part of JAXA for over ten years. During this time, the Center has been expanding its space education programs in both quality and quantity. It continues to enhance its activities in the effort to ignite children’s curiosity of nature, life, and the universe, while inspiring them to achieve higher goals. It should also be noted that space activities are not just limited to STEM education, but continue to play a critical role in a variety of other fields including cultural arts, sports, and home economics.

Children’s fascination with space is ignited by these different experiences and therefore, the Center believes that it is vital to share this information by partnering with other space organizations from around the world.

JAXA’s Space Education Center slogan, “Space will ignite children’s hearts” captures the commitment to our on-going contribution of providing wholesome growth for today’s youth: a growth that fosters self-confidence, self-awareness, and the desire to cherish family, friends, the earth, and outer space.



Venus Climate Orbiter “Akatsuki”



Report of JAXA Space Education Center

On Its Activities in 2015 – 2016

Space Education Center
Japan Aerospace Exploration Agency (JAXA)

3-1-1 Yoshinodai, Chuo-ku, Sagami-hara, Kanagawa, 252-5210, Japan

Tel: +81-50-3362-7590 Fax: +81-42-759-8612

<http://edu.jaxa.jp>

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