

Report of JAXA Space Education Center

On Its Activities in 2012–2013



Japan Aerospace Exploration Agency



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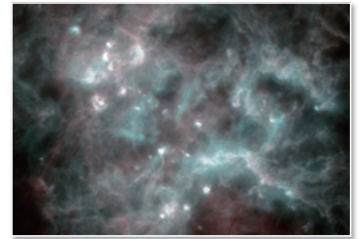
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I. INTRODUCTION

As the Space Education Center of Japan Aerospace Exploration Agency (JAXA) enters its eighth 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 2012 and the year 2013 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 2013 and indicates directions to be pursued in the coming year.



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.

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 aim 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.



Opening of the Space Education Center: Prof. Y. Matogawa, First Director of the Center (left), and JAXA President K. Tachikawa (right)



JAXA Sagamihara campus



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

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.

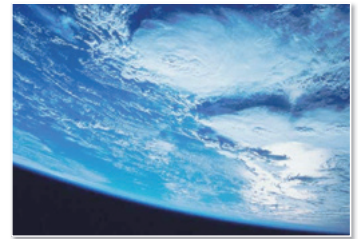
The Center considers it important that the young people understand the thinking process behind what they acquire as knowledge. Taking advantage of their simple curiosity toward nature, life and environment that surrounds them, the Center offers them with opportunities to experience the joy of discovering 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.



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.

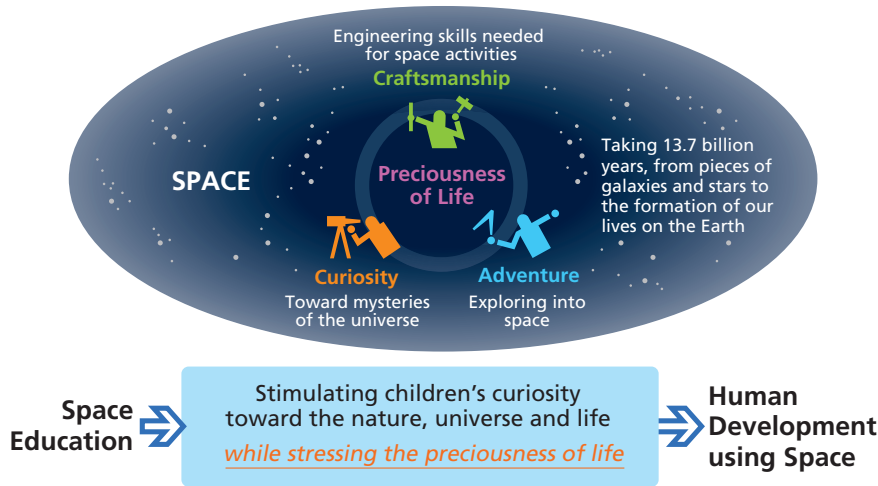
The Center aims to increase their appreciation of all forms of lives on the Earth by having young people learn about the origin and evolution of the universe and life and showing how long we have been searching for Earth-like planets without success.

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.



SPACE = Unique source of interest, imagination & inspiration.



C. Organizational structure and major activities

The Space Education Center consists of the Space Education Office, which serves as the implementing body of the Center, and 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 2013, the Space Education Office consists of 18 staff members, including 8 regular staff and 10 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;



Formal education support



Informal education support



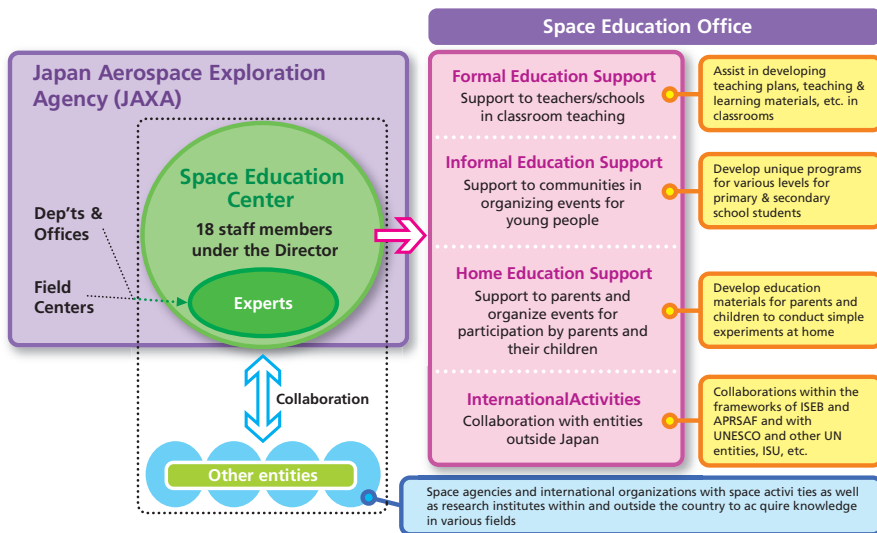
Home education support



International activities: Space Education Seminar in Nepal

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

MAJOR ACTIVITIES

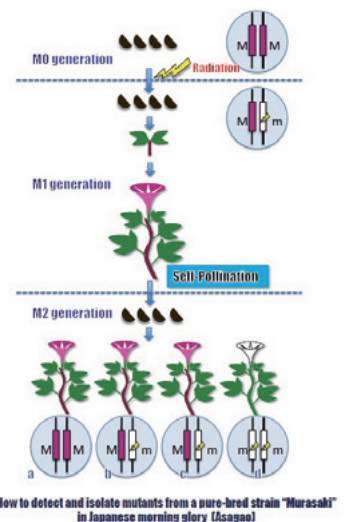


D. Collaborations with other offices and departments within JAXA

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



Basic graph of the “Seeds in Space” project

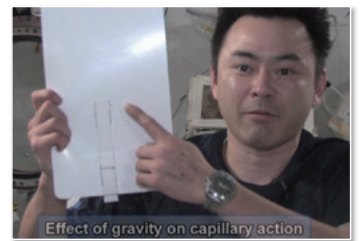
normal seeds on the Earth by using seeds of the flowering plant named “Miyakogusa”, or Japanese lotus corniculatus, and “Asagao”, or morning glories.

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, 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. As a new approach, JAXA 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 boards 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



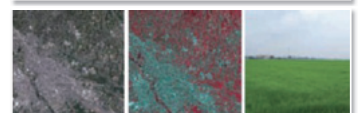
Astronaut A. Hoshide performs an experiment submitted by a Pakistani student for the Try Zero G educational experiment



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

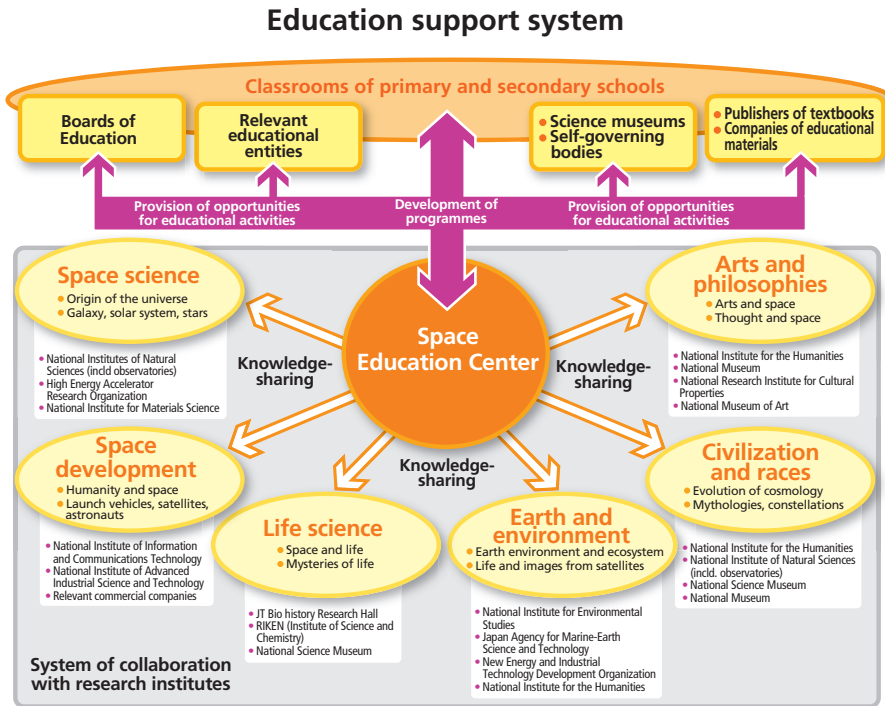


Instructions on how to make a Styrofoam kite demonstrated by a Japanese teacher at John F. Ward Elementary School on the occasion of SEEC



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

also with others that are engaged in studies on humanities, civilization, arts and philosophy.



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.

The revised guidelines were instituted to coincide with the principles of the Center, which has developed a number of teaching materials, methods and programmes 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



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



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



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



Teachers training course



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

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.

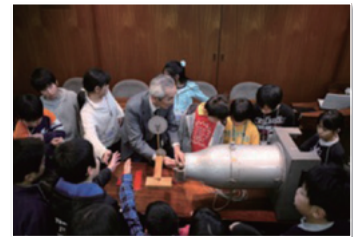
B. Support for Informal Education

Supporting informal education continues to be another pillar of the activities of the Space Education Center. Using unique programmes 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”.

In the past year, the Center has followed a few strategies as described below.

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 providing training opportunities and technical advice, 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, called "schooling", where the participating parents and children learn together about various space-related subjects and conduct basic experiments, and 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.

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

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 endeavours 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 (APRSAP) 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.

As for developing countries in other regions, the Center supports their space education activities through initiatives taken by the United Nations Educational, Scientific and Cultural Organization (UNESCO) and other entities of the United Nations system as well as development agencies, such as Japan International Cooperation Agency (JICA).

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).



E. Dissimination 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 provides information on its activities, including announcements for upcoming events, campaigns, and

reports on past activities and distributes updated on-line education materials and programs. Information and explanatory notes on various space-related topics are also available through the Space Information Center, an online information service that can be accessed through the Center's web site.

The web site 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 available in the most efficient manner 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 web site 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 web site 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.



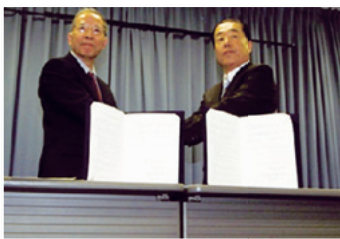
Web site of the Space Education Center: <http://edu.jaxa.jp/en>

A. Establishing Strategic Footholds

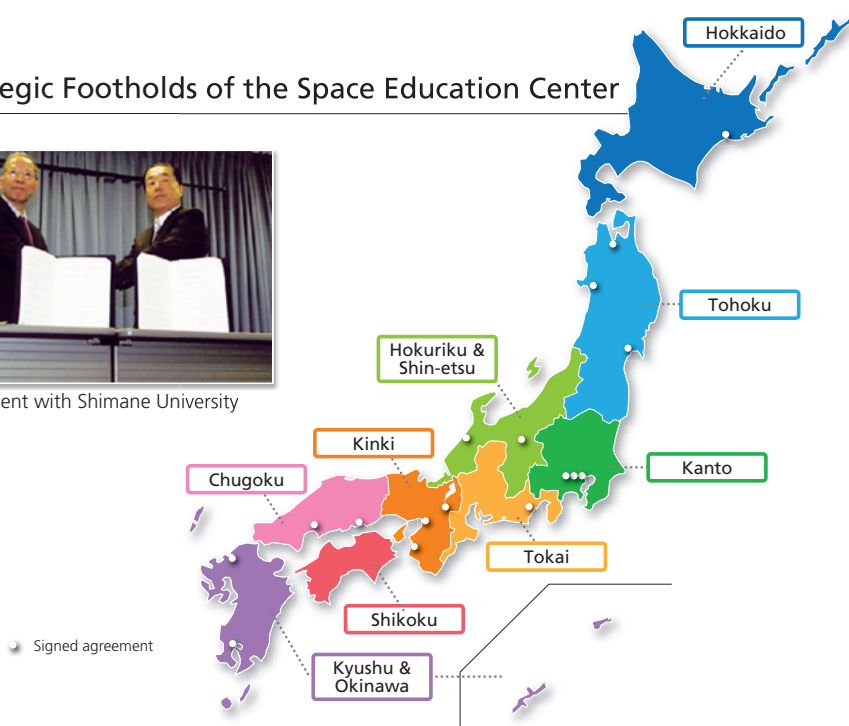
As part of the executive directions set by the management of JAXA, the Space Education Center has been tasked since the fiscal year 2008 to establish strategic footholds in all nine regional blocs of Japan, i.e. Hokkaido, Tohoku, Kanto, Hokuriku and Shinetsu, Tokai, Kinki, Chugoku, Shikoku, Kyushu and 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 2013, the Center has concluded agreements with twenty five entities to serve as its strategic footholds in Hokkaido, Tohoku, Kanto, Hokuriku and Shinetsu, Tokai, Kinki, Chugoku, Kyushu and Okinawa blocs.

Strategic Footholds of the Space Education Center



Agreement with Shimane University



List of strategic footholds (as of March 2013)

Bloc	Area	Entity	Date of Signature
Tohoku	Akita	Akita University	21-Mar-08
Tohoku	Miyagi	Miyagi technical College/Sendai Technical College	19-Sep-08
Chugoku	Shimane	Shimane University	27-Oct-08
Hokkaido	Kushiro	NPO Kodomo Yugakukan Shimin Stage ¹	2-Dec-08
Hokuriku/Shinetsu	Shimosuwa	Shimosuwa-Town - Board of Education	2-Dec-08
Kanto	Sagamihara	Sagamihara-City	4-Dec-08
Kanto	Tokyo	Waseda University	29-May-09
Tohoku	Aomori	Aomori-City Junior High Schools Working Group on Science	1-Aug-09
Hokuriku/Shinetsu	Komatsu	Komatsu-City - Board of Education	1-Dec-09
Kyusyu/Okinawa	Kagoshima	Kagoshima-City	10-Jan-10
Kyusyu/Okinawa	Fukuoka	Kyusyu University	8-Mar-10
Kanto	Tokyo	Tokyo-Gakugei University	10-Mar-10
Kanto	Tokyo	Kokubunji-City - Board of Education	1-Apr-10
Tokai	Shizuoka	Shizuoka Science Museum - RU·KU·RU	12-Jun-10
Chugoku	Kurashiki	Kurashiki-City Board of Education	1-Jul-10
Chugoku	Kure	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	Gifu	Ogaki-City Board of Education	24-Mar-11
Kanto	Tokyo	Keio University	24-Mar-11
Shikoku	Tokushima	Anan-City Board of Education	25-Jan-12
Kanto	Yokosuka	Japan Agency for Marine-Earth Science and Technology	4-Feb-12
Tokai	Nagoya	Nagoya-City Science Museum	18-Jul-12
Tokai	Yokkaichi	Yokkaichi-City	24-Oct-12
Kinki	Kobe	Kobe-City – Board of Education	10-Mar-13

¹ Kodomo = Children, Yugakukan = Study House, Shimin = Civic/Citizen

B. Support for Formal Education

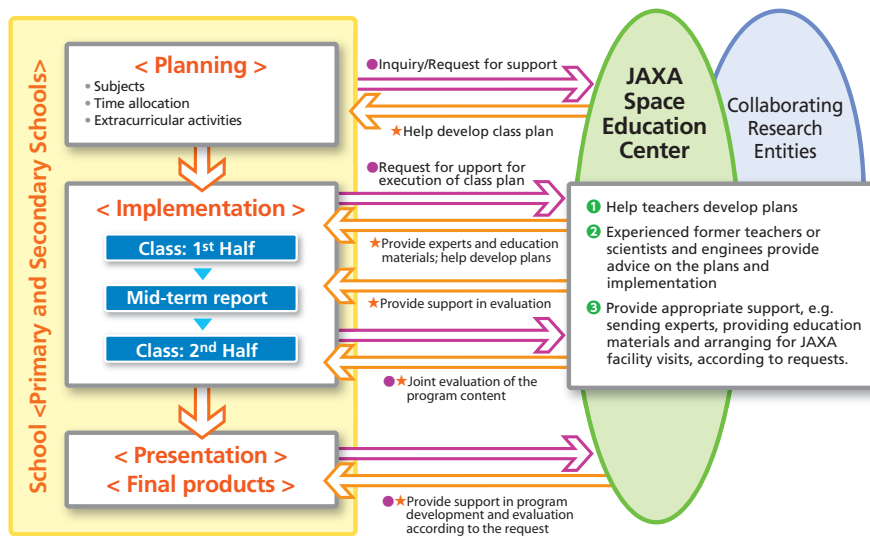
The support for formal education provides customized support to the teachers who have contacted the Center with a request for support. After the initial contact, the Center's staff hold numerous consultations with those teachers to articulate their needs and interests, identify goals and develop plans 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.

SCHOOL SUPPORT: PROCESS

TEACHERS IN THE DRIVING SEAT. JAXA to assist the teachers



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.

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 and currently has 139 branches across the country and about 3,000 members to carry out educational activities addressing space and science.



1. 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

2. 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

3. Cosmic College: Space Camp

The “Space Camp” is for a wide range of students starting from the fourth grade of elementary school all the way to senior high school. The programme takes place over multiple days and participants stay on JAXA’s field centers the entire time while spending the night in the dormitories with their peers. They are given the opportunity to directly observe the space development team with the finest and most advanced facilities and technology at the camp. Through hands-on activities involving scientific observations, experiments and handicraft work, the programme leads the students to pose scientific questions and come up with answers for those questions by themselves. The programme aims to enhance their scientific and logical thinking capabilities.



Space Camp

4. Other recurrent activities

At Sagamihara Campus, the Space Education Center organizes a five-day training programme 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 programme is known as “Space Mission High School”, or “Kimission”, which is a combination of “Kimi”, or “you” in Japanese, and “mission”.

The Center assists, upon request, other departments and offices of JAXA in organizing, or co-organizing with other research entities to create educational activities for young people. Such activities include Space Schools, organized by ISAS, to provide the students with opportunities to interact with its leading space scientists, Microgravity Experiment Contests, by the Space Environment Utilization Center to provide the selected students with opportunities to conduct microgravity experiments during parabolic flights, and Science Camps, hosted by Space and Field Centers of JAXA in Tsukuba, Tanegashima, Chofu and Kakuta and organized by Japan Science Foundation, for the students to visit space facilities, listen to lectures by leading space engineers and to experience the making and launching of model rockets.



Group discussions and presentations during “Kimission”



Lecture of “School of Space” by ISAS



Microgravity experiment by the students



Science Camp

5. Special events

The Center supported the “CanSat Kohshien”³. Each participating high school student team builds a “CanSat”, nano-scale quasi-satellite model weighing 350 to 1050 grams with all basic functions of a satellite fitted into a soda can of 350 ml, and its carrier to be placed on board a balloon or model rocket.



All Japan Water Rocket Contest



CanSat Kohshien

ii. For educators and instructors of space education

The Center has been offering Space Education Leaders Seminars for instructors of space education activities. In 2009, the Center began to offer training opportunities for those instructors with experience to further enhance their knowledge about space education and their skills. The support system for the Space Education Leaders(SEL) who have completed the Seminars has also been enhanced to facilitate communication among them and to provide material support for their space education activities.



1. 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 programme aims to transfer to the participants basic knowledge and skills that are required to be able to demonstrate space education activities. Among other things, the participants learn about the goals and principles of space education, role of leaders and understanding children’s needs, as well as crisis management and safety measures.



Space Education Leaders Seminar

³ “Kohshien” is the name of the prestigious ballpark in Hyogo Prefecture where the traditional Japan High School Baseball Championship is held every summer with the participation of about 50 high school teams selected through the prefectural tournaments.

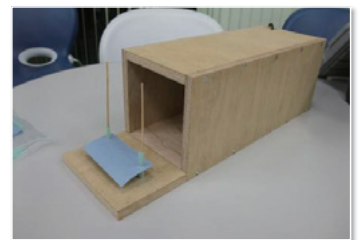
The SEL Skill-Up Course is for those individuals who have completed the above Seminar and who wish to improve their skills in conducting space education activities. Through this Course, the participants obtain the latest news on the developments with space activities, basic knowledge in the aerospace area required to carry out space education activities as well as know-how and skills for activity management, teaching skills and methods to develop educational materials.

2. Space Education Leaders Support System

As part of its support to the Space Education Leaders(SEL) who have completed the SEL Seminar in the past three years, the Space Education Center has a financial support system, and a rental system for its education materials and equipment for use during their space education activities. The rental period is up to one month, and the use of materials and equipment of the Center requires the Center's prior approval. After the completion of the activities, the users are requested to provide feedback on the rented materials and equipment.



Space Education Leaders Skill-Up Course



Small wind tunnel for rent



Space suits for rent

D. International Activities

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

a) Space Education and Awareness 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. Currently consisting of members from 17 countries and 3 international organizations and one associate member organization⁴, 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)



Working Group members during APRSAF-18, held in Singapore, December 2011

⁴ Australia, Bangladesh, Cambodia, India, Indonesia, Japan, Kazakhstan, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Republic of Korea, Sri Lanka, Thailand, Vietnam, Asian Institute of Technology, the United Nations Educational, Scientific and Cultural Organization (UNESCO), the United Nations Committee on the Peaceful Uses of Outer Space (UN COPUOS) and the United Nations Office for Outer Space Affairs (UNOOSA) are currently members of the Working Group, and Space Generation Advisory Board(SGAC) is current associate member of the Working Group.

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.

b) 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.



Water Rocket launch, Malaysia
December 2012



APRSAF-12 Water Rocket Event,
Kitakyushu, Japan, 2005



APRSAF-13 Water Rocket Event,
Jakarta, Indonesia, 2006



APRSAF-14 Water Rocket Event,
Bangalore, India, 2007



APRSAF-15 Water Rocket Event, Ha
Noi, Vietnam, 2008



APRSAF-16 Water Rocket Event,
Bangkok, Thailand, 2010



APRSAF-17 Water Rocket Event,
Melbourne, Australia, 2010



APRSAF-18 Water Rocket Event,
Singapore, 2011



APRSAF-19 Water Rocket Event, Kuala
Lumpur, Malaysia, 2012

c) 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.



Poster by a Thai student Who won APRSAF-19 Best Poster Award



Calendar for 2013, with posters submitted to ARPSAF-19 Poster Contest



Poster Contest in Jakarta, Indonesia, 2006 under the theme "Importance of Space"



Poster Contest in Bangalore, India, 2007 under the theme "50 Years in Space"



Poster Contest in Ha Noi, Vietnam, 2008 under the theme "Wonders of the Universe"



Poster Contest in Bangkok, Thailand, 2010 under the theme "Our Universe-Great Discoveries"



Poster Contest in Melbourne, Australia, 2010 under the theme "Space Technology to Help the Earth"



Poster Contest in Singapore, 2011 under the theme "The Next 50 Years in Space"



Poster Contest in Kuala Lumpur, Malaysia, 2012 under the theme "Friends in Space"

d) Space Education Forums and Seminars

The Working Group convened space education forums and seminars in Vietnam and Indonesia in 2006, Sri Lanka in 2009, Bangladesh in 2011 and Nepal in 2012, 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. The next Space Education Seminar is scheduled to be held in Cambodia in 2013.



Making syringe rockets during hands-on session of the Space Education Seminar, Nepal

e) International Water Rocket Event Workshop

In order to expand the pool of skilled and informed educators who can effectively use water rockets to enhance education for young people and to establish a network of those educators, the International Water Rocket Education Workshop was hosted by Victorian Space Science Centre (VSSEC) in Melbourne, Australia, from 30 June to 3 July 2008. Teachers, educators and space experts from 12 countries in Asia and the Pacific as well as Latin America participated in the Workshop. Looking back over the years, the Working Group has created the report of a brochure on water rocket activities for educational purposes to seek for sponsorship by not only space-related public entities, but also commercial entities in September 2010.



Flight testing various types of water rockets

**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 and the South African National Space Agency (SANSA) as Member from October 2012. 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



Establishing ISEB in October 2005

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 programmes.

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 recognised 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 and 2012.

The term of the chairmanship is one year, and it rotates among the Founding members. ESA successfully acted as the chairman in its first year and in 2009-2010. ISEB was then chaired by NASA from 2006-2007, and by CSA from 2007-2008 and 2011-2012. JAXA served as chairman in 2008-2009, and is currently serving as the chair in 2012-2013.



Interactions with Heads of Agencies, IAC 2012, Naples, Italy



Lunch time event at International Student Zone, IAC 2012, Naples, Italy

iii. Pursuing cooperation with developing countries outside Asia

a) Supporting UNESCO efforts

Upon invitation by UNESCO, the Space Education Center participated in workshops organized by UNESCO in and for developing countries. Following its participation for the first time when the workshops were held in multiple cities of Colombia in November and December 2005, the Center has participated to date in those workshops held in multiple cities in Ecuador, Peru, Tanzania and Vietnam.



Participants of the workshop with the Deputy Minister of Education and Vocational Training at the center, Dar-es-Salaam, Tanzania

From 2008 to 2010, the Center introduced water rockets as educational activities and supported hands-on session for school children to experience the launch of water rockets at the workshops held in Dar-es-Salaam and Arusha, Tanzania, in May 2008, Lima, Peru, in June 2009, and the Philippines in February 2010.

At the regional space camp held in Ibarra, Ecuador, in May 2008 for teachers and students from 5 Latin American countries, i.e. Argentina, Brazil, Chile, Ecuador and Peru, the Center also helped organize the session to build water rockets and the water rocket launch competition. Lectures on water rocket theory at an advanced level were also offered at the space camps held in Salinas and Puerto Aroyo, Galapagos, Ecuador in June 2009, where college students participated.



Head of the space agency of Peru conducting the first water rocket launch, Lima, Peru



Mayor of Ibarra opening the water rocket competition



Water rocket lecture and launch in Salinas, Ecuador



...and in Puerto Ayora, St. Cruz, Galapagos, Ecuador

b) Supporting water rocket activities around the world

The partnership with UNESCO has turned out to be effective in promoting water rocket activities for educational purposes, using the materials provided by the Space Education Center. It has opened the door for collaborations with those other developing countries with emerging space capabilities with willingness to initiate space education activities to reach out to a large number of school teachers. As part of such collaborations, the Center has continued to support water rocket events as well as associated teachers seminars held in Argentina, Brazil, Chile, Colombia, Ecuador, Nigeria, Philippines, Vietnam and Bangladesh. While the Center has introduced its teaching methods and materials in



Teaching physics in Argentina using water rockets

developing countries, it has also benefited from inputs provided by enthusiastic teachers and educators in developing countries. Building upon the Educator's Manual for Water Rockets developed by the Center and translated into Spanish in cooperation with UNESCO, teachers in some countries, such as Argentina, have developed advanced teaching materials to meet the needs of their classes. The map below shows the countries to which the Center provided technical and material support for their water rocket activities. The Center continues to receive various ideas from teachers and educators in those countries.



Teachers training in Brazil



Water rocket workshop in Chile



Water rocket competition during Space Adventure, Baranquilla, Colombia

c) Supporting Japan International Cooperation Agency (JICA) as part of its training programme

In response to requests by Japan International Cooperation Agency (JICA), the Center received groups of African science teachers in September in 2006, 2007 and 2008 to introduce space education. The Center provided short hands-on sessions for those teachers to use space materials and resources to stimulate interest of students in science classes. In total, the Center provided such opportunities to 24 science teachers from 9 African countries, i.e. Kenya, Gambia, Ghana, Lesotho, Malawi, Namibia, South Africa, Tanzania and Uganda. In addition, liaison council of JAXA-JICA has started since January



Welcoming the group of science teachers from African countries, 2008

2008, and discussions regarding Space Education for developing countries were brought up in the 3rd meeting held in February 2011. JAXA Space Education Center and JICA are collaborating together to hold Space Education Leader Seminars since November 2011 in 2 JICA training facilities, Kamagane and Nihonmatsu. These seminars are held every quarter and the number of participants from the JICA dispatch members have increased each session.

iv. Other collaborations: providing education opportunities outside Asia for graduate students

In cooperation with the International Space University (ISU), the Space Education Center continues to provide scholarships for Japanese university and graduate students to participate in the Space Studies Program (SSP), a nine-week course held between June and August by ISU at a different location each year around the globe, and the degree programs for Master of Science in Space Studies and Master of Science in Space Management (MSS/MSM), a one-year course held at ISU main campus in Strasbourg, France. Starting from 2008, the Center also provides funding support for Japanese university and graduate students to participate in the annual symposium organized by ISU in February.

With more than 3,000 alumni worldwide and several hundred faculty and lecturers drawn from around the world, ISU offers unique programmes that are international, interdisciplinary and inter-cultural in nature. Based on the Memorandum of Understanding concluded between JAXA and ISU in December 2003, JAXA supports the activities of ISU by receiving MSS/MSM students as interns at JAXA research facilities, sending JAXA staff as lecturers for SSP and MSM/MSM and participating in the Board of Trustees of ISU.



ISU Campus in Illkirsch, France
(Photographs: Courtesy of ISU)



ISU Annual Symposium in 2013

V. RECENT ACHIEVEMENTS

A. Support for Formal Education

1. 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 consists of normally 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 labour-intensive approach to support school education with a team of 5 staff members.

Numbers of schools supported by the Center and the students benefited from the support

	FY 2005		FY 2009		FY 2010		FY 2011		FY 2012	
	Schools	Students	Schools	Students	Schools	Students	Schools	Students	Schools	Students
Kindergarten	0	2	3	250	0	0	0	0	10	338
Elementary Schools	1	14	34	2,105	36	2,916	44	4,251	58	6,970
Junior High Schools	5	14	18	1,348	16	1,497	24	2,070	26	3,870
High Schools	14	20	12	537	14	821	14	1,195	18	1,385
TOTAL	20	50	67	4,240	66	5,234	82	7,516	112	12,563

NOTE: Japanese fiscal year starts from April 1 to next March 31.

It should be noted that in the past year, some schools that had received support from the Center in the preceding years have continued classroom activities with the use of space materials without support from the Center. Through administered transfers from one school to another, some of those teachers who had been supported by the Center in the past have begun their classroom activities with the use of space materials at their new schools by themselves. There are apparently more schools that have started or that are carrying out classroom activities using space materials than the above statistics indicate.

Another major development is the increased opportunities for teachers training in space education through collaborations with, for example, boards of education or faculties of education. The Center started its support for the faculty of education by organizing one space education training session in 2007. During the fiscal year 2008, three such sessions were organized with the support of the Center. As for the previous fiscal year, two sessions have been organized, benefiting 260 students. The number of

training sessions that the Center supported for those teachers who are already teaching at school has also increased over the past years, from one in the fiscal year 2005 to 31 in the fiscal year 2012.

Number of teacher training sessions and participants

	FY 2005		FY 2009		FY 2010		FY 2011		FY 2012	
	Sessions	Students/Teachers	Sessions	Students/Teachers	Sessions	Students/Teachers	Sessions	Students/Teachers	Sessions	Students/Teachers
For candidates for teachers	Nil	3	2	265	3	324	4	396	2	260
For teachers	1	39	36	1,163	30	1,320	42	2,925	31	1,126
TOTAL	1	42	38	1,428	33	1,644	46	3,321	33	1,386

2. Let’s Make and Play with Flying Objects: Tomioka Pre-School

Children at Tomioka Pre-School in Shizuoka made rockets out of umbrella bags in May, 2012.



Before making the rockets, the children were shown footage of a real rocket launch and the International Space Station. The students were engaged and cheering throughout the video presentation as it was the first time to see a rocket and outer space for many of them.

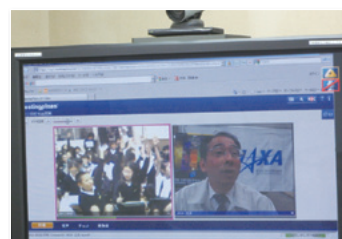
The children each made their own rocket with the help of their parents and teachers and flew them with much enthusiasm.

3. Connecting with JAXA facilities to Elementary Schools through Tele-Education: Shibukawa Elementary School

In November, 2012, JAXA employees held two special classes for children over 300km at Shibukawa Elementary School in Shiga via the internet.



100 students from the school gathered in front of two monitors and listened attentively to the JAXA employees. The first class was taught by employees at the Sagamihara Campus and they taught about JAXA’s activities in space and space environment. The children also learned about the International Space Station and what it is like to live in space.



Later that month JAXA employees at the Tsukuba Space Center taught children about satellites that are monitoring the earth’s environment from space. In later classes, the children were given the opportunity to think

about the changes in their local environment and internalize the “perspective from space” that the satellites provide. These classes helped children localize the topics they learn in school.

4. Research and Development of Space Robots ~Through Programming Rovers and Trial Runs~: Ayama Junior High School

In October 2011, a class using an experimental lunar rover took place at Ayama Junior High school in Mie.

Students developed their own driving program to navigate their rover, through a course replicating the surface of the moon in the school’s sandpit, to a designated goal. Furthermore, the students were given missions to take photos of certain landmarks along the way.

Students were able to learn the importance and difficulty of calculating measurements through a lecture on the current conditions of research rovers and this exercise. They were also able to realize how the things they learned that day are connected with the front line research on control technology.



5. Searching Space through Electric Waves ~Observing the Annular Eclipse in Coordination with Other Schools~: Hakuyo High School

1st year high school students of Hakuyo High School in Kanagawa received instruction and practiced space observation through electric waves from May to September 2012.

In the lecture, the students learned about what can be observed from electric waves and how to analyze the data collected. In practice, students observed solar radio waves with items including parabolic antennas and calculated the temperature of the surface of the sun with the data.

On 21 May, students were able to collect data from the sun during the annular eclipse. They then compared the data they collected with other high school students at Osaka Prefectural Education Center High School in Osaka and Saibi High School in Ehime who also collected data during the eclipse.



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 continues to increase while the level of financial and manual resources remained the same.

Number of events and participants of Cosmic College courses

	FY 2010		FY 2011		FY 2012	
	Events	Participants	Events	Participants	Events	Participants
Kids Course	49	2,286	57	4,203	80	5,594
Fundamental Course	103	10,567	128	10,243	166	12,856
Space Camp	10	215	9	262	7	203
TOTAL	162	13,068	194	14,708	253	18,653

NOTE: Japanese Fiscal year starts from April 1 to next March 31.

The pool of space educators and instructors who have newly received training from the Space Education Leaders Seminar continues to expand. As for the current fiscal year, FY2012, the number of participants of the Space Education Leaders Seminars as well as its Skill-Up Courses that have been organized to date is over 1000.

Number of Space Education Leaders (cumulative)

FY 2009	FY 2010	FY 2011	FY 2012
661	676	1,036	1,005

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.

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 programme since April 2009. During the last fiscal year, 42 courses were organized totaling 4,438 participants.

The success of this new programme 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 programme 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 2013, 87 sets of family worksheets have been developed.

Number of teacher training sessions and participants

	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
Course	Nil	3	15	20	31	42
Participants	Nil	1,037	2,000	3,187	3,890	4,438



D. International Activities

1. ISEB Student Program

During IAC2012 in Naples, Italy, ISEB student program sponsored students from each agency and organized academic presentation sessions by specialists, student presentations, Q&A Sessions with respective Heads of Agencies, and were able to network with other students and professionals to help them diversify their contacts both personally and academically.



2. APRSAF Water Rocket Event

In 2012, the eighth APRSAF Water Rocket Event was held in Kuala Lumpur, Malaysia on 8 and 9 December 2012, in conjunction with APRSAF-19. 56 students and 46 teachers and leaders from 16 countries participated in the event. The ninth APRSAF Water Rocket Event is planned to be held in Vietnam on 30 November and 1 December 2013, immediately preceding APRSAF-20.



3. APRSAF Poster Contest

In 2012, the APRSAF Poster Contest was held at APRSAF-19. The Working Group had produced a calendar for January – December 2013 using the posters submitted for the APRSAF-19 Poster Contest, held with the theme “Friends in Space”. 32 posters were submitted from 11 countries and the winners of the Awards were announced during APRSAF-19. The next Poster Contest will hold the theme of “Space and Me”.

4. JAXA-KARI Space Camp

JAXA and KARI held a joint space camp for secondary school students to form and share a social consensus about the future of mankind with space as the source of interest. The camp was held on 19 and 20 August, 2012 at KARI and NARO facilities in Korea. Fifty students participated in the Space Camp (25 Japanese and 25 Korean)

The programs during the camp included a science lecture by Korean astronaut, Dr. Lee, visiting KARI and NARO Space Center facilities, participating in egg drop and model rocket workshops and working in groups to present on learning how to cooperate and making the future of mankind better using space.



E. Dissimination 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 pique 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 350 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.

Among the newest materials that were developed were videos of various experiments taken by Japanese astronauts while aboard the International Space Station. These experiments were first performed in on earth, and the astronaut would compare the results after the experiments were performed in space. Experiments titled "Bernoulli's Theorem", "Water and Space" and "Inertia and Energy" were organized in 2010, and "Weight and Mass of Objects" and "The Mysteries of Space Environment" were performed in 2011. In addition, the Center made a video comprised of several replicated zero gravity experiments that took place on a parabolic flight.

People in most parts of Japan were able to witness an annular solar eclipse on 21 May 2012. The Center urged children to submit pictures of the sun through a filter. About 700 pictures of the sun were submitted and the Center was able to increase interest in heavenly bodies through this activity.

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 newsletters, in the form of school wall newspapers to about 10,000 elementary and junior high schools in the country. The 24th issue of the quarterly journal, "Sora e no Tobira" ("Door toward Space" in Japanese), has been issued in March 2013. The purpose of the journal is to deliver the most recent Space News and to report on recent Space



School Wall Newspaper



Quarterly magazine, "Sora e no Tobira" ("Door toward Space")



Space Education TV Channel

Education Activities. It is also a tool that is used to publicize upcoming events.

Starting from April 2009, the Center significantly increased the frequency of real-time internet broadcasting to provide live coverage of not only the rocket launches but also space education events organized by the Center. The Center aims to provide such live coverage through “Space Education TV Channel” which is broadcasted on average twice a month. From April 2012 to March 2013, 27 programmes were broadcasted through the “Space Education TV Channel”. All these broadcasted programmes have been archived and made available on-line. On 10 December 2011, the Channel held a special live broadcast of the Lunar Eclipse in Japan. The special episode attracted over 680,000 viewers throughout the broadcast.

VI. STRATEGIC ALLIANCES AND ESTABLISHMENT OF Footholds

The Center further strengthened its collaborations with other offices and departments of JAXA, 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, some of the courses of the Cosmic College were co-organized with Panasonic Corporation, Discovery Channel and The Sankei Shimbun Co., Ltd.. In the case of the Discovery Channel, which broadcasted advertisements of the Cosmic College courses, eleven courses have been organized together, and the event attracted about more than 200 participants.

Since 2010, the Center began to vigorously pursue collaborations with national research institutes, such as Japan Agency for Marine-Earth Science and Technology (JAMSTEC), National Astronomical Observatory of Japan (NAOJ) and RIKEN, to have their researchers and experts involved in not only co-organizing educational events but also in the development of programme contents and planning for future activities.

Significant progress has been made in the collaborations with publishing companies producing textbooks and supplementary learning materials. In response to 127 requests from 45 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 programmes, support for space education leaders and development of educational materials. Under this



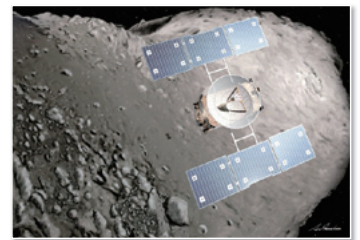
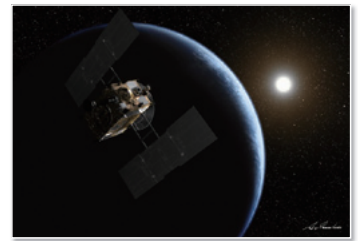
Collaborations with Discovery Channel

Advisory Board, the establishment of two working groups, one on space education materials and the other on space education activities, is also envisaged.

VII. CONCLUDING REMARKS

Three years has passed since the Hayabusa Spacecraft returned to earth. There are already 3 films that have been made in regards to the Hayabusa. There are other movies that have been produced about space missions like “Apollo 13”, but it is rare to see multiple films on the same mission. The three films attracted about 1.4 million viewers combined. The capsule that brought back the asteroid sample has been put on display at each of the 47 Prefectures in Japan in 69 venues with a total of over 890,000 visitors. There are many children who know what the Hayabusa is, even if they do not know what JAXA is. Eventually children started personifying the spacecraft by calling it “Hayabusa-kun” (the suffix “kun” is generally used for young boys). This personification was not done intentionally, but came naturally as the children became personally attached to the mission. It is interesting to think about what the children feel after learning about how the spacecraft overcame many trials and tribulations to eventually make it back home. Perhaps they fell in love with the tenacity of the Hayabusa and its staff. Hope, endurance, sadness, never giving up, curiosity, adventurous and the importance of crafting are perhaps among other emotions children may have felt.

Young children will create memories with events that give a strong impression and will remember them for their entire lives. This is where the fundamentals of Space Education lies. We are to help children treasure these precious memories especially in their youth. There are so many possibilities to create such memories even outside of the labors of the Hayabusa. JAXA’s Space Education Center would like to continue to contribute to the wholesome growth of today’s youth through our slogan, “Space will ignite the children’s hearts” so they can take care of themselves, their friends, family, the earth and outer space.



Report of JAXA Space Education Center
On Its Activities in 2012–2013

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