

Report of JAXA Space Education Center On Its Activities in 2010-2011



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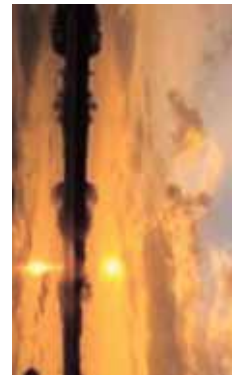
REPORT OF JAXA SPACE EDUCATION CENTER ON ITS ACTIVITIES IN 2010 - 2011

(Information as of February 2011)

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I. INTRODUCTION



As the Space Education Center of Japan Aerospace Exploration Agency (JAXA) entered its sixth year of operation following its establishment in May 2005, it continued to enhance its activities both in terms of quantity and quality to ignite children's curiosity toward the 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 2010 and the year 2011 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 2010 and 2011 and indicates directions to be pursued in the coming year.

II. BASIC FACTS

A. Establishment of the Center



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

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 2003¹, had carried out educational activities as part of the public relations and outreach activities. Those activities focused on increasing public awareness and understanding of the work of JAXA and highlighting societal benefits of space activities, with the aim to gain public support for the activities of JAXA.



JAXA Sagamihara campus

B. Goals and principles



Space subjects, resources and materials inherently have unique power to attract young people's attention and 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 positive impact on the minds of young people in their development process, helping them to expand their potential and to become socially responsible individuals.

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).



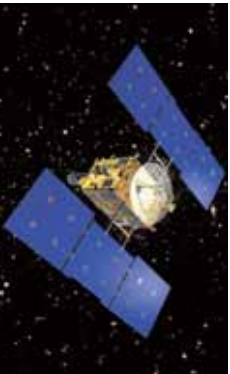
There are a few principles that the Space Education Center follows in its activities.

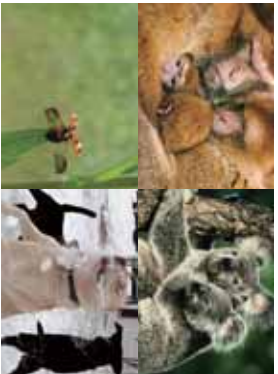
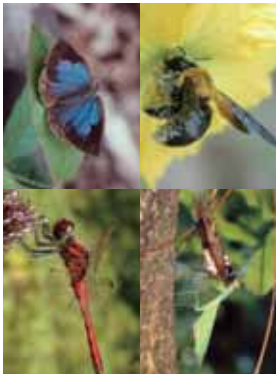
The Center considers it important that the young people understand the thinking process behind what they acquire as knowledge. Taking advantage of their simple curiosity toward the nature, life and environment that surrounds them, the Center offers them with opportunities to experience the joy of discovering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

“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 those of young people. 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, and get involved in serious crimes. The people involved in the establishment of the Space Education Center had become deeply concerned about those young people, and they 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.





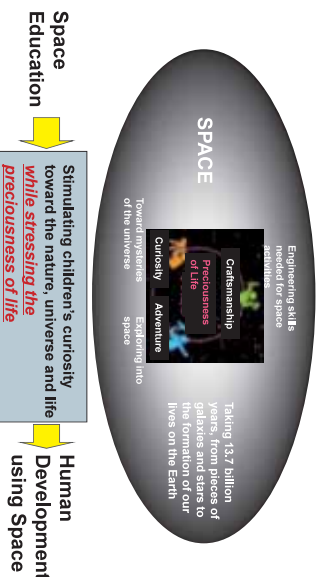
By letting young people learn about the origin and evolution of the universe and life and showing how long we have been searching for Earth-like planets without success, the Center aims to increase their appreciation of all forms of lives on the Earth.

The spirit of “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.

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 in whatever they do.

SPACE = Unique source of interest, imagination & inspiration.



C. Organizational structure and major activities



Formal education support



Informal education support



Home education support

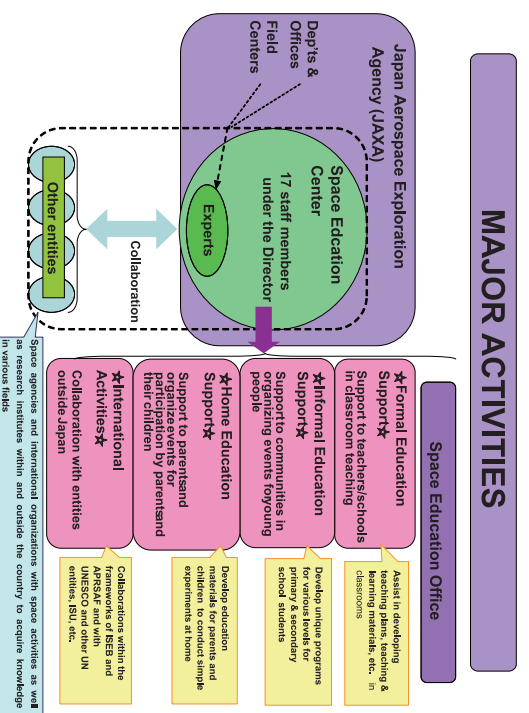


International activities: Space Education Seminar in Bangladesh

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 February 2011, the Space Education Office consists of 17 staff members, including 7 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 off school days to learn about space-related subjects and to participate in hands-on activities;
- iii) home education support, to assist parents in enhancing communications and interactions 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.



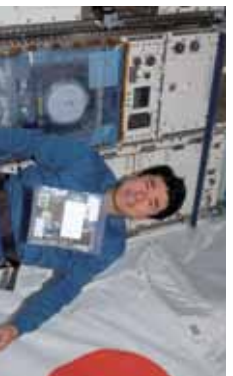
D. Collaborations with other offices and departments within JAXA

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. Particularly during the one-month period celebrating Space Day in Japan, on 12 September, a number of JAXA staff are sent to schools to talk about space subjects.



Call for opportunities to participate in “Seeds in Space” project



Astronaut Doi and samples used for an educational experiment relating to space and life



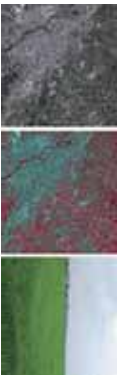
SEEC session with teaching demonstrations by Japanese teachers supported by the Space Education Center



Bamboo battery experiment demonstrated by a Japanese teacher at Seabrook Intermediate School on the occasion of SEEC

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 “Seeds in Space” project. Using seeds of the flowering plant named “Miyakogusa”, or Japanese lotus corniculatus, and “Asagao”, or morning glories, this project allows the participating schools to compare those seeds that have been flown on the ISS with normal seeds on the Earth in the growing process.

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 primary and secondary schools as well as kindergartens 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 experience on using space materials to teach across the curricula, not only for science, but also for language, arts, mathematics, history and other subjects. On the occasion of SEEC2011, in February 2011, JAXA have provided the opportunity for Japanese teachers to make lectures at local school in Houston as new approaches.



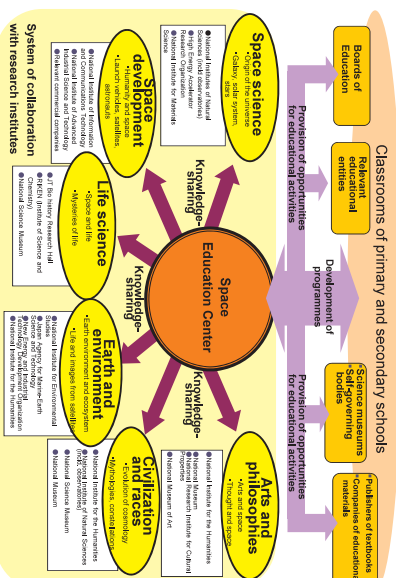
Supporting senior high school class in environmental study together with Satellite Applications and Promotion Center

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 needs of schools and teachers. Significant progress has been made in this area particularly in the past year. Details of collaborations with those entities are provided in Chapter VIII of the present report.

In pursuing collaborations to expand space education activities, the Center takes a comprehensive approach. The Center seeks for collaborations not only with those entities that are involved in space science and technology and their applications, life science and Earth science, which have clear links with space activities, but also with others that are engaged in studies on humanities and civilizations as well as arts and philosophies.

Education support system



III. SUPPORT FOR FORMAL EDUCATION

A. Objectives and strategies



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 attention of young people and appeal to their curiosity. The challenge is to find a best way to make those materials available for use under 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 a several strategies pursued by the Center to achieve that goal.

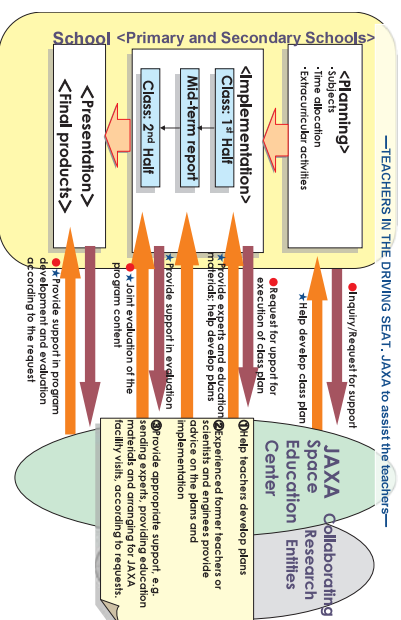


One is to provide customized support to the teachers who have contacted the Center with request for support. After the initial contact, the Center's staff hold numerous consultations with those teachers to articulate their needs and interest, identify goals and develop plans for activities for their 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, 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



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 foods produced by students of Obama Fisheries High School, Obama, Fukui

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. Depending on the needs of and objectives pursued by the teachers, the Center’s support covers various types of classroom activities, ranging from normal classes according to the curricula guidelines, integrated learning classes as well as extracurricular activities. Following the expansion of its support to include kindergartens from 2007, the Center has been supporting an increasing number of kindergartens, elementary schools and junior and senior high schools, as well as faculties of education of universities.

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, 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.

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



Teachers training course

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.

In light of the recently revised curriculum guidelines issued by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) in March 2008, for K-12 grades, the Center has been focusing its efforts to help teachers to follow the revised guidelines to adjust the contents of the classes as well as methods by using relevant space materials.



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

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.

For the Center, it presents an excellent opportunity to introduce its space education materials for a wider use by school teachers. The idea behind the revised guidelines resonates with the principles of the Center, and it 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 relate to mathematics and science had already begun to be followed at schools from April 2009, the revised curriculum guidelines are to be implemented in elementary schools from 2011 and for the junior high schools in 2012. Textbook companies have begun to produce new textbooks and supplementary learning materials to 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. Achievements



1. Introducing space education at schools across the country

Providing customized support to teachers and schools consumes a large amount of staff time and efforts. A classroom activity plan consists of normally more than one classes, and the period required to implement the plan could last for one full academic year, requiring at least a several visits by the Center's staff and experts. The Center has, nonetheless, continued this labour-intensive approach to support school education with the team of 5 staff members.

The number of schools that received customized support from the Center increased from 20 in the first fiscal year, May 2005 to March 2006, to 67 in the fifth fiscal year, April 2010 to March 2011.

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

	FY 2005		FY 2006		FY 2007		FY 2008		FY 2009	
	Schools	Schools	Schools	Schools	Schools	Schools	Schools	Schools	Schools	Schools
Kindergarten	0	0	1	112	1	94	2	150	3	250
Elementary Schools	1	30	8	337	18	1,634	14	1,177	34	2,105
Junior High Schools	5	1,158	3	457	6	817	14	1,088	18	1,348
High Schools	14	355	15	898	17	1,499	20	594	12	537
TOTAL	20	1,543	27	1,804	42	4,044	50	3,009	67	4,240

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 current fiscal year, two sessions have been organized, benefiting 265 students. In addition, the number of training sessions for those teachers who are already teaching at school, has also increased in comparison to years past from one in the fiscal year of 2005 to 39 in the fiscal year of 2008. It has already reached 36 as of January 2010.

<Number of teacher training sessions and participants>

	FY 2005		FY 2006		FY 2007		FY 2008		FY 2009	
	Sessions	Students/ Teachers	Sessions	Students/ Teachers	Sessions	Students/ Teachers	Sessions	Students/ Teachers	Sessions	Students/ Teachers
For candidates for teachers	Nil	Nil	Nil	Nil	1	156	3	234	2	265
For teachers	1	10	12	1,201	7	242	39	1,186	36	1,163
TOTAL	1	10	12	1,201	8	398	42	1,420	38	1,428

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

2. Creating a starting point for intellectual curiosity: Kobe YMCA Chitose Kindergarten, Kobe, Hyogo



The joint learning exercise by parents

and children at Kobe YMCA

The Space Education Center has been supporting kindergartens since February 2007 to carry out space education activities. In January 2011, the Center continuously support the joint learning exercise by parents and children at Kobe YMCA Chitose Kindergarten. The children enjoyed the explanation of various type of rockets and making and launching straw rockets and umbrella rockets from readily available materials around them while learning about the basics of science of flight.

The excitement prevailed throughout the programme, which the center had designed with the hope that it would serve as the turning point for their growing curiosity.



Carrying out a vacuum test and making umbrella bag rockets.



Thinking about the global environment from a point of view from outer space

3. Opening the door into outer space: Yokohama-City Idogaya Elementary School, Yokohama Kanagawa

Starting from the academic year 2010, the Center has supported the integrated interdisciplinary programme for the sixth-grade students of Idogaya Elementary School. Through this programme, the students learned about life in space, such as space food and space suit, after group research on the subject of “What is space like?”. They also took part in hands-on activities, to carry out a vacuum test and to make umbrella bag rockets. They enjoyed unusual experience studying the environment in space and flight mechanism.

4. Protecting our environment and saving our planet: Minami-Tane Junior High School on third grade selected class of science.

With the theme of “The global environment as seen from space”, there will be talks about the Solar system, explanations of why there is life on earth, and they will be made aware that the earth is a miracle planet. Also, as the global environment as seen from space, they will use satellite imagery to see the environmental problems such as global warming and desertification from the viewpoint of man-made satellites.

They will be given the understanding of the earth’s current situation as seen from space and the awareness of what they must do with the problems about the global environment. After the lecture of JAXA, they researched the environment of Kagoshima and other regions using satellite data.



5. Learning science technology related to space exploration from experts: Tokai University Boyo High School

It was adopted as a Science Partnership Project(SPP) conducted by Japan Science and Technology Agency(JST). As Tokai University Boyo High School's continuing theme "Space", they learned about science technology related to space exploration. The specialist gave the students lectures and experiments for several times focused on food and environment. The students visited relative facilities and presented their studies.



Experiments focused on food

6. Strengthening partnerships with universities to support teachers training: Faculty of Education, Shimane University

Having recognized the advantages of enhancing understanding of space education among the students who wish to become teachers, the Space Education Center has pursued collaborations with interested universities with faculties of education. This is also part of the Center's efforts to contribute to enhancing education in the local community.



Seminar for future school teachers



Science Academy

One such example is its collaboration with the Faculty of Education of Shimane University. The Center worked together with faculty members of the University to organize a seminar on space education as part of the teacher-training course for the students of the Faculty of Education. For the students of the elementary and junior high schools attached to the University, the Center supported the organization of special lectures by sending space experts. The Center also provided education materials for the teacher training courses organized by the University and sent space experts as lecturers.



Teachers training for the renewal of teaching licences



Image taken by National Astronomical Observatory of Japan, with transmission supported by National Institute of Information and Communications Technology (NICT) and JAXA

7. Advancing space education on the occasion of a rare celestial phenomenon: solar eclipse on 22 July 2009

The Space Education Center took the advantage of the total solar eclipse that occurred on 22 July 2009, the longest one during the twenty-first century lasting a maximum of 6 minutes and 39 seconds off Southeast Asia, to stimulate interest of children in learning more about celestial bodies and their phenomena. On that day, the total eclipse of the Sun was visible from within a narrow corridor that traversed half of the Earth, crossing also the Ryukyu Islands of Japan. A partial eclipse was visible from the entire parts of Japan.

Besides carrying out its own special project to encourage the general public to take photographs of pin-hole images of the total solar eclipse, the Center provided support for the special classes that addressed the solar eclipse on that day.

As part of the tele-education programme between Ogasawara Village, located in the archipelago of “Ogasawa Group” at some 1,000 kilo-meters directly south of Tokyo, and Tamarokuto Science Museum of Nishi-Tokyo City, participants on both sides observed and took photographs of the pin-hole images of the solar eclipse. With the high-definition images and video conference system provided by the Wideband Internetworking Engineering Test and Demonstration Satellite of JAXA, known as “KIZUNA”, the participants then compared their photo-images of the solar eclipse.

At Chohshi High School of Chiba Prefecture, the students conducted solar radio observation using the parabola antenna that they had built together. By observing the solar eclipse using scientific methods, they could deepen their understanding of the phenomenon.



Observing solar radio by their own parabola antenna

C. Establishing strategic footholds

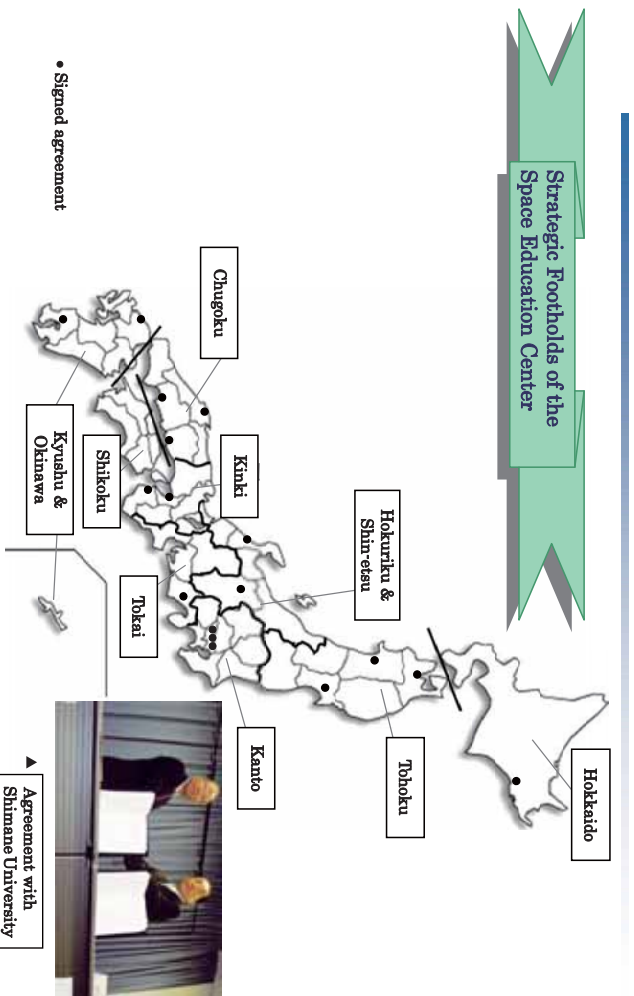
As part of the executive directions set by the management of JAXA, the Space Education Center has been tasked since the fiscal year 2008 to establish strategic footholds in all nine regional blocs of Japan, i.e. Hokkaido, Tohoku, Kanto, Hokuriku and Shinetsu, Tokai, Kinki, Chugoku, Shikoku, Kyushu and 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 all primary and secondary schools in the country 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 bloc 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 February 2011, the Center has concluded agreements with seventeen entities to serve as its strategic footholds, in Hokkaido, Tohoku, Kanto, Hokuriku and Shinetsu, Tokai, Kinki, Chugoku, Kyushu and Okinawa blocs.

List of strategic footholds (as of February 2011)

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 ²	2-Dec-08
Hokuriku/Shinetsu	Shimosuwa	Shimosuwa-Town Board of Education	2-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

² Kodomo = Children, Yugakukan = Study House, Shimin = Civic/Citizen



IV. SUPPORT FOR INFORMAL EDUCATION

A. Objectives and strategies



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 off school days.



Through its informal education support, the Center aims to maximize the synergies of space education efforts undertaken by various entities, including not only local governments but also 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.

B. Programme structure



1. 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 those Cosmic College courses, the Center also supports a few other recurrent space education events and non-recurrent special events for young people.

In supporting the organization of Cosmic College courses, the Center has continued to work closely with the Young Astronaut Club (YAC)-Japan, an incorporated foundation originally established in 1986 and currently with 129 branches across the country and about 3,000 members to carry out educational activities addressing space and science.

a. Cosmic College: Kids Course

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



Kids Courses



Fundamental Courses

b. Cosmic College: Fundamental Course

The “Fundamental Course” is for the school students between the third-year in the elementary school and the third-year in the junior high school. The programme aims to enhance the students’ interest in the 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 their scientific and logical thinking capabilities.



Advanced Courses

c. Cosmic College: Advanced Course

The “Advanced Course” is for the junior and senior high school students. The programme normally lasts for a few days. Through hands-on activities involving scientific observations, experiments and handicraft work, the programme leads the students to pose scientific questions and to come up with answers for those questions by themselves. The programme aims to enhance their scientific and logical thinking capabilities.

The High School Course, which used to be a separate programme of the Cosmic College, has been integrated into the Advanced Course since April 2009.

d. Other recurrent activities

At Sagamihara Campus, the Space Education Center organizes the five-day training programme for high school students, during their summer vacation period, to learn how to design scientific missions through team work 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 “Kimiission”, which is a combination of “Kimi”, or “you” in Japanese, and “mission”.



Group discussions and presentations during “Kimiission”



Lecture of “School of Space facilitated” by ISAS



Microgravity experiment by the students



Science Camp



All Japan Water Rocket Contest 2010



CanSat Koshien

As much as the circumstances allow and upon request, the Center assists other departments and offices of JAXA in organizing, or co-organizing with other research entities, their educational activities for young people. Such activities include Space Schools, organized by the Institute of Space and Astronautical Science (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 the parabolic flights, and Science Camps, hosted by Space Centers of JAXA in Tsukuba, Tanegashima and Kakura and organized by Japan Science Foundation, for the students to visit space facilities, listen to lectures by the leading space engineers and to experience making and launching of model rockets.

e. Special events

The Space Education Center collaborated with the local government of Aichi Prefecture, YAC and Kodomo-Uchu-Mirai Association (KU-MA)³ in organizing the Japan Water Rocket Contest 2010 at the same venue as the Expo 2005 Aichi Japan. With the participation of about 500 primary and secondary school students, the students who had been selected through the regional contests held in nine regional blocs of Japan competed for the accuracy of launch and flight distance of the water rocket.

The Center supported the “CanSat Koshien”⁴ by covering the event live by the dedicated TV channel operated in collaboration with YAC. Each participating high school student team built 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 onboard the model rocket provide by the organizer. The six participating teams competed for the duration of the

³ “Kodomo”, “Uchu” and “Mirai” mean “Children”, “Space”, “Future”, respectively, in Japanese.

⁴ “Koshien” 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.

image-capturing of the target marker on the ground after the release of the CanSat 300 meters above the ground until its landing.



2. For educators and instructors of space education

As for instructors of space education activities, the Center has been offering Space Education Leaders Seminars since April 2008, following the restructuring and merging of the Educators Course of the Cosmic College and the Leaders Seminar, which had been separately organized to provide training opportunities for any individuals interested in carrying out 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 instructors who have completed the Seminars has also been enhanced, to facilitate communications among them and to provide material support for their space education activities.

a. Space Education Leaders Seminar

The Space Education Leaders 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 for instructors of space education activities. Among other things, the participants learn about the goals and principles of the Center, role of leaders and understanding children's needs, as well as crisis management and safety measures. The Center issues licenses for Space Education Leader (SEL) to those individuals who have completed the Seminar.



Space Education Leaders Seminar



Space Education Leaders Skill-Up Course

The Space Education Leaders 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.



Small wind tunnel for rent

b. Space Education Leaders Support System

As part of its support to the instructors and leaders who have completed the Space Education Leaders Seminar in the past four years, the Space Education Center has 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 concerned, the users are requested to provide feedback on the rented materials and equipment.



Space suits for rent



Community site registration through the homepage of the Space Education Center

Starting from December 2009, the Center provides an on-line forum to facilitate the communications among the space education instructors and leaders as well as with staff of the Center. The “Space Education Community Site” allows the registered users to exchange information, ideas and educational materials as well as to receive the latest information on the Center’s materials produced and most recent and upcoming activities.

The Center has also started in the past year a new system of support for the instructors and leaders. The Center now provides financial support on a selective basis for those who carry out space education hands-on activities for young people, at 18 years old or younger, or activities in support of such activities for young people. Interested instructors and leaders must have completed the Space Education Leaders Seminar in the past three years and their activities to apply for funding support must not be co-organized or co-sponsored by JAXA. The expenditure items to be supported by this system include those relating to travel, educational materials, expendable items, rental of the meeting rooms and facilities, communications, transportation and insurance for the participants. An application submitted by an individual is eligible for funding support up to 50,000 Japanese yen, and a group of two or more individuals is eligible up to 200,000 Japanese yen, and the amount will depend on the size and quality of the proposal.

C. Achievements

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 continued to increase while the level of financial resources remained the same and the number of staff increased from 4 to 11 in FY2010.

<Number of events and participants of Cosmic College courses>

	FY 2005		FY 2006		FY 2007		FY 2008		FY 2009	
	Events	Participants	Events	Participants	Events	Participants	Events	Participants	Events	Participants
Kids Course	6	600	14	1,318	26	3,068	39	2,048	46	3,217
Fundamental Course	10	565	10	505	34	2,278	61	2,257	81	4,965
Advanced Course	1	65	1	61	2	63	Nil	Nil	3	92
High School Course*	1	43	1	35	Nil	Nil	Nil	Nil	Nil	Nil
TOTAL	18	1,273	26	1,919	62	5,409	100	4,305	130	8,274

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

* High School Course was merged with Advance Course from April 2008 and reorganized.

The pool of space educators and instructors who have newly received training from the Center through the Cosmic College Educators Course until February 2011 and through the Space Education Leaders Seminar continued to expand. As for the current fiscal year, FY2010, the number of participants of the Space Education Leaders Seminars as well as its Skill-Up Courses that have been organized to date is 557 in total as of February 2011.

<Number of space education instructors and leaders>

	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Cosmic College: Educators Courses*	349	192	174	Nil	Nil
Cosmic College:	213	233	600	Nil	Nil
Space Education Leaders Seminars**	Nil	Nil	Nil	388	538
TOTAL	562	425	744	388	538

* Cosmic College Educators Course and Leaders Seminar were reorganized and merged to become

Space Education Leaders Seminar from April 2008.

** Space Education Leaders Seminars include those organized for the purpose of training instructors of the Seminars.

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 fly 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.

V. SUPPORT FOR EDUCATION AT HOME

A. Background and objectives



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 in the past year. Its support for home education is provided mainly through its collaborations with Kodomo-Uchu-Mirai Association (KU-MA) in organizing “Space Schools for Families”, for participation by parents and children together.



The programme of “Space School for Families” consists of a 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 the homework to be done between the schooling, 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 School for Families”, the Center aims to enhance parent-child relationships and to help create conducive environment for learning at home.



B. Achievements

The series of “Space School for Families” in collaboration with KU-MA began as a separate and distinctive programme since the last fiscal year, starting from April 2009. During the last fiscal year, fifteen courses were organised totaling 2,000 participants. For the current fiscal year, from April 2010 to March 2011, 20 courses have already been organized totaling 3,187 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 this programme. 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 School for Families, some parents discovered and treasured what their children really enjoy doing.

For the Space School 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 February 2011, about 20 kinds of teaching guides have been developed.

<Number of Course and Participants of Space School for Families >

	FY 2007	FY 2008	FY 2009
Course	Nil	3	15
Participants	Nil	1,037	2,000

VI. INTERNATIONAL ACTIVITIES

A. Objectives and strategies



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 (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.



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 (ISEEB).

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



Working Group members during APPRSAF-17, held in Melbourne, Victoria, Australia, November 2010

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 APPRSAF Space Education and Awareness Working Group since 2006. Currently consisting of members from 17 countries and 3 international organizations and one associate member organization⁵, 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.



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

Starting from 2005, the Working Group has organized the Water Rocket Event each year, immediately following the APPRSAF 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 friendship beyond national borders based on common interest in space. In 2010, two APPRSAF Water Rocket Events were held. The fifth APPRSAF Water Rocket Event had been held in Khlong Luang, Pathum Thani, Thailand, on 23 and 24 January 2010, immediately preceding the APPRSAF-16, with the participation of 53 students and

⁵ Australia, Bangladesh, Cambodia, India, Indonesia, Japan, Kazakhstan, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Republic of Korea, Singapore, 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 its secretariat, the United Nations Office for Outer Space Affairs (UNOOSA), are currently members of the Working Group.



APPRSaf-16 Water Rocket Event, Khlong Luang, Pathum Thani, Thailand, January 2010

23 teachers and leaders from 15 countries, and the sixth APPRSaf Water Rocket Event was held in Melbourne, Victoria, Australia, on 20 and 21 November 2010, immediately preceding the APPRSaf-17, with the participation of 33 students from 12 countries with 34 teachers/leaders from 13 countries. The seventh APPRSaf Water Rocket Event is planned to be held in Singapore, on 3 and 4 December 2011, immediately preceding the APPRSaf-18.



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



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



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



APPRSaf-15 Water Rocket Event, Hanoi, Vietnam, 2008

The Working Group has organized the Poster Contest under a selected theme each year since 2006 during the APPRSaf session, for children of the age between 8 and 11 years old. From among those posters submitted by the participating countries, the participants of the APPRSaf session vote to select the best poster, for APPRSaf Best Poster Award, and the second and third best posters for APPRSaf Special Poster Awards.



Poster by an Indonesian student who won APPRSaf-17 Best Poster Award



alendar for 2011-12, with posters submitted to ARPSAF-17 Poster Contest

In 2010, two APPRSaf Poster Contests were held. On the occasion of APPRSaf-16, to contribute to the celebration of International Year of Astronomy in 2009, the Working Group had produced a calendar for April 2010 – March 2011 using the posters submitted for the APPRSaf-16 Poster Contest, held under “Our Universe – Great Discoveries”.

On the occasion of APPRSaf-17, to contribute to the celebration of life on earth and of the value of biodiversity for our lives on the occasion of International Year of Biodiversity in 2010, the Working

Group produced a calendar for April 2011 – March 2012 using the posters submitted for the last Contest, held under “Space technology to Help the Earth” .

28 posters had been submitted from 10 countries, and winners of the Awards have been announced during the APRSAF-16, Bangkok, Thailand from 26 to 29 January 2010. 23 posters had been submitted from 9 countries, and winners of the Awards have been announced during the APRSAF-17, Melbourne, Victoria, Australia from 23 to 26 November 2010.

The theme for the next Poster Contest is “The next 50 years in Space”, and it is planned during the APRSAF-18, Singapore, from 6 to 9 December 2011.



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, January 2010 under the theme “Our Universe – Great Discoveries



Poster Contest in Melbourne, Victoria, Australia November 2010 under the theme “Space Technology to Help the Earth”



Studying Flight mechanism of flying seeds in the simple window tunnel during hands-on session of the Space Education Seminar, Dhaka, Bangladesh

Recognising the need for providing opportunities for students and teachers of primary and secondary schools particularly in developing countries to enhance their understanding of space science and technology and their applications and to participate in hands-on space education activities, the Working Group convened space education forums and seminars in Vietnam and Indonesia in 2006 and Sri Lanka in 2009. The last seminar was held in Dhaka and Enayetpur, Bangladesh on 17-19 January, co-organized by Bangladesh Astronomical Society (BAS) and JAXA .



Flight testing various types of water rockets



Brochure on Water Rocket Activities for Educational Purposes

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, which resulted in establishing an Internet-based Wiki site to serve as an on-line forum for any interested teachers and educators to exchange information, views and education materials relating to water rockets.

(See Wiki site: http://wiki.vsssec.vic.edu.au/waterrockets/index.php?title=Main_Page).

With a look back over the years, the Working Group has created a report 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.

C. Collaborations with advanced space-faring nations: International Space Education Board



Establishing ISEB in October 2005

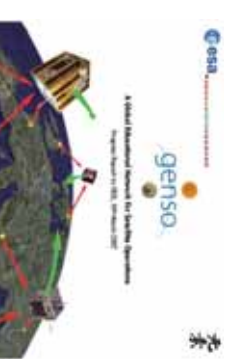


ISEB members during IAC2010, held in Prague, Czech Republic in September/October 2010

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 a Member from October 2006, and Victorian Space Science Education Centre (VSSEC) as an Associate Member from October 2010. 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



JAXA Student Presentation, at COSPAR 2010, Bremen, Germany



GENSO Project concept



Interactions with Heads of Agencies, IAC 2010, Prague, Czech Republic.



Lunch time event at International Student Zone, IAC 2010, Prague, Czech Republic.

is open to any public organization carrying out space activities and pursuing education programmes.

In 2010 and 2011, the following projects were carried out within the framework of ISEB: i) international student programmes at the International Astronautical Congresses (IAC's) held in Prague, Czech Republic in September/October 2010 and at the Scientific Assembly of the Committee on Space Research (COSPAR) in Bremen, Germany in July 2010; ii) international participation in NASA Academy; iii) “Global Educational Network for Satellite Operations” (GENSO) project; and v) 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 term of the chairmanship is one year, and it rotates among the Founding members. Following its successful initial year under the chairmanship of ESA, ISEB was chaired by NASA from October 2006, by CSA from September 2007 and by JAXA from October 2008, by ESA from October 2009, NASA is currently serving as the chair again.

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

Particularly during the chairmanship of JAXA, the Center contributed to advancing the objectives of ISEB by establishing the Task Group for Student Programmes, reorienting the work of the Representative Working Group to focus on policy and coordination issues, coordinating the IAC Student Programme and ensuring the participation of a large number of Japanese students. The total of 43 students participated in the Programme. Recognizing that the activities of ISEB had been carried out predominantly for university and graduate students, the Center proposed to initiate a joint activity for the benefit of primary and secondary school teachers and students.



The Center suggested the exchange of education materials as an example in this regard, as it did with ESA by translating into Japanese the set of educational DVDs of ESA on the scientific experiments on the International Space Station for use by schools in Japan.



During IAC 2009, the Japanese students worked with the Korean Local Organizing Committee to carry out hands-on activities for local Korean children as part of the Space Festival, which took place in parallel to IAC 2009. The Japanese students also worked with Korean students supported by the Korea Aerospace Research Institute (KARI) to organize a joint KARI-JAXA Student Session, introducing each other's space projects undertaken by university and graduate students, including CanSat experiments.



During IAC2010, the Japanese students carried out hands-on outreach activities for local Japanese Elementary School in Prague as a new approach.



JAXA Student Hands-on Session at local Japanese School during IAC2010, Prague, Czech Republic.

D. Pursuing cooperation with developing countries outside Asia

1. Supporting UNESCO efforts

Upon invitation by UNESCO, the Space Education Center participated in the workshops organized by UNESCO in and for the developing countries. Following its participation for the first time in the UNESCO workshops when they 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 (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



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



Mayor of Ibarra opening the water rocket competition

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 five 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.



Water rocket lecture and launch in Salinas, Ecuador

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

2. 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 including those outside the region of Asia and the Pacific 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 and Vietnam.



Teaching physics in Argentina using water rockets



Teachers training in Brazil



Water rocket workshop in Chile



Water rocket competition during “Space Adventure”, Baranquilla, Colombia

While the Center has introduced its teaching methods and materials in 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 materials support for their water rocket activities. The Center continues to receive various ideas from teachers and educators in those countries.





3. 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 nine African countries, i.e. Kenya, Gambia, Ghana, Lesotho, Malawi, Namibia, South Africa, Tanzania and Uganda.



Welcoming the group of science teachers from African countries, 2008

E. Other collaborations: providing education opportunities outside Japan for graduate students



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

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), 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), 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.



ISU SSP in 2010
(Photographs: Courtesy of ISU)

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 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.

VII. DISSEMINATION OF INFORMATION AND PUBLICATIONS

A. Objectives and strategies



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

The Space Education Center uses Internet-based services and publications as the 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 the past activities, and distributes update on-line education materials and programmes. 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 web site.

The web site of the Center (<http://www.edu.jaxa.jp>) 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 a 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. Its web site continues to be upgraded, and it now contains movie files and video clips.

In the past year, the Center focused on the following strategies: i) to create conducive environment for any 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.

B. Achievements



Campaign named "Let's observe a total lunar eclipse!" through Website



Campaign named "I found that the first twinkle star (Venus) in the dark morning sky!" through Website



School Wall Newspaper



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



Space Education TV Channel

The Space Education Center continues to upgrade its web site, and the next upgrade is planned for release in next spring 2011. One of the major achievements in the past year is the establishment of the "Space Education Community Site", in support of those who have completed the Space Education Leaders Seminar as well as those teachers interested in introducing space materials into their classrooms. In addition, the number of astronomy observation campaign through web site continues to increase since the first campaign on Solar eclipse in 2009.

The Center has continued to issue short journals via Email, or "Mail Magazine", once or twice a month, taking up a space-related topic that may be of interest to young people and disseminating the latest news on the Center's activities. As of February 2011, 78 issues have been disseminated since the first issue in June 2006. The number of subscribers more than doubled in the past four years, from about 1,000 to 3166 as of the end February 2011.

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 news letters called School Wall Newspapers, to about 15,000 elementary and junior high schools in the country. For "Science for Kids", a monthly journal for children, the Center has continued to contribute articles on its activities. The fifteenth issue of the quarterly journal, "Sora e no Tobira" ("Door toward Space" in Japanese), has been issued by March 2011.

Starting from April 2009, the Center significantly increased the frequency of the real-time television 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" twice a month on average. From April 2010 to February 2011, 34 programmes were broadcasted through the "Space Education TV Channel", attracting the maximum of 99,735 viewers per programme. All these broadcasted programmes have been archived and made available on-line.

VIII. STRATEGIC ALLIANCES AND ESTABLISHMENT OF Footholds



Collaborations with Discovery Channel



Reaffirming its conviction that the collaborations with all stakeholders would be the key of success in further expanding space education activities at various levels of school education and many different places and on occasions, 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.

As a result of its increased efforts to collaborate with interested industries, some of the courses of the Cosmic College were co-organized with Discovery Channel, Denshi Kahatsu Gakuen and The Minami-nihon Living Shinbun Co., Ltd. In the case of the Discovery Channel, which broadcasted advertisements of the Cosmic College course, ten courses has been organized together. With Family Mart, Cosmic Colleges were organized during the Space Camp programme in Tanegashima Space Center and Tsukuba Space Center.



Collaborations with Family Mart in Tanegashima Space Center

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

IX. CONCLUDING REMARKS



Asteroid Explorer "Hayabusa" overcame many difficulties, and successfully returned to the Earth on June 13, 2010 after a grand journey that lasted seven years.

Hayabusa has met and overcome a series of technical glitches, such as reaction wheels failure, onboard RCS (Reaction Control System) fuel leak accident, communication blackout, and Ion engine failures.



Many people have been encouraged by the journey which was a miraculous achievement made possible by leading-edge technologies, teamwork and excellent ideas among engineers. The mission of Hayabusa was to return samples from asteroid 'Itokawa' to the Earth with clues that would reveal some of the mysteries of the origin of our solar system. It also impressed us with a "never-give-up attitude".

It has enormous influence on the school scene.



Towards enforcement of the Japanese government's new teaching guidelines, which are completely revised every 10 years, from the Japanese fiscal year 2011, JAXA has been collaborating with publishing companies producing national school textbooks and supplementary learning materials, and providing images and data resulting from JAXA space activities for use in the textbooks and materials not only for science but also other school subjects, such as Japanese, English, Homemaking, Agriculture, and Geography and etc.

JAXA has actively continued to conduct Space Education Leaders Seminars for school teachers and volunteer social educators.

We in the Center are, of course, aware of the need to increase children's interest in space-related science and engineering.

By making full use of attractive space materials in Japan and overseas, we hope to actively promote space education activities in order to spark a bright flame in children's hearts and minds for years to come.



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ISS and KIBO (c) NASA/JAXA, SRMS and OBSS (c) NASA/JAXA, After Hayabusa Swing-by (c) Akihiro Ikeshita, Towards Asteroid Itokawa (c) Akihiro Ikeshita