“Hearts in Harmony”

Astronaut Koichi Wakata emphasizes the importance of teamwork on ISS long-duration missions.
Welcome to JAXA TODAY

The Japan Aerospace Exploration Agency (JAXA) works to realize its vision of contributing to a safe and prosperous society through the pursuit of research and development in the aero and space fields to deepen humanity’s understanding of the universe. JAXA’s activities cover a broad spectrum of the space and aeronautical fields, including satellite development and operation, astronomical observation, planetary exploration, participation in the International Space Station (ISS) project and the development of new rockets and next-generation aeronautical technology.

With the aim of disseminating information about JAXA’s activities and recent news relating to Japan’s space development programs to as wide an audience as possible, we launched JAXA TODAY in January 2010.

Message from the President

JAXA celebrated its 10th anniversary on October 1, 2013. During its first decade, JAXA has logged many world-first achievements that have received wide praise internationally. These include the successful test launch of the Epsilon Launch Vehicle, and the sample return by asteroid explorer Hayabusa. These successes have helped bolster Japan’s research and development capabilities and national strength, while also driving space development around the world.

JAXA has now entered a fresh stage in its organizational development, and to coincide with this milestone, JAXA has redefined its management philosophy as working “To realize a safe and affluent society using space and the sky.”

We will: 1. Aim to improve people’s daily lives, and contribute to the enjoyment of those lives.
2. Constantly strive for greater heights, and aspire toward creativity.
3. Work to meet the trust and expectations placed on us by society by acting with responsibility and pride.

This declaration highlights our commitment as an organization to pioneering a new era in space development.

In fiscal 2014, which commenced on April 1, 2014, we will focus particularly on the development of a new main rocket, as well as an array of satellite missions that will serve many important roles. In these endeavors, we look forward to your continued support and cooperation.

Dr. Naoki Okumura

Received a Doctorate in Applied Physics from The University of Tokyo in 1973. Served as Representative Director and Executive Vice President of Nippon Steel Corporation and executive member of Japan’s Council for Science and Technology Policy. Appointed President of JAXA in April 2013.

Cover Photograph

ISS Expedition 38 Long-Duration Crew
From bottom right, clockwise: Koichi Wakata, Sergey Ryazansky, Richard Mastracchio, Mike Hopkins, Mikhail Tyurin and Oleg Kotov.

Epsilon-1 lifts off from the Uchinoura Space Center, in Kimotsuki, Kagoshima Prefecture, on September 14, 2013

Profile

Professor Yasuhiro Morita, Ph.D.
Project Manager, Epsilon Rocket Project Team
Professor, Department of Space Systems and Astronautics
Institute of Space and Astronautical Science (ISAS), JAXA

Professor Morita graduated from the Department of Aeronautics, The University of Tokyo, and received his doctorate in aeronautics from the Graduate School of Engineering, The University of Tokyo. At ISAS, he was appointed Project Manager of the M-V rocket program in 2003, and has fulfilled a key leadership role in Japan’s solid-fuel rocket development efforts as the Epsilon Rocket Project Manager since 2010
What was the background leading up to the development of the Epsilon Launch Vehicle?

Morita: In 2006, further development of the M-V Launch Vehicle program was called off owing to a range of factors. The M-V boasted performance at the world’s highest level for a multi-stage solid-propellant rocket. Subsequently, in 2010 the decision was made to embark on the development of Epsilon as a new solid-fuel launch vehicle. I was appointed Project Manager. The first key question we faced was, “How do we build a rocket that surpasses the M-V, which was considered to be the world’s most advanced in its field?” The entire Epsilon team agreed that we did not want to simply make an improved version of the M-V, but instead start from scratch and develop a rocket that could carry us into the future. We knew that we had been given a fantastic opportunity to push back the frontiers. Development of the revolutionary Epsilon rocket began from that moment.

What was your primary goal at the development stage?

Morita: Our main objective was to create an innovative launch system. Previously, it was sufficient to improve the performance of the launch vehicle itself. That was the overriding consideration. However, if we look at a 50-year horizon for space development, improving rocket performance alone is not enough. What we have to do is design a system that makes it easier to put launch vehicles into space. It is imperative that we shift away from the current paradigm—one that is based on having a large workforce spend a lot of time and money, using a large array of equipment to get a rocket launched. The key feature of the Epsilon development project was our decision to create a simplified launch system. We might say that global rocket-development history has reached a turning point.

On the day of the Epsilon-1 launch, a large number of people gathered near the launch site to offer their support. Did you see the scene yourself?

Morita: I saw footage of the crowd gathered to watch the launch shot by the television crew following me. I was surprised at just how dramatic the scene was. By the time of the launch, many local people from the town of Kimotsuki, Kagoshima Prefecture, as well as a large number of space enthusiasts had gathered. This included people of all ages, from young children to the elderly, who turned out to show their support. It really took the excitement to a new level. We were even more determined to succeed, since we knew that the dreams of so many people were riding on Epsilon. Their passion was also helping propel the rocket skyward!

Please outline the innovative technologies incorporated into the Epsilon Launch Vehicle.

Morita: Previously, we spent a lot of time and effort on pre-launch inspections of the rocket’s electrical systems and ignition circuits, which were carried out manually. To make these procedures autonomous and automated, we newly developed the Responsive Operation Support Equipment (ROSE), which employs artificial intelligence (AI), and the Launch Control System (LCS), which provides remote control capabilities from the ground. ROSE is mounted on the rocket to perform a wide array of equipment diagnostic tasks. Through this system, we have shortened the time required between when the first vehicle stage is placed on the launch pad until the launch, from 42 days to just seven days. Simultaneously, we are aiming to extend the time window during which inspections can be carried out on the payload satellite from nine hours prior to launch to three hours before launch.

The satellite payload carried by Epsilon is also very innovative. Could you explain the design features?

Morita: Epsilon will carry small satellites based on a modular structure to allow flexible modification. This will enable Epsilon to cater to a diverse range of mission requirements. The satellite payload comprises two main sections—the mission section containing observation instruments, and the satellite bus section containing equipment necessary for the maintenance of the satellite’s functions. By adopting this structure, it is no longer necessary to build an entire satellite from scratch, but simply replace the mission section. This makes the design suitable for a broad variety of missions. Following on from the ultraviolet astronomy satellite HISAKI (SPRINT-A) carried by Epsilon-1, this semi-customized method will also be employed for Epsilon-2’s payload satellite—Exploration of energization and Radiation in Geospace (ERG)—which is planned for launch in 2015.

We use the term “space vehicle” to express the combination of the Epsilon rocket and the small satellite bus section. In the future, we will aim to provide a method whereby space users will only have to develop their mission equipment and we will transport that into space aboard our space vehicle.

HISAKI: Spectroscopic Planet Observatory for Recognition of Interaction of Atmosphere (SPRINT-A)

This satellite will observe extremely short-wavelength ultraviolet rays given off in the vicinity of planets. It will observe Jupiter’s magnetosphere—which has the strongest magnetic field in the Solar System—to examine what effect the solar wind has on it. HISAKI will also look at how the atmospheres of Venus and Mars escape into space due to the effects of the solar wind. Extreme ultraviolet rays can only be detected from space, so JAXA expects to acquire new insights into planetary environments.
Morita: We are continuing with development of Epsilon-2 and Epsilon-3, and plan to progressively reduce costs and improve performance. Firstly, on the cost side, based on accumulated launch experience, we are aiming to implement on-board software to control the rocket during flight and to automatically trigger certain actions at specific points during the mission. By doing so, we hope to reduce the workload on the ground control team and make launches more efficient.

A rocket that inspects itself!

The Epsilon was developed with the aim of realizing a compact, high-performance, low-cost rocket that can be launched easily. It is a “smart rocket” that is able to inspect its own equipment. For this reason, pre-launch preparations have been simplified. When we have accumulated a little more launch experience, we will be able to shorten the time needed from putting the first stage on the launch pad until launch from the 42 days needed by the M-V rocket to just seven days for the Epsilon. In the future, we want to make rocket launches even simpler, so that they become as familiar as aircraft.

What things do you see as critical for the future of Japan’s space development?

Morita: I think it will be necessary to open up space development. What I mean by this is that we need to create a system that will get more industries, companies and people involved in space development than has been the case to date. I want to see the general public becoming more involved, too. At the same time, we also need to build greater linkage between advanced technology fields in the space development frontlines and those in non-space-related spheres. For example, small-scale factories in Japan often boast processing technologies that produce the world’s highest performance. We are now at the stage where we need to think seriously about how we can leverage such manufacturing capabilities on the space development frontlines.

North, what are your expectations of younger staff members who represent the next generation of rocket developers?

Morita: I want them to retain the frontier spirit that has been a key characteristic of Japan’s solid rocket development efforts over a long period. Another way of saying this is that we must challenge conventional wisdom. We need to take up this challenge even if we are attempting to do some things in unconventional ways. By taking up this challenge we can create some new traditions.

To all the children who love space

What I want to tell all of you is that your dreams are important and you should never give up hope for a bright future for humankind. If each and every one of you hang on to the dreams you have and make the efforts needed to bring those dreams to fruition, you will become the driving force behind space development and this will lead to a bright future.
All of Japan Becomes a Part of JAXA

The Japan Aerospace Exploration Agency (JAXA) was born on October 1, 2003, through the merger of the Institute of Space and Astronautical Science (ISAS), the National Aerospace Laboratory of Japan (NAL), and the National Space Development Agency of Japan (NASDA). In this retrospective, we look back on some of the highlights of the past 10 years, during which Japanese citizens have greatly deepened their interest in space development. JAXA’s first decade, major milestones included the miraculous return of Hayabusa, an extension of Japan’s manned space flight programs through the Japan Experiment Module (JEM) Kibo and the H-II Transfer Vehicle (HTV; Japanese nickname: “KOUNOTORI”), and the successful development of the Epsilon launch vehicle.

In 2005, several successful launches marked JAXA’s recom mencement of space flight. In February, there was the launch of the National Experimental Supersonic Transport (NEXST-1) scaled aircraft, thus overcoming the first test failure in 2002.

In 2006, Hayabusa Heads for Asteroid Itokawa

H-IIA Launch Vehicle No. 6 (H-IIA F6) was destroyed after a launch failure, and two spacecraft—ADEOS-II (Midori II) and PLANET-B (NOZOMI)—ceased operation.

Assembly of JEM Kibo Begins

In July, Astronaut Kazuto Wada established the EVA team for JEM’s first joint mission, JAXA’s first joint mission. The mission to assemble JEM got under way after the module was transported to the ISS aboard the Space Shuttle. In March, Astronaut Takao Doi joined the assembly team as part of a mission to realize high-speed, wideband telecommunications.

Hayabusa Returns to Earth

In July, Hayabusa Heads for Asteroid Itokawa

FTB “Hisho” prepares for launch on 2004

JAXA launches a satellite called FTB “Hisho” for the Japanese Air Self-Defense Force (JASDF) and the Japan Air Defense Agency (JADA), which aims to enhance the anti-missile defense system.

Okinawa (1811–1824) a small island located in the East China Sea.

The Tale of the Bamboo Cutter

Astronaut Satoshi Furukawa served a long-duration mission aboard the ISS from June 2011 (© JAXA/NASA)

Dawn of a New Era for Launch Vehicles

On September 14, 2004, JAXA successfully launched its new Epsilon rocket, which realizes lower operational costs and high performance. The launch vehicle, called Epsilon, is an advanced three-stage rocket with a total length of 37 meters and a diameter of 3 meters. It is the first rocket developed and manufactured in Japan, and it has already been launched twice, in 2010 and 2012.

Global Change Observation Mission 1st–Water (GCOM-W1; Japanese nickname: “SHIZUKU”), which aims to enhance understanding of the water cycle, was launched on September 14, 2012. It is designed to observe the sea surface temperature and the thickness of the ocean’s surface layer, which are important for understanding the water cycle.

Assisting Disaster-Affected Areas from Space

After the Great East Japan Earthquake and Tsunami on March 11, 2011, Japan launched two satellites, U HANDY and DORIS, to support disaster relief efforts. U HANDY is a small satellite designed to provide real-time imagery of affected areas, while DORIS is a medium-resolution satellite that can provide detailed observations of the affected areas.

SHIZUKU Observes the Earth’s Water Cycle

JAXA launched a satellite called SHIZUKU, which is designed to observe the Earth’s water cycle. It is equipped with two instruments: one to measure the height of the ocean’s surface and the other to measure the thickness of the ocean’s surface layer.

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Koichi Wakata—Japan’s First ISS Commander

JAXA Astronaut Koichi Wakata is currently serving on a long-duration mission aboard the ISS as part of Expedition 39. On this mission, he became the first astronaut from Asia to assume the role of ISS Commander. In this feature article, we explain about Astronaut Wakata’s career leading up to his appointment as ISS Commander, and he gives us his insights on the direction of Japan’s space development program. On page 12, we offer advice for children interested in going into space. This page is presented in both Japanese and English.

Apollo 11 Inspires Fascination with Space

Wakata’s fascination with space was sparked in July 1969, when he saw the Apollo 11 Moon landing on television. In the summer of 1991, during a train commute while working as an aerospace engineer, he happened to see a recruiting advertisement for astronaut candidates. At that moment, he had a flashback to the excitement he felt as a child watching the Apollo 11 mission. A year later he was taking part in the 14th NASA Astronaut Class.

Later, Wakata flew on the STS-72 mission, during which he performed operations to deploy and retrieve satellites using the Shuttle Remote Manipulator System (SRMS), and gained experience on the STS-92 mission through tasks for assembly of the ISS. In July 2006, he participated in the NASA Extreme Environment Mission Operations (NEEMO) training program as mission leader. The program was held at the U.S. National Oceanic and Atmospheric Administration (NOAA) Aquarius underwater laboratory off the coast of Florida. At the preparation stage, Wakata assigned tasks to the other team members and formulated a training plan. During the actual exercises, he led the whole team while communicating minute by minute. NASA’s evaluation stated that Wakata had the qualities necessary to be an ISS Commander.

First ISS Commander Assignment Signifies High Expectations and Trust toward Japan

From March to July 2009, Wakata served his first long-duration mission aboard the ISS as part of Expedition 18, 19 and 20. During the latter part of his mission in July, he completed the assembly of JEM Kibo.

In March 2010, Wakata was appointed Chief of the Space Station Operations Branch of NASA’s Astronaut Office—a role in which he trained astronauts preparing for long-duration missions aboard the ISS—and was involved in coordinating and negotiating with managers from each country responsible for supporting long-duration missions. In February 2011, Wakata was assigned the role of ISS Commander for Expedition 39. Wakata’s appointment as the first Japanese astronaut to serve as ISS Commander signifies the high level of expectations and trust toward Japan among the international partners.
When the ISS is in Imminent Danger, What are the Commander’s Duties?

Securing the Safety of the Crew and the ISS during Emergencies

The Commander is charged with leading the ISS crew during training and launch preparations as well as on-orbit tasks. The Commander is expected to play a leadership and coordinating role to ensure that day-to-day operations of the ISS are carried out smoothly, and the crew works toward steadily achieving the goals set for various projects and tasks. In case of an emergency, the Commander must take actions necessary to secure the safety of the crew and the ISS.

Potential emergency situations on the ISS include leaks of ammonia or other toxic substances, sudden loss of pressure and fires. The crew begins work each day after breakfast, and on some days there may be members working alone until lunchtime. If there were an emergency at such a time—a meteor strike or collision with space debris, for example—it would be vital to know the location of all crew members so that appropriate response measures could be executed quickly.

The Commander Must Retain the Confidence of the Crew

In the initial response to an emergency, to immediately heighten the crew’s awareness of the situation, everyone puts on oxygen masks and carries out other procedures, including the closing of hatches. The Commander must take various actions, such as activation of sensors to detect the concentration of any toxic substances.

For example, in case of a leak of ammonia (used to cool the ISS), it would only take a short time for the amount to reach a lethal dose. Hence, the crew immediately dons oxygen masks and closes prescribed hatches. If there is a sudden loss of pressure, the crew identifies which module is leaking air, and then closes hatches in accordance with a procedural manual in order to isolate the leak. In such emergencies, the Commander ascertains where all of the crew are and confirms the location of equipment necessary for the safety of the crew and the maintenance of the ISS’ functioning. This includes such items as oxygen masks, fire extinguishers, first aid kits, drinking water and EVA suits.

The Commander also confirms the remaining internal air pressure level inside the ISS and estimates the time remaining before the pressure drops to a level that will induce decompression sickness* in the crew.

Clearly, the Commander bears a heavy responsibility to ensure the safety of the crew. As such, it is important for the Commander to maintain the confidence of all crew members, and a key part of this is making sure that day-to-day communication among the team is functioning effectively.

The ISS and the Future of Japanese Space Development

The Future of Space Development Envisaged by Japan

The future direction of Japan’s space development efforts will utilize the technology, human resources and know-how Japan has cultivated through such programs as JEM Kibo and the HTV. It will be important for Japan to further expand its areas of expertise so that it can play an even more active role in the future. Japan has developed world-leading technology of which it can be proud. Examples include the rendezvous technology developed for the HTV, JEM Kibo’s robotics technology, the safety and reliability management technology built up through the development and operation of these two programs, and the camera technology used in each of the ISS modules.

The results achieved by the ISS program through space experiments have brought a wide array of advances in the industrial sector and areas that affect our daily lives. However, many of the results generated by manned space programs are not as tangible. A prime example of this is safety and reliability management technology, since manned space activity requires a very high level of safety. It is extremely difficult to safely move objects in the harsh and dangerous space environment. Through the safety design and operation of redundant systems and other complex systems, which factor in the potential for human error, Japan has acquired safety technology for the space environment that places the preservation of human life at the top priority. It was only possible to achieve this capability through the prior accumulation of a vast array of technologies during the development and operation of JEM Kibo, the HTV and other projects. This has provided a further boost to Japan’s reputation as a global technology leader.

Pursuing Further Manned Space Technology, Contributing to the World’s Future

Astronaut Wakata describes the ultimate aim of manned space flight as being risk management for the survival of humanity as a species. “Risk management includes such measures as those needed to avoid collisions between the Earth and a large meteor, which could cause major disruptions to the global environment. Manned space technology is a fundamental necessity for the survival of the human race. Contributing to a world based on that technology is the mission of the science and technology powerhouse countries, including Japan. Japan is a country capable of making such a contribution, and through space development we can help realize more prosperous societies and pave toward world peace. I look forward to a continuation of these efforts.”

Theme 2

Theme 3

Astronaut Wakata—Japan’s First ISS Commander

Astronaut Wakata holds the emergency procedures

An emergency training drill held on the ground

During the drill, Astronaut Wakata practices putting on an oxygen mask while wearing a space suit

Astronaut Wakata aboard the ISS with robotic arm SSRMS and Earth in the background

HTV4 docked onto ISS Node 2

JEM Remote Manipulator System (JEMRMS) grips the JEM Small Satellite Orbital Deployer (J-SSOD)

HTV4 docked onto ISS Cube 2

JEM Remote Manipulator System (JEMRMS) grips the JEM Small Satellite Orbital Deployer (J-SSOD)
Astronaut Koichi Wakata is working hard every day as ISS Commander. Please support him by reading about his activities on the JAXA web site (http://iss.jaxa.jp/iss/jaxa_exp/wakata/news/) and following him on Twitter (@Astro_Wakata). The first steps toward becoming an ISS Commander begin on this page.

What was the reason for the establishment of JAXA’s Moscow Office, and what are the main functions carried out by the office?

The Moscow Office opened in 2011. Coinciding with the retirement of the Space Shuttle, the JAXA office at the Kennedy Space Center in Florida was closed, and Moscow became the main overseas office coordinating manned spaceflight-related activities.

Since it will likely be some time before the manned space transportation system successor to the Space Shuttle is developed, in the foreseeable future the ISS partners—including JAXA—will rely on Russia’s Soyuz spacecraft for manned spaceflight.

JAXA astronauts receive training at the Gagarin Cosmonaut Training Center (GCTC), in Star City, Russia, and the Russian resupply spacecraft Progress carries equipment and samples for experiment on behalf of JAXA as part of space experiment cooperation with the Russian Federal Space Agency (Roscosmos). For these reasons, JAXA decided to establish a Moscow Office to provide support for such operations.

What message do you have for children who are interested in space?

Through my two overseas assignments in Washington, D.C., and Moscow, one of the things I have come to appreciate is the importance of efforts to understand the importance of the world’s most exciting, leading-edge fields. I sincerely look forward to working with many of you in the future.
For the astronauts serving long-duration missions aboard the ISS, one of the things they look forward to is their meals. In this column we introduce various types of space meals developed specifically for consumption aboard the ISS, and “Japanese space food,” which has begun to be certified in recent years.

Astronauts Prepare a Rich Variety of Space Meals Aboard the ISS

There are approximately 250–300 different space meals available today. These can be divided into four broad categories: 1. Rehydratable (freeze-dried) foods 2. Retort pouch foods 3. Partially dried foods (dried fruit, beef jerky, etc.) 4. Foods that can be eaten as is (including fresh fruit, bread, cookies, etc.).

There are also a range of beverages, such as fruit juices and coffee, as well as a variety of condiments. Preparation of meals aboard the ISS is mainly done in the mid-deck galley of the Destiny module, the United States’ main research laboratory within the ISS.

The galley is equipped with a press oven for heating foods and an appliance that rehydrates food by such means as injecting hot water through needles. Both of these appliances have a maximum temperature of just over 80°C, and in the case of rehydrated food, the maximum amount of water is 200ml. Water must be transported to the ISS aboard the unmanned resupply spacecraft operated by Japan’s HTV. The ISS also has a water recovery and recycling system, which began full-fledged operation during Astronaut Koichi Wakata’s long-duration mission from March to July 2009.

After heating or rehydrating their meals, astronauts cut the retort pouches open with scissors and scoop the food out directly before eating. Instead of eating at a table, they have a tray, which they fix onto their body. The folks and spoons they use are the same as those used on the ground, but for the most part only a spoon is required. They do not use bowls or plates. Liquids are consumed through a straw straight from the pack to prevent leakage or spills, which could come into contact with equipment and cause malfunctions.

Japanese Cuisine’s Popularity Reaches into Space

In The Tales of Ise, which dates from Japan’s Heian Period (794–1185), there is a particularly famous passage that describes people listening to the recitation of waka poems by a man who has fled from the imperial capital of Kyoto. “The dried rice that we were supposed to eat after soaking it in water has become sodden from our tears of homesickness.” This illustrates that people in Japan have carried dried foods on journeys since ancient times. Japanese cuisine has a rich tradition of preserved foods, including umeboshi (salted sour apricots), nori (dried seaweed) and tsukemono (pickles). Such foods are ideal for astronauts serving long-duration missions aboard the ISS. At present, JAXA has called for proposals for long-duration missions aboard the ISS. By all accounts, the astronauts are very happy to receive these supplies.

What are the Main Conditions for Certification as Space Food?

What do you think? A party pack of Japanese space food might be quite useful. Some readers may think to themselves, “I’d love to send my culinary efforts up to the ISS!” To those people, we would like to offer a few pieces of advice. Freeze-dried foods are rehydrated in the ISS galley. Foods that might give off gases are not suitable since they might cause contaminants to deodorize—or even worse, rupture and leak. For example, foods containing carbonated beverages are unsuitable. On the ISS, since astronauts from many countries live within a confined area, it is best to avoid foods that have strong aromas, such as garlic or natto (fermented soy beans), which might cause discomfort to other astronauts. Unfortunately, glass containers are also out due to weight and disposal constraints. The URL below provides detailed information on requirements for Japanese space food, including packaging conditions (information in Japanese only).

Japanese space food information:
http://iss.jaxa.jp/spacefood/about/

Wouldn’t you like to cast your thoughts up to space while eating the same menu as Astronaut Wakata as he orbits 400km above the Earth?

Adaptation of the sardine and tomato sauce menu:
Sardines on a bed of sliced onions

Although there is no medical proof, experience suggests that astronauts serving long-duration missions prefer strongly flavored foods. The menu we sampled was sardina with tomato sauce, which neutralized the fishy smell. It was very appealing and even adults thought it was more tasty or spicy than a similar meal on the ground. Did you know that the popularity of Japanese cuisine now reaches into space?
JAXA’s Frontier

International Space Exploration Forum (ISEF) Held in Washington, D.C.

ISEF was held in Washington, D.C., on January 9, 2014, hosted by the United States Department of State. The forum brought together the representatives of governments and space agencies of 35 countries, which reaffirmed the importance of space exploration and discussed views on future space exploration efforts.

Within these discussions, the participants particularly noted the importance of exploration targeting asteroids, the Moon and Mars, and recognized such projects as part of key long-term objectives based on international cooperation. Participants also reiterated the value of utilizing the ISS, not only for research, technology demonstrations and experimentation but also for the benefits generated in relation to future space exploration. NASA announced that it would continue operation of the ISS until at least 2024.

The forum was attended by Japan’s Minister of Education, Culture, Sports, Science and Technology, Hakubun Shimomura, and JAXA President Naoki Okumura, who expressed Japan’s strong commitment to involvement in building an international framework for space exploration. They also communicated Japan’s intention to play an active role in future space exploration efforts by leveraging the country’s technical strengths and unique technologies. The ISEF participants welcomed an offer from Japan to host the next space exploration dialogue in 2016 or 2017.

The 20th Session of the Asia-Pacific Regional Space Agency Forum (APRSAF-20) Held in Hanoi, Vietnam

From December 3-6, 2013, APRSAF-20 was jointly hosted by Japan and Vietnam in the Vietnamese capital city of Hanoi. Under the theme of “Values From Space: 20 Years of Asia-Pacific Experiences,” the forum drew over 400 participants, comprising space agency and government officials and space-related researchers from the Asia-Pacific region. The forum included a plenary session and reports from four working groups. JAXA President Naoki Okumura’s keynote address was titled “JAXA’s Space Activities,” and introduced such programs as the Epsilon, H-I A and H-II B main launch vehicles. He also provided case-study explanations for JAXA’s natural disaster response programs and the application of space technology in agriculture.

As one of the activities run in conjunction with APRSAF-20, the 8th Poster Contest for elementary school children was held, and the poster made by an eight-year-old student from Thailand won the Best Poster Award.

Astronaut Takuya Onishi Selected for Long-Duration Mission Aboard the ISS

JAXA Astronaut Takuya Onishi has been selected to perform a long-duration mission aboard the ISS as part of the crew of Expedition 48/49. He is scheduled to begin the mission in June 2016, and to stay on the ISS for approximately six months. Astronaut Onishi was certified as an ISS astronaut in July 2011, and since then has undertaken a range of training programs to enhance his capabilities as an ISS astronaut. This has included participation in NEEMO at the Aquarius underwater laboratory in Florida.

Astronaut Onishi commented on his aspirations after the announcement of his selection for Expedition 48/49. “During my long-duration mission, I want to communicate to children in various ways the wonder of universe so that they can feel close to the universe.”

Observations from X-ray Astronomy Satellite Suzaku Confirm Ancient Distribution of Iron

Observations from JAXA’s X-ray astronomy satellite Suzaku (ASTRO-EII) have provided evidence to clarify the origin of the iron that is in our blood. Researchers at Stanford University in the United States and at JAXA have used Suzaku’s high sensitivity and spectroscopic performance to observe the distribution of iron in the Perseus cluster of galaxies. As a result, the researchers confirmed that the explosions of supernovae more than 10 billion years ago caused iron and other heavy elements to spread evenly throughout the universe. The observations provide evidence that these ancient explosions were the origin of most of the heavy elements present in the universe today. This discovery was reported in the journal Nature on October 31, 2013.

In the future, using the ASTRO-H X-ray astronomy satellite—successor to Suzaku—if researchers are able to observe similar phenomena in other galaxy clusters, and investigate the state of large-scale structures, including multiple galaxy clusters, it is hoped that scientists will gain further insights into the history of how heavy elements were generated and spread.

Core Observatory Satellite Launched for Global Precipitation Measurement (GPM) Mission

On February 28, 2014, the Core Observatory satellite of the GPM mission was launched from the Tanegashima Space Center (TNSC) aboard an H-II A launch vehicle. GPM is a joint international mission that will provide advanced observations of rain and snowfall worldwide via a constellation of satellites. The GPM Core Observatory was developed jointly by JAXA and NASA, and carries the Dual-frequency Precipitation Radar (DPR) and GPM Microwave Imager to enable high-precision observations of precipitation. The Core Observatory will also fulfill the role of calibrating precipitation measurements made by the satellite constellation. In particular, since DPR uses two frequencies it will be able to observe a wide variety of precipitation conditions, from strong squalls in tropical regions to light rain at high latitudes. Hence, DPR is expected to make a significant contribution to disaster prevention through more accurate prediction of storm paths and flooding. It is also hoped that it will contribute to the resolution of water resource issues through better understanding of changes in the global water cycle.

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The 21st Session of the Asia-Pacific Regional Space Agency Forum (APRSAF-21)

Leap to the Next Stage: Delivering Innovative Ideas and Solutions

- Date: December 2-5, 2014
- Place: Tokyo, Japan
- Venue:
  - National Museum of Emerging Science and Innovation (Miraikan)
  - Tokyo International Exchange Center (Plaza Heisei)
- Co-organizers:
  - Ministry of Education, Culture, Sports, Science and Technology of Japan (MEXT)
  - Japan Aerospace Exploration Agency (JAXA)
- Website: http://aprsaf.org