Executive Summary Report

The 2\textsuperscript{nd} International Symposium on Sustainable Space Development and Utilization for Humankind

Expectations to establish a cooperative framework in Asia-Pacific Region

March 2013

Japan Space Forum

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1. Preface

The space debris problem is “a common challenge for all humanity” that cannot be solved by any single nation, whether it be the United States or Russia, which lead space development, or a European country such as France or Germany. As a first step in addressing the challenge, we invited top-level policy makers from countries in Europe and from the United States and held an international symposium on the space debris problem last year. Not only the guest speakers but also the audience appreciated the symposium as a timely meeting.

This year, based on the results from last year, transparency and confidence-building measures (TCBMs) were chosen as the main topic for discussion with an eye toward ensuring international cooperation given the strong necessity of international communication for addressing the space debris problem. Now is the time for such international communication. It is important for Japan to take this opportunity to make an active international contribution in terms of its space development and utilization. In particular, providing a platform for international communication distinguishes Japan as a significant leader in the Asia-Pacific region. We decided to host another international symposium immediately, recognizing that if we miss this opportunity, the negative legacy that will be left for the next generation could worsen.

This report outlines the symposium.
2. Outline of the subsidized program
This international symposium was held as part of a project funded by Strategic Funds for the Promotion of Science and Technology in FY2012

<Point of the subsidized program>
The purpose of the subsidized projects is the development of diplomacy on science and technology under the leadership of non-governmental organizations to support, promote and establish a venue for international communication such as conferences and workshops to discuss the future model of science and technology through the participation of a wide spectrum of leading international industry, academia, and government stakeholders in science and technology.

2.1 Name of the subsidized program
The 2\textsuperscript{nd} International Symposium on Sustainable Space Development and Utilization for Humankind
-Expectations to establish a cooperative framework in Asia-Pacific Region-

2.2 Purpose of the subsidized program
In the first international symposium held last year, the space debris problem was recognized as an important challenge that cannot be solved by any single nation, whether it be the United States or Russia, but that requires international cooperation for its solution.

However, it was also recognized that international cooperation in this field is extremely difficult. Because space development and utilization has become a system for building some of the most important infrastructure and is also an important element of security for every nation, nations must commit to “transparency and confidence” in following international rules for ensuring the long-term sustainability of space development and utilization. “Transparency” is achieved through disclosure of information and “confidence” means bilateral or multilateral understanding; the extent to which we can achieve mutual “confidence-building” will determine the future success or failure of international cooperation. The international symposium this year aims to foster common recognition of the need to achieve “transparency and confidence-building.” In addition, it is desirable that Japan play a leading role in achieving this aim among Asia-Pacific countries.

2.3 Details of the subsidized program
International symposium on Space Situational Awareness for sustainable space development and utilization
This year’s focus is evident from the subtitle: “Expectations to establish a cooperative framework in the Asia-Pacific Region.”

To put it more concretely, we invited those who drafted the European Union’s Code of Conduct to present on the background of the drafting, the intent of the individual provisions, and the reaction to the Code in Europe. We also invited representatives from the U.S. Department of State to present on the background and intent to develop an “International Code of Conduct” that is based on, but distinct from, the EU Code of Conduct.

On the other hand, Japan-EU consultations on the EU Code of Conduct started around 2009 and dialogue at the Japan-EU governmental level has continued. For example, “Summit leaders also shared their intention to strengthen existing Japan-EU cooperation on outer space... as regards the EU initiative on ‘Code of Conduct for outer space activities’” at the Japan-EU Summit in April 2010. Accordingly, we have asked the Ministry of Foreign Affairs to report on the progress of and future issues that may arise in the Japan-EU consultations. In addition, we asked those from Asia-Pacific countries such as China, India, Korea, and Australia to report on their SSA (or similar) activities.

This symposium aimed to foster the exchange of opinions on “transparency and confidence-building measures (TCBM)s,” which is required for international communication to solve the space debris problem, based on the information presented, and we, Japan, aimed to play the role of a leader in achieving an international agreement among Asia-Pacific countries.
3. Outline of the implemented result

3.1 The holding of an international symposium

(1) Date
Thursday, 28 February and Friday, 1 March 2013

(2) Place
THE GRAND HALL (Shinagawa Grand Central Tower 3F, 2-16-4 Konan, Minato-ku, Tokyo)

(3) Official supporters
Office of National Space Policy, Cabinet Office
Ministry of Internal Affairs and Communications
Ministry of Foreign Affairs
Ministry of Education, Culture, Sports, Science and Technology
Ministry of Economy, Trade and Industry
Ministry of Defense
The Society of Japanese Aerospace Companies

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Mitsubishi Heavy Industries, Ltd.
NEC Corporation
NEC TOSHIBA Space Systems, Ltd.
SKY Perfect JSAT Corporation

(5) Program and brief summaries of speeches

Day 1: Thursday, 28 February 2013

Welcome Remarks
Mr. Kaoru Mamiya, President, JSF
The first symposium last year included high-ranking guests, richly experienced speakers, and about 400 participants from home and abroad, and, luckily, not just guests and speakers but also the audience appreciated that it was a timely, well-organized meeting. This symposium was supported by the Strategic Funds for the Promotion of Science and Technology, Ministry of Education, Culture, Sports, Science and Technology (MEXT), and was rated highly by MEXT’s review committee.
At the first international symposium held last year, it was established that the space debris problem is an important challenge that cannot be solved by any single nation, whether it be the United States or Russia, and requires international cooperation for its solution. However, it was also recognized that international cooperation in this field is extremely difficult. The reason for this is that space development and utilization has become a system for building some of the most important infrastructure and is also an important element of security for all nations.

To ensure the long-term sustainability of space activities, international agreements on some basic principles are required. For example, a space debris mitigation guideline, adopted in the United Nations (UN), must be followed, and the International Code of Conduct should be agreed upon. For that purpose, “transparency and confidence-building measures (TCBMs)” have to be shared. “Transparency” means information sharing and “confidence-building” means bilateral or multilateral understanding and the elimination of suspicions and doubts. The extent to which we can achieve the condition of “transparency and confidence-building” will determine the success or failure of international cooperation in the future.

As a leader on this issue in the Asia-Pacific region, we, Japan, decided to hold the second international symposium in order to achieve the aforementioned aims.

I expect that all participants will conduct constructive discussions in this symposium.

**Guest Speeches**

**Mr. Ichita Yamamoto, Minister of State for Space Policy, GOJ**

Today, outer space is utilized in various areas of our lives. Although space objects, including artificial satellites, have faced a real, concrete threat from the space debris problem, conservation of the space environment cannot be achieved by only one nation; it has to be promoted through international collaboration. Japan will continue to make the maximum contribution possible.

Japanese laws revised last year stipulated that the Cabinet Office take leadership over governmental space development and utilization; a system to advance our national space policy as a body has just been organized. Under the new system, the Strategic Headquarters for Space Policy decided on the new Basic Plan for Space Policy on January 25 of this year. In conformance with the Basic Plan for Space Policy, the Japanese government will actively participate in the preparation of international guidelines for the long-term sustainability of space activities, which are being discussed in the United Nations (UN) Committee on the Peaceful Uses of Outer
Space (COPUOS) and in the International Code of Conduct on space activities proposed by the EU. We will also promote research on technologies for space debris removal. Outer space with its unlimited latent possibilities can serve as future public property for all of humankind. To promote sustainable development and utilization of space, every nation should embrace the values we will discuss here in a responsible way. Finally, I hope this symposium will be fruitful and satisfactory for all participants. Thank you very much.

Mr. Takashi Yanagi, Director, Space Development and Utilization Division, Research and Development Bureau, Ministry of Education, Culture, Sports, Science and Technology, GOJ

Over 50 years have already passed since the beginning of space development. Space debris, that is, defunct satellites and rockets and their scraps orbiting around the earth, has been a problem for space development and utilization. For sustainable development and utilization of space in the future, measures such as mitigating the generation of debris and monitoring debris have become important.

Some measures against space debris have been promoted in response to increasing international concern about such space debris. For example, guidelines for the mitigation of the quantity of newly generated space debris were established under COPUOS in February 2007. In Japan, satellite design and operation with the aim of space debris mitigation has been conducted on the basis of these guidelines. In addition, we understand that experts have been actively discussing various problems, including mitigation of space debris, under the rubric of COPUOS since 2010.

Japan has been advancing various efforts to contribute to the sustainable development and utilization of space. MEXT has been making efforts to ensure safety and security on the ground by providing the relevant ministries and agencies and the general public with information on reentry of satellites and the like. Through the Japan Aerospace Exploration Agency (JAXA), we continue to actively promote international cooperation as well as research and development concerning the prevention of the generation of space debris, the mitigation of space debris, contribution to the sustainable development and utilization of space for the benefit of humankind, and the maintenance of safety and security.

Mr. Kazuyuki Yamazaki, Ambassador (Policy Planning, International Security Policy), Deputy Director-General, Foreign Policy Bureau, Ministry of Foreign Affairs, GOJ
Needless to say, the importance of space diplomacy and security has been growing. On February 22, last week, Prime Minister Shinzo Abe visited the United States and held talks with President Obama; they confirmed that a comprehensive dialogue on the space field between Japan and the United States will be initiated. In addition, Minister of Foreign Affairs Fumio Kishida, who accompanied Prime Minister Abe, and Secretary of State John Kerry reached an agreement that Japan and the United States will accelerate negotiations on an agreement for space monitoring cooperation. In the diplomatic field, efforts concerning outer space have become active. One consequence of this development is that Japan’s national security situation has become increasingly severe. Of course, it is extremely important not only for the field of defense but also for civilian realms to address problems relating to outer space and to cope with the increase in vulnerability and risk associated with developments in outer space.

In April 2012, the Ministry of Foreign Affairs established the Space Policy Division to build a system that can address issues relating to outer space in a comprehensive manner. The first important task for international cooperation is to frame rules. Efforts to create an International Code of Conduct on space activities have been accelerated. I think it is extremely important that a Code of Conduct be created quickly; its purposes would be as follows: minimizing the likelihood of accidents or collisions; preventing the intentional destruction of space objects in order to mitigate the generation of space debris; changing the operation schedules or orbits of objects that have the potential to approach other space objects; providing for nations to notify each other of risk of reentry; and creating a mechanism that enables nations to request deliberations in the event of possible violation of the Code by another nation. SSA is also highly important for security. SSA holds that to ensure transparency of other nations’ space activities leads to confidence-building in security, which further leads to peace and stability.

Mr. Kazuo Sunaga, Director General for International Affairs, Bureau of Defense Policy, Ministry of Defense

The Ministry of Defense recognizes that outer space does not belong to any nation and performs its duty of ensuring national defense by using outer space, in which there are no geographical restrictions, and by strengthening information collection, information guarding and monitoring, and information communication. From this point of view, we recognize that the
stable use of outer space is an extremely important issue in national security. Accordingly, discussions on this symposium’s theme, sustainable space development and utilization for humankind, should be very meaningful to the Ministry of Defense.

The Basic Space Law, which was established in 2008, allows the Ministry of Defense to perform space development and utilization in a responsible manner. In cooperation with the Cabinet Office, we have also included in the budget for the coming fiscal year funds for research and study of the approach to monitoring the space situation in the interest of national defense. In the future, we will examine our space activities from both the defense and civilian perspectives in an integrated manner. The importance of monitoring the space situation was discussed in the meeting of the Japan-U.S. Security Consultative Committee, known as “2+2,” in June 2011, and the Ministry of Defense has also recognized it as an important issue for further development of the Japan-U.S. alliance. To promote cooperation between Japan and the United States, it is essential that the Cabinet Office, which takes a leading role in the national space policy, and the relevant ministries and agencies decide early on the direction for construction of a unified governmental system for monitoring the space situation. The Ministry of Defense will actively cooperate with the efforts of the Japanese government.

Finally, I think that cooperation in both the civilian and defense fields to overcome barriers between nations is required for peaceful and stable utilization of outer space; therefore, I hope that platforms for such discussions will be established regularly.

**Keynote Speeches**

**“New Japanese Space Plan and Sustainable Space Development”**

*Mr. Junya Nishimoto, Director General, Office of National Space Policy, Cabinet Office, GOJ*

As of now, more than 50 countries have their own satellites; nations with the capability to develop satellites are few but the number of nations that want their own satellites will increase as ordinary nations come to desire their own satellites for the defense of their own territory and territorial waters, for domestic disaster management, and for supervision of their own territory. It is important to fulfill this desire in order to ensure the autonomy of these nations. It is also important to conduct space development with an eye toward concrete goals. That is, research should not be performed for the sake of research, but space development should be practically useful in activating industries, improving the life of the citizens, enhancing the sophistication and efficiency of administration, ensuring security in a broad sense,
including disaster management, and developing the economy. These are important points for the future.

In the Basic Plan for Space Policy, great importance is placed on three subjects: (i) National Security and Disaster Management, (ii) Development of Industry (to establish a firm industrial base), and (iii) the Space Science Frontier. Measures will be promoted in connection with these three subjects.

All of you here know that SSA is important, but I would like to note that space situation surveillance will be key to making the International Code of Conduct effective. SSA is necessary to sustain space utilization and also has an important significance for security. Surveillance over malicious activities in outer space, such as interference, obstruction, sabotage, and space militarization, is important. SSA, or a firm grasp of the space situation, will become increasingly important for peaceful utilization of outer space by international collaboration (which is indispensable for SSA). The Japanese government will continue to contribute to the monitoring of space debris through various forms of cooperation including multilateral and bilateral activities as part of international collaboration.

“Pursuing Space TCBMs for Long-term Sustainability and Security”

Mr. Frank A. Rose, Deputy Assistant Secretary for Space and Defense Policy, U.S. Department of State

I would like to thank JSF for inviting me back. I am also pleased that this symposium is becoming an annual event highlighting that our space debris poses an increasingly serious threat to the long-term sustainability of the space environment, and I would like to commend JSF for continuing to organize it.

My first emphasis is on the vital importance of space assets, including satellites, in today’s society. Track prediction of hurricanes is an example. Accurate forecasting of hurricanes’ paths provides us with information critical to preserving life and property on Earth.

In my remarks today, I plan to focus on how pursuing transparency and confidence-building measures (TCBMs), such as the International Code of Conduct, measurably contributes to ensuring that we can continue to utilize space assets for addressing future disasters as well as for the many other benefits space assets provide. I would also like to discuss other ongoing efforts such as the work of the UN Committee on the Peaceful Uses of Outer Space (COPUOS), the study of the UN Group of Government
Experts (GGE) on space TCBMs, and finally, the ASEAN Regional Forum (ARF) Workshop on space security held in December of last year.

The stated purpose of the International Code of Conduct drafted by the United States is to “enhance the security, safety, and sustainability of all outer space activities,” which is fundamentally in the interest of all nations. A Code of Conduct would also help reduce the risk of misunderstandings, miscalculations, and misperceptions by committing the United States to share its space policies, strategies, and procedures, thus improving the stability and security of the space environment.

While many approaches to ensuring stability in space come from the top down, there is great value in bottom-up approaches from experts and satellite operators, such as the efforts of COPUOS and the GGE. COPUOS addressed the best practice guidelines for space debris mitigation and now holds the Working Group on Long-term Sustainability of Space Activities. The GGE serves as a real opportunity to move forward with pragmatic steps to strengthen stability in space through unilateral, bilateral, and multilateral measures and will develop a consensus report.

The Asia-Pacific region in particular is seeing rapid expansion in its number of spacefaring nations and rapid development of those nations’ capabilities. For this reason, I was extremely pleased and honored to speak at the first-ever ARF Workshop on space security held in early December of last year. I hope that the ARF will consider holding additional workshops on this worthy subject in the future.

We are increasingly reliant on space not only when disasters strike, but also for our day-to-day lives. Accidents or irresponsible acts against space systems have the potential not only to harm the space environment, but also to disrupt services on which the international community depends. As a result, we must take action now and pursue TCBMs in space. These TCBMs will enhance the long-term sustainability, stability, safety, and security of the space environment. Protecting the space environment for future generations is in the vital interest of the United States, Japan, and the entire international community.

“U.S. Space Policy and Updated DOD Activities”

Ms. Jessica Powers, Director for Engagement, Office of the Deputy Assistant Secretary of Defense for Space Policy, U.S. Department of Defense

Space is a domain that no nation owns but on which all nations rely. Countries around the world depend upon satellites for weather information, navigation, mapping, disaster relief, humanitarian assistance, phone calls, internet access, and other necessary functions. While space is increasingly crucial to our
collective security, it is also increasingly hazardous for satellites. Our U.S. National Space Policy recognizes the rights of all nations to access, use, and explore space for peaceful purposes and for the benefit of all humanity. In 2011, the U.S. Department of Defense (DOD) issued the first-ever National Security Space Strategy with the key objective of strengthening safety, stability, and security in space. The Strategy was reinforced by the recently released DOD Space Policy, which we have now updated for the first time in 13 years.

The DOD continues to improve the quantity and quality of the SSA information it obtains and is expanding the provision of flight safety services to other nations. We seek to establish agreements with other nations, governmental organizations, and commercial firms to maintain and improve space object databases. To ensure transparency and spaceflight safety, we encourage other space operators to share their satellite data to the maximum extent possible. The National Security Space Strategy specifies that shared awareness of spaceflight activity must improve in order to foster global spaceflight safety and help prevent mishaps, misperceptions, and mistrust. Thus, we are stepping up cooperation with key Asia-Pacific allies such as Australia and Japan. Last year, the United States and Australia signed an agreement to relocate a C-band radar sensor to Australia. This relocation will improve the network’s ability to monitor and track objects in the East Asia region. To enhance our global network of SSA sensors, the United States recently signed an agreement to integrate data from Canada’s Sapphire satellite, which is a space-based electro-optical sensor system for space debris that was launched earlier this February.

An International Code of Conduct for space activities, as other speakers have mentioned this morning, can encourage responsible behavior in space. The International Code of Conduct, if adopted, would institute guidelines for responsible behavior for all spacefaring nations to reduce the hazards of space-debris-generating events and increase the transparency of operations in space. Guidelines for responsible behavior can help to single out those nations that act otherwise.

The U.S. government will use commercial space services to the maximum extent practicable in fulfilling government needs, invest in new and advanced technologies and concepts, and use a broad array of partnerships with industry to promote innovation. The U.S. National Space Policy reaffirms many tenets regarding how we should view space activities, for example, that all nations have the right to access, explore, and use space for peaceful purposes and for the benefit of all humanity, in accordance with international law, and there can be no national claims of sovereignty over outer space or any celestial bodies.

The now-ubiquitous and interconnected nature of space capabilities means that irresponsible acts in space can have damaging consequences for all of us. The United
States therefore calls on all nations to work together to adopt approaches for responsible activity in space to preserve this right for the benefit of future generations. No single nation can preserve the space environment on its own.

“Strategic Partnership in Space”

Major General John W. "Jay" Raymond, Director, Plans and Policy, United States Strategic Command (USSTRATCOM)

I would like to thank the JSF very much for inviting me to be here. I actually participated in the first symposium last year. I was truly honored to serve here as the Fifth Air Force Vice Commander from January 2011 to July 2012, and I was stationed at Yokota Air Base. I can tell you that the time I spent in Japan was a highlight of my Air Force career. Operation Tomodachi, an assistance operation for the great earthquake of March 11, was a model of cooperation and partnership between Japan and the United States.

United States Strategic Command (USSTRATCOM) performs a broad mission set under the National Space Policy published in 2010 and the National Security Space Strategy published in 2011.

Our SSA sharing program is a tiered program that consists of the following elements. (i) Emergency services: Without formal agreements, we routinely notify any users of emergency conjunctions where there is a possibility that two items may collide in space (20–30 notifications a day). (ii) Basic services: We provide registered users (88,000 users in 185 different countries) with our satellite catalog data on Space-Track.org. (iii) Advanced services: We provide customized tailored services to folks who have entered into SSA sharing agreements (we have agreements with 35 countries and are in negotiations with 10 countries). An example of the advanced services is the screening of launch trajectories for a prelaunch conjunction assessment on the basis of highly accurate orbit prediction data. Examples of the basic services include provision of reentry assessment data (e.g., for reentry of the Upper Atmosphere Research Satellite) and provision of a two-line element set (TLE) of satellites. An example of the emergency services is the provision of conjunction assessment data (for example, data relating to the close approach of the asteroid 2012 DA14).

Combined Space Operations (CSpO) offers benefits to all nations involved. CSpO strengthens deterrence, improves mission assurance, enhances resilience, and optimizes resources across participating nations. Conducting CSpO is consistent with U.S. operations in other domains. It supports the U.S. government by providing sustainability, stability, and free access to and use of space; encourages bilateral and multilateral TCBMs to promote responsible actions in and the peaceful use of space; and provides partners an
understanding of the current and future space debris environment and a military-to-military relationship to address this challenge.

In response to the North Korean Taepodong-2, the importance of CSpO was proved and the usefulness of CSpO was recognized with respect to partnership and communication.

When I served here in Japan, I was very impressed with the capabilities of FPS-5 radars, which I had the opportunity to see. There are some great capabilities here. We are very interested in developing a partnership and signing a space surveillance agreement to develop a partnership with other nations.

Finally, I am very happy that this is becoming an annual event.

**Multilateral Cooperation**

“French Approach to Sustainable Space Activities”

Mr. Gerard Brachet, Member of UN Group of Governmental Experts (GGE) on Outer Space Transparency and Confidence Building Measures, France

Since 1965, France has been playing a special role in the field of space technology and the development and practical use of satellites. We launched our first satellite (the third in the world) in November 1965 from a launch base in Algeria. In March 1970, we launched a satellite from French Guiana, and the first satellite launch of French design, but within the European Space Agency Program, Ariane, occurred in December 1979. In addition, we launched the first of a series of five SPOT optical remote sensing satellites in February 1986; the first of a series of four French military reconnaissance satellites, the Helios satellites, in July 1995; and the first in a series of dual use optical imaging satellites called Pleiades, with a ground resolution 70 cm, in October 2011. As of February 2013, more than half of the commercial satellite systems, most of which are in the GEO orbit, are being launched from Kourou (French Guiana) by Ariane. 212 such launches have taken place so far.

As of the end of 2012, France’s registry of space objects contained 305 entries: 114 of spacecraft (both in and out of operation) and 191 of launcher upper stages and elements associated with the launch. In addition to that, about 250 pieces of orbital debris are registered. Today, the French government operates about 20 different operational spacecraft; some of them are of course dedicated to national security missions. Under a license from the French authorities, Eutelsat Communications SA operates 26 satellites in the geostationary orbit. In addition, Astrium Services launched SPOT-6 using their own funds last year and is planning a launch of SPOT-7 at the end of 2013.

France is the first country to suffer the effects of an in-orbit collision with space debris.
In the collision, a small military spy model satellite called Cerise was hit by debris that had probably come from the explosion of an upper stage of Ariane-1. This accident led the authorities to pay a lot more attention to this problem of space debris, and subsequently, France has participated the Inter Agency Debris Committee (IADC) and COPUOS and contributed to the development of space debris mitigation guidelines.

As for national legislation regarding space activities, in 2008 the French Parliament adopted the Space Operation Law, which regulates space activities and introduces a licensing system for French private sector operators. In 2011, the French government established rules for operators in order to minimize risk and the creation of orbital debris during space objects’ launch phase as well as the orbital and reentry phases. As for France’s activity at the international level, during my term as Chairman of COPUOS, I introduced to the delegation the idea that the Committee should tackle the issue of the long-term sustainability of outer space activities; a first informal working meeting of spacefaring nations on this very topic was held in 2008. The issue had been discussed within the COPUOS framework, and the Long-term Sustainability of Outer Space Activities Working Group was officially established in 2010. In parallel with this, France led discussions on the International Code of Conduct for outer space activities in 2007–2008; incidentally, the leader of these discussions subsequently took over the presidency of the EU. France is also very much involved in the UN Group of Governmental Experts (GGE) on space TCBMs. The GGE will deliver a report in summer of 2013.

“Report on SSA Related Discussions on the Scientific and Technical Subcommittee of COPUOS 2013”

Dr. Yasushi Horikawa, Chairman (2012–2013), COPUOS

Last year, I presented on the activity of Long-term Sustainability of Outer Space Activities Working Group established in 2010 under the Scientific and Technical Subcommittee (STSC) of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS). This year, I was asked to give a presentation on the progress of this Working Group.

In the STSC session held from February 11 to 22, 2013, the Working Group held 7 meetings, a workshop, and a symposium, and four Expert Groups (EGs) held separate group meetings and a joint meeting. I would like to introduce some topics described in the guidelines proposed by the EGs.

EG-A (sustainable space utilization): (i) the use of earth observation systems and space services, in accordance with the International Telecommunication Union (ITU) Radio Regulations; (ii) awareness of space activities and applications, such as space-system-based disaster management support, for sustainable development on Earth;
(iii) international cooperation for capacity-building, data accessibility, and processing; 
(iv) international cooperation to support the establishment of national capacities for engagement with outer space; and (v) international cooperation in regulatory frameworks.

EG-B (SSA): (i) as for space debris, characterization of the space debris population to enable measures to reduce space debris and notification of reentry of substantial space objects; (ii) as for space operations, conjunction assessment and collision avoidance; and (iii) as for tools to support collaborative SSA, directories of spacecraft operators, space operations, and SSA organizations, and collection, sharing, and dissemination of orbital data on space objects.

EG-C (space weather): (i) collection, sharing, intercalibration, and dissemination of critical space weather data; (ii) coordinated development of advanced space weather models and forecast tools; (iii) sharing and dissemination of space weather model outputs and forecasts; (iv) sharing and dissemination of information relating best practices to mitigating the effects of space weather on the design, launch, and operation of ground- and space-based systems; and (v) education and training for a sustainable global space weather capability.

EG-D (regulatory regimes): (i) facilitation of international cooperation in the use of outer space; (ii) sharing of experience and expertise related to long-term sustainability; (iii) facilitation of the compilation and effective dissemination of information on space weather; (iv) outreach and education on regulations and technical best practices; (v) encouragement of the activities of non-governmental entities that will enhance the long-term sustainability of outer space activities; (vi) recommendation that long-term sustainability of outer space activities be considered when implementing national regulatory frameworks. Six other topics were also discussed.

“Report for the Discussion of the Working Group on the Long-term Sustainability of Outer Space Activities”

Mr. Ken Hodgkins, Director, Office of Space & Advanced Technology, U.S. Department of State

I would like to talk about the work of the Working Group on Long-term Sustainability from a different perspective.

1 The Crucial Role of the Use of Space in Sustainable Development on Earth

I will take Vietnam, which is one of the most naturally disaster-prone areas in the Asia-Pacific Region, as an example. With a majority of people concentrated in vulnerable areas such as the coast, extensive damage is expected from natural disasters.
Because of this, Vietnam decided to launch two earth observation satellites with the generous help of the Japanese government in supporting Vietnam’s national efforts to prevent, prepare for, and mitigate natural disasters. The use of satellite data for natural disaster management is not unique to Vietnam but is also occurring in the United States and Japan, which are advanced in space activities.

2 UN Governance Supporting Sustainable Development on Earth

Recognizing the benefits that the use of outer space for peaceful purposes could bring to humankind, UN established the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) in 1959 to promote international cooperation in conducting space activities. COPUOS established two subcommittees, the Scientific and Technical Subcommittee (STSC) and the Legal Subcommittee (LSC), developed space debris mitigation guidelines, and adopted four core outer space treaties and a declaration. The four treaties are the Outer Space Treaty (which reinforced the fundamental tenet of international cooperation in the peaceful exploration and use of outer space), the Rescue Agreement (which requires states to assist an astronaut in case of accident, distress, emergency, or unintended landing), the Liability Convention (which establishes the standards of liability for damage caused by space objects), and the Registration Convention (which requires states to register all objects launched into outer space with the United Nations). The declaration governs nations’ activities in outer space including the moon and other celestial bodies. In addition, the LSC established the Principles Relating to Remote Sensing of the Earth, the Principles on the Use of Nuclear Power Sources, and other similar guidelines.

3 The Changing Outer Space Environment

Space assets and their benefits were originally available only to a few nations, but today, nearly 70 nations, international organizations, and government consortia operate satellites. There are also numerous commercial and academic satellite operators. In return for the benefits obtained from space applications, space debris has increased, and the United States is currently tracking tens of thousands of pieces of space debris 10 cm or larger in various earth orbits. Experts are issuing various warnings about potential future damaging collisions and the like.

Due to rapid advances in space technology and the applications that this technology enables here on Earth, opportunities for utilizing space are constantly evolving. COPUOS and its subcommittees offer a unique platform at the global level to monitor these developments.
**Special Lectures**

**“PLANETES”: The Story of Space Junk Retriever**

Mr. Makoto Yukimura, “Mangaka” (Comic Artist)

The title of my comic, “PLANETES,” means “planet” in Greek. I have heard that planetes originally meant not just planet but also drifter in Greek. I created this comic with the implication that we, humankind, have been advancing little by little, sometimes drifting, and have reached space at last. The reason I chose the space debris problem as material for my comic is that when I was young, I read a book on space debris entitled “Uchu no gomi mondai” (Space debris problem), written by Dr. Tetsuo Yasaka. This book inspired me very much.

This story is set in the 2060s–2070s, a time at which people can live in outer space. The protagonist manages a spacecraft for space debris collection. Of course, I know that the collection of space debris is not easy. I imagined that because the spacecraft would be flying into areas where the debris is dense, its body would be full of holes from hits by small pieces of space debris and the protagonist would use every trick he knew to coax the spacecraft. On the surface of the moon, there are many cities and some bases to support space debris collection activities. To avoid radiation damage, people live deep underground. Trains on the moon run underground, like subways on Earth, and people conduct various activities underground. Spaceports, where spacecraft arrive and depart from, are of course located on the surface of the ground. Space debris collected and brought back to the moon by the spacecraft is reused or recycled.

Rather than focusing on the typical bright lights of the outer space, or on people who pursue their dreams of exploring the frontier with energetic and vital activity, I like to describe people who are ordinarily neglected and carry out thankless but important tasks.

I have just met Mr. Donald J. Kessler. In this comic, I thought of a story in which terrorists try to blow up a huge structure in outer space in order to trigger the Kessler syndrome. It takes two days to finish drawing one picture. I attempted to illustrate directly the terribleness of the phenomenon proposed by Dr. Kessler.

For the 10 years since I drew this comic, I have felt that in order to avoid being afflicted with space debris, we must at some point pay attention, equivalent to the manifested passion for the development of the frontier, to the problem of space debris; otherwise the balance between generated debris and removed debris will be lost and the earth will be surrounded by a membrane of space debris.
“Elements of an Earth Orbital Debris Management Strategy for a Long-term Sustainability of the Environment”

Mr. Donald J. Kessler, Chairman of National Research Council’s Committee for the Assessment of NASA’s Orbital Debris Programs

The number of orbital debris impacts on returned spacecraft surfaces exceeds the number of impacts of meteoroids, which originate from the solar system. Materials melted into the craters include many man-made materials, such as aluminum, titanium, paint, copper, silicone, circuit board material, and sodium-potassium particles, the latter of which were coolants for nuclear power sources.

I would like to look back on the history of space debris problems. Before 1976, there was no orbital space debris program because there were certain misconceptions about space debris. There was no plan for what to do about it. And moving forward, the advance of debris cataloging revealed that the explosions of satellites and rocket stages caused the space debris population to increase. In the beginning, fuel tanks were depleted to keep explosions from happening, but this was only a short-term solution. Thus, we instituted what we call the “25-year rule” as a long-term solution. Increasing the shielding on spacecraft was also proposed. However, shielding is not a long-term solution; the more shielding one adds, the more mass that is in orbit, which eventually translates into more orbital space debris. In the 1970s, the building of solar power stations in space was proposed. However, such huge structures in space would have a high risk of collision with other satellites and space debris and would induce a cascade of new debris. Therefore, three objectives were set for addressing space debris problems: (i) to protect spacecraft, (ii) to protect the orbital debris environment, and (iii) to protect people on Earth. One of the measures for accomplishing (i) is using bumpers for debris. However, because this is not a perfect solution, we combined all of the measures for (i), (ii), and (iii) into a single space debris assessment system to address all three objectives. For example, while pieces of space debris larger than 10 cm are cataloged, smaller ones, up to 2 cm, for example, are not cataloged but instead estimated in the form of density distribution by altitude based on various data. Through the combination of cataloging the large objects and statistically monitoring the small objects, the full size spectrum has been provided for.

The National Research Council (NRC) established a two-year ad hoc committee to assess NASA’s orbital debris programs in 2010, and I served as the chair. This is the second time that the NRC has been asked to look at the program; the first time was in 1995. With a limited budget, the committee assessed the programs and finished the report in the fall of 2011. Only short-term issues were addressed because of funding constraints.
We reviewed the modeling, detection, protection, mitigation, reentry, collision avoidance, risk analysis, etc., as well as interagency, international, and commercial cooperation. Because we could not give convincing recommendations for what NASA should do in the long term and could not propose proper programs, the funds were not allocated. However, what is important is to discuss where is the international space program going, not where is NASA’s orbital debris program going.

Inclination regions with a higher probability of collision are at altitudes between 600 km and 1000 km and inclinations near 82 degrees and 98 degrees. Inclinations near 65, 71, and 74 degrees at the same altitudes are also at high risk. However, the fact that the inclination distribution of most mass is confined to four or five bands provides a opportunity for effective removal or collection. This is an important point because changing inclination in space requires a large amount of energy. Space debris removal or collection measures that have been proposed so far, that is, removal or collection by lasers, tethers, large sails, etc., are limited by many unsolved problems.

Although collisions at GEO altitude are less problematic because of their lower relative velocities of 500 meters/second, collision problems are not completely absent. I would like to propose a possible solution. At GEO altitude, solar perturbations exert a relatively large influence on stationary satellites and the orbital inclination of objects placed in GEO gradually changes as much as about 15 degrees. Therefore, things could be launched into the stable plane rather than the equatorial plane, and they would never wobble again, meaning no north-south station-keeping would be required. Although ground tracking would need to be implemented for an antenna to go up and down, some operators are now launching their spacecraft more biased toward the stable plane. However, this is just a temporary solution in the long term.

Now is the time to begin a process of reevaluating how we use Earth’s orbit and determining the necessary steps to maintain the earth orbital environment for future use.
**Day 2: Saturday, March 1**

**Multilateral Cooperation**

“**ESA’s Clean Space Initiative**”

**Dr. Kai-Uwe Schrogl, Head of the ESA Policies Department, European Space Agency (ESA)**

ESA defines clean technologies for space as those that contribute to the reduction of the environmental impact of space programs, taking into consideration the overall life cycle and the management of residual waste and pollution resulting from space activities, both in the ecosphere and in space. ESA proposed the “Clean Space Initiative” to look at the International Code of Conduct that has been presented by the European Union from ESA’s side on the technical challenges. The Clean Space Initiative has four branches: (i) Eco-Design (considering the design of satellite launchers and extension of the life cycle of satellites), (ii) Green Technologies (use of clean hydroelectric power), (iii) Space Debris Mitigation, and (iv) Space Debris Remediation (including space debris removal).

I would like to introduce Space Debris Remediation. The first point is risk mitigation. As far as the sustainability of space exploitation is concerned, simulations by NASA and ESA show that the quantity of space debris keeps growing even if no further objects are launched, and there is a substantial increase in the number of Collision Avoidance Maneuvers carried out each year. The risk of ESA satellites experiencing a catastrophic collision, like the 2009 satellite collision between a U.S. satellite and a Russian satellite, in the next 50 years is estimated to be between ~7.5% and ~11%. Furthermore, the Initiative indicates the necessity of worldwide actions to limit the proliferation of space debris by active debris removal (~five objects per year). Next, I would like to introduce some recent ESA activities. ESA studied RObotic GEostationary orbit Restorer (ROGER) in 2010 and performed research studies on active space debris removal concepts from 2010–2011.

To realize these technologies, we organized a workshop at the European Space Operations Centre (ESOC) and created a roadmap in which the target date is set as 2020. Following internal preparatory activities with stakeholders in 2012, ESA plans to implement over the next two years a dedicated set of technical and system activities within its existing R&D programs.
“TCBMs and Multilateral Initiatives for Sustainable Space Development”

Mr. Ben Baseley-Walker, Programme Lead, Emerging Security Threats Programme, United Nations Institute for Disarmament Research (UNIDIR)

While space infrastructure is now used in various forms, our continued use of space infrastructure is facing a critical situation because of space debris. In addition, lines between military and non-military activities in outer space have become blurred. Outer space is also important as a tool for crisis management, including border security, management of earth resources such as water, military activities, disaster warning and management, etc.

From a policy perspective, space security is becoming more and more prominent. Key considerations need to be taken into account in the international policy arena in the formulation of cooperative space security initiatives: organizational proliferation, options for legal and policy models, and the international political climate.

As far as transparency and confidence-building measures (TCBMs), I am sure many of you have heard this term in a variety of fora. UNIDIR has comprehended TCBMs as follows: “The final objective of confidence-building measures is to strengthen international peace and security and to contribute to the development of confidence, better understanding, and more stable relations between nations, thus creating and improving the conditions for fruitful international cooperation.”

TCBMs can contribute to reducing perceptions of threat, help to build trust among states, facilitate international cooperation and thus enhance international peace and security, complement and contribute to disarmament and arms limitation agreements, and cultivate improved information-sharing between states.

A Group of Governmental Experts (GGE) on TCBM, proposed by Russia, held its first meeting in June 2012. Mr. Rose, Mr. Brachet, and I serve as members of this and 15 states participate. An International Code of Conduct proposed by the European Union commits to preventing space from becoming an area of conflict and provides recognition that space is essential to national security and strategic stability.

TCBMs are a key first step to security and predictability in outer space activities.
“Think Tank’s View of TCBMs in GGE”

Ms. Tiffany Chow, Project Manager, Secure World Foundation, U.S.A.

We define space sustainability as follows: ensuring that all humanity can continue to use outer space in the long term for peaceful purposes and socioeconomic benefit. Threats to space sustainability include orbital debris, crowding, interference, space weather, and irresponsible behavior. These problems require international solutions.

TCBMs for space can reduce the chance of mishaps, misperceptions, and mistrust, and can also promote strategic stability, peace and security, and international cooperation. Possible TCBMs for the GGE to consider include increased sharing of actionable SSA data and information, prevention of accidents, identification of unexpected incidents (e.g., space weather), verification of behavior, and distribution channels for sensors and capabilities.

To enhance the transparency of outer space programs, the following measures are required: publication of policies and budgets, dual use nature of space programs and activities, clarification of intent, and reduction of confusion or suspicion.

GGE is not the only non-binding international initiative contributing to space sustainability. The COPUOS Long-term Sustainability of Space Activities Working Group and proposed International Code of Conduct for space activities are very promising and constructive efforts, just like the GGE. In addition, “harmonization” is key.

Country Presentation from the Asia-Pacific Region

“Space Policy and Program in China”

Dr. Shouping Li, Director, Institute of Space Law, Beijing Institute of Technology (BIT), China

I would like to introduce China’s space policy and space programs. The Chinese government has published white papers about space activities three times: in 2001, in 2006, and in 2011. In these white papers, the Chinese government introduced China’s space policy and activities. Four main purposes of space activities described in the third white paper are as follows: (i) enhancing understanding of the earth and the cosmos, (ii) promoting human civilization and social progress and benefiting the whole of humankind, (iii) meeting the demands of economic development, scientific and technological development, national security, and social progress, and (iv) protecting China’s national rights and national interests and building its
comprehensive national strength. The third white paper also provides five principles for China’s space activities: the scientific development principle, the independent development principle, the peaceful development principle, the innovative development principle, and the open development principle. The focus on scientific development is a prominent political view in China because it was put forth by China’s Hu Jintao in the beginning of 2000s. The peaceful development principle was included under the idea that space activities have to be pursued not by one dominant nation but through international cooperation. In addition, China wants to put forward the independent innovation principle because it has had great progress in the area of space and the development of space technology. To fulfill these purposes and principles, the Chinese government has concurrently passed legislation to further the advance of science and the development of industry. China has decided that in the next five years, it will give priority to satellite application, development of human spaceflight, and deep-space exploration.

China’s space programs planned for the years to come are as follows. (i) Strengthening of basic space capabilities, such as the launch of Long March 5 (large thrust; liquid oxygen / liquid hydrogen), Long March 6 (small thrust), and Long March 7 (medium thrust) and the construction of the third launch site in Hainan Province, an island in the south of China. (ii) Promotion of key projects: continuation of human spaceflight to complete construction of China’s space station, and the last step of the lunar exploration project, that is, landing on the Moon and returning to Earth. (iii) Development of man-made satellites: the Baidou Project, a constellation of navigation satellites, is in progress and will be completed in 2020; an earth observation satellite project is also ongoing. (iv) Fostering of the space industry. (v) Space debris: monitoring of space debris (from a technical approach) and establishment of legal system to mitigate space debris (from a legal approach). In the future, the China aims to institute a comprehensive space law, which will be expected to spur space debris mitigation. (vi) Strengthening of international space cooperation under three principles: supporting space activities within the framework of the UN, emphasizing Asia-Pacific regional space cooperation (through the Asia-Pacific Space Cooperation Organization: APSCO), and reinforcing cooperation with developing countries and valuing cooperation with developed countries.

In China, there is no comprehensive policy to regulate space activity. Two authorities, the State Administration of Science, Technology and Industry for National Defence and the General Armament Department, have been regulating space activities separately. I think it is actually difficult for the Chinese government to implement the policy.

“Space Policy and Program in India”

Dr. Rajeswari Pillai Rajagopalan, Senior Fellow in the Security Studies Observer Research Foundation, India
Recent issues of debate in India include renewed focus on security, re-evaluation of India’s traditional policy, debate over an Indian ASAT system, and the enduring official policy against space militarization, some of which stems from the 2007 Chinese antisatellite test.

Although there is no declared policy established in India yet, India’s space program has continued to emphasize the utility of space technology for national development. This technology remains crucial for the development agenda, but the importance of technological dominance in ensuring military security or even superiority cannot be discounted in the debate within India. Indian intends to pursue civilian technology with military potential. The shifting of aeronautical engineers and other technocrats from civilian programs to defense programs has begun in India.

In the early 2000s, India reconsidered its space militarization policy. Signs of fluctuations in Indian policy can be seen in the following phenomena: India’s initial reaction to Bush’s National Missile Defense (NMD) speech, India’s own interest in developing a Ballistic Missile Defense (BMD) program, recognition of a strategic challenge from China, short- and medium-range missile threats that India faced from both Pakistan and China, and high-technology transfer as part of missile defense cooperation.

In the future, we need to collaborate on the following challenges: space debris removal technologies; space situational awareness to monitor, understand, and predict the changing physical space environment; maritime domain awareness (MDA); confidence-building measures (CBM), and so on.

“**Australian Activities to Promote Space Sustainability**”

**Ms. Georgina Downer, Second Secretary, Australian Embassy Tokyo**

In the Australian government, there are three major actors that have responsibility for managing space-related issues: the Space Policy Unit, which is the central point of contact and coordination for civilian space activities; the Department of Foreign Affairs and Trade, which takes the lead on the International Code of Conduct and the Group of Governmental Experts (GGE), etc.; and the Department of Defense, which is responsible for SSA.

Principles for a National Space Industry Policy, which was released in 2011, set out to strengthen and increase international cooperation and to contribute to a stable space environment. The most relevant project to space sustainability is the “Automated Laser Tracking of Space Debris.”

To reinforce one of the weaknesses of current global SSA, that is, a lack of sensors in
the Southern Hemisphere, Australia, and the United States agreed to a Space Situational Awareness Partnership in 2010 and announced further cooperation to enhance SSA capabilities in 2012.

Australia regulates space activities conducted by Australian companies and universities. Australia is also actively working toward the International Code of Conduct for space activities.

Australia co-chairs Expert Group D of the COPUOS Long-term Sustainability of Outer Space Activities Working Group.

“The KARI Space Program and SSA Activities”

Dr. Eun Kyou Kim, Director, Satellite Operation Division, Satellite Information Research Center, Korea Aerospace Research Institute, Korea

The Korea Aerospace Research Institute (KARI) has aimed to contribute to the development of the national economy and improvement of quality of life in Korea since 1989. With 1000 personnel, KARI spends about U.S. $300 million per year in the aerospace research and development sector. KARI is trying to cooperate with the international partners, including Japan, the United States, India, Israel, France, and Russia.

KARI places high priority on earth observation satellite programs. KOMPSAT-1 (spatial resolution: 6.6 m) was launched in 1999, KOMPSAT-2 (spatial resolution: 1 m) in 2006, and KOMPSAT-3 (spatial resolution: 0.7 m) in 2012 by H2A rocket. KOMPSAT-3A, which will be launched in 2014, has 0.55 m of spatial resolution and KOMPSAT-5, which will be launched in 2013, has a Synthetic Aperture Radar (SAR). GEO Satellite COMS, the missions of which are meteorological observation, ocean color monitoring, and Ka-band communication experimentation, was launched in 2010 and is currently in operation. These satellites are operated by Korea’s worldwide Tracking, Telemetry, and Command (TT&C) network, whose ground stations are in Daejeon (the KARI headquarters), Norway, Micronesia, and Antarctica.

KARI began carrying out SSA-related activities in 2007 at the time of the Chinese ASAT test and is now promoting various forms of research and development, such as collision avoidance maneuvers. KARI also actively participates in a task force team for monitoring the latest decaying satellites, including ROSAT, Phobos-Grunt, and Cosmos-1484. KARI officially registered KOMPSAT to JSPOC. KARI cooperates with JSPOC and received 46 emergency notifications on approaching debris, or Conjunction Summary Messages (CSMs), in 2012. KARI also actively working for COPUOS and the EU Code of Conduct.
The Republic of Korea will make a continuous effort to conduct monitoring of various kinds of space debris in cooperation with the member states of the United Nations.

“Space Policy and Program in Malaysia”
Dr. Noordin Bin Ahmad, Deputy Director General, National Space Agency of Malaysia (ANGKASA), Ministry of Science, Technology and Innovation, Malaysia

Looking forward to 2020, Malaysia’s National Space Policy aims to develop the country’s potential in the space sector in order to support the development of the new economy and strengthen national security. Maintaining that it is important for people to enjoy the benefits of space activities, such as the construction of space infrastructure, promotion of space industries, promotion of security, and use of innovative space technology, we formulate seven thrusts as follows.

(i) Space as a frontier of knowledge, (ii) research and development, application, and commercialization of the space sector, (iii) accelerating space technology and infrastructure development, (iv) local space industry development, (v) human capital and talent development, (vi) effective governance, and (vii) international relations and diplomacy. The issue of the long-term sustainability of space activities, on which this symposium focuses, has not yet been included in our space policy. However, we do not disregard international cooperation and governance.

For each of the seven thrusts, we have the corresponding seven programs. (i) Exploring New Knowledge and Scientific Discovery: Since we are on the equator, we are enhancing the near equatorial orbit (NEqO) satellite program. (ii) Invigorating Research, Development, Innovation, and Commercialization: We decided to establish a joint government-industry innovation space fund to make possible joint government-industry technological innovation. (iii) Accelerating Space Technology and Infrastructure Development: We promote strategic development of space technology and infrastructure. (iv) Developing Local Space Industry: We promote incubation programs. (v) Human Resources Enrichment: We have established a joint government-industry space training center. (vi) Promoting Good Governance: we are formulating a Malaysia Outer Space Act. (vii) Embedding Space in the Nation Foreign Policy: We are trying to utilize space technology in disaster management, and we participate in the United Nations and many international space operations-related programs.

Although there are many challenges that Malaysia will face in fulfilling the above objectives, we promote space activities, aiming to build up the nation’s capacities, acquire innovative technologies, and foster industry.
“Space Policy and Program in Vietnam”

Dr. Pham Anh Tuan, Director, Vietnam National Satellite Center, Vietnam

Academy of Science and Technology, Vietnam

Vietnam’s strategy for research and application of space technology until 2020 includes the following eight objectives: (i) to formulate a national policy and legal framework for research, application, and international cooperation, (ii) to build the infrastructure for space technology, (iii) to carry out a national science and technology program on space technology, (iv) to master the technologies of manufacturing ground stations, (v) to manufacture and launch some small earth observation satellites to complete the system of satellite positioning stations, (vi) to master rocket technologies and techniques, (vii) to train a contingent of highly qualified personnel, and (viii) to put space technology applications into wide-ranging and regular use to meet production, service, education, and healthcare demands.

As for the five UN treaties on outer space, Vietnam ratified the Outer Space Treaty but has not yet ratified other treaties.

Next, I would like to introduce the Vietnam Space Center project. With 54.4 billion Japanese Yen (ODA Fund), construction of the Center has started in a suburb of Hanoi and will be completed by 2020. This project aims at human resource development, construction of infrastructure, and technology transfer.

Next, I will discuss our satellite program. As for earth observation (EO) satellites, we have two missions, LOTUSat-1 and LOTUSat-2, which will be launched in 2017 and 2020, respectively. They are equipped with X-band SAR sensors. We have started the design phase this year. In parallel with the LOTUSat missions, we are also advancing an optical satellite (VNREDSat-1) mission with support from the French ODA. This satellite, VNREDSat-1, is a small EO satellite with a weight of approximately 130 kg and spatial resolution of 2.5 m (panchromatic) and 10 m (multispectral). Development of its successor, VNREDSat-1b, is being performed with the support of Belgium’s ODA. It will be equipped with a hyper-spectral sensor and launched in 2017.

As for communication satellites, VINASAT-1, which was launched in 2008, is in operation. It covers Vietnam, Laos, Cambodia, Thailand, and part of Myanmar. VINASAT-2 was launched in May 2012 and has wide-ranging customers such as oil companies, banks, and finance companies in Laos, Cambodia, and Myanmar.

Vietnam has only recently initiated its space activities. In parallel with development of our satellite business, Vietnam looks forward to opportunities to cooperate with the UN and other countries.
**Japan’s Space Diplomacy**  
**Mr. Tomofumi Nishinaga, Director, Space Policy Division, Foreign Policy Bureau, Ministry of Foreign Affairs, GOJ**

Last year, the Space Policy Division was established in the Ministry of Foreign Affairs. I would like to report on the progress of Japan’s diplomatic space policy.

First, with regard to international rulemaking on the utilization of space (both civil and national security aspects), we have been actively participating in the international discussions toward the adoption of the International Code of Conduct for space activities proposed by the EU. In 2013, we will take part in the meetings of the Group of Governmental Experts (GGE) and aim to hold diplomatic meetings for signature. We will be actively engaged in outreach efforts to gain the support of other countries, particularly Asian countries. In addition, we will contribute actively to the creation of guidelines regarding the long-term sustainability of space activities at COPUOS.

Our second effort is the promotion of international cooperation regarding space activities. Again using ODA support, we will create new markets for Japan’s space industries by developing satellites and ground facilities for developing countries. We have already obtained good results in Turkey and Vietnam and are now in consultation with Thailand. We will also use Japan’s space technologies to contribute to efforts to address global challenges, such as climate change, disaster reduction, forest preservation, measures against illegal logging, and resources and energy. We have been promoting the idea of a Disaster Management Network for the ASEAN Region. In addition, we have been enhancing international cooperation and dialogue in bilateral and multilateral fora. We will promote the establishment of a comprehensive dialogue on space between Japan and the United States and discussions on space with Canada, the United Kingdom, and the EU.

The last effort is to ensure space security, that is, to ensure free access to space, transparency of nations’ space activities, and further development and use of space in the area of national security. In the area of security, we have been promoting bilateral U.S.-Japan space security cooperation. In the meeting of the Japan-U.S. Security Consultative Committee, known as “2+2,” in June 2011, concrete details of cooperation were specified, for example, Space Situational Awareness (SSA) and space-based Maritime Domain Awareness (MDA). To promote Japan’s utilization of space for security purposes, we aim to establish an SSA cooperation system, expand the utilization of a Quasi-Zenith Satellite System for security purposes, and maintain, expand, and strengthen the information-gathering satellite (IGS) project. In addition, recent amendment of the...
JAXA law has enabled related activities in the space security area.

“Report of AMOS SSA Forum in Maui”

Ms. Jeanne Unemori Skog, President & CEO, Maui Economic Development Board, U.S.A.

The Advanced Maui Optical and Space Surveillance Technologies Conference (AMOS) has been held annually in Maui and took place for the 13th time last year. Although the original intent of AMOS was to showcase space surveillance capabilities, particularly those of optical surveillance technologies including technologies for surveillance of space debris, the most recent AMOS conference was the first program on space policy, the “AMOS SSA Forum.” The following three panel discussions were held.

1. U.S. National Space Policy
2. International Cooperation
3. Commercial and Civil SSA

In the international SSA and collaboration session, representatives from France, Germany, Italy, and JSF reported on their SSA activities and discussed the possibility of international cooperation with the United States. The European representative noted that, in the case of European countries, SSA requires a careful balance between countries’ national security and international cooperation. In spite of increased activity within the European countries, budgetary constraints and emphasis on return on investment underscore enhanced international cooperation as the most efficient way of achieving SSA.

The space policies of individual countries change on a daily basis and the status of space activities, particularly of SSA activities, has been changing by the moment. Under these circumstances, the 2012 SSA Policy Forum was significant. When asking on the evaluations whether we should present the forum annually, the response was a resounding yes. We humbly offer our continued assistance with advancing the SSA dialogue. We invite all of you gathered here today to join us. Maui welcomes you.

Panel Discussions

Topics: Expectation to the Asian countries for the realization of international coordination

Moderators: Ms. Tiffany Chow (SWF) and Mr. Susumu Yoshitomi (JSF)

<Panelists>
Part 1: Representatives from Asian Countries

Dr. Shouping Li (China)
Dr. Rajeswari Pillai Rajagopalan (India)
Dr. Eun Kyou Kim (Korea)
Dr. Noordin Bin Ahmad (Malaysia)
Dr. Pham Anh Tuan (Vietnam)

Part 2: World Opinion Leaders

Mr. Frank A. Rose (U.S.A.)
Mr. Gerard Brachet (France)
Mr. Donald J. Kessler (U.S.A.)
Mr. Ben Baseley-Walker (UN)
Dr. Setsuko Aoki, Professor at Keio University
Dr. Kazuto Suzuki, Professor at Hokkaido University & Visiting Fellow at Princeton Institute for International and Regional Studies (PIIRS)

Summary of Panel Discussions

Part 1: Panel discussion of representatives from Asian countries
Topic 1: Asian countries’ expectations for sustainable space activity
(Yoshitomi)

So, I would like to ask the representatives from Asian countries, (i) what is required to achieve the sustainability of space activities, or, more generally, what you think or feel based on this symposium?

(Li: China)
- Although the sustainability of space activity is usually thought to require the safety and the security of such activities, I think the sustainability of space activity actually entails two endeavors. The first is to ensure the safety and security of space activities, and the second is to ensure that all the states in the world can enjoy their right to freely explore and use outer space.

(Rajeswari: India)
- Many things have been discussed, including what it means to make outer space sustainable, how we ensure that it stays sustainable, and what the challenges arise in the process. Today, space debris has increased and outer space has become crowded; the number of actors entering the domain of outer space is increasing. Actors in space now include not only state actors, but also private sector players. The question arises, then, of who addresses these new actors, who is responsible for these private sector players—does the state assert its domain over them? I think this is a critical issue. The new set of technologies that is entering the domain is also important. However, no single country is
going to be able to resolve these challenges alone. The space debris issue has reached alarming levels, but as of today, the United States has the largest network of sensors, followed by Russia and to some extent the European Union. While all the major spacefaring powers do have an interest in maintaining the sustainability of space, they do not have the technology or the financial resources to maintain a sustainable status for outer space. Accordingly, international collaboration and regional collaboration have become necessary.

(Kim: Korea)
- I think that responsible conduct of space actors will be necessary for outer space activities to be sustainable. The international community has been making great efforts of various types to encourage nations to contribute to sustainability. A notable example is the International Code of Conduct for outer space activities. I hold the international code to be important for forming establishment of TCBMs with regard to outer space. The Republic of Korea will support the codification of the International Code of Conduct for outer space activities. The international community must draft an International Code of Conduct that every spacefaring nation can follow. The code should reflect the views and positions of all participating countries so that international agreement may be attained. The Code of Conduct should take into consideration the unique levels of space technology each nation possesses. Setting the specific standards too high without leaving room for necessary discretion may be detrimental to those nations that are in the initial development stage of outer space exploration.

(Ahmad: Malaysia)
- To assure their sustainability, the scope of space activities needs to be defined in more detail. Space activities must have an impact on the economy in order for countries to feel the benefits of ensuring the sustainability of these activities. We must avoid a situation in which new actors feel like victims of the new Code while developed countries harvest the benefits of it.

(Tuan: Vietnam)
- Vietnam is a newcomer to space activities and we very much appreciate the leading countries’ efforts to create an International Code of Conduct for this area. Many international problems have occurred at sea; we think measures must be taken to ensure that similar problems do not occur in space. We very strongly support this activity and Vietnam really wants to join the International Code of Conduct for sustainable space activity.

(Yoshitomi)
As for the space activities of Asian countries, China, India, and Japan are advanced countries and Korea, Malaysia, and Vietnam are still-developing countries. When debating the sustainability of space activity and the International Code of Conduct, I think we should take account of the balance
between the advanced countries and the still-developing countries. What are your thoughts on this point, Dr. Li and Dr. Rajeswari?

(Li)
- I asked Mr. Brachet for a definition of sustainability of space activity. I think it is necessary to ensure the safety and security of space activity. Not all countries in the world have the capability to use and explore outer space. I think we should pay more attention to establishing a regional cooperation framework. For example, although there are only a few spacefaring countries in Asia, it would be beneficial to establish a regional cooperation framework incorporating countries that have not yet initiated space activities. I think it is very important to establish an organization like the European Space Agency (ESA) in the Asian region.

(Rajeswari)
- We need to identify the areas of cooperation, including space situational awareness (SSA). In the last two days, many issues have been discussed, and active debris removal is important in terms of developing space technologies and developing a cooperative framework with other countries at the regional and multilateral levels. As far as maritime domain awareness in Asia is concerned, there is already some competition and rivalry in the Indian Ocean region. Maritime security protection issues are important for Asian countries, of course for India, Japan, and China. Air domain awareness is also important. On February 15 of this year, a meteorite fell in Russia. Just after the event, a small near-Earth asteroid passed very close to the Earth. These are highly important issues. The sharing of information and recognition are critical for addressing such phenomena and, generally, for international cooperation at the bilateral, regional, and multilateral levels.
- There are ways to move forward on this, I think, at both the regional and international levels. At the bilateral level you can start with certain TCBMs between two countries where there are potential tensions. One way to reduce the tension is for the countries to sign on to some confidence-building measures (CBM)—to sign on to agreements that provide for notification of pre-launching events or high-risk reentry events, or for no weapons in outer space. Particularly in the Asian context, I think that it is very, very important to reduce the trust deficit as well as mutual suspicion between two countries.
- India’s position on TCBMs has been that they are good measures, but good supplementary measures. Indians insist that the preference has been for legally binding mechanisms, but it is also important to identify things to which a non-legally binding approach can be applied. The International Code of Conduct proposed by the European Union it is more of politically binding mechanism. At the international level, it is a very loose set of rules, but it does expect countries to implement rules and regulations in a much more stringent manner at the national level. The countries will agree to this or will not; these are issues to be worked out.
- In any case, I think India’s insistence has also been on a more inclusive framework.
There are two aspects of international cooperation: establishment of rules and technical problems, which includes monitoring of satellites and satellite-related debris, and new usage of Earth’s orbit, which Dr. Kessler addressed yesterday. What do the new players, Korea, Malaysia, and Vietnam, think of these aspects?

- We, the new players, have only immature technology; thus, we are trying to obtain some benefits from the activities of the advanced countries. The balance between technology and rules is important. However, the new players do not have the capability of, for example, space debris monitoring, meaning that we may have to work in an integrated manner rather than just as part of an isolated or bilateral program.
- Although the integrated approach is needed to ensure the sustainability of space activities, I know it is not easy to reach agreements between the advanced countries and the new players. However, at least the idea of agreement should be promoted.

- We have launched only a few satellites and we are now trying to establish very strong cooperation with Japan to make considerations and share information.

Part 2: Panel discussion by world opinion leaders

Topic 2: Prospects for an international Code of Conduct and for UN TCBM/GGE activity

Topic 3: Expectations for establishing a cooperative framework in the Asia-Pacific region

Therefore, it is time to move toward Part 2.

In Part 2, we will discuss (ii) prospects for agreement on an International Code of Conduct and the direction of discussion on the UN TCBM/GGE, and (iii) expectations for establishing a cooperative framework in the Asia-Pacific region (including expectations of Japan and advice for Japan). First, we ask for brief comments from Professor Aoki and Professor Suzuki, who did not have an opportunity to speak before.

- As for topic (ii), we have to recognize that norms for conduct space exist and that they are adequate and appropriate. Article 2.4 of the UN Charter prohibits the “threat or use of force.” This is effective on the ground and even in outer space. If this principle is observed, an additional agreement should not be needed. In the UN, there are five treaties on outer space and four of them
are acceded to by most of the spacefaring nations. Therefore, the extent to which these treaties are followed is important. The space-related treaties that do not include substantive laws or adjective law stipulate how nations should act but do not stipulate how disputes should be resolved when they arise. To the current rules and regulations, the Code of Conduct adds consultation systems for dispute, a dispute settlement system, an advanced notification system for abnormal events or for instances of conjunction between other nations’ satellites one’s own satellites, and an emergency notification system for accidents.

- Although there seem to be various definitions, I think about a positional relationship among TCBMs, the Code of Conduct, and the associated guidelines as follows: TCBMs address ideas, notions, or concepts that compensate for deficiencies in laws. Concrete parts among these, or concrete parts containing other elements, come to fruition as the Code of Conduct, which is a non-binding norm-creating document. The draft Code stipulates the preparation of guidelines for concrete implementation; best practice guidelines that have been examined by the Scientific and Technical Subcommitte (STSC) of COPUOS come under that. The Code of Conduct includes respect for nations’ sovereignty in its principles. I think it is a very wise choice to make the Code of Conduct non-legally binding that and the Code will better be able to realize some of the concepts of various TCBMs this way.

(Suzuki)

- Since one of the themes of this panel discussion is Japan’s role, I would like to talk about the Japanese perspective on space sustainability, in other words, how Japan has dealt with the issue of the long-term sustainability of outer space activities. With JAXA at the center of its conduct, Japan has acted responsibly as a spacefaring nation. It appears certain that Japan has carried out self-regulation based on various domestic laws. For example, JAXA developed a technique to prevent rocket upper stage, that is, the second and third stages, from becoming space debris. Despite this, Japan has not placed much importance on the urgency of the space debris problem, as the risk of space debris is not necessarily high. However, I think Japan has affirmatively recognized that the debris problem has become significant and a solution to it must be found one way or another.

- However, a new administrative framework was established last summer and awareness has been gradually changing. As Mr. Nishimoto, director of the Ministry of Foreign Affairs, discussed just while ago, the Ministry of Foreign Affairs established the Space Policy Division, which will solve diplomatic or international issues in space. The Cabinet Office also established the Office of National Space Policy, which will advance a comprehensive space policy for the whole nation. With the new administrative framework implemented last year, it has become possible for Japan to take active leadership of the sustainable utilization of space in multilateral relations, especially in the Asia-Pacific region. In this context, Japan’s space security problem has also been evolving. One change is international demand; in other words, various discussion platforms, including this symposium, have been created that require Japan to shoulder the international responsibility to some
extent. In this context, space security has become a high priority in space diplomacy, as you can see from this symposium. Furthermore, there has been a growing trend in the Ministry of Defense to address space-related problems, particularly the space debris problem. In Asia, Japan and China independently demonstrate interest in this leadership issue, which is an interesting situation from the point of view of international politics. I think Japan will continue to assume this role.

(Chow)
- Thank you Professor Aoki and Professor Suzuki. First, I want us to think about how much progress has already been made toward promoting and raising awareness about this issue of space sustainability. Just a few years ago, none of these international initiatives were fully underway and now we see multiple international efforts focusing on this important goal; that is great progress made already. The International Code of Conduct, the GGE for TCBMs, and the COPUOS Working Group on Sustainability are successfully harmonized and come out with products, best practices, or a menu of TCBMs. These entities also effectively include all the relevant stakeholders, especially the emerging nations or newcomers. What happens next? Thinking about two or three years down the line, will these be enough to ensure the sustainability of the space environment, or will more efforts be needed? What will be the results of these initiatives that are going on right now?

(Rose)
- Well, Ms. Chow, let me say first that you are very optimistic that we will get all of these proposals to be harmonized and successful. Let me take a different tack to your question. If you look at history with regard to space security and space sustainability issues, and I think there is a certain link between the two, the major advances have come about in situations where the security of the space environment and the environmental sustainability of the space environment have intersected. One of the first real successful efforts was the Limited Test Ban Treaty between the United States and the Soviet Union, which addresses the use of nuclear weapons in outer space. The two countries had nothing in common, but at the time, it seemed like blowing up nuclear weapons in outer space was a good idea. However, we started damaging our own satellites as a result; had we continued to do so, we probably would have put so much radioactivity in the ionosphere that it would have prevented us from engaging in human spaceflight. That was the first instance of major success in space security. The second major success was the Outer Space Treaty in 1967. The UN Space Debris Mitigation Guidelines in 2007 are also comparable. We need to focus on practical solutions to practical problems.

(Chow)
- Mr. Baseley-Walkwer, did you want to add to that?

(Baseley-Walkwer)
- I have to say I do agree with Frank. Your optimism is very refreshing. I hope that your reality is one that comes to pass. We used to say that a good career in diplomacy was a career where nothing happened. We do not want to see further testing of space weapons. I think TCBMs may be part of a moving target.

- The reliance on space for many states, especially in the Asian region, is continuing to grow. I think there will be new satellites, new technologies, and new threats to security and sustainability, and the way in which we protect sustainability will naturally have to evolve.

(Kessler)

- I would say that, no, it would not be enough. We have always felt that openness and transparency was the right way to go. There is still the technical issue. I think the real work begins once you have established that type of working relationship, because the real problem is, in a way, whether we do business in space; everybody will maintain that they did not intend to cause problems, they just did so accidently. They need to be educated; they need to understand what the fundamentals of the problem are, and how to approach it, and what they need to do differently. In some cases, they are going to be prohibited from doing what they need to do because of existing legal rules. For example, during the National Research Council study, we were constantly being warned by the legal people that you cannot go up and touch another person’s satellite, because it would be considered an act of war given that they own that satellite. Once you build confidence, you can get permission to do that. But even then, you still have to set up a framework by which you conduct that type of activity, and you have to foster an attitude or motivation that encourages parties to really want to follow these guidelines. For example, if I just use a little bit more fuel to operate it, it will take a little bit longer, I can save a lot more money, and whatever they are going to do does not matter, because I have customers I need to satisfy. When Iridium was first launched, it was launched with the idea that all the satellites would reenter within 25 years. They keep finding more and more ways to get more time out of it, and then the question is always going to come up, well, are they really going to do that if they can make a little bit more money by staying up there a little bit longer? I think you have to answer those kinds of questions before things will work as smoothly as you would like them to.

(Brachet)

- I would like to take a step back, because I believe that we are focusing too much on space debris and on the threat of space debris and so on. We are not limited to space debris. We are addressing the long-term sustainability of space activity and that includes a number of other things. For example, when considering an initiative for valued use, let us keep in mind that we are talking about a wider topic than just protecting assets against space debris. We essentially have two top-down approaches, the GGE and TCBMs, which are presently in the development phase. Maybe, next year, we will have something to work with. There is more groundwork done by the COPUOS Working Group on Long-Term Sustainability of Space Activities, in more of a bottom-up approach—which,
hopefully will be more inclusive in covering all aspects of long-term sustainability. But because it is a bottom-up approach, it takes more time. We are very careful to ensure that the two approaches do not diverge, and so far, they are not diverging. I agree with Mr. Rose and Mr. Baseley-Walkwer that it may take a longer time.

(Suzuki)
- I will try to bolster Ms. Chow’s point that takes a more optimistic view with regard to the future necessity of international regulation. These initiatives we have been discussing—the GGE, the Code of Conduct, and the TCBMs, and also the long-term sustainability working group—are all a sort of, let us, say emergency measure. However, what we need to do is determine how to remove space debris and try to clean up the orbital environment; that is perhaps the most important goal in the future. I think that if we cannot agree in this initial stage, it will be more difficult to reach agreement in the future. From that perspective, I think it is necessary to have at least converged on a sort of groundwork for minimally mitigating the risk of space debris and make sure that we can move forward to the removal of space debris.

(Aoki)
- I would like to take a position between these two. Perhaps the Code of Conduct for outer space activities will be adopted within a few years, but some countries will not be party to it. Such countries have to prepare national legislation on the issue first. As Dr. Kessler pointed out, active space debris removal is very difficult; there are many complicated legal matters involved, including who is responsible for active removal, who owns the space debris, and how to define space debris. Even if a satellite is not functioning, it can be used to occupy space to reserve a certain GEO spot for exclusive use. If state parties have confidence in each other, if they trust each other, those legal issues can be addressed; thus, TCBMs are very important.

(Baseley-Walkwer)
- I just wanted to pick up on the issue of national implementation. The process is not completed when either a non-legally binding Code of Conduct or bilateral TCBM or even an overarching treaty has been agreed on. Those documents and those tenets must then be converted into applicable national legislation and national policy. I think that if, as Dr. Kessler discussed, you have a company talking about its client base, my response would be that it is really the responsibility of the government to make sure that the national legislation and the parameters within which the company is operating respect the sustainability frameworks that are put in place. As an example, I introduce the German government, which has incorporated the UN space debris guidelines into its national legislation.

(Yoshitomi)
Here is a question from the floor. As Dr. Ahmad, from Malaysia, has pointed out, if TCBMs, for example, which seem to be settled this year, are decided on only by developed countries, there is worry that this poses a difficult obstacle for developing countries to overcome. Japan may also face this situation, as it is not a member of TCBM/GGE. There is another question regarding actions like the ASAT test, asking whether legal frameworks proscribing such tests will be developed.

(Baseley-Walkwer)
- GGE consists of 14 countries, including both developed and developing countries; I think it is well-balanced. However, it is impossible to incorporate every country into GGE. In the discussion on the starting up of the GGE in the UN, it was expected that a GGE concerning cyber information would start up. Accordingly, it can be said that various opinions have been reflected in the GGE. The GGE can also hear opinions from non-member countries. All GGEs in the UN cap membership at 14. As for space weapons, they are difficult to define, so the definition has not yet been determined over the course of more than 40 years. This problem cannot be solved until space weapons are defined.

(Chow)
- Now, we move on to the third topic: (iii) Expectations for establishing a cooperative framework in the Asia-Pacific region (expectations of Japan and advice for Japan), and how inputs from those stakeholders who are not officially represented in the GGE can be reflected in GGE’s outputs.

(Baseley-Walkwer)
- The GGE outputs consist of a report to the Secretary-General, which will be supplied to the UN General Assembly First Committee. The report is not a binding document. GGE members are not representing their governments in that environment, so it really represents the conclusions of a group of governmentally chosen experts who have come together to discuss this particular issue. In terms of TCBMs and so on, you have regional coordination. The relationships between the multilateral environment and the regional environment have already been established.

(Suzuki)
- The question of the ownership of the space debris has not been discussed. The GGE document is not binding. But it is desirable, at least, to have a sense of belonging, the sense of ownership of these rules and standards; this is an important part, particularly for the non-binding issues. A non-binding framework needs to have voluntary commitment to those rules and standards, and that is ultimately the only supporting mechanism of those international regimes. Last year the forum for discussing the question of space sustainability in the Asia-Pacific region was successfully held in Australia and Asian countries with the help of UNIDIR and the Japanese government. This forum is an extremely important way of addressing these issues, because it indicates that we are engaged,
relevant, and participating in the decision-making process.

(Kessler)
- As far as Japan’s leadership, I think Japan is in an excellent position to be a leader in the Asia-Pacific region. Because Japan was a member country of IADC and knows its history, Japan is perfectly capable of doing the same thing with the Asian community. That is, the Japanese representatives can go out and educate people in the Asian community, and work with them, and encourage them to do their own research, and feel sense of ownership of what we are doing and why, and be part of the international community.

(Brachet)
- The organization of a conference like we are participating in today is also active leadership on the part of Japan and I would like to encourage Japan to continue this. Japan is considering its facilities in terms of space debris surveillance, but I do not know the extent of the plans to develop this capability. I believe that something will be discussed between Japan and the United States in the future. Australia has been also very active in the region. Australia is not a member of GGE, but it has already contributed its own thinking about the GGE, effectively contributing to GGE. As Dr. Kessler said, the IADC is a very powerful group because it is not a group of states, it is a group of space agencies. They do a lot of very detailed work. Whatever comes out of the IADC is based on the consensus of the experts on very technical things. The process by which IADC has transferred knowledge to the COPUOS is difficult and takes time. If guidelines IADC formulated are based on very strong, robust consensus, they will have a strong presence.

(Kessler)
- I think he is exactly right.

(Aoki)
- Going back to discuss what kind of leadership Japan can have, I think Japan can play a role of sharing information about SSA and about other space awareness issues. Japan can behave not as a leader but as a comrade or colleague. If Japan shares the experiences, confidence-building measures will better facilitate safe and secure use of space in Asian countries.

Questions from the audience: About ASAT

(Rose)
- The United States conducted an ASAT test in 1985. Looking back now, we should not have done this, but we did. We learned a lot from it. If you want to do an ASAT test, you do it at a sufficiently low altitude and make sure that you do not damage any other objects. In 2007, China conducted an
ASAT test. Pieces of space debris from this ASAT test came close to the International Space Station. Ironically, the pieces of space debris also came close to China’s own satellites. We should understand that the more debris you create in outer space, the more risk your space assets are subject to. Senior members of the U.S. military have come out in favor of responsible uses of outer space and the need for rules of the road. I think the military more than anyone else understands how dependent we are on space and the need to preserve the space environment.

(Yoshitomi)

Thank you. We have run out of time. We have heard expectations and suggestions based in part on opinions from some Asian countries. Contents of this two-day symposium will be summarized and made available in due course.

Presentation materials will also soon be made available on JSF’s website.

I would like to close this panel discussion. I want to thank all of you and thank the panel.

**Closing Remarks**

**Mr. Kaoru Mamiya, President, JSF**

I would like to express my appreciation to all of you for your contributions to and participation in this two-day symposium. I am glad to hear that a total of 450 people were present and that a total of 2,000 people listened to this symposium via Internet broadcast. I think the symposium has made a large impact.

I have heard a variety of speeches during these two days; some speeches were well worth hearing and some were difficult. Listening to the last panel discussion, I noted how high expectations can be for platforms like this symposium, compared to expectations of Japan. Professor Aoki referred to information sharing, but there are many fewer opportunities to share information, even though everyone must know the topics discussed here well. I think this symposium is an invaluable opportunity because during these two days we have caught a glimpse of the world that we rarely come in contact with and have obtained some new understanding. In addition, not only Japan but also some developing countries have participated. Information sharing that includes people from the Asia-Pacific region is a very valuable, useful opportunity for all of us.

I also thank Mr. Rose and other speakers from developed countries for your participation in this symposium and valuable discussions.

We will provide a platform like this again next year, and we look forward to seeing you there.

Again, I sincerely thank you all for coming from far and wide.
4. Results of questionnaires

General

(1) Part 1: Speeches

- I would have liked to have heard more concrete examples.
- Parts of some talks, for example, information available through the Internet and talks on space debris, fell short of my expectations. I think effective use of outer space is inevitable. I could not understand very well based on the talks how precisely debris can be monitored and reduced (disposed of), given that debris will certainly increase. I gathered that every nation has to follow rules, share information, and cooperate with each other. I found Dr. Kessler’s talk especially valuable.
- I found the speeches on multilateral cooperation slightly boring.
- I would like to get presentation handouts, if possible.
- I came to hear Mr. Yukimura’s talk. It was great, of course, and diplomatic topics unfamiliar to me were also interesting. Dr. Kessler’s technical talk was very interesting.
- I wish I could have asked questions of each speaker. I think interactive exchanges would facilitate the audience’s understanding of the talks.
- I enjoyed talks about, for example, the introduction of each nation’s efforts and policies. However, I felt that some talks were not as concrete as they could be because their themes were abstract.
- The discussion of Asian countries’ efforts toward space development, long-term sustainability, and SSA was interesting. Opinions expressed in the panel session were also interesting.
- Although I only heard the talks on Day 2, I would have liked the speakers to discuss more original, concrete examples, not generalities.
- I was interested in the present state of Asian countries’ space utilization.
- To invite Mr. Makoto Yukimura as a speaker is an interesting approach for attracting students and will serve as a preparatory step in compiling future symposia. Simultaneous interpretation for the presentation by Dr. Shouping Li was poor. (Although Dr. Li’s English is easy to understand.) The simultaneous interpretation for the presentation by Dr. Rajeswari Pillai Rajagopalan was good.
- I took the most interest in (i) the new Basic Plan for Space Policy (Mr. Nishimoto), (ii) the French approach (Mr. Brachet), (iii) PLANETES (Mr. Yukimura), and (iv) Debris Management Strategy (Dr. Kessler) because they were concrete and easy to understand.
- I think it would have been better if Dr. Kessler’s lecture had been the first because one of themes of this symposium is space debris. I also think it would have been better if Mr. Yukimura had done a face-to-face talk with Dr. Kessler.
- This symposium, the second one, seems to be enriched compared to the first one.
- I think it would have been better if speakers gave explanations of some of the more difficult points such as each nation’s vested interests.
- Dr. Kessler’s talk was very interesting to me because he offers an opinion on conventional measures against debris from a different perspective.
- As compared to the first symposium last year, the second one had no novelty. Inviting a comic artist and people from Asian countries was good, but I experienced a sense of déjà vu several times.

(2) Part 2: Panel discussions
- The panelists’ opinions on questions involving CoC, TCBM, and the COPUOS Working Group were interesting to me.
- I had great interest in the Asian countries’ present circumstances concerning the space debris problem.
- I enjoyed hearing opinions from developing countries.
- I can now understand solutions to the debris problem more concretely.
- It was good that summary discussions for the two days were held in Part 2.
- I found it interesting to hear exchanges of opinions between panelists with different stances.
- The opinions of people involved in space from various countries were informative.
- I wanted the panelists from Asian countries to express their opinions more frequently.
- It was good that the panel discussions were active.
- The latter half of the panel discussion, especially, was very interesting. The analyses of Professors Aoki and Suzuki, as was to be expected, were interesting in a sense.
- The remarks of an Indian legal expert were very informative.

(3) Whole SSA symposium
- Please continue to explain to stakeholders what kind of business model this theme can provide to the industrial and commercial worlds.
- One of the simultaneous interpreters lacked skill at interpretation. The schedule and time management on the first day were bad. All speakers should prepare presentation slides.
- I was disappointed at the lack of participation from Russia, which is one of the major actors in outer space. Also, one of the interpreters could not follow the speaker and could not interpret correctly. I hope this will be improved.
- I hope that there are opportunities to reveal the space policies and future plans of Asian countries in more detail. We have to further deepen discussions about what contribution Japan’s space industry can make toward the development of the space industry in other Asian countries.
- I would like to hear a panel discussion mainly of Japanese experts about how Japan
has advanced (about the idea of Japan’s SSA center, for example).
- The report of the first symposium was very detailed and excellent. I expect that the report of the second one will also be excellent.
- I hope this symposium will be established and held annually.
- Please use interpreters who are familiar with technical terms. Several sentences were skipped, sometimes making the translation meaningless and illogical.
- It was good to hear opinions from both developed and developing countries. I think I will now consider the debris problems.
- I think it would be better to have question and answer periods just after each speech. Although the punctuality is important, listeners’ satisfaction would be enhanced if Q&A periods were established.
- I expect that the symposium will develop as a neutral platform in which all nations can exchange their opinions freely.
- The symposium focused too much on discussion of the debris problem. I wanted to hear concrete opinions from Japan’s Ministry of Defense.
- I wanted to hear concrete details of what each country discussed.
- The contents of the lectures in the first half were similar to those of last year’s symposium. If the symposium will be held annually in the future, it should avoid being repetitive.
- The networking reception was very good. Recently, many such gatherings have entailed an associated charge, and it may be difficult to hold a free reception because it requires sponsors. However, a free reception is welcome because this makes it easy to take part.
- I would like presentation handouts to be distributed. There is a perspective that hopes for the introduction of JAXA’s wide-ranging activities concerning space debris. Presenters from China and India were good selections. I think their frank explanations are a fundamental element of TCBM. The presentations of some speakers from the United States were enthusiastic.
- Please strive to promote space utilization and to create an environment that is motivating for the industrial and commercial realms.
5. Summary

I would like to express my appreciation to all guests, speakers, panelists, and a total of 450 participants for your contributions to this second symposium, which has just ended successfully.

We are especially grateful to Mr. Ichita Yamamoto (Minister of State for Space Policy), Mr. Takashi Yanagi (Director, Space Development and Utilization Division, Research and Development Bureau, Ministry of Education, Culture, Sports, Science and Technology), Mr. Kazuyuki Yamazaki (Ambassador [Policy Planning, International Security Policy], Foreign Policy Bureau, Ministry of Foreign Affairs), and Mr. Kazuo Sunaga (Director General for International Affairs, Bureau of Defense Policy, Ministry of Defense) for participating in an international symposium held by a private organization and making their guest speeches in spite of their busy schedules in the session of the Diet. We also thank the Keynote speakers, Mr. Junya Nishimoto (Director General, Office of National Space Policy, Cabinet Office), who takes a leadership position in Japan’s space development and utilization, Mr. Frank A. Rose (Deputy Assistant Secretary for Space and Defense Policy, U.S. Department of State), who is in the position leading the space debris problem and participated in the first symposium last year, Ms. Jessica Powers (Director for Engagement, Office of the Deputy Assistant Secretary of Defense for Space Policy, U.S. Department of Defense), and Major General John W. “Jay” Raymond (Director, Plans and Policy, United States Strategic Command).

The session on multilateral cooperation had three great speeches from Mr. Gerard Brachet (Member of the UN Group of Governmental Experts on Outer Space Transparency and Confidence-Building Measures, France), Dr. Yasushi Horikawa (Chairman [2012–2013], COPUOS), and Mr. Ken Hodgkins (Director, Office of Space & Advanced Technology, U.S. Department of State).

In addition, we had special lectures by Mr. Donald J. Kessler (former NASA researcher), who sounded an alarm about the seriousness of debris problems, and Mr. Makoto Yukimura (comic artist), who introduced “the Kessler syndrome” to the public through his comic “PLANETES” and therefore is known to all researchers studying space debris. Proving that PLANETES is a epoch-making work for the Japanese young people who are beginning to be interested in space, many students participated in this symposium.

On Day 2, we had lectures from the European Space Agency (ESA) and the United Nations Institute for Disarmament Research (UNIDIR) as representatives of
international organizations. In addition, to represent the Asia-Pacific region, we invited representatives of China, India, Korea, Malaysia, Vietnam, and Australia. We also requested a talk on Japan’s diplomatic policy by Mr. Tomofumi Nishinaga, Director of the Space Policy Division, which was newly established in the Ministry of Foreign Affairs last year.

In the first symposium held last year, expectations for Japan’s presence in the SSA area were set by the Western participants. To respond to these expectations, we have held the second symposium. In Japan, the new Basic Plan for Space Policy was established in January of this year and the importance of SSA activity has been incorporated substantially in the new Basic Plan as compared to the old Basic Plan. As a result, various efforts around SSA activity have been initiated and carried out in the Cabinet Office (Office of National Space Policy), Ministry of Foreign Affairs, and Ministry of Defense.

Recently, the space environment surrounding the earth has become more congested, and solar activity has increased further since last year; the rate of orbital decay of debris in the low earth orbit region has likewise increased. As a result, the International Space Station (ISS), which has executed collision avoidance maneuvers twice a year in the past, has been forced to execute five or six maneuvers a year and to retreat to Soyuz.

There had previously been no opportunity to tell the public about this situation; last year JSF was able to provide such opportunity with the support of MEXT and, this year, JSF was able to do it again. JSF, an organizer of this symposium, has been recognized not only based on Japanese expectations, but also by those concerned both in Japan and abroad for the significance of its provision of such a platform.

The public symposium concerning space debris problems on the policy level, which was the first one ever held in Japan, has been unexpectedly promoted in both Japan and abroad as never before. As an organizer of the symposium, it is the greatest of all delights that the following remarkable activities have occurred: in terms of the international aspect, activities toward agreement on the International Code of Conduct, discussion about long-term sustainability in the UN, and discussion about transparency and confidence-building measures (TCBMs) by governmental representatives from many nations of the world have progressed; in terms of the domestic aspect, a comprehensive dialogue on the space field between Japan and the United States was established, and discussions on SSA activities in both the civilian and security realms have been initiated through the revision of the Basic Plan for Space Policy.
6. Acknowledgments

This symposium was funded by the Strategic Funds for the Promotion of Science and Technology in FY2012, Ministry of Education, Culture, Sports, Science and Technology (MEXT). It is not necessary to point out that the space debris problem is one of our national challenges. We thank MEXT again for meeting the challenge to address this problem in spite of the fact that we are a private organization.

This symposium could not succeed without cooperation of the guests, including Mr. Ichita Yamamoto and key government officials, and speakers both from Japan and abroad. We thank them deeply.

We also thank the Office of National Space Policy of the Cabinet Office; the Ministry of Foreign Affairs; the Ministry of Education, Culture, Sports, Science and Technology; the Ministry of Economy, Trade and Industry; the Ministry of Defense; and the Society of Japanese Aerospace Companies for their support.

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