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Committee on the Peaceful Uses of Outer Space

International cooperation in the peaceful uses of outer space: activities of Member States

Note by the Secretariat

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I. Introduction

1. In the report on its fifty-second session, the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space recommended that the Secretariat continue to invite Member States to submit annual reports on their space activities (A/AC.105/1088, para. 27).
2. In a note verbale dated 27 July 2015, the Secretary-General invited Member States to submit their reports by 19 October 2015. The present note was prepared by the Secretariat on the basis of reports received in response to that invitation.

II. Replies received from Member States

Austria

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Austria in space

Austrian research institutes and companies were involved in the past, largely on projects and missions of the European Space Agency (ESA). Five of 21 instruments of the ESA Rosetta mission come from Austria. On the industrial side thermal insulation, the Global Positioning System (GPS) receiver and control systems found on board a number of ESA satellites are Austrian key competences. Also on the evaluation and use of satellite data involved a number of companies and institutions.

Relating to the topic “International cooperation in the peaceful uses of outer space: activities of Member States”, we wish to inform about:

Technology

Austria takes part in the new European Ariane 6 launcher

Space science and technology have become increasingly important for Austria. By increasing its contribution to the new European Ariane 6 launcher, Austria will foster the participation of domestic companies in this project for the future. For this purpose, the Austrian participation in the Ariane 6 project was increased by 26.2 million euros.

Applications

EO4HumEn Earth observation-based services

Currently, with EO4HumEn Earth observation-based services to support humanitarian operations: monitoring population and natural resources in refugee/internally displaced person camps, there is one Austrian Space Applications Programme (ASAP) project running, which is particularly interesting in this context. The project background is that population displacement due to armed conflicts, regional crisis, or natural disasters often leads to large-scale, highly dynamic settlements, which challenge humanitarian relief operations. During crisis

situations, up-to-date, targeted and reliable information on population numbers and densities, potential groundwater reservoirs, and the impact on the local environment are required for mission planning as well as for the day-to-day operation of refugee and/or internally displaced person camps. The developed products will be provided as maps, online web services and reports and will be fully validated by the user in terms of their relevance and usability. The project will come to its final stage during the coming months.

Space weather

With respect to international space weather activities, Austria's role has increased in the recent past. As such, the University of Graz, represented by the Kanzelhöhe Observatory for Solar and Environmental Research, has joined the International Space Environment Service (ISES) as a member.

Also in the context of space weather, Austria is engaged in monitoring the effects of space radiation on human beings; Seibersdorf Laboratories has developed a tool for aviation dosimetry (AVIDOS). AVIDOS is an informational and educational online software package for the assessment of galactic cosmic radiation exposure at flight altitudes. It estimates route doses for flights between any two locations. It also provides a comparison of assessed exposure with natural background radiation on Earth. AVIDOS today is an operational web service and is accessible under the ESA space weather portal at <http://swe.ssa.esa.int/web/guest/avidos-federated>.

Earth Observation Data Centre for Water Resources Monitoring

Earth Observation Data Centre for Water Resources Monitoring (EODC) operates a virtualized, distributed Earth observation data centre, providing collaborative information technology infrastructure for archiving, processing, and distributing Earth observation data. Together with multinational partners from science, the public and private sectors, EODC fosters the use of satellite-derived geoinformation. Their focus ranges from scientific research to operational services in the areas of water resources and land monitoring, agricultural applications, humanitarian aid and civil security.

European Satellite Navigation Competition

The European Satellite Navigation Competition is an international competition looking for the best ideas for applications in the growing market for satellite navigation. The competition is organized and carried out by Anwendungszentrum Oberpfaffenhofen. In 2015, Austria participates for the fourth time already as a partner region in this competition.

New European Space Agency business incubation centre in Austria

The ESA business incubation centres, initiated by the ESA technology transfer programme office, work to inspire entrepreneurs to turn space-connected business ideas into commercial companies, and provide technical expertise and business development support. Currently an ESA business incubation centre is being established in Austria. This centre will cover, beside business incubation, also the integrated application promotion ambassador platform and, in the long term, the

technology transfer broker network. Thus, all ESA space solutions in Austria would be combined in order to maximize the foreseeable synergies of these activities.

Science

TUGSAT-1/BRITE

The first Austrian satellite BRITE-AUSTRIA/TUGSAT-1, launched in February 2013, has now been in orbit for 32 months, travelled 600 million kilometres during more than 13,000 orbits and collected more than 6 gigabytes of excellent science data, outperforming its original specifications. A highlight at the recent BRITE science conference in Gdansk, Poland, was a presentation concerning the Be-star phenomenon, which is unresolved so far and could be explained only using the results of the BRITE Constellation network of nano-satellites.

Microgravity research

The Technical University of Vienna is scientifically involved in the Jeremi experiment. The experiment with ESA and the Japan Aerospace Exploration Agency (JAXA) will be performed on the International Space Station in the area of fluid dynamics research.

The Technical University of Graz is scientifically involved in the experiment “Electrical resistivity measurement of high temperature metallic melts (RESISTIVITY)” to be performed on the International Space Station.

The University of Leoben is scientifically involved in the experiment “Metastable solidification of composites: novel peritectic structures and in situ composites (METCOMP)”, to be performed on the International Space Station.

Education

The Aeronautics and Space Agency of the Austrian Research Promotion Agency supports national institutions in their efforts to stimulate interest in space in general at university level and in schools. It serves as a contact and information point for schools and university institutes and promotes contests, campaigns as well as demonstration and teaching material of ESA.

The opportunities offered range from the traditional annual summer school in Alpbach and courses offered by the International Space University to training available from ESA and grants from the Austrian Research Promotion Agency for students and pupils to participate in space camps and similar activities for young people.

Other themes

Space law

In 2015, a regulation of the Federal Minister for Transport, Innovation and Technology for the implementation of the federal law on the licensing of space activities and the establishment of a register space entered into force. For the prevention of space debris in accordance with § 5 of the Austrian space law, the following requirements shall be met by the operator.

A report taking into account the internationally accepted guidelines on space debris (e.g. no longer than 25 years in orbit), in order to avoid space debris during operation and to prevent the break-up of the space object in orbit, must be approved. Within this report a representation of the measures taken to avoid collisions with other space objects in outer space activities must be included. Furthermore an appropriate documentation is needed to prove that the space object does not contain dangerous or harmful substances that can lead to harmful contamination of space or harmful environmental change.

Austrian Space Applications Programme

The twelfth call for project proposals for ASAP makes available a total of EUR 7,500,000 in funding. Funding is allocated in a competitive process. The call was open until 13 November 2015. The call invited proposals for the following topics: space research and science, space technologies, and application of satellite-based technologies. Furthermore Austria wanted to support the development of an Austrian CubeSat.

Germany

[Original: English]
[19 October 2015]

German space activities in the last year were characterized by the outstanding Rosetta mission of the European Space Agency (ESA) and the very first landing of a comet with its lander Philae. It was a significant highlight with overwhelming perception by the international media and scientific community. Also the ESA mission Blue Dot, with astronaut Alexander Gerst (Germany), was a specific highlight in terms of successful peaceful international cooperation.

Unrivalled is the landing of Philae on the surface of the comet 67P/Churyumov-Gerasimenko in November 2014 after a 10-year journey. The mission consists of the orbiter Rosetta carrying 11 instruments and the lander Philae built jointly by an international consortium under the leadership of the German Aerospace Centre (DLR). After 64 hours of measurements of all 10 instruments and transmission of scientific data on the surface characteristics and materials, Philae went into sleep mode. After seven months of hibernation it woke up again in June 2015. Since then it communicates irregularly. Due to the heating up of the comet while approaching the sun it spews out increasing amounts of gas and dust. Therefore Rosetta cannot maintain its close orbit to scan Philae. Attempts to communicate and for data transfer will be continued.

After the launch in December 2014 the Hayabusa mission, in cooperation with the Japan Aerospace Exploration Agency (JAXA), is on its four-year journey to the asteroid Ryugu (1999 JU₃). The Japanese Hayabusa probe carries the Mobile Asteroid Surface Scout (Mascot) lander. While Hayabusa-2 will vacuum up surface material when orbiting the asteroid, Mascot will descend to the surface and perform measurements at several locations on the asteroid. This joint German-French project will be controlled from the Mascot control centre at DLR.

The Stratospheric Observatory for Infrared Astronomy (SOFIA), is one of the most important ongoing bilateral projects in the 50 years lasting period of fruitful collaboration with the United States of America. End of 2014 SOFIA landed again at its home base in California after an extensive overhaul in Germany. The German Receiver for Astronomy at Terahertz Frequencies (GREAT), and the Field-Imaging Far-Infrared Line Spectrometer (FIFI-LS), are the German instruments on board. For 2015 and beyond, GREAT is planned for observing star-forming systems. For the enhanced instrument, upGREAT, several test flights have been successful with so far unmatched precision.

LISA Pathfinder, the technology demonstration mission in preparation for the eLISA gravitational wave observatory, successfully reached an important milestone, the LISA technology package core assembly under the lead of Airbus Defence and Space in Germany. Besides, other German research institutions contribute significantly to the payload development of this mission under ESA responsibility.

The mission Blue Dot by the German ESA astronaut Alexander Gerst was an absolute highlight for human space flight in Germany at the end of 2014. “Shaping the future” was the tagline for more than 100 experiments to improve our life on Earth. The scientific results will foster progress in medicine, biology, material science and physics. Alexander’s astronautic highlight was his spacewalk. Another milestone for him was the supervision of the fully automated docking process of the European cargo vessel Automated Transfer Vehicle 5 (ATV-5). With this last manoeuvre the era of this European piece of space technology ended. Based on the experience from ATV, Airbus Defence and Space located in Germany will lead the new industrial endeavour to build a service module for the future Orion crew capsule of the United States jointly with ESA member States. The European Service Module (ESM) will propel the Orion capsule to missions beyond low-Earth orbit and provide supplies to the astronauts inside the capsule.

A research team in Berlin designed a series of experiments with a three-dimensional eye-tracking device to understand and analyse the impact of weightlessness on spatial orientation at the International Space Station (ISS). In parallel, engineers realized that the eye tracking device has potential for applications on Earth, like for the surgeon’s work in eye-laser surgery. This development received an award from the Space Foundation (United States) as an outstanding example of a space technology that was transferred into an application on Earth in the service of mankind.

The Kontur-2 experiment — controlling robots from space — is a major milestone successfully conducted by the ISS cosmonaut Oleg Kononenko. Flying aboard the ISS over Earth at 28,000 km/h he controlled a robot and moved its fingers on the ground while in microgravity. In near-real time he was able to control and to feel exactly what was happening with the robot in the DLR laboratory. This key technology paves the way to remotely controlled work, e.g. on the Moon or Mars.

At the ESA Ministerial Council at the end of 2014, Germany ensured its financial contributions for ISS operations for the period 2015-2017 on Toulouse level. We highly appreciate that other European partners contributing to the ISS also confirmed their contractual financial contributions.

With the forward-looking agreement on the development of the new Ariane 6 launcher a further major decision has been taken.

The proven cooperation between European Union (EU) and ESA assures further joint successful European space activities such as the fruitful European Earth Observation Programme (Copernicus).

Sentinel-1 and Sentinel-2 are already operational. Sentinel-2 with the German Airbus Defence and Space in Germany will provide data for key societal challenges like food security, climate change and disaster management. Both satellite series are equipped with laser communication terminals based on the successful test series of optical data transfer between Sentinel-1 and Alphasat I-XL, which paved the way for the use of the European Data Relay Satellite of ESA. The technology for this path-breaking data link was developed in Germany. It will provide near-real time data transfer and will be able to download larger volumes of image data faster and more securely, helping to improve environmental monitoring, disaster response and crisis management.

With the successful launch of the Galileo satellites FM7 and FM8 built by German industry, the build-up of the ambitious European navigation system Galileo is proceeding. The European Commission plans to set up its early services based on the constellation in 2016.

In the context of the Committee on the Peaceful Uses of Outer Space and its subcommittees, German experts are very active in different boards and activities. They are actively involved in the work of the International Asteroid Warning Network (IAWN) and the closely collaborating Space Mission Planning Advisory Group (SMPAG), both affiliated to the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space. German experts from DLR involved in SMPAG lead the task road map for future work on planetary defence. A first outcome is a first concept on an overview of worldwide activities in the field of impact hazard and fields of further scientific research and technical development. DLR has gained relevant experience for this effort as the leader of the EU-funded NEOSShield project and also contributes the follow-up project NEOSShield 2. German experts also support the work of the newly established expert group on space weather and the expert focus group on space and global health. Here German activities are flanked by the tailored master programme entitled “Space and global health — risk and resource management” at Koblenz University. The programme pursues the distant-learning approach, which requires only minimal financial investment for the participants and therefore contributes to capacity-building in developing and emerging countries.

Reflecting the fact that 2015 is a very important year for United Nations and its future focusing German institutions like the Federal Ministry for Economic Affairs and Energy and DLR jointly with UN-SPIDER and the Office for Outer Space Affairs in May 2015 conducted an international conference entitled “Global solutions for the challenges of sustainable development in societies at risk”. This conference picked up those outcomes of the Third World Conference on Disaster Risk Reduction held in March 2015 in Japan that comprise space-based technology aspects. German experts contributed as well to the world conference in Japan.

In February 2015, DLR and the United Nations University signed a memorandum of understanding to strengthen their scientific cooperation and

exchange, especially in the field of space-based applications and conducted a high-level workshop as a first step to build up an intense cooperation.

Besides these United Nations-associated events, German research institutions are very active in fields relevant to the Scientific and Technical Subcommittee. DLR hosted a very well recognized conference on satellite communication as well as a well-respected event on space weather dealing not only with a national space weather strategy but also international coordination of services and data exchange.

The Thirty-sixth International Symposium on Remote Sensing of Environment, held in May 2015, was organized in Berlin by the DLR jointly with international partners. It picked up the benefits of Earth observation and other space-based techniques to benefit to the understanding and managing of the environment and resources. ESA and Airbus Defence and Space Germany used the opportunity of this international get-together to sign a contract to develop the Jason-CS/Sentinel-6A satellite mission for EUCopernicus programme. The radar altimeter will observe and measure the sea surface, global sea levels, ocean currents and ocean heat storage, parameters which are indispensable for the modelling of oceans and predictions of sea level rises. The satellite is foreseen to be launched in 2020.

INNOSpace is since many years a very successful instrument of the DLR national programme for space and innovation to promote and evolve the benefits of space activities to society. The last event focused on the fact that high-end technology, especially space technology is very closely connected with information and communication technology. "Big data", high data rates and huge data volumes will become more and more prior challenges in future space research.

One late and prominent candidate for the production of big data is the German Experimental Space Surveillance and Tracking Radar (GESTRA), which is planned for the detection of satellite orbits and space debris in low-Earth orbit. The first measurements are planned for end of 2017, then in combination with other German large radars and telescopes to watch and monitor the space. The Fraunhofer Institute for High-Frequency Physics and Radar Techniques is commissioned with GESTRA.

Finally, the success story of the drop tower experiment series (DropTes) is continuing. While the student research team from the German-Jordanian University in Jordan worked during the present cycle very concentrated and faced some unexpected intermediate results very successfully, a new team for the upcoming cycle was chosen and is awaiting its confirmation: a team from a university in the Plurinational State of Bolivia that plans to conduct the behaviour of a nickel and titanium alloy (nitinol) in microgravity. Focus is then on its possible utilization for medical applications.

Professor Pascale Ehrenfreund has taken over the leadership of DLR in August 2015 and succeeds in her position as new chair of the Executive Board Professor Jan Wörner, who today is Director General of ESA. Professor Ehrenfreund is a well-known figure in the space world and we are very pleased that she will push forward the activities of DLR, setting the focus on contributions to global challenges like climate change, health, environment, resources or conflicts and disaster management.

Ghana

[Original: English]
[26 October 2015]

Activities of the Ghana Space Science and Technology Institute

The Ghana Space Science and Technology Institute (GSSTI) is a research institute mandated to develop, uncover and exploit the capabilities of space science and technology for national socioeconomic development through cutting-edge research and human capacity-building. GSSTI is in collaboration with the Square Kilometre Array in South Africa to convert a telecommunications antenna into a radio telescope. The purpose of this conversion is to allow astronomers use the facility to study the Milky Way galaxy.

GSSTI is not operating any direct receiving station, nor have we launched any satellite into space. However, we are in contact with spacefaring companies such as Airbus to develop a space road map for Ghana that includes a data centre, a direct receiving station, and possibly launching our own satellite in the near future.

The remote sensing and climate centre of GSSTI uses open-source data from the National Aeronautics and Space Administration (NASA) and other agencies for research, climate and other environmental activities.

Japan

[Original: English]
[23 October 2015]

International cooperation in the peaceful uses of outer space: Japan's activities

Participation in the International Space Station programme

The International Space Station (ISS) is the largest international science and technology programme ever attempted in the new frontier of space. The ISS programme has been pursuing the further utilization of outer space and will continue to improve the quality of our lives. Japan has been participating in this iconic international cooperation programme for the peaceful use of outer space from the beginning. One of Japan's notable contributions to ISS is the Japanese Experiment Module (Kibo), which has been utilized to conduct various on-orbit experiments. Another notable contribution is the H-II Transfer Vehicle (HTV) known as "Kounotori" and the fifth HTV flight to the ISS (HTV5), which successfully completed its mission on 30 September 2015.

In July 2015, Japanese astronaut Kimiya Yui began his long-duration stay at ISS as a crewmember for the 44th/45th expedition mission. During his five-month stay at ISS, he conducted many experiments and research about life science, physical science, and space medicine. Two Japanese astronauts are to follow. Astronaut Takuya Onishi, selected as a crewmember for the 48th/49th expedition mission, is scheduled to arrive at the ISS in June 2016, and astronaut Norishige Kanai is assigned as a crewmember for the 54th/55th expedition mission, scheduled to arrive in 2017.

Japan has been strongly committed to the utilization of the space environment on board ISS. This year, the Japan Aerospace Exploration Agency (JAXA) is conducting various experiments in space, such as the ninth set of protein crystal growth experiments to study protein structure and its function for drug discovery. JAXA is planning to enhance utilization of Kibo using devices carried to the ISS by HTV5, such as the mouse habitat unit for studying the human ageing mechanism using mice, the Electrostatic Levitation Furnace for measuring the thermophysical properties of high-temperature melts of metals and insulators, and the Calorimetric Electron Telescope (CALET) for observing high-energy electrons and gamma rays. JAXA is also promoting the deployment of CubeSats, using the Kibo airlock system and robotic arm. In 2015, JAXA and the Office for Outer Space Affairs agreed to cooperate in providing developing countries with opportunities to deploy CubeSats from Kibo too. These opportunities will contribute to improving their space technology.

Space transportation

The H-IIB launch vehicle No. 5 was successfully launched in August 2015 with HTV5, otherwise known as “Kounotori-5”, on board. We plan to launch an upgraded H-IIA launch vehicle this year. The Japanese ASTRO-H X-ray astronomy satellite is also scheduled to be launched by the H-IIA launch vehicle.

Space exploration

On 3 December 2014, JAXA successfully launched the Hayabusa-2 asteroid explorer, which is planning an Earth swing-by towards the target asteroid Ryugu this coming December. Hayabusa-2 is expected to arrive at Ryugu in 2018 and to return to Earth in 2020.

Japan will contribute to the global discussion on future international space exploration and we are honoured to host the Second International Space Exploration Forum (ISEF-2) in Japan scheduled for 2017. We will also host the conference preceding the Forum in 2016.

Remote sensing

Japan has been intensively promoting utilization of earth observation satellites data through international frameworks such as the Group on Earth Observations (GEO) and the Committee on Earth Observation Satellites (CEOS). In 2015, JAXA, holding the chair of CEOS, led an earth observation event during the Third World Conference on Disaster Risk Reduction. Prior to that, Japan coordinated the seventh Asia-Pacific symposium of the Global Earth Observation System of Systems (GEOSS) in Tokyo, from 26 to 28 May 2014. The symposium focused on the societal benefits of the evolution of GEOSS towards addressing the United Nations Sustainable Development Goals.

The Global Change Observing Mission (GCOM), allows long-term and ongoing observations that are essential to understanding the effects of climate change over many years. The GCOM mission consists of two series of satellites, GCOM-W for observing water circulation changes and GCOM-C for observing climate change. JAXA successfully launched GCOM-W, named Shizuku, in May 2012. GCOM-W observes water cycle mechanisms, such as water vapour and

liquid, ocean wind velocity, sea surface temperature, snow extent and depth. As the name implies, GCOM contributes to monitoring climate change around the world. For example, in September 2012, Shizuku observation data showed that sea “ice” extent in the Arctic Ocean has become the smallest in observation history. GCOM-C, scheduled to launch in 2016, will observe surface and atmospheric parameters related to the carbon cycle and radiation budget, such as clouds, aerosol, seawater colour, vegetation, snow and “ice”.

The Global Precipitation Measurement (GPM) mission is an international constellation of satellites that aims to achieve highly accurate and frequent global rainfall observation. The mission was initiated by JAXA and the National Aeronautics and Space Administration (NASA), and comprises a consortium of international space agencies. The GPM core observatory was successfully launched by the H-IIA launch vehicle on 28 February 2014, carrying the Dual-Frequency Precipitation Radar (DPR), which was developed by JAXA and the National Institute of Information and Communications Technology (NICT), and the GPM Microwave Imager (GMI) provided by NASA. GPM data are distributed to user organizations in near-real time. It is expected to be useful in operational fields and hydro-meteorological disaster mitigation, such as the prediction of floods and improvement in the accuracy of numerical weather and typhoon forecasting, as well as in research fields such as the elucidation of climate and water cycle variations. JAXA has completed calibration activities during initial calibration/validation phase to improve data accuracy, and started data distribution to the public through the JAXA Earth observation satellite data distribution service, G-Portal. GPM and DPR are continuing their missions smoothly.

In order to monitor greenhouse gases from space, the Greenhouse Gases Observing Satellite (GOSAT or Ibuki), developed jointly by the Ministry of Environment, the National Institute for Environmental Studies (NIES) and JAXA, launched in January 2009, accurately observes the concentration distribution of global greenhouse gases in the atmosphere. In October 2011, for the first time in the world, the Ministry, NIES and JAXA quantitatively demonstrated the effectiveness of satellite data application to the observation of greenhouse gasses. As a follow-up, we are developing the GOSAT-2 satellite. In December 2014, GOSAT showed the tendency for higher CO₂ concentrations in megacities than those in their surroundings, and positive correlations were shown between differences in CO₂ concentrations and the concentrations estimated from data for fossil fuel consumption. These results indicate that GOSAT observations have the potential to enable us to detect enhanced CO₂ concentrations originating from fossil fuel consumption for megacities. In addition, GOSAT and the Orbiting Carbon Observatory 2 (OCO-2), launched in July 2014 by NASA, have collaborated to improve the accuracy of carbon dioxide measurements.

With regard to forest and carbon tracking, the successful Advanced Land Observing Satellite (ALOS) containing the phased array type L-band synthetic aperture radar (PALSAR), which can detect forest/non-forest areas and measure the amount of aboveground forest biomass, was succeeded by ALOS-2 or Daichi-2, with the state-of-art PALSAR-2. It was successfully launched by the H-IIA launch vehicle on 24 May 2014. ALOS-2 enables wide-swath and high-resolution observation compared with its predecessor, and will further contribute to global forest monitoring, as well as disaster, land, agricultural monitoring and so on.

Lastly, the Third World Conference on Disaster Risk Reduction, held in March 2015 in Sendai, Japan, reviewed the progress of the Hyogo Framework for Action 2005-2015 and developed the post-2015 framework for action.

International Committee on Global Navigation Satellite Systems

Japan has continuously and actively participated in activities related to the International Committee on Global Navigation Satellite Systems (ICG). Japan is particularly contributing to promote the utilization of constellations of multiple global navigation satellite systems (GNSS) by supporting Multi-GNSS Asia, which was established in September 2011.

The seventh annual Multi-GNSS Asia conference will be held from 7 to 10 December 2015 in Bandar Seri Begawan. It is jointly organized by JAXA, the survey department of the Ministry of Development of Brunei Darussalam, Soartech Systems Sdn Bhd, Building European Links towards South-East Asia (BELS), GNSS.asia, QZS System Services Inc, and the Satellite Positioning Research and Application Centre (SPAC), and is supported by the United Nations International Committee on GNSS and International Global Navigation Satellite Systems Service (IGS).

Additionally Japan has been promoting the Quasi-Zenith Satellite System (QZSS) and the Multi-functional Transport Satellite (MTSAT)-based Augmentation System (MSAS). Japan hosted the sixth meeting of ICG and the seventh meeting of the Providers' Forum in Tokyo, and we will host the twelfth meeting of ICG in 2017.

Asia-Pacific Regional Space Agency Forum

The Asia-Pacific Regional Space Agency Forum (APRSAF) was established in 1993 to enhance space activities in the Asia-Pacific region. Space agencies, governmental bodies, and international organizations, such as the United Nations agencies, as well as companies, universities and research institutes from over 30 countries/regions and international organizations take part in APRSAF every year. It is the largest space-related conference in the Asia-Pacific region.

The twenty-first session of APRSAF was successfully held in Tokyo, from 2 to 5 December 2014, under the theme "Leap to the next stage: delivering innovative ideas and solutions". The session was attended by 580 participants from 33 countries and regions, as well as by 12 international organizations. At the session, the reorganization of working groups was approved to facilitate outcome-oriented activities and to contribute to solving common issues in the Asia-Pacific region through the Forum.

In 2015, the twenty-second session of APRSAF will be held from 1 to 4 December in Bali, Indonesia, under the theme "Sharing solutions through synergy in space." The four newly-structured working groups, i.e., the working group on space applications (formerly the working group on earth observation), the working group on space technology (formerly the working group on communication satellite applications), the working group on space education (formerly the working group on space education and awareness) and the working group on space environment utilization, which has expanded its ISS/Kibo utilization and space exploration activities, will welcome participants from various backgrounds. Plenary sessions

will feature keynote speeches, country reports from major Asian space agencies and organizations, and several special sessions. Status reports from each working group and the initiatives of the disaster management support system in the Asia-Pacific region, Sentinel Asia, Space Applications for Environment (SAFE), the Asian Beneficial Collaboration through Kibo/ISS Utilization initiative (Kibo-ABC) as well as the report on the seventh Multi-GNSS Asia conference will also be presented.
