



# General Assembly

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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-third 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.105/1109](#), para. 36).
2. In a note verbale dated 29 July 2015, the Secretary-General invited Member States to submit their reports by 17 October 2016. 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

### Japan

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#### Participation in the International Space Station programme

Japan has actively participated in the iconic international cooperation programme of the International Space Station (ISS) for the peaceful uses of outer space since its foundation. ISS is the largest international science and technology programme ever carried out in the new frontier of space. The participants in the ISS programme pursue the further utilization of outer space to continue improving the quality of lives. One of the notable contributions of Japan to the ISS programme is the Japanese Experiment Module “Kibo”, which is utilized to conduct various on-orbit experiments. Another example of the country’s remarkable contribution to the ISS programme is the H-II Transfer Vehicle (HTV). HTV6, launched this year, carries Li-ION battery replacements, which are essential for sustaining the ISS operation. In addition to this, the Japan Aerospace Exploration Agency (JAXA) will conduct a “KITE” experiment to demonstrate key technologies of Electrodynamic Tether for future debris-removal application using HTV6. Furthermore, Japan is developing a new ISS resupply vehicle, which will offer various other capabilities for future missions.

Japanese astronaut Takuya Onishi is aboard ISS as a crew member for the 48th/49th Expedition Mission. During his four-month stay on ISS, he has been conducting various experiments and research, such as Japan’s first long-term rodent-rearing mission and a high-quality protein crystal growth experiment. Onishi will complete his mission in October 2016, and astronaut Norishige Kanai, who is assigned as a crew member for the 54th/55th Expedition Mission, scheduled for 2017, will succeed him.

Japan has also been promoting the utilization of Kibo. The long-term rodent-rearing mission on ISS contributed to the new discovery of ageing mechanisms on Earth in 2016. In April 2016, by using Kibo’s airlock system and robotic arm, the 50-kg-level microsatellite “DIWATA-1” of the Philippines was successfully deployed. JAXA and the Office for Outer Space Affairs of the Secretariat have launched a cooperation programme on CubeSat deployment from Kibo named “KiboCube.” This programme aims to encourage non-ISS partners to utilize ISS. In August 2016, a team from the University of Nairobi was selected as the first to benefit from the programme.

## Space transportation

The following launch vehicles are scheduled to be launched during the Japanese fiscal year 2016: H-IIA launch vehicle flight No. 31, with the Japanese geostationary meteorological satellite “Himawari-9” on board; H-IIB launch vehicle flight No. 6, with the H-II transfer vehicle No. 6 (HTV6) “KOUNOTORI-6” on board; Epsilon Rocket flight No. 2 (Enhanced Epsilon), with Japanese geospace exploration satellite “ERG” (Exploration of energization and Radiation in Geospace) on board; and the SS-520-4 rocket, which is a mini-satellite launch vehicle created by adding the third stage atop the SS-520 sounding rocket, with the satellite named “TRICOM-1” on board.

## Space exploration

JAXA is currently operating the next sample-return mission from a carbonaceous asteroid named “Hayabusa-2”. Hayabusa-2 was launched on 30 November 2014 and is expected to arrive at the target asteroid in 2018 and to return to Earth in 2020.

The X-ray astronomy satellite ASTRO-H “HITOMI”, which was launched in February 2016, lost its ability to receive signals at the end of March. It is assumed that both solar array paddles were broken off at their bases. JAXA ceased its efforts to restore “HITOMI” on 28 April.

JAXA succeeded in inserting the Venus Climate Orbiter “AKATSUKI” into Venus’ orbit in December 2015 and put the five onboard instruments into regular operation mode in April 2016. Now AKATSUKI continuously acquires valuable data for all leading Venus researchers in the world.

Japan also contributes actively to the global discussion on future international space exploration. Japan is honoured to host the second International Space Exploration Forum (ISEF2), which is scheduled for the second half of 2017.

## Remote sensing

Japan promotes the utilization of Earth observation satellite data through international frameworks such as the Group on Earth Observations (GEO) and the Committee on Earth Observation Satellites (CEOS). JAXA assumed the Chair of CEOS last year and led an Earth observation event during the third United Nations World Conference on Disaster Risk Reduction. Japan will coordinate the ninth Global Earth Observation System of Systems (GEOSS) Asia-Pacific Symposium, to be held in Tokyo from 11 to 13 January 2017. The Symposium will focus on the societal benefits of GEOSS in achieving the Sustainable Development Goals.

The Global Change Observation Mission (GCOM) allows for long-term and ongoing observations to analyse the effects of climate change. GCOM consists of two series of satellites: GCOM-W and GCOM-C. JAXA launched GCOM-W in May 2012. GCOM-W observes water cycle-related parameters, such as water vapour, liquid, sea surface wind speed, sea surface temperature, sea ice extent and snow depth. In early April 2016, GCOM-W captured large-scale melting over the Greenland ice sheet earlier than usual in the year, which is possibly related to higher temperatures in that region in April. GCOM-C monitors climate change by observing surface and atmospheric parameters related to the carbon cycle and radiation budget, such as clouds, aerosol, ocean colour, vegetation, snow and ice. By providing these data to researchers around the world, GCOM-C contributes to improving the accuracy of climate-related models.

The Global Precipitation Measurement (GPM) mission is an international constellation of satellites that is aimed at achieving highly accurate and frequent

global rainfall observation. The mission was initiated by JAXA and the National Aeronautics and Space Administration of the United States of America (NASA), and comprises a consortium of international space agencies. GPM data are useful in operational fields and hydro-meteorological disaster mitigation, such as flood prediction and improvement in the accuracy of numerical weather and typhoon forecasting. It is also useful in research fields such as the elucidation of climate and water cycle variations. The data are available to the public through the Earth observation satellite data distributing service of JAXA, G-Portal. JAXA also provides Global Satellite Mapping of Precipitation (GSMaP) as one of the GPM products. JAXA global rainfall maps are available approximately four hours after observation using the GPM-Core, constellation satellites and geostationary satellites data. JAXA also offers “Real-time Rainfall Watch (GSMaP\_NOW)”, which is a quasi-real-time version of GSMaP. GSMaP\_NOW estimates the current rainfall on a map over the area of the geostationary satellite “Himawari” every half an hour. A significant achievement in the operational field is the dual precipitation radar and GPM microwave imager assimilation in the Numerical Weather Prediction (NWP) system started by the Japan Meteorological Agency on 24 March 2016. This is the world’s first “operational” assimilation of spaceborne radar data in the NWP system by meteorological agencies.

The Greenhouse Gases Observing Satellite (GOSAT) is a joint mission of the Ministry of Environment of Japan, the National Institute for Environmental Studies and JAXA. It was launched in January 2009 to observe the concentration and distribution of global greenhouse gases in the atmosphere. In December 2014, data acquired from GOSAT showed the tendency for higher carbon dioxide (CO<sub>2</sub>) concentrations in megacities than in surrounding areas. GOSAT data are highly reliable as they correlate with data based on fossil fuel consumption. Additionally, GOSAT data showed that the atmospheric monthly CO<sub>2</sub> concentration had exceeded 400 parts per million in December 2015 for the first time since beginning the observation. Furthermore, GOSAT and OCO-2, launched by NASA in July 2014, have collaborated to improve accuracy in measuring CO<sub>2</sub> with joint calibration and validation efforts.

Japan is currently developing a follow-on mission of GOSAT, called GOSAT-2. In addition to CO<sub>2</sub> and methane, GOSAT-2 will observe carbon monoxide and short-lived climate pollutants such as black carbon with higher precision. Japan expects that this follow-on mission will be able to contribute to climate change prediction and climate policymaking.

With regard to forest and carbon tracking, following the successful Advanced Land Observing Satellite (ALOS), which could detect forest and non-forest areas and measure the amount of aboveground forest biomass, ALOS-2, with the L-band synthetic aperture radar (PALSAR-2), was launched on 24 May 2014. ALOS-2 enables wider swath and higher resolution observation compared with its predecessor. ALOS-2 further contributes to global forest monitoring, as well as disaster, land and agricultural monitoring.

### **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). In particular, Japan is contributing to promoting the utilization of multiple global navigation satellite system (GNSS) constellations by supporting Multi-GNSS Asia (MGA), which was established in September 2011.

As an annual conference of MGA, the seventh Multi-GNSS Asia Conference was held in Bandar Seri Begawan from 7 to 10 December 2015. The conference was

jointly organized by JAXA, Soartech Systems Sdn Bhd, Building European Links toward South-East Asia in the field of EGNSS (BELS), GNSS.asia, QZS System Services Inc. and the Satellite Positioning Research and Application Center, and was supported by ICG, the International Global Navigation Satellite Systems Service, the Ministry of Primary Resources and Tourism and the Survey Department of the Ministry of Development of Brunei Darussalam.

Additionally, Japan has been promoting the Quasi-Zenith Satellite System and the MTSAT Satellite-based Augmentation System. Japan hosted the sixth meeting of ICG and the seventh meeting of the Providers' Forum in Tokyo, and 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 United Nations agencies, as well as companies, universities and research institutes, from over 30 countries and regions take part in APRSAF every year. It is the largest space-related conference in the Asia-Pacific region.

The twenty-second session of APRSAF (APRSAF-22) was successfully held in Bali, Indonesia, from 1 to 4 December 2015, under the overall theme, "Sharing solutions through synergy in space". The session was attended by 477 participants from 38 countries, regions and international organizations.

The twenty-third session of APRSAF (APRSAF-23) will be held in Manila from 15 to 18 November, under the theme "Building a future through space science, technology and innovation". Plenary sessions will feature keynote speeches as well as country reports from major Asian space agencies and organizations, and several special sessions will also be held. Status reports from each working group and the initiatives of Sentinel Asia (disaster management support system in the Asia-Pacific region), SAFE (Space Applications for Environment) and Kibo-ABC (Asian Beneficial Collaboration through Kibo/ISS Utilization) will also be presented.

## **Portugal**

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### **Overview: a brief history of the Portuguese space sector**

Participation by Portugal in the space sector has been mainly characterized by an increasing involvement with the main European institutional space organizations, including the European Space Agency (ESA).

1989 — Portugal becomes a State member of the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT)

1993 — Launch of PoSAT-1, the first Portuguese satellite

1996 — Portugal becomes an ESA cooperating State

1997 — Portugal subscribes to the Advanced Research in Telecommunications Systems (ARTES) and GNSS programmes

2000 — Portugal becomes an ESA member State and joins the European Southern Observatory

2001-2007 — Portugal Incentive Scheme task force is set up within ESA

2003 — The Portuguese Space Office is set up within the Office for International Relations in Science and Higher Education of the Ministry of Science of Portugal (GRICES)

2007 — The European Space Policy is adopted by the Space Council

2009 — The Foundation for Science and Technology (FCT) Space Office is established

2009 — The Treaty of Lisbon enters into force

2012 — The EUMETSAT satellite application facility LandSaf starts

### **Portuguese participation in optional space programmes of the European Space Agency**

ESA activities fall into two categories: mandatory and optional. Programmes carried out under the general budget and under the science programme budget are mandatory; they include the agency's basic activities (studies on future projects, technology research, shared technical investments, information systems and training programmes). Besides the ESA mandatory programmes, Portugal participates in several optional programmes, encompassing an investment of around 100 million euros in the period between 2000 and 2014, shared among most space programmatic areas.

### **Portuguese participation in EUMETSAT and European Union space programmes**

As a State member of EUMETSAT, Portugal participates in the Meteosat Third Generation programme and Polar System Second Generation programme. As a European Union member State, Portugal participates in the Galileo and European Earth Observation Programme (Copernicus) programmes.

### **Portuguese space community — the main players**

The main actors in the Portuguese space community can be divided into two main categories, namely research and industry, which can be tracked in the Portuguese Space Catalogue, accessible online at the following link: [www.fct.pt/apoios/cooptrans/espaco/docs/Portuguese\\_Space\\_Catalogue](http://www.fct.pt/apoios/cooptrans/espaco/docs/Portuguese_Space_Catalogue). An updated version of the catalogue is expected to be published during 2017.

### **Other space activities**

#### **FP7 and H2020 projects**

There has been an evolution of Portuguese participation in the H2020 space work programme, which supports the major European space flagship programmes, namely Copernicus, Galileo and Space Surveillance and Tracking (SST).

### **Research fellowships, national research projects and infrastructure**

Since 2000, FCT has funded 98 research fellowships under the scientific domain Earth and space sciences. Since 2008, FCT has also funded 22 projects in Earth and space sciences and in astronomy and astrophysics.

Regarding space infrastructures, Portugal hosts key ground infrastructures, including the Santa Maria site (Azores) (comprising an ESA tracking station since 2008 (ESTRACK network), Earth observation capabilities (Radarsat-2 and Sentinel-1), a GNSS sensor station since 2014 and an oil spill detection service for the

European Maritime Safety Agency), the EUMETSAT land surface analysis satellite application facility, the ESA European Shock-Tube for High-Enthalpy Research (ESTHER) and a thermodynamics laboratory operated by ISQ (a Portuguese private entity).

### **European Space Agency and the Committee on the Peaceful Uses of Outer Space**

Portugal participated actively in the meetings of the different ESA programme boards and committees and in the Committee on the Peaceful Uses of Outer Space, as well as in the Scientific and Technical Subcommittee and the Legal Subcommittee of that Committee. It also participated in several working groups, namely in the Working Group on the Long-term Sustainability of Outer Space Activities (as Co-Chair of an expert group), the Working Group on Space Debris and the Expert Group on Space Weather.

## **Ukraine**

[Original: English]  
[17 October 2016]

### **Space activities of Ukraine in 2016**

Space activities of Ukraine in 2016, as in previous years, have been focused on the implementation of the priority projects of the fifth space programme of Ukraine, the implementation of the country's commitments under international programmes and projects, enhancing the efficiency of the national space sector and promoting broad cooperation with European Union countries, the United States, countries of the Asia-Pacific region, the Middle East and Africa and Commonwealth of Independent States countries. Activities were carried out to ensure the participation of Ukraine in international organizations, to develop contractual and legal frameworks, to fulfil obligations under the international non-proliferation regimes and export controls, to promote the participation of enterprises in international space projects, and also to represent the space industry in international exhibitions.

In 2016, the Ukrainian-American Working Group on the use and exploration of outer space for peaceful purposes was established and commenced its work in order to facilitate the development of practical cooperation between the two countries and search for partnership projects. The Antares Project is now considered the focus of collaborative work, in which Ukrainian enterprises produce the central unit of the first stage of the launch vehicles.

Cooperation between Ukraine and the United States continued in the field of storage and elimination of the solid rocket motor propellant of the SS-24 missile at the facilities of the Pavlograd chemical plant. At the March 2016 meeting of the State Space Agency of Ukraine management with representatives of the Defense Threat Reduction Agency of the United States Department of Defense, the parties reached agreement to continue work on a full-scale elimination of solid rocket propellant, in accordance with the previously signed "Joint requirements and implementation plan of the cooperative threat reduction program between the State Space Agency of Ukraine and the Department of Defense of the United States of America", and to complete the full cycle of works until December 2018.

The People's Republic of China remains a substantial partner of Ukraine in the space sphere. The third meeting of the Ukrainian-Chinese Subcommittee on the cooperation in the field of space was held in 2016, in the course of which the parties signed a cooperation programme for the period 2016-2020.

Cooperation with the Republic of India has resumed. The first meeting of the Ukrainian-Indian Working Group on cooperation in the space sector was held in February 2016. At this meeting, an agreement was reached by the parties on the need to intensify work on the practical implementation of joint projects.

The level of cooperation with European Union countries has been gradually increasing. The Ukrainian-Polish Working Group on the use of outer space has been actively working.

In January 2016, during the visit of representatives of the European Commission to Ukraine, a regular meeting of the Ukraine-European Union Working Group on Cooperation in the Field of Space was held, which was aimed at strengthening cooperation and establishing regular dialogue on space exploration, information exchanges on Earth remote sensing, navigation, innovative projects and the collective use of advanced space technologies.

The main engine for the fourth stage of the Vega LV is being designed and manufactured to support Italy. The Vega launch vehicle is being jointly developed by ESA and the Italian Space Agency.

Negotiations were held with the Republic of Kazakhstan to define promising directions of cooperation. Those discussions addressed issues related to cooperation in the field of Earth remote sensing, rocketry, space research and monitoring and analysis of space situations.

From 1 to 4 June 2016, the International Air Show (ILA) 2016 was held in Berlin, at which the State Space Agency of Ukraine presented information on the space industry of Ukraine.

Most of the tasks are subject to the implementation of projects of the fifth space programme and are grounded in the appropriate international legal frameworks and outlined in the Government's documents, in the Association Agreement with the European Union, in the Strategy for Sustainable Development "Ukraine 2020", as envisioned in the Decree of the President of Ukraine, in the concept of the implementation of the State policy in the field of space activities for the period up to 2032, and in the space strategy of Ukraine for the period up to 2022. Those tasks are dictated by the challenges that the country must address against the background of reforms on the principles of sustainable development for the purpose of positioning Ukraine in the world in line with its political and economic interests, and to improve and optimize the State's presence at international events and venues.

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