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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

Contents

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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

Germany

[Original: English]
[22 November 2016]

Since many years INNOSpace has been a very successful instrument of the German national programme for space and innovation to promote and evolve the benefits of space activities to society. In 2016, the INNOSpace Masters competition was run by the German Aerospace Centre (DLR) space administration for the first time. Using the slogan “Satellite 4.0”, the competition called for new proposals and concepts for the future of space (new space economy). Partners in the competition were the European Space Agency (ESA) business incubation centres in the federal state of Bavaria and the city of Darmstadt, and aerospace group Airbus Defence and Space. Fifty companies, start-ups, universities and research institutions from eight European countries responded to the call. The objective of the overall initiative is to bring together space and non-space communities to enhance new markets and to support technology transfer and innovation. Those are federal activities that strengthen the continuous and stable development of space affairs in Germany and pave the way for future engagements at the national, European and international levels.

For the European space calendar the year started with the initial node of the European Data Relay Satellite system (EDRS) taking off en route to geostationary orbit. EDRS is a public-private partnership between ESA and Airbus Defence and Space that uses optical laser links that will carry data with a minimal time delay from orbit to Earth. The heart of the system is made up by the laser communication terminals consisting of the two geostationary nodes EDRS-A and, by 2017, EDRS-C, developed and built in Germany. The geostationary relay satellites will send the data packages to ground stations in Europe, including the DLR facility in Weilheim, a station in Redu, Belgium, and one in Harwell, United Kingdom of Great Britain and Northern Ireland. The first users will be the European Earth Observation Programme (Copernicus) satellites of the European Commission, Sentinel-1 and Sentinel-2. The second EDRS payload, EDRS-C, will be launched in 2017 on board an Ariane-5 rocket. Starting in 2018, the International Space Station (ISS) will also be able to communicate with Earth through EDRS.

With the Spheroids experiment, launched to ISS on 8 April 2016, scientists from the University of Magdeburg want to investigate the effects of microgravity on human blood vessel cells (vascular endothelial) that form the innermost layer of human blood vessels. These cells play an important role in regulating blood pressure and the growth of muscle cells, as well as in coagulation and inflammatory processes.

The science and technology demonstrator Laser Interferometer Space Antenna (LISA) Pathfinder was launched from Europe's spaceport in Kourou, French Guiana. Preparations for this ESA mission, which places unprecedented requirements on both payload and spacecraft, lasted more than 10 years. The LISA technology package (LTP) core assembly was led by Airbus Defence and Space in Germany. Other German research institutions contributed significantly to the payload development for this mission. On 25 June 2016, LTP completed its nominal operations phase, passing the baton to the disturbance reduction system, an additional experiment provided by the National Aeronautics and Space Administration (NASA) of the United States of America.

The tried and tested cooperation between the European Union and ESA assures further joint successful European space activities such as the fruitful Copernicus programmes.

Sentinel-1 and Sentinel-2 are already operational. The first Sentinel-3 satellite (Sentinel-3a) was launched in February 2016 and will deliver high-quality ocean measurements. The second Sentinel-1 satellite, Sentinel-1B, was launched in April to provide more "radar vision" for the environmental programme of Copernicus. Sentinel-1B joins its identical twin, Sentinel-1A, in orbit to deliver information for numerous services, from monitoring ice in polar seas to tracking land subsidence, and for responding to disasters such as floods. The first Sentinel satellite achieved a revisit time of 12 days, meaning it took 12 days to observe every point on Earth. Sentinel-1B will reduce this cycle to just six days. A key factor in this respect is the capacity of the radar instruments (provided by Airbus Defence and Space in Germany) to observe the Earth's surface day and night, even through cloud cover. The laser communication terminals installed on the satellites were developed and built in Germany and use EDRS to ensure rapid and secure data transmission to the ground station.

With the successful launches of the Galileo satellites in 2015 and 2016, the build-up of the ambitious European navigation system Galileo is proceeding.

The Stratospheric Observatory for Infrared Astronomy (SOFIA) airborne observatory is one of the most important ongoing bilateral projects in the 50-year period of fruitful collaboration with the United States. The numerous 10-hour flights have been so fruitful that DLR and NASA have extended the service life of SOFIA. In the summer of 2016, SOFIA visited New Zealand for the third time and took advantage of the long winter nights in that country. 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 the first time, an upgraded version of GREAT was on board: upGREAT. Instead of one detector, as in GREAT, upGREAT operates fourteen detectors simultaneously. They are divided into two arrays and can therefore map molecular clouds significantly faster.

In the field of space debris research and mitigation measures German scientists are actively involved in the Inter-Agency Space Debris Coordination Committee (IADC) together with twelve international space agencies to contribute to the understanding of the space debris environment and its evolution.

German experts are very active in different boards and activities in the context of the Committee on the Peaceful Uses of Outer Space and its subcommittees. They are actively involved in the work of the Space Mission Planning Advisory Group (SMPAG) and the closely collaborating International Asteroid Warning Network (IAWN) to monitor near-Earth objects worldwide. German experts also support the work of the expert group on space weather and the expert focus group on space and global health.

After meeting in Paris at the Conference of the Parties to the United Nations Framework Convention on Climate Change to reaffirm their commitment to jointly developing the Methane Remote Sensing Lidar Mission (Merlin), DLR and the French space agency Centre national d'études spatiales (CNES) signed, in September 2016, a cooperation agreement for the design, construction and operational phases of Merlin. The Merlin climate satellite will measure the concentration of methane in the Earth's atmosphere with unprecedented accuracy. With Merlin, France and Germany are making a significant contribution to climate change research. Space missions such as Merlin will help to gain a greater understanding of the mechanisms that influence the Earth's climate and will be an essential component in the implementation of the Paris Agreement on climate change.

Climate has become one of the most important issues mankind will have to contend with in the coming decades. In 2016 DLR conducted jointly with the Office for Outer Space Affairs the Conference on Climate Change to provide a discussion forum for international scientists, space agencies and United Nations entities such as the Office for Outer Space Affairs, the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER), the United Nations Framework Convention on Climate Change, the World Meteorological Organization, and the Global Climate Observing System. The aim was to consider how space and atmospheric research could support the requirements of climate protection and to identify tools and methods for a continuous monitoring process to ensure adherence to climate change agreements.

As Germany considers the benefit of space-based technology for disaster management and reduction to be very high, it extended its financial support for the UN-SPIDER office in Bonn, and DLR extended its staff secondment to the office. Experience has shown once again that effective space-based emergency mapping is possible only in close cooperation with international mechanisms such as UN-SPIDER and the International Charter on Space and Major Disasters.

Finally, the Rosetta mission came to an end in September 2016. Since its arrival in August 2014 at comet 67P/Churyumov–Gerasimenko, Rosetta has been sending reams of data and photographs of the comet, bringing surprises and providing insights into one of the fragments left over from the formation of the solar system 4.5 billion years ago. This was an ESA mission with contributions from its member States and NASA, which consisted of the orbiter, Rosetta, carrying 11 instruments and the lander, Philae, built jointly by an international consortium under the leadership of DLR. After 64 hours of measurements by all 11 instruments and transmission of scientific data on surface characteristics and materials, Philae went into sleep mode in November 2014. It has now been found by the camera on board the Rosetta orbiter in June 2016, which will help significantly to interpret certain data better. A great deal of new information has been acquired by the Rosetta mission, which will permit a more detailed comet investigation than has ever been done before. The impact of Rosetta on 30 September 2016 marked the end of a mission that ventured into space on 2 March 2004, but whose initial idea and development period date back much further.

Currently the Mobile Asteroid Surface Scout (MASCOT) lander is winging its way on board the Japanese Hayabusa-2 orbiter toward the asteroid Ryugu, where it is scheduled to arrive in summer 2018. After its launch in December 2014, the Hayabusa mission, in cooperation with the Japan Aerospace Exploration Agency (JAXA), is on its four-year journey to Ryugu. The Hayabusa probe carries the 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. This German-French project will be controlled from the MASCOT control centre at DLR.

Luxembourg

[Original: English]
[15 November 2016]

Luxembourg started being active in space through the creation of the Societé européenne des satellites (SES) in the middle of the 1980s. With a significant commitment by the Government of Luxembourg, SES launched its first communications satellite covering Europe.

SES currently operates, inter alia, 10 satellites at the main geostationary orbital positions of Luxembourg, predominantly for direct-to-home video distribution in Europe. Other satellites under Luxembourg jurisdiction include SES geostationary satellites operating in inclined orbit and two smaller satellites of the company LuxSpace in low-Earth orbit.

In 2005, Luxembourg became a member of the European Space Agency (ESA) and has since managed to develop a dynamic space sector consisting of some 30 different companies employing more than 800 people with diverse nationalities. Over the last 10 years Luxembourg progressively increased its involvement in ESA research and development programmes and will continue doing so in the future with a view to supporting its scientific, technical and commercial capabilities in space-related applications, data and infrastructure. In complement to these research and development activities, Luxembourg has also set up a specific programme together with ESA to support young graduates willing to develop a career in the space domain.

Luxembourg looks back at a compelling history of economic innovation and it is currently gearing up for a third industrial revolution, part of which could once more occur in space. To that effect, Luxembourg announced in February 2016 its willingness to explore the potential use of space resources in coordination and collaboration with other nations, the scientific community and commercial partners.

Space resources hold a large potential for future technological innovation, economic activity and growth with a promise of ecological and social benefits. Space resource utilization could open up a wealth of new, nearly unlimited resources, as well as new perspectives for humanity.

Raw materials from space, to be used in space at a relatively low cost, can make current satellites more capable and less expensive. Once a supply chain of materials is established in orbit, it will encourage new applications and new business models as entrepreneurs attempt to introduce even more services that people on Earth find useful.

Luxembourg aims to contribute to the peaceful exploration and sustainable utilization of space resources for the benefit of humankind. Fully respecting its international obligations, Luxembourg will set up and implement a strategy promoting the growth of and investment in private ventures in space resource utilization.

Luxembourg is currently developing legislation to regulate space activities in general and space mining activities in particular. In addition, the new space law will implement the Convention on Registration of Objects Launched into Outer Space under national law.

Since the academic year 2016/2017, the faculty of law, economics and finance of the University of Luxembourg has offered a new master’s degree (LL.M.) in space, communications and media law. The degree combines a range of courses on space law, international and European satellite and communications law, media law, electronic communications and e-commerce law, intellectual property law and data protection

law. The programme covers the international, European and national levels. Students acquire complex expertise in the regulatory aspects of space, communications, information and communications technology, and media law. The programme provides ample opportunities for development in the public and private sectors as well as in academia (llmspace-media@uni.lu).

In the humanitarian field, Luxembourg, through its initiative “emergency.lu”, is addressing the challenge of worldwide rapid response capacity and preparedness for humanitarian emergencies by providing a solution that can fill the communication gap in the first hours and days after a large-scale disaster. Emergency.lu is a multi-layer platform consisting of satellite infrastructure and capacity, communication and coordination services, satellite ground terminals for long-term as well as rapid deployment, and transportation of equipment to the disaster area within the first 12 to 20 hours. Emergency.lu collaborates with United Nations agencies for integration of the solution into existing communications infrastructures used in humanitarian operations. Partnerships exist with the World Food Programme as the global lead organization of the Emergency Telecommunications Cluster, as well as with the Office of the United Nations High Commissioner for Refugees and the United Nations Children’s Fund (UNICEF). Recently, another partnership agreement has been signed with the International Organization for Migration.