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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

Addendum

Contents

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I. Introduction

1. At its fifty-fifth session in 2018, 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.105/1167, para. 44).

2. In a note verbale dated 29 August 2018, the Office for Outer Space Affairs of the Secretariat invited Member States to submit their reports by 5 November 2018. The present note was prepared by the Secretariat on the basis of replies received in response to that invitation.

II. Replies received from Member States

Armenia

[Original: English]
[9 November 2018]

The Centre for Applied Astronomy of Byurakan Astrophysical Observatory (Armenia) carries out monitoring of circumterrestrial space jointly with the "Astronomical Centre" company of the Russian Federation which is a part of the approved programmes of the State Space Corporation "Roscosmos" of the Russian Federation. The telescopes mounted at the Saravand base of Byurakan Astrophysical Observatory are used for conducting monitoring activities. These observations are aimed at revealing the anthropogenic and natural objects that can pose potential threats to the space stations orbiting our planet. For this purpose, three telescopes constructed in the Russian Federation have been put into operation.

Observations are being conducted in close cooperation with specialists commissioned by the Russian Federation. An agreement has been concluded with the "Astronomical Centre" to acquire an additional telescope, to be installed at the base in Saravand.

In addition, one of the offices of the Russian Federation Global Navigation Satellite System (GLONASS) project became operational in the Centre for Applied Astronomy building in Byurakan this year.

Kenya

[Original: English]
[5 November 2018]

Introduction

In support of the Sustainable Development Goals and the "No Country Left Behind" initiative of the International Civil Aviation Organization (ICAO), Project Loon, a heavy, free unmanned balloon network operating at higher altitudes, seeks to enable education, investment, remote medical information and emergency services by expanding Internet capability to areas of the world that are currently underserved.

Space activities in Kenya under Project Loon

Kenya signed a Letter of Agreement with Project Loon Mission Control (LMC) in 2016 to establish a coordination framework for overflights and landings of the higher-altitude Project Loon balloons. Since October 2016, Project Loon balloons have safely logged a total of 850,000 flight hours globally, with more than 16,000 hours in Kenyan airspace. This represents more than 70 movements made in Kenyan airspace.

In July 2018, a commercial agreement was signed between LMC and Telkom Kenya with the objective of bringing 4G Internet access to the mountainous parts of central Kenya, which, owing to the mountainous terrain, has proved difficult. This commercial agreement is expected to be operational by 2019.

High-altitude airspace operations are expected to increase over Kenyan airspace as a result of the commercial agreement, hence the Kenya Civil Aviation Authority and LMC are in the process of reviewing the 2016 Letter of Agreement in order to accommodate the commercial agreement and address coordination issues noted in the course of past space activities.

Conclusion

Kenya will continue participating, together with other ICAO member States, in the development of a guidance and regulatory framework for high-altitude operations, in accordance with the recommendations on operations above flight level 600 of the ICAO Thirteenth Air Navigation Conference.

Saudi Arabia

[Original: Arabic]
[31 October 2018]

His Highness Prince Turki bin Saud bin Mohammed Al-Saud, President of King Abdulaziz City for Science and Technology, participated in the UNISPACE+50 high-level segment, held in Vienna on 20 and 21 June 2018, delivering a speech in which he expressed the desire of the Kingdom of Saudi Arabia that outer space be used for peaceful purposes, as well as the importance of international cooperation for achieving the goals of the 2030 Agenda for Sustainable Development and of the long-term sustainability of outer space activities in ensuring the advancement and well-being of humankind. His Highness reaffirmed that the United Nations treaties on the exploration of outer space and its use for peaceful purposes formed the legal framework that ensured that outer space, the Moon and other celestial bodies were used only for peaceful purposes. He provided a historical overview of the Kingdom's activities in space, from sending the first Arab and Muslim astronaut into space in 1985, to the satellite launches by King Abdulaziz City for Science and Technology over the last 10 years (for amateur satellite radio communication, relay communications, Earth monitoring, education and scientific experiments). He also referred to other international treaties that promoted the exploration of outer space and its use for peaceful purposes.

The Space and Aeronautics Research Institute of King Abdulaziz City for Science and Technology is concerned with the localization of space science and technology applications to benefit education, health, environmental monitoring, the management of natural, agricultural, mineral and water resources, disaster management, the protection of cultural heritage, and communications and direct broadcasting, as well as to foster economic and social growth. The Institute has signed a number of international, regional and local agreements and memorandums of understanding on outer space applications. In addition, the Institute has participated in many international, regional and national events, such as the exhibition accompanying UNISPACE+50, held in Vienna from 18 to 23 June 2018, the Jenadriyah Festival, held in Riyadh in 2018, and the forty-second Assembly of the Committee on Space Research, held in Pasadena, California, United States of America, from 14 to 22 July 2018.

National Satellite Technology Centre

King Abdulaziz City for Science and Technology has developed and manufactured two Earth monitoring satellites: SaudiSat 5A and SaudiSat 5B. These are second-generation remote sensing satellites. The organization has already launched 13 satellites that are used for amateur radio communications, relay

communications, Earth monitoring and education services, as well as for scientific experiments.

The National Satellite Technology Centre of King Abdulaziz City for Science and Technology participated in a project to explore the dark side of the Moon in collaboration with China as part of the Chang'e-4 mission. The Centre's contribution involved the installation of optical imaging detectors developed and manufactured in the laboratories of King Abdulaziz City for Science and Technology. These microcameras weigh 630 grams each and are able to provide images of the Moon with a resolution of 38 metres from a point approximately 2,000 kilometres from the lunar surface. Furthermore, the Longjiang satellite took photographs of the Earth and craters on the Moon's surface using remote sensing systems designed by the Centre. In those photographs, Saudi Arabia appears clearly, as do the Petropavlovskiy M and Wegener craters.

International agreements

The Kingdom's interest in international cooperation has led it to conclude local, regional and international agreements in line with the Saudi Vision 2030 plan and its related programmes. Those agreements are designed to foster meaningful and constructive cooperation with States that share the Kingdom's interest in exploring outer space and using it for peaceful purposes for the benefit of all humankind. The agreements include the following:

- Cooperation agreement between Saudi Arabia and the Russian Federation on the exploration of outer space and its use for peaceful purposes, as approved by the Council of Ministers in 2018.
- Cooperation agreement with the China Academy of Launch Vehicle Technology on the Saudi satellite launch programme.
- Cooperation agreement with the China Satellite Navigation Office (Beidou Navigation Satellite System) to conduct scientific studies relating to the development of reception systems and the more efficient use of the Beidou System in Saudi Arabia through joint research, including system monitoring, evaluation of signal performance in the region, identification of atmospheric factors affecting the strength of signal performance, determination of the impact of distortion on navigation signals and development of alternative solutions to overcome such distortion.
- Cooperation agreement with the Lockheed Martin Corporation of the United States to build and launch the first Saudi geostationary satellite (SGS-1) for broadband communications.

Centres of excellence have been established at several prestigious United States universities to build capacity and conduct joint research. They include:

- The King Abdulaziz City for Science and Technology/Stanford Center of Excellence for Aeronautics and Astronautics, which was established under a cooperation agreement with Stanford University. Focusing on space and aeronautics research and technology, it seeks to create solid research and educational infrastructure in the fields of aerospace and space physics.
- The Center of Excellence for Telecom Applications, which is a joint initiative with the University of California San Diego that seeks to strengthen Saudi research capacity in the fields of telecommunications, wireless applications and the Internet of things.
- The Center of Excellence for Microwave Sensor Technology, which was established under a technical cooperation partnership agreement with the University of Michigan, Ann Arbor, is intended to become a global centre for research into the propagation of electromagnetic waves. As the physical medium employed in telecommunications, electromagnetic waves are one of the most

important physical phenomena that enable us to study and interact with the world around us.

National Centre for Remote Sensing Technology

Space data have a significant role to play in social and economic development and sustainable development. They are of great importance when taking decisions pertaining to the monitoring of greenhouse gas emissions and pollutants, climate change, essential climate variables, vegetation coverage, space weather, and water resources and their impact on health and security, as well as to natural resource and ecosystem management, cartography and urban development. The development of remote sensing applications will constitute a substantial contribution to achieving the goals of the 2030 Agenda for Sustainable Development.

Saudi Arabia has established the first ground receiving station in the region for receiving images from commercial satellites. The station, which will be operated by the National Centre for Remote Sensing Technology at King Abdulaziz City for Science and Technology, will collect data from more than eight commercial satellites, including WorldView-4 and Pleiades-1A and 2B, which provide image resolutions of up to 31 cm.

The Centre provides government bodies and universities with data gathered through remote sensing to meet their needs. It also conducts studies in a number of areas, such as agricultural, mineral and water resource management and town planning, using remote sensing data and technologies, geographic information systems and geographic positioning systems. The Centre concludes contracts with ministries and public and private sector bodies to update maps and identify mosques, hospitals, primary care centres, schools, roads and transport hubs. Furthermore, the Centre is keenly interested in localizing remote sensing technology in order to integrate this growing technology and apply it effectively to the development planning process.

National Centre for Astronomy

The National Centre for Astronomy monitors the lunar crescent and prepares the Kingdom’s official calendar, the Umm al-Qura calendar.

Sudan

[Original: English]
[4 November 2018]

Introduction

The Republic of the Sudan and other countries of the African Union have accepted the challenge and started national space programmes. Irrespective of what people think about space capability in Africa, we are benefiting one way or the other from space applications. The African policy and strategy documents being developed by the African Union Commission shed more light on this very same issue. Developing nations can utilize economical engineering to lower the costs of developing useful scientific and engineering projects, for both space and Earth-based applications, that would be useful for developed countries as well.

Space activities have been undertaken in the Sudan since the early 1970s, when small, specialized remote sensing units were established in some governmental departments, such as Soil Maintenance, Land Investments, the Water Programme, Forestry and the Department of Survey Engineering at the University of Khartoum.

In 1977, the National Remote Sensing Centre was established under the umbrella of the National Council for Research. The Centre was later transformed into the Remote Sensing and Seismology Authority, which is one of the institutes of the National Centre for Research. It is active in the field of analysing and interpreting

space images of the Earth surface to extract useful data about the environment and natural resources, as well as human activities.

The Mierag Space Technologies Company was established in 2002 by the Ministry of Science and Technology to provide geographical information system data and maps to both the governmental and private sectors. It is the pioneer geomatics and geospatial service provider in the Sudan. Likewise, the Ceres Space Technology Centre was established to promote the space sector in the Sudan. It has built a satellite ground station in the north of the capital city of Khartoum that receives optical image data from commercial remote sensing satellites operating in the X band.

Institute of Space Research and Aerospace

The Sudan National Space Programme was launched in 2012 by the Ministry of Science and Communications to promote the development of space activities intended to contribute to the economy and scientific development of the Sudan. In June 2013, the Institute of Space Research and Aerospace (ISRA) was established as one of the institutes of the National Centre for Research, as a unique component of the National Space Programme. ISRA was established to fill the gap in local research and development in space science and aerospace engineering and as one of the seeds for a future Sudanese space agency.

ISRA comprises five departments: Astronomy and Space Physics, Communication Systems, Aerospace Engineering, Electronic Systems and Applied Programming. In 2016, the prototype of the ISRAHAB-1 high-altitude balloon was completed and launched into the stratosphere to study the physical nature of that layer of the atmosphere.

Currently, the main research project of the Institute is the design of the ISRASAT-1 cube satellite. In 2016, ISRA researchers completed the design and implementation of the prototype of ISRASAT-1. Subsequently, the ISRA team started the second phase of the ISRASAT-1 research project, which was to implement ISRASAT-1 by launching it into a low Earth orbit of 400 km altitude, carrying a small camera for the observation of Sudanese territory.

However, owing to many reasons, ISRA is still facing problems in finding a way to launch the satellite into orbit. ISRA has twice failed, in 2017 and 2018, to participate in the opportunity provided by United Nations/Japan Cooperation Programme on CubeSat Deployment from the International Space Station Japanese Experiment Module (Kibo) “KiboCUBE”.

ISRA plans to establish an optical astronomical observatory outside Khartoum. Subsequently, that planned observatory is expected to include a radio astronomical telescope to explore stars and planets in deep space. Furthermore, the observatory is planned to be national and to serve in tracking satellites and the Moon, as well as in detecting threatening objects such as asteroids, meteors and comets.

In the field of aerospace engineering, a research project has been initiated to design a short-range unmanned aerial vehicle to assist in precision agriculture. The small aeroplane is planned to be designed and produced by ISRA researchers for other civil aerial surveillance entities.

World Space Week 2018

For the fourth year in a row, ISRA has organized World Space Week activities in the Sudan, in association with several entities working in the fields of space science and aerospace engineering in the country. Since October 2015, ISRA has organized, in collaboration with the World Space Week Association, annual celebrations of World Space Week (in 2015, 2016, 2017 and 2018). World Space Week activities include seminars, lectures and exhibitions and are mainly targeted at postgraduate and undergraduate students and teenagers, as well as children.

Collaboration and partnership

ISRA is looking forward to establishing strong relationships and collaboration with regional partners in East Africa and Arab League countries to establish common space-related infrastructure and joint space research projects for the benefit of the people of those countries and the world.

United Arab Emirates

[Original: English]
[2 November 2018]

The United Arab Emirates space sector has accomplished a number of significant achievements at the national, regional and international levels. Most of those achievements were enabled by the continuous process of regulation and organization of the sector by the United Arab Emirates Space Agency towards achieving its strategic goals. The United Arab Emirates Space Agency is focused on enhancing national capabilities and the use of space technology in the United Arab Emirates. The Agency is helping the nation achieve its diversification plans and is supporting the creation of a knowledge-based economy. During 2018, the United Arab Emirates Space Sector successfully launched and executed the following notable local and regional initiatives and projects.

The United Arab Emirates Astronaut Programme

Two astronauts were selected from the United Arab Emirates Astronauts Programme, initiated by the Mohammed Bin Rashid Space Centre (MBRSC), for the first United Arab Emirates human space flight mission to the International Space Station, planned in collaboration with the State Space Corporation “Roscosmos” of the Russian Federation for April 2019. The selection was made on the basis of an e-registration open to the public and commenced in December 2017.

MBRSC launched the United Arab Emirates Astronauts Programme in April 2017, with the aim of preparing the first Emirati astronaut corps to participate in global space exploration missions. It is considered to be one of the most inspiring programmes, meeting the aspirations of youth possessing distinguished capabilities.

Endorsement of the federal law on regulating the United Arab Emirates space sector

The United Arab Emirates draft federal law on regulating space activities was approved by the Cabinet of Ministers and is currently pending approval by the Federal National Council and Supreme Council, the final stage prior to its adoption. It is the first of its kind worldwide, and was a result of an analysis guided by the National Space Policy and was aligned with the leadership’s vision and international laws. It touches on aspects relating to the organization and objectives of space projects undertaken by the country, including peaceful space exploration and the safe use of space technologies. It will also address new and complex concepts, such as space resource utilization, space debris mitigation, liabilities and insurance, authorizations and human space flights. In addition, the United Arab Emirates Space Agency is mandated under the draft law to regulate high-altitude flights and space activities supporting flights.

Issuance of space-related regulations

The United Arab Emirates Space Agency has issued the Regulation on Registration and the Human Space Flight Regulation in its capacity as the mandated entity for drafting, reviewing and overseeing the process of issuing space-related legislation that governs the United Arab Emirates space sector. The two regulations were issued on the basis of consultations with relevant stakeholders in the United Arab Emirates. The regulations establish the general rules and conditions for space

object registration and human space flights carried out by the United Arab Emirates. Moreover, both regulations will be further elaborated in regulatory procedures that are currently under consultation with stakeholders.

Issuance of the National Space Investment Promotion Plan

The National Space Investment Promotion Plan, issued by the United Arab Emirates Space Agency, is aimed at achieving National Space Policy objectives by defining at a high level the United Arab Emirates approach to facilitating increased investment in new and well-established space companies, and attracting more space businesses to the United Arab Emirates. The initiatives prescribed in the plan will be implemented by means of an implementation road map, in collaboration with stakeholders.

Participation in the International Astronautical Federation and election of a representative of the United Arab Emirates as a Vice-President of the Federation

A delegation from the United Arab Emirates, which included representatives of the United Arab Emirates Space Agency and MBRSC, participated in the sixty-ninth International Astronautical Congress of the International Astronautical Federation (IAF), held in Bremen, Germany, in 2018, delivering several papers and technical presentations. The papers and interactive presentations provided insights into the recent successful experiences of the United Arab Emirates space sector and Space Programme.

Moreover, the United Arab Emirates, represented by Dr. Mohammed Al Ahbabi, Director-General of the United Arab Emirates Space Agency, was elected as a Vice-President of the IAF following a vote during the International Astronautical Congress in 2018.

Small-satellite programme

The United Arab Emirates Space Agency has financed and supported projects related to four small satellites, in collaboration with national universities and the space industry. Those projects are:

- *MeznSat* (fourth quarter of 2019), a new satellite project initiated and funded by the United Arab Emirates Space Agency in partnership with Khalifa University and the American University of Ras Al Khaimah. MeznSat, which is to be developed, built and tested primarily by university students, will be a CubeSat for detecting greenhouse gas concentrations. The project is aimed at supplying the United Arab Emirates space industry with qualified, well-trained graduates through hands-on experience. In addition, MeznSat will open windows for advanced space-oriented research relevant to the United Arab Emirates.
- *United Arab Emirates MiniSat* (first quarter of 2020). The United Arab Emirates Space Agency, in collaboration with Khalifa University, has devised this contest oriented towards science, technology, engineering and mathematics. It provides the opportunity for students interested in the fields of engineering, material sciences and physical sciences to develop technology applications and experiments that are exposed to the space environment and have a clear view of the Earth and universe. Moreover, New York University of Abu Dhabi plans to develop a gamma ray detector that will be installed in the CubeSat, which will be launched from the International Space Station.
- *MySat-1 and MySat-2* (fourth quarter of 2018 and fourth quarter of 2019) is a series of educational and technology demonstration CubeSat projects being carried out in collaboration with Yahsat JSC and Northrop Grumman Innovation Systems. The first mission of MySat-1 will carry an experimental coin cell battery based on technology developed at the Masdar Institute and Khalifa University, along with a video graphics array camera. MySat-1 is to be launched

in November 2018. MySat-2 will evaluate novel algorithms for attitude determination and control and is scheduled for launch by the end of 2019.

- *DM Sat-1* (second quarter of 2019) is a satellite being manufactured for the purpose of environmental monitoring, and is an outcome of an agreement between MBRSC and the Dubai Municipality. The satellite will provide the Dubai Municipality with the data collected after its launch. The project is also aimed at developing the technical capabilities of specialists in the Municipality in the management and use of nanosatellites for environmental monitoring, as well as the optimal use of information and data in the agreed areas, which are focused on finding solutions to climate change challenges, among others.
- *Small-satellite ground station* (April 2017). The station supports VHF/UHF amateur radio bands and S-band downlinks. Discussions are being held with international universities and organizations regarding the possibility of a ground station network for small satellites.

Launches of satellites

The United Arab Emirates witnessed the launch of two traditional satellites that will increase capabilities and that contributed significantly in building technical capacities during the design and manufacturing process:

- *Al Yah 3* (first quarter of 2018), the third satellite in Yahsat's fleet, is a telecommunication service satellite launched in January 2018. The launch was a key milestone in Yahsat's strategy to expand its Ka-band coverage across Africa and to establish a presence in Latin America. The mission experienced some challenges during the launch stages that resulted in the Al Yah 3 satellite being inserted into an orbit that differed from the flight plan. However, the satellite is healthy and operating normally. A revised flight plan will be executed in order to achieve the operational orbit and fulfil the original mission. Al Yah 3 will join Al Yah 1 and Al Yah 2 in helping to empower millions of people across the Middle East, Africa, South-West Asia and Brazil to gain affordable access to the Internet via Yahsat's high-speed satellite broadband service, YahClick.
- *KhalifaSat* (fourth quarter of 2018) is a remote sensing Earth observation satellite that is being manufactured in the United Arab Emirates at MBRSC. The satellite was launched in October 2018. It is the first satellite to be built in the clean rooms of the space science and research facility of the government of Dubai and the first to be developed entirely by a team of Emirati engineers.

Hosting of international events

The United Arab Emirates succeeded in being designated to host the following international events in the future:

1. Humans to Space 2019
2. Young Professionals in Space 2019
3. International Astronautical Congress 2020