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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. At its fifty-sixth session in 2019, 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.105/1202, para. 41).

2. In a note verbale dated 15 July 2019, the Office for Outer Space Affairs of the Secretariat invited Member States to submit their reports by 21 October 2019. 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

Algeria

[Original: French]
[31 October 2019]

Algeria is of the view that international cooperation in the peaceful uses of outer space is the most appropriate way to foster the exchange and transfer of knowledge and know-how and to promote space technology and applications in support of human development and well-being.

Such cooperation has taken the form of a cooperation agreement with India, a memorandum of understanding with the South African National Space Agency and a partnership agreement with the Sahara and Sahel Observatory.

In this connection, Algeria has taken part in space technology and applications events organized by United Nations bodies and by agencies and institutions having space-related mandates, such as:

- The second session of the Conference Preparatory Meeting for the World Radiocommunication Conference, which was held in Geneva from 18 to 28 February 2019 and was dedicated to satellite services
- The Global Space Congress 2019, which was held in Abu Dhabi from 19 to 21 March 2019 and was aimed at promoting space activities regionally and globally, providing participants with the opportunity to share and exchange information on space policies and strategies, in particular those of Arab countries
- The fifty-second session of Comprehensive Nuclear-Test-Ban Treaty Organization Working Group B, which was held in Vienna from 25 March to 5 April 2019 for the purpose of establishing coordination among country stakeholders

At the national level, the Algerian Space Agency (ASAL) has taken steps to establish cooperation agreements with potential in-country users for the design and implementation of decision-making tools based on space technology and applications. The aim is to provide those users with space data and imagery, value-added by-products and geographical information systems, while offering training and development programmes to professional staff of partners in such areas as remote sensing, geographical information systems and global navigation satellite systems.

At the regional level, Algeria continues to support initiatives to promote inter-African cooperation for sustainable development and people's well-being in Africa. In this connection, Algeria took part in the international workshop on the socioeconomic benefits of space resource utilization, held on 23 and 24 May 2019 in Pretoria, and the third African Space Stakeholders Dialogue, hosted by the African Union Commission in Dakar from 12 to 14 June.

Our country, which participates each year in the sessions of the Committee on the Peaceful Uses of Outer Space, follows with great interest the issues considered by the Committee and contributes to the promotion of peaceful space activities for sustainable development and human well-being.

In this regard, Algeria highlights the importance of:

- Ensuring equitable access to orbital positions, in accordance with the principles of peaceful use and non-appropriation of outer space.
- Combating the proliferation of space debris, without hindering the development of the emerging space capabilities of developing countries. Algeria supports the voluntary implementation of the guidelines on space debris mitigation established by the Inter-Agency Space Debris Coordination Committee. Algeria also supports the Committee's initiative to develop a set of guidelines for the long-term sustainability of outer space activities.
- Establishing a regulatory framework governing the commercialization of high-resolution satellite data to prevent any misuse that would harm persons or property.

With regard to legislation relating to the exploration and peaceful uses of outer space, Algeria enacted in August 2019 a law governing national space activities, to codify and regulate the strong potential of the national space programme through the establishment of a legal framework to support the development of national space activities.

In terms of space infrastructure and systems, ASAL has carried out in 2019 maintenance operations to keep its satellites and related ground control segments in optimum operating condition. This applies in particular to high- and medium-resolution Earth observation satellites, namely, Alsat-2A, Alsat-2B and Alsat-1B, and telecommunications satellite Alcomsat-1, with the following result:

- Alsat-1B: more than 2,000 results have been generated, covering an area of over 46 million km^2
- Alsat-2A and Alsat-2B: more than 12,000 results have been generated, covering an area of almost 1.2 million km^2
- Alcomsat-l: operational use of the satellite through the development of applications related to broadcasting and telecommunications using Ku and Ka bands

Lastly, among the training and research activities geared towards building human capacity in the area of space technology, in line with the national space programme, academic and short-term training activities conducted abroad have been carried out or were under way at the following agencies in 2019:

- China: Regional Centre for Space Science and Technology Education for Asia and the Pacific
- India: Indian Space Research Organization and Indian Institute of Remote Sensing, as part of the Indian Technical and Economic Cooperation Programme
- Republic of Korea: Korea Aerospace Research Institute

Indonesia

[Original: English]
[13 November 2019]

1. Space policy

The National Institute of Aeronautics and Space (LAPAN) of Indonesia manages space activities in Indonesia, in addition to its role of aerospace research and development institute. LAPAN answers directly to the President of Indonesia, and its activities are coordinated by the Ministry of Research and Technology. Space activities in Indonesia are governed by the Law of the Republic of Indonesia No. 21 of 2013 on Space Activities. As mandated under that law, Indonesia promulgated presidential decree No. 45 of 2017 on the space activities master plan for 2016–2040 on 12 April 2017, followed by government regulation No. 11 of 2018 on the management of remote sensing activities.

2. Space activities

(a) Remote sensing applications

LAPAN, the national focal point in research and development for the use of remote sensing satellite data for government and private institutions in Indonesia, has two main remote sensing programmes: the National Remote Sensing Data Bank and the national Earth Monitoring System. The former is responsible for satellite data acquisition, processing, storage and distribution in Indonesia, while the latter concerns the processing and use of remote sensing data to monitor natural resources, identify environmental problems, analyse disaster mitigation measures and atmospheric dynamics, physics and chemistry. LAPAN holds an annual national coordination meeting (Rakornas) and monthly technical training sessions (Bimtek) for employees of Indonesian government agencies. LAPAN also collaborates with international agencies to develop satellite applications for monitoring systems, including the European Space Agency and the Asian Development Bank, Wageningen University in the Netherlands, the Japan-Association of Southeast Asian Nations (ASEAN) Integration Fund and the Japan Aerospace Exploration Agency (JAXA).

(b) United Nations Platform for Space-based Information for Disaster Management and Emergency Response regional support office

As a regional support office of the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER) through the Sentinel Asia initiative and the Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters (the International Charter on Space and Major Disasters), and in collaboration with international space agencies, LAPAN has provided responsive information on disaster conditions, predictions of disaster-affected areas and the latest conditions monitored through remote sensing satellite data. In collaboration with UN-SPIDER, Sentinel Asia, the International Charter on Space and Major Disasters, the Asian Institute of Technology, JAXA, the German Aerospace Centre and international satellite data providers in Indonesia, LAPAN provided quick response and the rapid mapping of disaster areas based on remote sensing satellite data for the National Disaster Management Agency and other agencies. As a UN-SPIDER regional support office, LAPAN was also actively involved in the annual conference of UN-SPIDER. LAPAN supported the development of guidelines for disaster management in ASEAN countries by the Economic and Social Commission for Asia and the Pacific, in collaboration with ASEAN, namely, *Specific Hazards: Handbook on Geospatial Decision Support in ASEAN Countries* and *Sharing Space-based Information: Procedural Guidelines for Disaster Emergency Response in ASEAN Countries*.

(c) Remote sensing contribution for to the achievement of the Sustainable Development Goals

Indonesia has used space-based technology to support national efforts to achieve the Sustainable Development Goals of the 2030 Agenda for Sustainable Development. Indonesia issued presidential decree No. 59 of 2017 on the achievement of the Sustainable Development Goals and has benefited from the use of outer space in disaster management, health, education and the maritime and economic sectors. The presidential decree lists 17 goals and 94 national targets to be met by 2030, as stated in the National Medium-Term Development Plan 2015–2019. In line with the decree, Indonesia has been developing Sustainable Development Goals centres in several universities. LAPAN is also developing a project to become such a centre using space technology to support the achievement of the Goals. Remote sensing applications are contributing to the achievement of Sustainable Development Goals 6 (ensure availability and sustainable management of water and sanitation for all), 11 (make cities and human settlements inclusive, safe, resilient and sustainable), 13 (take urgent action to combat climate change and its impacts), 14 (conserve and sustainably use the oceans, seas and marine resources for sustainable development) and 15 (protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss).

(d) Atmospheric and space science

(i) Space weather

LAPAN established the Space Weather Information and Forecast Services in 2014 to provide information on space weather in the Indonesian region and its surroundings. The country's unique equatorial position poses challenges, especially in relation to the dynamics of ionosphere layers and their forecasting. Data for basic information and predictions are collected through international observation, including the LAPAN ground-based network across the country. At this stage, LAPAN has 15 ground-based observation stations, some operating under a cooperation framework with universities and related government institutions.

Indonesia participated in the Expert Group on Space Weather established in 2013 in connection with the work of Expert Group C of the Working Group on the Long-term Sustainability of Outer Space Activities, which operated from 2011 to 2015. Following the initial work plan of the Expert Group, Indonesia studied the effect of space weather on civil aviation, as proposed by the International Civil Aviation Organization and the World Meteorological Organization. LAPAN works closely with Airnav Indonesia, the Indonesian air traffic control organization, to identify how space weather affects air traffic control in Indonesia and how to mitigate those effects. LAPAN also serves Indonesian users with information on high frequencies affected by space weather. To strengthen space weather activities in the country, Indonesia started a bilateral collaboration with Japan in May 2019, with LAPAN signing a technical agreement on ionosphere and upper atmosphere research, observation and monitoring with the Electronic Navigation Research Institute and the National Institute of Maritime, Port and Aviation Technology of Japan.

(ii) Other space science

To advance space science in Indonesia, LAPAN started building a new observation facility in the eastern province of East Nusa Tenggara in 2017, which is expected to start operating in 2021. The main telescope, of a diameter of 3.8 m, will be built in collaboration with Kyoto University. This new facility is to be used not only for astrophysics research in Indonesia and in the context of international collaboration, but also for near-Earth object mitigation risk assessment and safeguarding against natural disasters from space (e.g., by contributing to the Minor Planet Center). LAPAN also organized an international space science symposium under the theme "Strengthening space science and technology in Indonesia" on

25 September 2019. The symposium was attended by hundreds of participants from Indonesia, China, Egypt, India, Japan and Malaysia. With regard to the participation of Indonesia in the space science community, LAPAN researchers have been members of the International Astronomical Union since 2018.

(e) Telecommunications

In 2017, the Ministry of Telecommunication and Information of Indonesia launched a broadband satellite programme to provide broadband communication services, mission-critical communications and public protection and disaster relief. This programme, which will connect 93,900 schools, 47,900 local government offices, 3,700 health facilities and 3,900 police stations and central government offices, is now in the financial closing stage. The government-owned satellite is to be launched and to start operating in 2023. The Indonesian telecommunications operator Pasifik Satelit Nusantara launched the Nusantara Satu satellite from Cape Canaveral Air Force Station, United States of America, on 22 February 2019. It is the first Indonesian high-throughput satellite providing broadband connectivity in Indonesia. A consortium of Indonesian telecommunication operators, Pasifik Satelit Nusantara and Indosat Ooredoo, plans to launch satellite Palapa N1 in 2020. With the satellites currently operating and those scheduled for launch, the penetration of broadband communications in Indonesia is expected to increase and benefit many aspects of national development.

(f) Space technology

LAPAN has developed national satellite technology with the objective of mastering the manufacture and operation of microsatellites for Earth observation, telecommunication and scientific missions. LAPAN is now building its fourth nationally developed Earth observation satellite, LAPAN A4, to be launched in 2020, providing medium-resolution images with a 200 km swathe to complement the Indonesian remote sensing database for monitoring agriculture and the environment. It will also carry an automatic identification system to monitor global maritime traffic and will measure Earth's magnetic field to monitor space weather. LAPAN is also helping universities to develop cube satellites and nanosatellites. Two universities, Surya University and Telkom University, are now developing a cube satellite for education purposes.

(g) Young space activities

To increase young people's knowledge and awareness of outer space, LAPAN organized the Indonesian Payload Rocket Competition (Komurindo) and the Atmospheric Balloon Payload Competition (Kombat). Komurindo was held at the LAPAN facility at Pameungpeuk, West Java, on 24 and 25 August 2019. Komurindo is an annual national competition held since 2009, in which students from all Indonesian universities participate. LAPAN is also a member of the Kibo-Asian Beneficial Collaboration (ABC), a programme established by the Space Environment Utilization Working Group of the Asia-Pacific Regional Space Agency Forum to promote the use of International Space Station Kibo in the Asia-Pacific region and to share and build on the outcomes of Kibo use. As a point of contact for Kibo-ABC, LAPAN is involved in preparing various activities, such as the Asian Try Zero-G competition, the Asian Herbs in Space programme and the Kibo Robot Programming Challenge, to be carried out in 2020.

(h) World Space Week

Indonesia organized events to celebrate World Space Week, from 4to 10 October 2019, and to commemorate the 100th anniversary of the International Astronomical Union, the fiftieth anniversary of the first human beings landing on the Moon and International Observe the Moon night 2019.

(i) International space cooperation

Regarding international cooperation in the field of outer space, Indonesia held a number of important events in 2019, including: (a) the second Asia-Oceania Group on Earth Observations workshop, on 10 and 11 April, with representatives from Indonesia, Australia, China, Japan, Malaysia and the Republic of Korea; (b) an inception workshop on science-based information-sharing derived from Earth observations satellite for agriculture management in the ASEAN region, on 27 June, in cooperation with the Japan-ASEAN Integration Fund; (c) the seventh ASEAN Remote Sensing Ground Station Expert Exchange Workshop, from 13 to 15 August, as part of the ASEAN Subcommittee on Space Technology and Applications agenda; and (d) a university service demonstration workshop and a technical user workshop on 8 and 9 October, in cooperation with Wageningen University.

Indonesia also participated in various meetings in 2019, including the seventy-fifth session of the Economic and Social Commission for Asia and the Pacific, held at the United Nations Conference Centre in Bangkok from 27 to 31 May; an inception meeting on "Improving the use and sharing of geospatial information for resilient and sustainable development in selected pilot countries", held in Jakarta from 24 to 26 July; the twenty-third session of the Intergovernmental Consultative Committee on the Regional Space Applications Programme for Sustainable Development, held in Bangkok from 27 to 29 August; and the workshop on "Science technology and innovation framework for action: converging towards the development of ASEAN platform on science technology and innovation for disaster and climate resilience", held from 24 to 26 September in the Philippines.

Luxembourg

[Original: French]
[6 November 2019]

National report on space activities 2018/2019

Over the years, an active space sector has developed in Luxembourg, which now hosts some 50 enterprises and research laboratories involved in a wide range of activities on the space value chain.

Luxembourg Space Agency

The Luxembourg Space Agency (LSA) was launched in September 2018 with the mission of promoting the economic development of the space sector in Luxembourg, including the development of key skills, talents and research capacities, thus contributing to the creation of long-term economic value. The Agency will also partner with innovative companies likely to play an important role in the future exploration and use of outer space.

In 2019, the Agency set up the LSA Data Center to provide enterprises and researchers in Luxembourg with reliable, rapid and intuitive access to data derived from Earth observation under the European Earth observation programme Copernicus. The detailed data that this project makes available help to safeguard the environment, combat the effects of climate change and ensure civil safety.

European Space Agency

Luxembourg has been a member of the European Space Agency since 2005. It has gradually increased its participation in the research and development programmes of the Agency and intends to continue to do so in order to develop its scientific, technical and economic competencies in the space sector.

At the same time, the Luxembourg Space Agency, in collaboration with the European Space Agency, continues to take part in the Luxembourg Young Graduate Trainee programme for young graduates wishing to pursue a career in the space sector.

The space policy of Luxembourg also covers primary and secondary education through the country's membership, since 2018, of the European Space Education Resource Office (ESERO) network. As the host organization of ESERO in Luxembourg, the Luxembourg Science Center uses space topics to support national school education in science and technology.

Space communications

Most of the space activities of Luxembourg are in the field of satellite communications. The Luxembourg operator SES operates a large number of communications satellites in geostationary orbit and a constellation in medium orbit, including 10 Luxembourg satellites positioned in geostationary orbit and several other geostationary Luxembourg satellites maintained in inclined orbit. The Luxembourg satellites are used mainly for the transmission of television programmes, mostly in Europe, that are broadcast to more than 200 million households, more than 60 million of which receive signals directly; however, they also provide Internet access and data transmission services.

Furthermore, through a law enacted on 14 August 2018, the Government may now acquire, launch and operate an Earth observation satellite.

Private sector space activities in Luxembourg are also diversifying rapidly. A great many initiatives are being developed in the "new space" field with the launch of space activity start-ups, including with a view to using the data collected for Earth observation and the study of Earth's atmosphere. As a result, several space objects have been launched and innovative technologies have been successfully tested over the past year.

Since June 2019, promising young enterprises in Luxembourg have been able to participate in the Luxembourg Space Agency acceleration programme. This programme provides initial financing and personalized assistance.

Spaceresources.lu

Luxembourg has a rich history of economic innovation and is preparing to start a third industrial revolution, which should also play out in space. Space resources have enormous potential for the continued exploration of our solar system and technological innovation and economic growth, at the same time providing opportunities for beneficial social and sustainable development. The exploitation of space resources could therefore create new prospects for humanity and bring about new applications and new development models.

Through the Spaceresources.lu initiative, launched in February 2016, Luxembourg intends to contribute to the peaceful exploration and sustainable use of space resources for the benefit of humanity as a whole. This vision will be achieved by developing and implementing a strategy to promote investment in and the growth of commercial companies active in the use of space resources.

Legal aspects

Luxembourg is a signatory to the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, and the Convention on International Liability for Damage Caused by Space Objects. A system of concessions is planned for the authorization of space activities. A law on the use of space resources adopted in 2017 introduced an approval and monitoring system in Luxembourg. The law is aimed at regulating the use of resources extracted in space and is the first legal framework of its kind in Europe.

In order to strengthen the authorization and monitoring system prescribed by the international treaties to which Luxembourg is a party, a draft law on space activities was introduced in the Luxembourg Parliament in 2018. Among other things, it makes provision for a national register of space objects. At the same time, a draft law has been introduced on the approval of the accession of Luxembourg to the Convention on Registration of Objects Launched into Outer Space.

International cooperation

Luxembourg reaffirms its commitment to and the necessity of more thoroughgoing international cooperation, especially regarding the exploration and use of space resources. Since 2017, memorandums of understanding have been signed to this end with Japan, China, Portugal, the United Arab Emirates, Poland, Czechia and the United States of America. It has also signed a joint declaration with Belgium.

Education

Since the academic year 2016/17, the Faculty of Law, Economics and Finance of the University of Luxembourg has been offering a master's degree in space law, communications and media. This degree combines several legal disciplines: space law, international and European satellite law, media law, communications and e-commerce law, and intellectual property and data protection law. It enables students to acquire expertise in the regulatory aspects of space, communications and the media. The programme thus opens up development opportunities in the public and private sectors, as well as in the academic world.

Moreover, in September 2019, the University of Luxembourg launched a new two-year interdisciplinary space master's degree programme, developed with the Luxembourg Space Agency. This is aimed at providing students with the engineering skills required in the space industry and in-depth and wide-ranging knowledge about managing space-related activities. To set up this programme, the University entered into several international partnerships and partnerships with private businesses.

Humanitarian aspects

In the humanitarian field, in 2011, the Government of Luxembourg launched the emergency.lu initiative, which provides a global system of rapid-reaction satellite communications in the event of natural disasters and humanitarian missions. Emergency.lu has been made available to the international humanitarian community with the goal of saving human lives in the hours following a humanitarian disaster.

Emergency.lu is an integrated global telecommunications platform designed to help the humanitarian community and civil defence teams on the ground to establish or re-establish telecommunications services in order to ensure effective communications and coordination for rescue teams. It provides satellite infrastructure and capacity, communications terminals and the logistics necessary for rapid deployment, within 12 to 20 hours, in response to natural disasters and crises triggered by human activity.

Emergency.lu works with United Nations agencies in order to include their resources in the communications used during humanitarian operations. Partnerships have already been concluded with the World Food Programme, the Office of the United Nations High Commissioner for Refugees and the United Nations Children's Fund.

Emergency.lu has already proved its effectiveness several times, most recently after Hurricane Dorian swept through the Bahamas in September 2019.

Pakistan

[Original: English]
[13 November 2019]

The Space and Upper Atmosphere Research Commission (SUPARCO), the national space agency of Pakistan, commenced its journey in the field of outer space and related technologies in the early 1950s and has continuously developed its space technologies for the advancement and peaceful use of space sciences for enhancing the national economy.

Pakistan is focusing on delivering benefits of space applications at the national and regional levels for socioeconomic development, including through the development of satellites, ground infrastructure and space application research centres.

At present, four satellites of Pakistan are being operated in space, including two communication satellites and two remote sensing satellites. PRSS-1 and PakTES-1A, the two remote sensing satellites, were launched on 9 July 2018. PRSS-1 is a high-resolution remote sensing satellite positioned at an altitude of 640 km in a sun-synchronous orbit enabling imagery for socioeconomic development, including in the areas of crop monitoring, forestry, urban planning, disaster management, environmental monitoring and natural disaster management applications. PakTES-1A (Pakistan Technology Evaluation remote sensing satellite) is the first nationally developed 300 kg-class Earth observation satellite and was launched together with PRSS-1.

Pakistan has been operating its own geostationary communication satellite PakSat-1R since 2011. It provides telecommunication, television broadcasting, cellular networking and Internet services across South Asia, the Middle East, Africa and Europe. Pakistan also operates the PakSat-MM1 satellite, and two tracking, telemetry and control relay stations have been established in Pakistan.

Pakistan is cognizant of the need for space legislation. To streamline the process, a national space policy of Pakistan is being prepared to regulate the system and provide a framework for all stakeholders to carry out their operations in the most effective manner.

At the United Nations, Pakistan has participated in all sessions of the Committee on the Peaceful Uses of Outer Space and its subsidiary bodies in 2019, including the fifty-sixth session of the Scientific and Technical Subcommittee, the fifty-eighth session of the Legal Subcommittee and the sixty-second session of the Committee. Pakistan strongly calls for the use of space for peaceful activities on a non-discriminatory basis, irrespective of a State’s level of scientific, technical or economic development. In all the documents that it has recently submitted to the United Nations, Pakistan has reiterated the importance of the definition, delimitation and review of international mechanisms and of transparency and confidence-building measures in outer space activities.

Pakistan participates in various disaster management programmes at the international level and is host to a regional support office of the United Nations Platform for Space-based Information for Disaster Management and Emergency Response. The participation of SUPARCO in the Asia-Pacific Space Cooperation Organization has resulted in the sharing of information related to natural and human-caused disasters for rescue and relief, early recovery, rehabilitation and reconstruction efforts.

SUPARCO plays a part in the International Satellite System for Search and Rescue (COSPAS-SARSAT) as a ground segment provider for search and rescue operations carried out under the low-altitude Earth orbit search and rescue (LEOSAR) satellite system for distress alerting and positioning, which has been upgraded to the medium-altitude Earth orbit search and rescue (MEOSAR) satellite system for distress alerting and positioning. Many new rescue coordination centres have been

established at various national airports. The establishment of another such centre is also in progress at the Pakistan Maritime Security Agency Base Gwadar.

SUPARCO also shares its data sets with international institutions. For instance, in collaboration with the Royal Meteorological Institute of Belgium, a joint recalibration of observatory magnetometers has been conducted at SUPARCO-Islamabad, and magnetic measurements were carried out at the Gilgit-Baltistan site during the month of September 2019.

Smog has now become a regional issue. SUPARCO is assisting national stakeholders through satellite and high-tech ground-based monitoring data in identifying the source of smog and immediate remedial actions. SUPARCO and experts of the World Meteorological Organization will also collaborate on the conduct of an in-depth study of the smog crisis in South Asia.

SUPARCO is also progressively using satellite navigation and developing infrastructure to meet the needs for long-term positioning, navigation and timing data. Other notable projects include environmental monitoring services for the Pakistan Atomic Energy Commission in relation to the Karachi nuclear power project units K-2 and K-3; working on remote sensing solutions for forest change detection in Khyber Pakhtunkhwa; strengthening the database with integrated remote sensing and geographic information system techniques and global navigation satellite systems surveying; conducting a multi-hazard vulnerability risk assessment for a Sindh Province resilience project; conducting an analysis of land cover and crop exposure to food and drought hazards under the multi-hazard vulnerability risk assessment project; and an extension of the dengue information management and analysis system in Hyderabad and Mirpur Khas Divisions in Sindh Province.

With regard to capacity-building, SUPARCO has conducted eight training sessions and provided training to 81 participants from the public and private sectors and academia in the field of remote sensing and geographic information system, covering socioeconomic aspects. It has also invested considerable efforts in raising awareness of space issues among the public, especially young people.

Pakistan participates in various projects and programmes conducted through bilateral and multilateral space cooperation agreements and memorandums of understanding with international organizations and States to develop its space programme. It is a member of the International Astronautical Federation, the International Telecommunication Union, the Economic and Social Commission for Asia and the Pacific, the Food and Agriculture Organization of the United Nations, COSPAS-SARSAT, the Committee on Space Research, the Asia-Pacific Space Cooperation Organization, the Asia-Pacific Regional Space Agency Forum, the Asia-Oceania Space Weather Alliance and the Inter-Islamic Network on Space Sciences and Technology.

Hence, Pakistan will continue to play its role in facilitating the implementation of the global sustainable development agenda under all programmes of regional and international cooperation.

Russian Federation[1]

[Original: Russian]
[20 November 2019]

In 2019, and as at 11 September 2019, the Russian Federation had carried out 14 carrier rocket launches to place in orbit 49 satellites(19 domestic and 30 foreign) for various purposes, including:

- Seven satellites under the Federal Space Programme (Soyuz MS-12, Soyuz MS-14, Progress MS-11, Progress MS-12, Yamal-601, Meteor-M No. 2-2 and Spektr-RG)
- One satellite under the Global Navigation Satellite System (GLONASS) Special Federal Programme (Glonass-M No. 758)
- Four satellites funded using extrabudgetary resources (Soyuz MS-13, Socrates, AmurSat and VDNKh-80)
- Thirty satellites under the commercial launch programme (foreign vehicles)

The carrier rockets were launched from the Baikonur, Plesetsk and Vostochny launch sites.

In addition, two Soyuz-ST-B carrier rockets with a Russian-manufactured Fregat-M booster were launched from the Guiana Space Centre, carrying into planned orbit 10 satellites forming part of the foreign OneWeb and O3b advanced non-geostationary satellite communications and data transmission systems (six OneWeb satellites and four O3b satellites).

Work is continuing on the construction of advanced Angara series launch vehicles and Soyuz-5 carrier rockets and on the development and upgrading of the Federatsia next-generation piloted spacecraft.

State Space Corporation “Roscosmos” is implementing a project entitled “Digital Earth”, which is aimed at providing consistent and unbroken remote sensing coverage of the territory of the Russian Federation and other countries. Digital Earth is intended to provide Russian users, as early as 2021, with unrestricted access to remote sensing data and to the services established on the basis of those data.

In 2019, the principal features of GLONASS have been maintained at a competitive level. Coordinates are determined with a positioning accuracy of 2.7 m and the navigation signal is accessible over 99.8 per cent of the territory of the Russian Federation and 98.9 per cent of the world. As at 11 September 2019, the GLONASS orbital constellation included 27 satellites, comprising 20 GLONASS-M satellites and 1 GLONASS-K satellite used for particular applications, 3 GLONASS-M satellites temporarily withdrawn for technical maintenance, 2 GLONASS-M satellites on standby in orbit and 1 GLONASS-K satellite undergoing flight tests. In 2019, one GLONASS-M navigation satellite was launched and put into normal operation.

The Russian Federation is fully complying with its international obligations relating to the provision of transportation and technical support for the International Space Station and to its operation. The programme of applied scientific research and experiments aboard the Russian segment of the International Space Station for 2019 has also been implemented in full. It included the launch of three Progress MS cargo spacecraft without crew and four crewed Soyuz MS spacecraft, one of which was launched in non-crewed mode (for the return of cargo). It is planned to use the Soyuz MS spacecraft to transport three Russian cosmonauts, four NASA astronauts, one ESA astronaut and one astronaut of the United Arab Emirates, together with scientific equipment, fuel and other cargo, to the International Space Station.

[1] The present section is a summary of the report of the Russian Federation on its national space activities prepared for the fifty-seventh session of the Scientific and Technical Subcommittee. The full report will be made available as a conference room paper.

Scientific experiments in space continue to be successfully carried out with the use of Russian instruments on board foreign satellites. The following Russian scientific projects bear testimony to the country's close cooperation with foreign partners:

- The Radioastron project, which is being carried out using a Russian Spektr-R satellite that operates in conjunction with more than 30 foreign ground-based radio telescopes
- The Spektr-UV ultraviolet spectrum astrophysical observatory project, the scientific instruments for which are being developed with the participation of Spanish organizations
- The Spectrum-Roentgen-Gamma (Spektr-RG) project, a joint Russian-German initiative

On 13 July 2019, the Spektr-RG astrophysical observatory was successfully launched. Currently, the observatory is continuing its flight to the vicinity of the second Sun-Earth Lagrangian point.

ExoMars, a joint project of Roscosmos and the European Space Agency (ESA) for the exploration of Mars, is the most extensive project under implementation. Preparations are under way for the second stage of the project, ExoMars 2020, as part of which it is planned to carry out a programme of research on Mars both with the use of remote sensing capabilities and from aboard the ESA rover and the Russian surface platform.

Work is continuing on lunar exploration projects with the use of the Luna-Glob and Luna-Resurs-1 non-crewed spacecraft (orbiting and landing craft).

The Russian Federation is paying close attention to the mitigation of space debris. Since 2016, the network of electro-optical instruments of the automated warning system for hazardous situations in near-Earth space has been in operation, ensuring the detection of hazardous situations in near-Earth space and of conjunctions with potentially hazardous space objects and the forecasting of the deorbiting and descent of space objects and associated risks, whereby the time and possible location of landing are determined. On 1 January 2019, a new version of Russian Federation national standard GOST R 52925, entitled "Space technology products: general requirements applicable to space assets in order to limit the human-caused pollution of near-Earth space", entered into force.

The Convention of the Commonwealth of Independent States on Cooperation in the Exploration and Peaceful Uses of Outer Space entered into force on 22 May 2019.

On 4 April 2019 an agreement was signed between the Government of the Russian Federation and the Government of Angola on cooperation in the exploration and use of outer space for peaceful purposes.

The International Aviation and Space Salon 2019 was held in Moscow from 27 August to 1 September 2019.