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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

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II. Replies received from Member States

Colombia

[Original: Spanish]
[16 November 2020]

With regard to activities in the area of international cooperation in the peaceful uses of outer space, Colombia wishes to highlight the unconditional support provided by the United Nations and the Republic of India in inviting it to participate in the UNISpace Nanosatellite Assembly and Training programme organized by the Indian space agency (the Indian Space Research Organization) and held in Bengaluru, India, from 15 October to 15 December 2019. The programme was a theoretical and practical course on nanosatellite assembly, integration and testing that assisted Colombia in building the necessary capacity and achieving the objectives of its national programme for the development of Earth observation nanosatellites (FACSAT). It was attended by representatives of 17 countries, thus providing an opportunity to strengthen ties with a view to international cooperation in the future.

Furthermore, Colombia, represented by the Colombian Air Force, participated in international events, such as the International Astronautical Congress 2019, held in Washington, D.C., United States of America, with technical presentations on space development activities carried out by the Colombian Air Force and by Colombia; the UNISpace Nanosatellite Assembly and Training programme; the Committee on the Peaceful Uses of Outer Space; and PeruSAT. Through the Centre for Research on Aerospace Technologies (CITAE), Colombia also carried out several research projects on space technology, including the following:

- (a) A research study aimed at the development of FACSAT-2 satellite sensors;
- (b) An assessment of the potential space capabilities of the Colombian Air Force in Antarctica;
- (c) The detection of illegal opencast mining using deep neural networks applied to FACSAT-1 satellite images.

Among other activities in the area of international cooperation in the peaceful uses of outer space, Colombia, through the Agustín Codazzi Geographic Institute, which is the national entity responsible for producing official cartographic and geographical information using Earth observation technologies, has participated in joint commissions established with countries in the region, such as Mexico and Argentina, to develop and implement projects aimed at the use of Earth observation technologies in order to exploit marine resources and generate products relating to areas affected by fires for the purposes of risk management.

These activities have been conducted in line with the European Space Agency Climate Change Initiative, which is aimed at exploiting the full potential of global Earth observation archives in the long term in order to generate essential satellite-based climate variables as a timely contribution to the databases required by the United Nations Framework Convention on Climate Change and the Intergovernmental Panel on Climate Change.

International cooperation, information on space activities and compliance with the treaties on outer space are also of great importance from the perspective of the defence sector. In this regard, the Colombian Air Force has underscored the unconditional support provided by the United States Department of Defense, specifically the United States Space Command, in relation to the process of concluding a memorandum of understanding on cooperation in space flight safety and the provision of services and information relating to space situational awareness, which is expected to be signed in 2021.

The memorandum of understanding, through the exchange of information on space objects in orbit, acknowledges the mutual interest in the peaceful use of outer space

and the importance of ensuring the safety of space operations and indicates the desirability of greater cooperation between the two countries.

Mexico

[Original: Spanish]
[13 November 2020]

Mexico contributes to international cooperation in the peaceful uses of outer space through the Mexican Space Agency (AEM), which promotes, coordinates and carries out activities in collaboration with national scientific and academic institutions and with space agencies, international bodies and intergovernmental organizations, such as the Italian Space Agency (ASI), the Asia-Pacific Space Cooperation Organization (APSCO), the National Centre for Space Studies (CNES) of France, the Commission for Environmental Cooperation, the National Commission on Space Activities (CONAE) of Argentina, the German Aerospace Center (DLR), the European Space Agency (ESA), Israel Aerospace Industries, the Israel Space Agency (ISA), the Indian Space Research Organization (ISRO), the National Aeronautics and Space Administration (NASA) and the National Oceanic and Atmospheric Administration (NOAA) of the United States, the Office for Outer Space Affairs and the United Kingdom Space Agency, within the framework of international cooperation agreements.

The international cooperation activities carried out include the following:

In response to the problem of sargassum on the beaches of the Caribbean coast of Mexico, AEM requested foreign space agencies and international organizations with which it has concluded collaboration agreements to provide satellite images in order to identify the trajectory of the sargassum. Responses were received from the following space agencies:

- (a) ASI;
- (b) ISRO;
- (c) CNES;
- (d) CONAE;
- (e) ISA;
- (f) DLR;
- (g) Chilean Air Force;
- (h) APSCO.

In addition, a number of activities continue to be carried out under cooperation agreements with space agencies and international bodies:

National Centre for Space Studies. Activities were carried out jointly with the Space Climate Observatory, a group of space agencies and international bodies established with the aim of coordinating international initiatives, in order for researchers, academics and scientists to submit proposals for assessing and monitoring the effects of climate change using satellite observations and computer models, as part of the initiatives planned for 2021.

National Commission on Space Activities. Under the agreement on space cooperation concluded by AEM and CONAE, CONAE offered to provide radar images, multispectral images and digital models free of charge. This will provide Mexican institutions and agencies with information relevant to the creation of products for mitigating the effects of natural disasters and facilitating post-disaster decision-making with regard to assessment and the recovery of cities.

European Space Agency. Within the framework of the Integrated Applications Promotion programme, which is dedicated to development, implementation and pilot

operations and involves the use of existing space data applications, such as Earth observation, satellite communication and satellite navigation, the following two projects are being implemented in collaboration with AEM:

(a) A project on vessel monitoring, which is in the process of being implemented with the National Commission for Protected Natural Areas (CONANP) of the Ministry of the Environment and Natural Resources (SEMARNAT);

(b) A project on the monitoring of infrastructure for hydrocarbons, which is at the design stage and is to be implemented jointly with the National Commission on Hydrocarbons (CNH), the Ministry of Energy (SENER), the Energy Regulatory Commission (CRE) and the Agency for Safety, Energy and the Environment (ASEA).

Indian Space Research Organization. The capacity and skills of Mexican experts are being strengthened in relation to the monitoring and processing of satellite images of forest fires. Furthermore, an application for detecting forest fires is being adapted for Mexico, a ground station is being built in Mexico to receive data from ISRO satellites, and a workshop on the use of satellite images to prevent, fight and mitigate the impact of forest fires is to be held in 2021.

National Aeronautics and Space Administration. AzTechSat-1 was developed by a multidisciplinary team of students and teaching staff from the Universidad Popular Autónoma del Estado de Puebla, supported by a team of mentors comprising specialists from AEM and NASA. The satellite was launched on 4 December 2019.

National Oceanic and Atmospheric Administration. NOAA donated 10 GEONETCast receiving antennas to Mexico; the antennas have been installed and are in operation throughout the country. In addition, NOAA helped to upgrade the receivers for those antennas so as to enable them to continue to operate normally.

Commission for Environmental Cooperation. Within the framework of the twenty-fifth session of the Council of the Commission for Environmental Cooperation, on the topic of “extreme events”, which focused mainly on droughts, forest fires and floods, AEM submitted a proposal entitled “Use of satellite images for early warning systems”, which was the winning proposal and led to three training workshops: the first in Mexico from 13 to 15 November 2019, the second in the United States from 22 to 24 September 2020 and the third in Canada from 6 to 8 October 2020.

The workshops helped participants to identify needs with respect to the improvement or implementation of early warning systems in Mexico and to explore how those systems could be aligned with existing early warning systems in the United States and Canada.

Office for Outer Space Affairs. AEM is a regional support office for the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER) and as such is responsible for coordinating outreach, capacity-building, cooperation and technical assistance activities.

Accordingly, AEM and UN-SPIDER have carried out a number of activities, such as joint work with the National Centre for Disaster Prevention (CENAPRED) and the National Civil Protection System (SINAPROC), as well as work carried out at the request of the Ministry of Foreign Affairs, through the Directorate General for United Nations Affairs, to enable AEM and UN-SPIDER to help address the problems caused by drought in the countries of the northern triangle of Central America.

In addition, following the earthquake that occurred on 23 June 2020, UN-SPIDER provided a series of maps generated with high-resolution TerraSAR-X radar images donated by Airbus Defence and Space, which showed with greater accuracy the possible locations of landslides in the area of Oaxaca. Those maps were then analysed jointly with the National Centre for Disaster Prevention.

Italian Space Agency. ASI, through the Copernicus Emergency Management Service, provided access not only to data from the Italian COSMO-SkyMed satellites but also to satellite and security data for the European Union (e-GEOS).

Asia-Pacific Space Cooperation Organization. APSCO activated its emergency mechanism with the assistance of the Government of the People's Republic of China in order to provide images and data relating to the earthquake of 23 June 2020. That contribution will be used to generate products that will help to determine which access routes have been affected by landslides and which villages have been cut off. It will also facilitate appropriate decisions with regard to the mapping of the damage caused, rescue operations and possibly recovery.

Cooperation related to the global coronavirus disease (COVID-19) pandemic

A series of meetings was held with other space agencies to consider and discuss technological satellite applications and the use of Earth observation satellite images with a view to enabling each country, in accordance with the outcomes of those meetings, to make recommendations to the health authorities regarding the establishment of public policies.

Indian Space Research Organization. At the meeting with ISRO, information was shared on how ISRO is taking action to help contain the spread of the COVID-19 virus. Similarly to the action taken in Mexico, India has also established environmental epidemiology systems based on geographic information systems (GIS).

National Commission on Space Activities. CONAE has been carrying out environmental epidemiology/landscape epidemiology activities based on GIS platforms, using not only information relating to the health of the population, confirmed cases and economic activities, but also information obtained through mathematical epidemiological models and meteorological studies. The meteorological studies are still at the preliminary stage; however, the possible role of nitrogen dioxide in increasing the spread of COVID-19 has been studied in more detail. Work is also being carried out on the effect that ambient temperature and relative humidity have on the survival time of the virus on certain types of surfaces. At the meeting, ties were established between CONAE and the main Mexican entities working on the issue. It was also agreed that the Mexican group working on the landscape epidemiology platform would establish direct contact with its counterpart in Argentina.

European Space Agency. At the meeting with ESA, reference was made to the close ties and cooperation that have existed since the creation of AEM. ESA gave a presentation on the activities it has carried out to support space medicine projects. The issues mentioned included estimates of the dispersion of mosquitoes as epidemiological vectors correlated with meteorological factors, as in the case of zika, for example, the use of artificial intelligence to exploit satellite information, and the correlation between levels of particulate pollutants and respiratory diseases and between levels of solar radiation and dermatological problems. In addition, experience in the use of satellite-based mobile communications to support telemedicine projects, particularly in the Amazon and in parts of Africa, and in the establishment of mobile biological laboratories during Ebola epidemics was shared. ESA has not yet initiated any specific projects relating to COVID-19, but it has called for tenders for three projects on the use of space technology to help contain the spread of COVID-19. Those calls have been published in collaboration with the United Kingdom Space Agency and ASI, among other European space agencies. ESA has also made all its Earth observation information available for the implementation of projects relating to COVID-19.

Italian Space Agency. ASI indicated that it had not carried out any activities of its own to help contain the spread of COVID-19 but had provided satellite information, primarily for GIS platforms used to conduct studies on the pandemic. It also indicated that all the information from its Earth observation satellites had been made available

to Italian institutions for the purposes of studies on COVID-19. For example, ASI had provided information on nitrogen dioxide, air quality, mapping, traffic density and property surveys. In collaboration with ESA, ASI had invited tenders for projects relating to the use of satellite information to monitor transmission of the coronavirus. As a result of the meeting, it was agreed that AEM would analyse the information provided by Italian satellites in order to request the images needed for studies that could benefit Mexico during the current pandemic.

National Centre for Space Studies of France. CNES, like other space agencies, has paid particular attention to the implementation of telemedicine projects to help contain the spread of COVID-19. Under those projects, portable devices have been made available to facilitate communication with medical command centres for the treatment of infected patients. Moreover, satellite technology has been used to support distance learning services and the availability of Internet services throughout France during the emergency. CNES has worked closely with local companies on the integration of satellite observation and in-situ data for the development of mathematical models for estimating the impact of the pandemic on the French economy. With regard to contact tracing, private companies have worked on the development of platforms that use Bluetooth technology for that purpose. An agreement was reached to continue to exchange information in order to identify specific areas of collaboration and facilitate requests for images in order to enable the two countries to implement joint initiatives.

Japan Aerospace Exploration Agency. Unlike other space agencies, the Japan Aerospace Exploration Agency indicated that it had provided information but had not played a vital role in studies on how to contain the spread of COVID-19. In particular, it had made information from its entire satellite fleet available, including information from both optical and radar sensors, primarily for environmental and meteorological monitoring applications. It also indicated that all the products created using its satellites were freely available and invited Mexico to access, through the relevant channels, any information it required in addressing the COVID-19 emergency.

Myanmar

[Original: English]
[13 November 2020]

The Government of the Republic of the Union of Myanmar has formulated a space programme (Myanmar Space Programme) aimed at realizing the aspirations to launch a national satellite and gaining control over strategic national communications and broadcasting. The second aim is to create a commercially viable and sustainable satellite-based communications industry in Myanmar, building a selective position in regional and multiregional markets.

In this respect, Myanmar issued a request for proposals dated 10 August 2015 and selected the satellite operator Intelsat, a global leader in the supply of satellite services, with the aim of setting up a venture for the joint operation of a satellite to be launched in the future, and in the meantime for the lease of satellite capacity through a five-year agreement on the satellites (Intelsat 902, located at 62 degrees East, and Intelsat 906, located at 64.15 degrees East).

In the agreement, there is a long-term service option. The agency (the Information Technology and Cybersecurity Department of the Ministry of Transport and Communications) has the option to accept an indefeasible right of use, and if the agency would like to exercise the long-term option, it has to notify the operator and pay the cost of the indefeasible right of use, \$155.7 million, to be paid in 10 quarterly payments.

Intelsat launched the Intelsat 39 satellite on 6 August 2019. According to the indefeasible right of use agreement for the satellite payload, the payload on the satellite is to be separately branded and marketed by Myanmar as its own satellite

under the name “MyanmarSat-2”. This activity is a second step in the Myanmar Space Programme.

The MyanmarSat-2/Intelsat 39 satellite is located at 61.95 degrees East, and Myanmar owns the capacities of 6x72 MHz C-band and 6x72 MHz Ku-band, in total 864 MHz, for the satellite life of 15 years, to be provided for satellite communication services. The capacity of 432 MHz C-band can be used by the Myanmar regional C-band spot beam, and the 432 MHz Ku-band can be used by the steerable Myanmar regional Ku-band spot beam.

Intelsat 39 is a high-power geostationary communications satellite that can provide broadband networking and video distribution services in Africa, Europe, the Middle East and Asia.

The third step in the Myanmar Space Programme is to launch a national satellite. The national satellite launch steering committee of Myanmar decided to launch a microsatellite for Earth observation. Myanmar Aerospace Engineering University carried out the Earth observation microsatellite project in cooperation with Hokkaido University, Japan. The mass of the 50 cm tube satellite is about 50 kg.

The satellite construction was carried out at Hokkaido University. The ceremony of transferring the satellite from Hokkaido University to the Japan Aerospace Exploration Agency (JAXA) took place on 21 October 2020. Very important persons and officials from Myanmar participated in the event through online videoconferencing. Under the agreement with Hokkaido University, JAXA is responsible for launching the satellite, called “MMSAT 1”. The satellite will be transported to the International Space Station (ISS) by JAXA in February 2021, and it is scheduled to be released into orbit from ISS in March 2021.

The satellite will be located in low Earth orbit at an altitude of 400 km above the Earth’s surface. It will orbit the Earth longitudinally, passing above the South and North poles and traversing the Earth’s rotation. It will also pass over Myanmar twice a day, once in the daytime and once in the night-time.

Each time the satellite passes over Myanmar, it will be controlled by the ground control station located at the Myanmar Aerospace Engineering University in Meiktila, Myanmar. While it is passing over Myanmar, it will be able to capture sky images and remote sensing data over Myanmar with its optical payload on board. For satellite control, telemetry data will be transmitted through an S-band uplink (1 kilobit per second) from the ground control station, and images and data (raw data) will be transmitted through an X-band downlink (2 megabits per second) from the satellite to the ground station. The satellite will have a lifespan of two and half to three years.

The Myanmar Earth observation microsatellite launching programme includes two 50 kg satellites and two ground control stations, one in Myanmar and the other at Hokkaido University. There are satellite testing laboratories and a scholarship programme for trainees to study in Japan. The total cost of the programme is \$15.3 million, to be paid in five years.

In September 2023, the second satellite will be launched directly into orbit at an altitude of 600 km. The second satellite will be built by Myanmar trainees in Myanmar. Owing to the global coronavirus disease (COVID-19) pandemic, students cannot study in Japan at present, but online training started from 1 July 2020, which will be followed by study in Japan.

This project will provide sky photos and Earth observation data related to the following:

- (a) Agriculture sector;
- (b) Forestry sector;
- (c) Urban planning sector;
- (d) Maritime and oceanography sector;

- (e) Mineral exploration and mining sector;
- (f) Hydrology and water resources sector;
- (g) Environmental sector;
- (h) Disaster management sector.

Earthquake data can also be made available.

Using space technologies can benefit international peace, safety and security. The Government can ensure peaceful, safe, secure and sustainable space activities while performing this project. Moreover, as a milestone of the UNISPACE+50 symposium for the wider space community to exchange views on the future of international space cooperation and the peaceful uses of outer space, our country will take part as a participant in the regional and global development of present and future space science and technology for the peaceful use of outer space.

Peru

[Original: English/Spanish]
[11 November 2020]

As expressed on other occasions, Peru shares the common interest of States in responsibly increasing the exploration and peaceful uses of outer space, by virtue of the present and future benefits that may be generated. In that regard, Peru recognizes the importance to humanity of outer space as a means of the development of nations.

This relevant role has been maintained even in the special and difficult global context created by the global coronavirus disease (COVID-19) pandemic. In this regard, it should be noted that Peru is working on the implementation of space technology applications in the health sector.

Peru presents a synthesis of its national space activities during the year 2020 below.

General topics

In 2020, the Peruvian Space Agency, as the governing body of space activities in Peru, together with the Ministry of Foreign Affairs and the Ministry of Defence, promoted the approval by the competent State planning body of the requirement to start the formulation of a national multisectoral space policy that will allow the optimization of resources and the coordinated strengthening of national efforts for the development of national space projects.

In addition, several agreements on cooperation in space activities have been signed with national and international entities for the purpose of offering and exchanging products and services based on the use of space information for better decision-making.

The Peruvian Space Agency, seeking to create interest among the general public, constantly carries out campaigns to promote awareness of space activities at the national level. In 2020, owing to the global COVID-19 pandemic, intensive use of information and communications technologies has been made to disseminate content in this area.

Activities in the fields of science and astronomy

The Centre for Space Observation, located in the city of Huancayo, operates a telescope with a 15 cm aperture that is integrated into an observation network implemented by the Asia-Pacific Space Cooperation Organization (APSCO), with nodes in Pakistan and Iran, allowing the monitoring of operational space objects (satellites) and non-operational space objects (debris) for the purpose of contributing to the security of the space infrastructure of APSCO member countries.

During the summer in the southern hemisphere, in the framework of the annual Peruvian scientific expedition to Antarctica, a Cherenkov-type cosmic ray flux receiver was installed in order to investigate the behaviour of this phenomenon at that location. That study has already produced a scientific publication. Additionally, during the Antarctic expedition, a very low-frequency signal receiver in broadband mode was installed for the first time, with the purpose of studying phenomena that occur in very short periods of time in the ionosphere due to the effect of solar activity.

The Peruvian Space Agency has implemented an astronomical observatory in the Moquegua region, at an altitude of more than 3,200 m above sea level, where an optical telescope with an aperture of 1 m has been installed; this observatory is registered with the Minor Planet Center under the code W73. With this instrument, a series of observations have been made in 2020, such as the occultation of the star TYC 0620-01340-1 by the asteroid (102) Miriam, which occurred on 27 August 2020. The passage of the asteroid (52768) 1998 OR2, considered potentially dangerous for the Earth, was also recorded; it reached its maximum approach to our planet on 29 April 2020. Likewise, the supernova SN 2020dko was observed, contributing to improving the estimation of its luminosity and other parameters, together with other observatories in the world.

Activities in the field of geomatics

During 2020, the Peruvian Space Agency developed a series of relevant works around the use of satellite images to provide useful information for decision-making in various sectors of the State through value-added products, including the elaboration of the national mosaic of metric images to support ecological and economic and forest zoning, support in the elaboration of cartography by blocks, the elaboration of frost frequency maps with satellite meteorological information, the identification of dry forests and the operation of a permanent alert service with attention to the need for a response to disasters.

In this regard, the Emergency Operations Centre of the Ministry of Health (COE Salud) recommends the use of the information produced by PeruSAT-1 for the monitoring of natural disasters and the analysis of vulnerability reduction at the national level, since it contributes to the generation of very accurate information for the monitoring of natural disasters.

PeruSAT-1 contributes to the analysis of hazard identification and estimation of physical vulnerability in relation to the territorial scope of health facilities. In this regard, interest has been shown in carrying out studies to stratify the levels of danger, risk and zoning in the geographical areas exposed to natural phenomena, for example, the identification of risks to health establishments according to their location near the following: riverbanks, mouths of active streams, sanitary landfills, geological faults, etc.

Additionally, in the field of research, the Peruvian Space Agency has carried out projects to determine the radiometric and geometric quality of images from the Peruvian satellite system, the validation of the identification of illicit crops, the elaboration of maps of water resource contamination resulting from mining activities, and the characterization of the Amazon with hyperspectral images.

Activities in the field of space operations

The Peruvian Space Agency, from its National Satellite Image Operations Centre (CNOIS), monitors and operates the Peruvian Satellite System (SSP), processing and supplying daily satellite images to the different registered users in the Peruvian State; counting from the beginning of operations to 30 September 2020, 74,256 satellite scenes were delivered from all the satellites that are part of SSP, a service in which attention to images in emergency situations due to natural disasters has been prioritized.

Additionally, in 2020, the Peruvian operations team successfully participated for the first time in the PANAMAX exercise, in combination with teams from other space agencies, in order to simulate work that would lead to a timely response in the event of a natural disaster in the region, which would activate the response protocols.

In 2020, the fourth course on space systems was carried out at the Senior College of Air Warfare (ESFAP), a course that is taught annually with the purpose of qualifying new engineers in aerotechnical specialties of the Air Force of Peru so that they can count on the capacity to be integrated into future crews that operate SSP.

Activities in the field of scientific training and dissemination

The Peruvian Space Agency has continued with academic activity aimed at training personnel specialized in the analysis, interpretation and exploitation of satellite images, through online courses for professionals from Peruvian public institutions working on satellite image applications.

The isolation measures in the face of the COVID-19 pandemic made it impossible to continue with classroom courses, so from June 2020 the teaching of a free five-hour online induction course on the fundamentals of satellite images and their applications began. The course was aimed at the general public, with the purpose of teaching in a very practical way the use of satellite images from PeruSAT-1. The course was disseminated using the social networks of the Peruvian Space Agency and achieved great acceptance, as reflected in the fact that it reached full enrolment within 48 hours.

In 2020, Peru also continued to offer the basic 10-hour online courses that have been well received by Peruvian universities and regional governments, leading to the training of more than 200 specialists in the public sector.

Another important activity to highlight for Peru is the current online international webinar programme on space technology, in which 34 organizations, including space agencies, companies and institutions in this sector, from the five continents of the world (America, Europe, Asia, Oceania and Africa) have confirmed their participation as lecturers.

Activities in the field of space weather studies

The Geophysical Institute of Peru, through its headquarters at the Jicamarca Radio Observatory, continues to carry out activities that make possible the observation, monitoring and study of physical parameters of space weather for peaceful purposes. Measurements are taken throughout the year using a variety of instruments that make it possible to observe the conditions of the interaction of the Sun with the space surrounding the Earth or geospace. The relevance of the monitoring and study of the space climate is due to the impacts that it can produce on the technological systems of our society, affecting the activities of the economic and social sectors. Among the systems that can experience a detrimental impact are satellite telecommunications and global navigation satellite systems, which are widely used in applications for disaster risk management, as well as for civil, military and defence purposes.

Since Peru is near the magnetic equator, it is possible to take measurements of the high atmosphere at these low latitudes, where physical phenomena typical of these space regions occur.

At the Jicamarca Radio Observatory, space weather monitoring is carried out in particular in the ionosphere region for the purpose of measuring the variations and behaviour of physical parameters that make it possible to generate new knowledge applications and technological development. The Geophysical Institute of Peru has various instruments distributed across different points in the territory of the country and in neighbouring countries for the observation of the ionosphere, including radar systems, Global Positioning System (GPS) and radio frequency receivers, satellite signal receivers, ionosondes, magnetometers, airglow cameras and optical instruments. The radar located at the Jicamarca Radio Observatory is considered the most powerful and largest in the world and allows high-precision measurements of

different ionospheric parameters, such as electron density, temperature, composition and ion speed. In addition, with the radar measurements it is possible to detect the presence of irregularities or scattered F structures, making it possible to study them throughout the year. By means of the ionosondes, other ionospheric parameters are observed, such as the maximum electron density of the ionosphere and its corresponding height. The magnetometer network monitors the variations of the Earth's magnetic field and the effect of the ionosphere. The network of GPS receivers is used to determine maps of electron content in the ionosphere in longitude and latitude coordinates, which also makes it possible to perform studies of ionospheric irregularities such as scattered F and fluctuations in radio signals captured by the receivers. With the optical instruments, it is possible to investigate the movement of neutral gases in the high atmosphere, in addition to correlating with the occurrence of plasma irregularities in this space region.

The Geophysical Institute of Peru thus contributes by providing and sharing information with the national and international scientific community through space climate observations and research on Peruvian territory, generating knowledge that can be very useful for planning the various strategies and management activities aimed at mitigating and reducing risks related to space climate in order to optimize the effective response processes of the authorities and the population and for the development of new technologies.

Future projections in the field of health

The Ministry of Health has incorporated into the National Tele-Health Network 2,026 health service institutions, which develop telemedicine, teletraining, remote management, tele-information, education and communication services benefiting the entire population of the country. However, the main barrier to the implementation of tele-health is the connectivity gap that exists in Peru, especially in the most remote rural areas.

In this regard, work is being done to promote connectivity by satellite, which would allow health institutions anywhere in the country to be connected and have access to tele-health and digital health services.

Turkey

[Original: English]
[24 November 2020]

The Turkish Space Agency was established in 2018. In coordination with the Agency, the development of the national space programme and strategic plans is ongoing. Within the scope of preparations for the national space programme, a preparatory workshop was organized in 2020 with the participation of administrators, experts and scientists from institutions, organizations, the private sector and universities on a national scale.

Within the scope of the collaboration developed between Turkey and Japan, a test sample of a self-repairing nanocomposite material developed by Istanbul Technical University was sent to the International Space Station Kibo module in 2018 to be exposed to space radiation tests. Tests of the material were completed in 2019 and brought back to Turkey. Scientific examination of the test sample was carried out in 2020.

The Turkish Space Agency aims to increase international cooperation in space activities at the bilateral and multilateral levels. In this context, cooperation agreements were made with various countries in 2020, and the Agency participated in the activities of international organizations related to outer space. In addition, a working report was prepared in 2020 with industry stakeholders to conduct national evaluations for participation in the European Space Agency.

Turkey develops projects with various institutions, organizations and companies in the field of satellite and satellite subsystem development. In this context, various ongoing satellite projects are presented in the section below. Apart from those projects, plans are being prepared for the development of new satellite and space projects in coordination with the Turkish Space Agency.

Ongoing projects/activities of Türksat

Türksat 6A domestic communication satellite project: Turkey continues its production activities of Türksat 6A, the first domestic communication satellite. The satellite is in the testing phase and is planned to be launched in 2022.

Türksat SA and Türksat SB communication satellite projects: The Türksat SA communication satellite is scheduled to be launched on 30 November 2020, and Türksat SB will be launched in 2021 to improve the country's communications capacity.

IMECE optical remote sensing satellite project: The satellite's electro-optical camera and many subsystems have been developed in Turkey. The satellite is planned to be launched in 2021.

Lagari remote sensing microsatellite: The Lagari remote sensing microsatellite is being developed by STM, together with a Turkish partner.

ASELSAT: ASELSAT is a 3U cube satellite that will communicate on the X-band. The satellite is being developed by Istanbul Technical University and Aselsan.

Grizu-263A pocket cube satellite: The satellite (0.25U) was developed by Bülent Ecevit University and is planned to be launched on 17 December 2020.

East Anatolia Observatory project: The East Anatolia Observatory project started in 2012 and will be operational in 2021. The telescope has an optical mirror with a diameter of 4 m that works in the near-infrared and visible wavelengths.

eXTP satellite project: The enhanced X-ray timing and polarimetry (eXTP) mission, an X-ray satellite, is being developed in partnership with the European Space Agency and the Chinese Space Agency. With the support of the Turkish Space Agency, Sabanci University and the TÜBİTAK Space Technologies Research Institute will contribute to the satellite's software development work, together with European partners. The scheduled launch date for the mission is 2027.

United Arab Emirates

[Original: English]
[25 November 2020]

Exploration missions supporting the international scientific community

The Emirates Mars Mission (Hope Probe) was launched on 19 July 2020 (21:58 UTC) from the Japanese Aerospace Exploration Agency (JAXA) Tanegashima Space Center in Japan on a Mitsubishi Heavy Industries H-IIA booster. The Mission is a space exploration probe mission to Mars that is funded by the United Arab Emirates Space Agency. The probe was built by the Mohammed Bin Rashid Space Centre, the University of Colorado and Arizona State University with the aim of enriching the capabilities of Emirati engineers and increasing human knowledge about the Martian atmosphere. It is an example of a collaborative scientific project with research institutions abroad, as a contribution towards a knowledge-based economy.

On 28 September 2020, MeznSat, a minisatellite developed through a collaboration between Khalifa University, the American University of Ras Al Khaimah and the United Arab Emirates Space Agency, was successfully launched into space aboard a Soyuz-2b rocket from the Plesetsk Cosmodrome in the Russian Federation. The goal of MeznSat is to provide data on greenhouse gas concentrations, including carbon dioxide and methane, using a short-wave infrared spectrometer, in the atmosphere of

the United Arab Emirates. It will also collect data on the red tide phenomenon in the United Arab Emirates.

The Government of the United Arab Emirates has announced a new satellite project that will be 100 per cent Emirati-made and launched in 2023. MBZ-SAT will be the most advanced commercial satellite in the region for high-resolution imagery, a 3 m x 5 m satellite that will improve image capture resolution by more than double what is possible now.

In addition, the Government of the United Arab Emirates has announced the launch of the Emirates Lunar Mission, the first Emirati and Arab mission to explore the Moon, which includes the development and launch of the first Emirati lunar rover, named "Rashid", by the Mohammed Bin Rashid Space Centre. The mission supports the efforts of the United Arab Emirates to enhance the region's space industry and contribute to its future, built by innovative Emirati minds.

Capacity-building activities

The United Arab Emirates Space Agency, in collaboration with the Mohammed Bin Rashid Space Centre, has launched the Kibo Robot Programming Challenge, an educational competition about creating a programme to operate free-flying robots in the International Space Station. This comes as part of the Agency's efforts to develop the skills of youth in science and technology and to inspire them to get involved in the space sector.

Also, in July 2020, the leadership of the United Arab Emirates announced the Arab Space Pioneers programme, which aims to build Arab expertise in space science and technologies and to empower the region's talents in the creative and scientific industry to practise their passion in space-related studies. A committee of scientists, researchers and thinkers will comprehensively evaluate applicants on the basis of their qualifications and achievements in science and research and innovative skills that can be developed. In total, the programme has attracted more than 37,000 applicants from different countries in the Arab region.

Environmental and disaster management

The United Arab Emirates Space Agency and the Mohammed Bin Rashid Space Centre are active members of the International Charter on Space and Major Disasters. Its members include space agencies and space system operators from around the world that work together to provide satellite imagery for disaster monitoring purposes. Types of disasters include cyclones, earthquakes, fires, floods, snow and ice, ocean waves, oil spills, volcanoes and landslides.

Additionally, space utilization plays a vital role in monitoring weather, climate and the environment, the management of natural resources, crisis and disaster management, and rescue and humanitarian aid programmes. Also, the effective utilization of available space capacities in the United Arab Emirates is constantly being improved through the enhancement of coordination among local institutions that offer space services and applications and the governmental entities concerned with natural disasters and national crisis management.

The United Arab Emirates Space Agency is working on land cover and land use mapping in collaboration with a number of national stakeholders. The goal of the project is to develop a land cover and land use map product for the entire country using high-resolution satellite images. This will lead to the development of local capabilities in the field and a positive contribution towards updating the developed maps.

Effective local and international partnerships

In March 2019, the Arab Space Cooperation Group was announced, setting a huge milestone towards sharing experiences related to the long-term sustainability of outer space activities, expertise and information exchange. The prime objectives of the

Group are to exchange knowledge, boost the Arab space industry and work on joint projects. The Group's first project, known as "813", will be a remote sensing/Earth observation satellite built by Arab space specialists from all countries in the Group. It will aim to tackle climate and environmental issues in the Arab world and other parts of the globe.

The new hyperspectral satellite 813 is funded by the United Arab Emirates Space Agency and will be developed by Arab engineers at the National Space Science and Technology Centre at the United Arab Emirates University in Al Ain. The development of the satellite will take three years, and it will have a lifespan of about five years. The planned launch year is 2023 or 2024. The satellite will have a polar orbit of 600 km. The data will be sent to a ground station in the United Arab Emirates and receiving stations in some Arab countries for the benefit of a number of environmental authorities, municipalities and institutions concerned with the agricultural sector and urban planning industry.

As part of the NewSpace Innovation Programme and the contribution of space activities to the national economy, in 2019, the United Arab Emirates Space Agency also launched the GeoTech Innovation Programme, in collaboration with Krypto Labs, as a pilot incubation programme for innovative space ideas. The aim of the programme is to accelerate the growth of high-potential start-ups in developing space applications and solutions using satellite data in the categories of urban and rural land management, crisis and disaster management and coastal border security, and to transform their innovative ideas into commercially viable, scalable and market-ready products and services. Two start-ups have successfully graduated from the programme: Farmin, an agricultural platform combining artificial intelligence and satellite imagery, and Ayn Astra, a geospatial image intelligence company providing a land monitoring platform using satellite data. The company's offers include geospatial analysis and mapping solutions.

In 2020, in collaboration with Krypto Labs, the United Arab Emirates Space Agency launched the Global Space Industry Accelerator initiative, which falls under the umbrella of the National Space Investment Promotion Plan, which adds further value building on experience from the GeoTech Innovation Programme by focusing on selected areas from the science, technology and innovation road map. The aim of the programme is to nurture a sustainable space industry and to foster a national ecosystem through innovation and research and development. In addition, it is designed to provide the necessary support for entrepreneurs and start-ups in the space industry in alignment with national objectives. Four start-ups have graduated from this programme, namely, SARSat Arabia, StarCense, InSky GreenTech and Eagle.i71.

In addition, the United Arab Emirates Space Agency, along with six other space agencies, signed the Artemis Accords of the National Aeronautics and Space Administration at the seventy-first International Astronautical Congress, to advance international space cooperation and strengthen the mutual ambition for the peaceful uses of space exploration. The Artemis Accords are based on a shared vision for principles grounded in the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, of 1967. The Accords are aimed at creating a safe and transparent environment that facilitates space exploration, science and commercial activities for the benefit of all humanity. The Accords are in line with the principle of the peaceful use and exploration of outer space, upheld by the United Arab Emirates.

Supportive space policies and legislation

The United Arab Emirates National Space Strategy 2030 includes an initiative aimed at enhancing the national utilization of space services and capacities through integration between different space applications, such as communications, Earth observation, remote sensing and navigation. The initiative seeks to enhance their integration with ground applications of communications, navigation, remote sensing and others. It is also aimed at developing new applications and innovative solutions

that support governmental, commercial and research interests in different fields, such as transportation of all kinds, natural resources management, surveillance, energy and the environment.

To support and enable the space sector, the United Arab Emirates Space Agency developed and approved remote sensing space data policy guidelines for institutional missions, in which it recalls principles, goals and ambitions stemming from the National Space Policy and elaborates on them in the context of United Arab Emirates institutional remote sensing space missions and data provision, and establishes voluntary guidelines aimed at providing a reference for institutional remote sensing space mission owners/operators to develop their own data policies for their own missions.

The data policy guidelines leverage international best practices and include forward-looking considerations. They were developed for institutional satellite missions generating remote sensing data, and they provide guidance to United Arab Emirates institutional remote sensing satellite owners/operators to develop their own data policies.
