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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

Algeria

[Original: French]

1. Space activities in Algeria in 2007 were characterized by accelerated implementation of the National Space Programme (2006-2020), whose main purpose is the use of space tools to promote sustainable development.

2. Implementation of the Space Programme focuses mainly on:

(a) Design and production of space systems in line with national needs;

(b) Installation of space facilities and specific equipment;

(c) Development and mobilization of human skills in the field of space technology and its applications;

(d) Development of international cooperation in this area.

3. The pursuit of these initiatives necessitated the reorganization of national space activities, including the establishment, at the Algerian Space Agency (ASAL), of new operational entities responsible for implementing the programme:

(a) The Satellite Development Centre, which is entrusted with the development and production of space systems and will make it possible to commence the incorporation and testing of the AlSAT-2B high-resolution Earth observation satellite in 2009;

(b) The Space Applications Centre, which is entrusted with the conduct of activities relating to the use of satellite data and systems arising from space programmes in connection with the various user sectors;

(c) The Telecommunication Systems Operation Centre, which is to be responsible for the management, operation and marketing of products and services of the Algerian AlCOMSAT-1 telecommunications satellite envisaged under the space programme.

4. The National Centre for Space Technology has been reorganized as the Space Technology Centre, whose main activities will involve the various fields of research mentioned below.

1. Space applications

5. In view of the importance of space applications, priority has been assigned to the continued implementation of projects relating to the prevention and management of natural and industrial disasters.

6. In addition to the activities that were continued in 2006, new projects have been established. They concern the promotion of the use of space tools in the habitat sector and the development of new methodologies for surveying African steppe and desert areas, the implementation of a geographical information system (GIS) specifically for use by local communities and so on.

7. The main activities relating to the contribution of space technology that were carried out in 2007 are set out below:

(a) Natural disaster prevention and management:

(i) Installation of a natural hazard warning system at the Directorate-General for Civil Defence. This project, which involves networking of institutions specializing in natural disaster prevention and management, is part of efforts to improve coordination between the civil defence services and the institutions concerned;

(ii) Seismic risk prevention and management. This entails creating the necessary conditions for initiating the project entitled "Updating seismic hazard maps using space technology" with the relevant institutions;

(iii) Forest-fire assessment and prevention. This project continues the forest-fire assessment programmes for the north of the national territory using AlSAT-1, which have been carried out jointly with the Directorate-General for Forestry since the summer of 2003, and the development of the forest-fire prevention and management system, which will be based on Earth observation data and indicators for establishing risk maps;

(iv) Locust control. ASAL has continued its active participation in efforts to combat locust infestation by analysing desert locust biotopes of the Maghreb and Sahel through the mapping of ecological situations using AlSAT-1 in locust-breeding areas;

(b) Land use management:

(i) National plan for sustainable land use management. This involves setting up a project for ground use classification and shoreline monitoring using a GIS;

(ii) Ecological monitoring of steppe areas for combating desertification. The start of work on updating cartographic material relating to sensitivity to desertification based on AlSAT-1 data is planned for 2007. A survey will be made of the ecological state of fragile zones, the most recent one having been undertaken in 1996;

(iii) Space technology for health applications. The following four projects were formulated in 2007:

a. A medical teleconsultation project targeting at-risk pregnancies and paediatrics. Under this project, a portable medical device will be used to provide links between the Ouargla Hospital and the Algiers University medical centres (El Harrach and Hussein-Dey) and a health-care centre in the Ouargla region;

b. Three tele-epidemiological projects involving the use of remote sensing for the characterization of environmental parameters linked to the emergence of epidemics, such as malaria in the El Kala region and cutaneous leishmaniosis in the high plateaux, and the characterization of cholera vibrios by the colour and turbidity of seawater in the Bay of Algiers and its environs;

(c) Assessment of natural resources and management of basic infrastructure. Priority activities relate to improving knowledge in various fields, such as:

(i) Energy and mines, including the following priority projects:

a. The production of a geological map of Algeria on the scale of 1:500,000;

b. A feasibility study on the implementation of a pipeline protection and management system with an environmental audit;

(ii) Water resources, involving the implementation of a series of measures in connection with the flood prevention and management system:

a. Scaling of the project on mapping of flood-prone zones at the pilot site situated in the El Harrach sub-catchment area;

b. Initiation of monitoring work on hydraulic structures using satellite-based global positioning systems (GPS) and radar interferometry technologies;

(iii) Surveying of African steppe and desert areas, involving the adoption of a methodological approach based on high-resolution imagery to survey such areas. A pilot study was conducted on the El Bayadh commune.

2. Space systems

8. In this area, priority has been given to:

(a) The continuation of the project initiated in mid-2006 concerning the design and production of two high-resolution AlSAT-2 Earth observation satellite systems, which are expected to enter into service by 2009;

(b) The continuation of work on the installation of two Earth observation satellite systems as part of regional and Arab cooperation, namely, the African resource and environmental management satellite (ARMS) constellation project initiated by Algeria, Kenya, Nigeria and South Africa and the Arab Satellites for Earth Observation (ASEO) project.

3. Training and research

9. The quality of human resources is the determining factor in the success of the National Space Programme. It is accordingly planned to treble scientific capacity by the end of 2009.

10. A feature of the year 2007 was the establishment of the Doctoral School of Space Technology and Applications, which will mobilize the expertise of five universities. It will admit some 50 doctoral candidates each year.

11. With regard to participation in space-related events, mention should be made of the following:

(a) Activities to mark the fiftieth session of the Committee on the Peaceful Uses of Outer Space at the United Nations Office at Vienna. ASAL represented Algeria through its participation in the exhibition held from 6 to 29 June 2007 on the following themes:

(i) International cooperation in the peaceful uses of outer space;

(ii) Space technology and its applications for the welfare of humankind;

(iii) Natural disaster management;

(iv) Space science and exploration;

(b) *Action Educspace*. This programme, which targeted pilot high schools and baccalaureate students, was launched in May 2004 and continued in 2005 and in December 2006 on the occasion of the celebration of the fourth year of the placing in orbit of the Algerian AlSAT-1 satellite through the organization of National Space Week. It was continued in 2007 in parallel with the National Space Week;

(c) Celebration of the twentieth anniversary of the creation of the National Centre for Space Technology and the fifth anniversary of the launch of AlSAT-1. The organization of a meeting at Arzew is planned from 26 to 28 November 2007 to mark these two events, with presentations of:

(i) The history of the Centre, covering its various phases and achievements;

(ii) The various operations carried out using AlSAT-1 images.

4. International cooperation

12. Algeria is continuing to strengthen its scientific and technical cooperation links in the areas of space activity with several countries and organizations.

13. In this context several framework agreements and memorandums were signed with space agencies in a number of countries and other draft agreements are being finalized (Argentina, China, France, India, the Republic of Korea, the Russian Federation, South Africa and Ukraine, among others).

14. The Algerian delegation's participation in the meetings of the Committee on the Peaceful Uses of Outer Space has enabled it to reaffirm the country's commitment to implementing and pursuing its National Space Programme with a view to promoting sustainable development and the welfare of peoples.

15. In its statement before the Committee, the Algerian delegation reiterated its support for the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER) programme and its readiness to host one of the regional bodies to be set up under the programme.

16. In addition, ASAL organized, in collaboration with the African Regional Centre for Space Science and Technology – in French Language and the Algerian Association for Research on Climate and Environment, an international workshop entitled "Climate change and adaptation in Africa: the role of space technology".

17. This scientific event, attended by 140 researchers, experts and representatives of various institutions, made it possible to identify the major challenges facing Africa through an analysis of the main obstacles and to define strategic approaches for the future.

Brazil

[Original: English]

1. Brazil continues to place great emphasis on international cooperation and has been developing many activities with several countries.

1. Cooperation with Ukraine

2. Brazil and Ukraine are concentrating their best efforts on setting up a bi-national company, Alcantara Cyclone Space, which was created by a treaty signed in 2003 and will be in charge of the exploitation of the Alcantara Launch Centre, a privileged site because of its proximity to the Equator, through the launching of the Cyclone-4 vehicle developed by Ukraine. The Board of Directors held its first meeting on 30 August 2007.

3. The project is seen as of great interest to Brazil, since it also contributes to bringing the Alcantara Launch Centre into full operation.

2. Cooperation with India

4. The already fruitful relations with India in the space area acquired new impetus recently with the visit of Madhavan Nair, Chairman of the Indian Space Research Organization, to Brazil in May. In June, Brazil's President visited New Delhi, on which occasion an implementing arrangement was signed regarding cooperation in augmentation of a Brazilian Earth station for receiving and processing data from Indian remote sensing satellites.

3. Cooperation with China

5. The China-Brazil Earth Resources Satellite (CBERS) programme is a successful example of South-South cooperation and constitutes a basic feature in the mutually beneficial Brazil/China partnership. The CBERS-2B satellite, the third in this family, was successfully launched on 19 September from Taiyuan, China.

6. As regards CBERS applications, since 2004, more than 320,000 CBERS images have been distributed at no cost to about 5,000 users, in Brazil, China and neighbouring countries, from private and governmental organizations, to be used in applications such as forest monitoring and agriculture support.

Cuba

[Original: Spanish]

1. During 2007, space research and applications continued to expand in Cuba in pursuit of the peaceful uses of outer space and modest yet indisputable advances

were made in promoting its sustainable development. The most significant space-related achievements are set out under the headings below.

1. Space meteorology

2. The country has given priority to developing the Institute of Meteorology (INSMET) of the Ministry of Science, Technology and the Environment (CITMA) and improvements were made in its weather forecasting, with the attainment of 90 per cent efficiency, through the operation of the eight installed radars and 68 meteorological stations and the optimum use of its high-resolution satellite station.

3. Timely and systematic provision of weather prediction data, supported by high-resolution satellite images, and organizational measures implemented by the Cuban Civil Defence in the area of preventive evacuation made it possible to significantly limit loss of human life during the heavy rains brought by tropical storm Noel to the eastern part of the country, with the occurrence of just one fatality, resulting from a rash attempt to cross a river in full spate.

4. The damage caused by Noel in the eastern region was severe, mainly affecting roads, housing, drinking water supplies and farming, but the country threw itself into providing support to the affected provinces in order to reverse the devastation within the shortest possible time.

2. Studies and projects under implementation in the field of geographical information and remote sensing techniques

5. High-resolution images from the INSMET station continue to offer timely information for detecting forest fires and studying dust clouds from storms occurring in the Sahara desert.

6. Through the application of multivariate statistical techniques and the use of imagery from satellites in the National Oceanic and Atmospheric Administration (NOAA) of the United States of America and Geostationary Operational Environmental Satellite (GOES) series, a preliminary climatological survey was undertaken on Saharan dust clouds for the Caribbean and Cuba. The impact of dust clouds in the Atlantic, Caribbean and Gulf of Mexico on rainfall and tropical cyclogenesis was assessed and an extensive study was made of the effects of these clouds on human health.

7. Cuban agriculture continues to use space applications in detailed thematic mapping of farming enterprises and cooperatives in the Havana provinces, including their infrastructure and land under cultivation. The findings have been incorporated into geographical information systems (GIS), making it possible to increase farming efficiency.

8. Through supervised classification of five images from the enhanced thematic mapper plus (ETM+) sensor on board Land Remote Sensing Satellite 7 (Landsat-7), researchers from the CITMA Institute of Oceanology identified and mapped five benthic habitats in Cuba's Gulf of Batabanó, taking into account the substratum and submarine vegetation (seagrass and macroalgae).

9. The Institute of Oceanology also studied general circulation patterns in Cuban shelf sea currents using satellite imagery. Seven space maps of marine current

movements in the island shelf area were prepared for that purpose through visual interpretation of images of different dates from the thematic mapper (TM) and ETM+ sensors of the Landsat Earth observation programme and the high-resolution visible (HRV) sensor on board the SPOT-2 satellite. To assist the visual interpretation and corroborate the results obtained, use was made of a current-meter measurement network in sectors of the island shelf. The image-based interpretation coincided with 100 per cent of the field measurements.

10. Researchers at the GeoCuba remote-sensing agency carried out a project using statistical-mathematical methods to evaluate the accuracy of geometric processing of images from the QuickBird sensor and assess uncertainties regarding the reliable use of the images for mapping purposes. The geometric accuracy achieved and the analysis of data content providing high-resolution input reaffirmed the use of these images as an intermediate solution for updating and creating large-scale, specific-purpose maps and updating medium- and small-scale topographic maps.

11. The GeoCuba agency prepared, as the outcome of another project, the first user's handbook on management and use of images from the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) for medium-scale digital mapping and land surveying. The handbook provides the main tools for processing ASTER images with a view to their subsequent use in the mapping process.

12. The global positioning system (GPS) station (SCUB station) at the Geodynamics Observatory of the National Seismology Research Centre in Santiago de Cuba was reclassified as a reference station of the International Global Positioning System Service for Geodynamics participating in the actual establishment of the International Terrestrial Reference Frame (ITRF), which means that one of the points defining the basic terrestrial coordinate system is now located on Cuban territory. The data obtained have enabled the station coordinates to be determined with an error of the order of 4-5 millimetres, both in rapid weekly solutions and in final multi-year analyses. The station is very important for geodynamic and geodesic studies within the country and it has been possible, through the continuous operation of the SCUB station, to determine the speed and direction of movement of the North American plate in the area of Santiago de Cuba and to observe fluctuations in the north-south component of the motion that are related to seismic activity in its vicinity.

3. International Heliophysical Year

13. In 2007, the CITMA Institute of Geophysics and Astronomy (IGA) prioritized regular observations by the Geomagnetic Observatory, the Ionospheric Vertical Sounding Station and the Havana Radio Astronomy Station, whose data are exchanged with the international scientific community. Data from geomagnetic measurements are sent to the International Real-time Magnetic Observatory Network (Intermagnet) geomagnetic information node in Edinburgh (United Kingdom of Great Britain and Northern Ireland), while radioastronomical data are transmitted to world data centres A, B and C and to Russian institutions requesting them.

14. Within the framework of the International Heliophysical Year, the wireless link from the Radio Astronomy Station to the IGA network server was designed and built

as a first step towards placing the Station's data online. The Geomagnetic Observatory will also shortly use this route to transmit its data.

15. Also in 2007, as part of the collaboration between IGA and the Institute of Geophysics at the National Autonomous University of Mexico and in acknowledgement of the International Heliophysical Year, significant results were achieved in signal quality and the process of calibration and tuning of the Mexican Array Radio Telescope (MEXART), a radio interferometer for interplanetary scintillation observations.

16. As a collaborative venture between IGA and the National Institute of Astrophysics, Optics and Electronics of Mexico, a further project was initiated for the design and construction of a 12.5 gigahertz radio telescope.

17. Following the revitalization of the treatment of astronomy in its educational and cultural plans, the National Natural History Museum in 2007 launched its "By Light and Stars" learning programme. Activities carried out under this programme included a temporary exhibition entitled "Colours of the Night", a number of amateur astronomic observations and an educational and cultural programme to support the teaching of the solar system.

4. Space sciences

18. Under a project concerning characterization of types of proton events and arrival parameters relating to interplanetary coronal mass ejections (ICMEs) associated with high-intensity solar radio events for the period 1987-2003, IGA researchers studied possible scenarios of particle acceleration for proton events with a high-intensity and low-intensity metric component using solar metric radio emission data on the basis of stepwise multiple regression analysis with analysis of variance.

19. Researchers from IGA and the Basovizza Radio Astronomy Station of the Trieste Astronomical Observatory in Italy studied pulsating structures in solar radio emission at 237 megahertz and described the two different types of pulsation observed prior to the solar flare of 9 September 2001. Use was made of observations with high temporal resolution of the radio polarimeter at the Basovizza Station.

20. Under a project on space-time characterization of very short-duration solar bursts, IGA researchers analysed the temporal structure of 135 cases of coronal mass ejections with complex behaviour.

21. At the Roque de los Muchachos Astronomical Observatory in Spain, an IGA doctoral student has continued to carry out photometric characterization of symbiotic stars, for the purpose of identifying candidate stars in the galactic plane, using visible far-red and near-infrared photometric data. A bibliographical review was undertaken of published articles dealing with photometric properties of symbiotic stars in the emitting regions of the electromagnetic spectrum.

22. With the use of multiple linear regression methods and on the basis of some 850 optical observations of comet C/1983 H1 (IRAS-Araki-Alcock), comet 55P (1995) Honda-Mrkos-Pajdusakova and comet 55P (1998) Tempel-Tuttle, as recorded in the *International Comet Quarterly*, the expressions characterizing the comets' heliocentric light curves and optimal adjustments at different phases of their trajectories were determined at IGA and it was established that the Delta effect

could be seen during periods when the comets were at a distance of less than 0.3 astronomical unit from the Earth, thus making it possible to improve brightness predictions during those trajectory phases.

5. Distance learning

23. Distance learning has remained a priority for Cuba, whose two educational television channels accordingly continue to broadcast a varied schedule of programmes. Through this medium, primary and secondary pupils receive classes in the subjects that form part of the teaching syllabus. Special courses, including astronomy, the forests of Cuba and renewable energy sources, are also provided in order to broaden the general culture of the public. To that end, all educational institutions in the country are equipped with television sets and video players.

6. World Space Week

24. On 4 October 2007, the Cuban Society for the History of Science and Technology, the Academy of Sciences of Cuba and CITMA celebrated the fiftieth anniversary of the beginning of the space era, at Humboldt House in the Office of the Historian of the City of Havana, as part of World Space Week. Lourdes Palacio Suárez, Director of IGA, made a speech inaugurating the event in Cuba. The illustrious José Altshuler delivered a lecture entitled “Sputnik remembered half a century on”. Those present included the President of the Academy of Sciences of Cuba, Ismael Clark, and José Legro of the Ministry of the Revolutionary Armed Forces. The event was well attended.

25. The sixth national workshop on outer space and its peaceful uses was held in Jimaguayú Hall at the National Capitol building, on 9 October 2007, with the presentation of 18 papers by Cuban scientific institutions.

26. The Sancti Spiritus Natural History Museum of the Ministry of Culture was the venue for the national meeting of amateur astronomers held from 5 to 7 October 2007. The 15 papers presented were discussed and a number of side exhibitions were organized. Also, a special talk was given at the Museum’s planetarium.

27. The National Natural History Museum and IGA organized a nocturnal observation session in areas of the Museum, with the participation of researchers from both centres, amateur astronomers and the general public.

28. For the first time since 2000 the posters for World Space Week did not arrive. We learned of this through a message from the assistant to Dennis Stone, Volunteer President of the Spaceweek International Association, a non-governmental organization, informing Lourdes Palacio Suárez, Director of IGA, that posters for the 2007 celebrations could not be posted since, because of the blockade restrictions, it was not possible to send any mail to Cuba except letters and postcards.

Republic of Korea

[Original: English]

1. Long-Term Plan for National Space Development Promotion

1. In 2007, the Long-Term Plan for National Space Development Promotion was established according to the Space Development Promotion Act of 2005. The Plan replaces the existing Mid/Long-Term Space Development Plan as it provides a vision and direction of national space policy through 2016 reflecting fast-changing domestic and international space technology advancements, policies and environmental changes.

2. The Plan changes the focus of space policy from a programme-oriented approach to the acquisition of independent core space technology and establishes milestones and strategies for the independent development of satellites and launch vehicles based on implemented space programmes. The schedules of satellite and launch vehicle development as well as strategies based on the Mid/Long-Term Space Development Plan have also been revised after appropriate examination.

3. The Plan is expected to play a pivotal role in systematically promoting space development and the use and management of space objects.

4. In general, space activities in Korea are well under way and will continue to operate well with the Government's stable and systematic support. The successful launch of KOMPSAT-2 in 2006 gave impetus to satellite programmes, the space launch vehicle programme, the astronaut programme, and space applications in 2007.

5. With the successful operation of KOMPSAT-2, we are working on the development of the succeeding KOMPSAT series, including KOMPSAT-3 and -5, aiming to secure self-sustaining high-resolution observation satellite technology and to transfer the results obtained from government-funded technology development to the commercial sector.

6. In 2007, Korea excelled in developing the Korea Space Launch Vehicle (KSLV-1), scheduled to be launched around the end of 2008. In addition to launching KSLV-1, Korea's first astronaut's flight to the International Space Station using a Soyuz spacecraft will be the biggest event of 2008.

2. Satellite development programme

(a) Korea Multi-Purpose Satellite Programme

7. Korea's major research institute in the space field, the Korea Aerospace Research Institute (KARI), developed the Korea Multi-Purpose Satellite-1 (KOMPSAT-1, also known as Arirang-1), over five years of collaborative research with the TRW Space and Technology Group of the United States of America. KOMPSAT-1 is a small-sized 470-kilogram (kg) Earth observation satellite with an orbital altitude of 685 kilometres (km). KOMPSAT-1 was successfully launched from the Vandenberg Air Force Base in California (United States) on 20 December 1999 and is still in operation beyond its three-year life span.

8. The KOMPSAT-1 has three payloads: a high-resolution electro-optical

camera (EOC), an ocean scanning multispectral imager (OSMI) and a space physics sensor (SPS). The EOC, the main payload, collects panchromatic imagery with a ground sample distance of 6.6 metres (m) and a swath width of 17 km. The KOMPSAT-1 EOC imagery could be used as the basis for a geographical information system (GIS) and land development programme. The primary mission of the OSMI is to conduct worldwide ocean colour monitoring and environmental monitoring. The Republic of Korea has been releasing relevant data to local and overseas users since 1 June 2000. Such data are authorized for use for peaceful purposes only. KOMPSAT-1 was the first Korean satellite for Earth observation. Following the KOMPSAT-1 project, Korea has built a national infrastructure for Earth observation satellites.

9. Since the successful launch of the KOMPSAT-1, KARI developed the Korea Multi Purpose Satellite-2 (KOMPSAT-2), an 800-kg Earth observation satellite with an orbital altitude of 685-km. The main mission of KOMPSAT-2 is the acquisition of GIS images for the Korean Peninsula during its three-year life span. A multispectral camera (MSC) is the main payload of KOMPSAT-2, developed jointly with Electro-Optics Industries, Ltd. (ELOP) (Israel). The MSC is capable of taking photostatic images with 1-m panchromatic resolution and 4-m multispectral resolution with a swath width of 15 km. Several domestic companies took charge of satellite manufacturing and assembly. ELOP and Astrium took part in this programme as foreign partners. Eurockot (Germany) was selected as launch service provider. KOMPSAT-2 has been operating well since its launch from the Plesetsk Cosmodrome in the Russian Federation on 27 July 2006.

10. A KOMPSAT-3 project also has been under way since July 2004. It aims to support national satellite demand and form a technology infrastructure to make inroads into the world space industry at an early stage by improving the indigenous capability to develop and design highly advanced remote sensing satellites. It is expected to be launched in the middle of 2011. The mission objectives of the KOMPSAT-3 are to provide continuous satellite observation of the Earth after KOMPSAT-1 and KOMPSAT-2 and to meet national needs for the high-resolution electro-optical images required for the establishment of a GIS and for environmental, agriculture and ocean monitoring applications.

11. In 2005, the KOMPSAT-5 project to develop the first Korean synthetic aperture radar (SAR) satellite started. It aims to support the national demand for SAR satellites. The main mission objectives of the KOMPSAT-5 system are to provide the so-called GOLDEN mission, a GIS, ocean and land management and disaster and environment monitoring.

12. The KOMPSAT-5 satellite will be delivered to low-Earth orbit for all-weather day-night monitoring of the Korean Peninsula. The launch will take place in May 2010. After achieving mission orbit and implementing in-orbit tests, repetitive SAR observations of Earth's land and oceans will be conducted for five years.

(b) Science and technology satellite programme

13. The fifth Korean small satellite, Science and Technology Satellite-2 (STSAT-2), has been developed under the direction of KARI. The spacecraft bus was developed by the Satellite Technology Research Centre and the Korea Advanced Institute of Science and Technology. The microwave radiometer was

developed by the Gwangju Institute of Science and Technology. The STSAT-2 programme commenced in October 2002. It has been successfully developed and is now waiting for launch by the Korea Space Launch Vehicle-1 (KSLV-1) from the Korean Naro Space Centre in 2008.

14. The missions of STSAT-2 in the applications of space science and technology are manifold. It carries payloads for various space science observations and space engineering tests. The main aim of its space science missions is to acquire brightness temperature data of the Earth at 23.8 and 37 gigahertz by microwave radiometry, which will provide physical parameters such as cloud liquid water and water vapour content after post data processing. Eventually the processed data can be utilized to yield an accurate global modelling of rainfall. The microwave radiometer has been developed jointly in cooperation with China. STSAT-2 has also been equipped with a satellite laser reflector to demonstrate its precession orbit determination capability.

15. As its next development programme, KARI is currently developing STSAT-3, that is, another small satellite, starting with defining new mission objectives. Its space science mission is to survey the galaxy with an infrared sensor (1-2 micron) for measuring emissions from diffuse warm ionized medium in the galaxy and the cosmic infrared background light from first-generation stars in the universe.

(c) Korea commercial communication satellite programme

16. The commercial communication satellite named Koreasat-5 owned by KT, Korea's top integrated wired/wireless communications service provider, was launched successfully in 2006 and is in operation. Koreasat-5, the nation's first communications satellite, was developed by a joint project between the private and military sectors.

17. As the demands of high-speed and multimedia services increase, the series of KOREASATs, Korean communications and broadcasting satellites, play a key role in the information business sector.

(d) Communication, ocean and meteorological satellite programme

18. KARI is undertaking to implement the Communication, Ocean and Meteorological Satellite (COMS) programme for the Republic of Korea.

19. The COMS programme is a national programme of the Government of the Republic of Korea to develop and operate COMS for compound missions of meteorological observation and ocean monitoring, and space tests of experimentally developed communication payloads, in geostationary orbit. The target launch of COMS is scheduled for mid-2009.

20. The mission of COMS is to provide Korea with the following services over the mission lifetime of at least seven years:

(a) Meteorological service:

(i) Continuous monitoring of imagery and extracting of meteorological data with a high-resolution and multispectral imager;

(ii) Early detection of special weather such as storms, floods, yellow sand and so on;

(iii) Extraction of data on long-term changes in sea surface temperature and clouds;

(b) Ocean monitoring:

(i) Monitoring of marine environments around the Korean Peninsula;

(ii) Production of fishery information (chlorophyll and so on);

(iii) Monitoring of long-term/short-term changes in the marine ecosystem;

(c) Satellite communication:

(i) In-orbit verification of the performance of advanced communication technologies;

(ii) Experimentation with wide-band multimedia communication service.

21. The space segment of COMS includes a spacecraft platform and three different payloads (meteorological imager, ocean colour imager and communication payload). In the ground segment of the COMS, there will be the Meteorological/Ocean Data Application Center (MODAC) as a primary data-processing centre, which will receive raw image data, generate calibrated image data as well as extracted products and distribute processed data (high-rate information transmission (HRIT)/low-rate information transmission (LRIT)) through the spacecraft. The spacecraft operation and monitoring will be performed at the Satellite Operation Centre (SOC). The latter will also have back-up functions as data-processing centre to provide for emergency situations of the primary data-processing centre. SOC and MODAC will be connected through exclusive data transmission lines. The Communication System Monitoring Centre will monitor radio frequency signals to check the status of the Ka-band communication system.

22. The COMS system will work as follows: meteorological and ocean monitoring imagery taken from a geosynchronous orbit will be transmitted to MODAC, where the raw data will be calibrated geometrically and radiometrically and be converted to processed data. Some of the processed meteorological data will be sent back to the spacecraft for the distribution of data to regional end-users. The processed meteorological and ocean data will be distributed to domestic end-users through existing ground networks.

3. Space launch vehicles

23. Korea started the development of the first Korea space launch vehicle, Korea Space Launch Vehicle (KSLV-1), in 2002 in cooperation with the Russian Federation and is scheduled to launch it around the end of 2008.

24. At the moment, Korea is accelerating the development of KSLV-1 to successfully launch it from her own territory, Ko-Hoeung. During 2007, there were a few events in the development process. Firstly, quality model assembly was completed and then a kick-motor combustion test was performed for a duration of 60 seconds. The Korea-Russian Federation cooperative work on developing KSLV-1 becomes more active as the technical safeguards agreement concluded between the Governments of the Republic of Korea and the Russian Federation comes into effect.

Space centre

25. A space centre is being constructed for the space launch vehicle. The first phase of the construction of the centre will be completed by the end of 2008 for launch of KSLV-1. The centre is located in Ko-Hoeung on the southern coast of the Korean Peninsula.

26. The space centre will be equipped with state-of-the-art facilities, such as a launch complex including storage and supply facilities for liquid propellants, an assembly complex, tracking and controlling facilities, and other key facilities.

27. Also operating a visitor centre, the space centre will play host to thousands of guests from all over the country, telling the story of Korea's past, present and future challenges in space. By providing all these facilities and infrastructure, the space centre will play a central role in Korea's space development.

4. Space technology applications and space science

(a) Space technology applications

28. Applications from KOMPSAT-1 have significantly affected the remote sensing community in Korea since its launch in 1999. Korea is now expecting to become an internationally competitive power in remote sensing, following the successful launch of KOMPSAT-2 with higher resolution in July 2006. Some preparatory work for KOMPSAT-2 applications were performed in 2006.

29. The current concerns and issues are:

(a) KOMPSAT-2 Calibration/Validation activities:

(i) Calibration of KOMPSAT-2 sensors and images;

(ii) Establishment of product validation site for end-user applications;

(b) Policy formation for KOMPSAT-2 data users:

(i) Basic plans of data application;

(ii) Top-level KOMPSAT-2 data policy;

(iii) KOMPSAT-2 data commercialization;

(c) Interface between the user group and KARI:

(i) Website application for KOMPSAT users;

(ii) Offices and a software system for external users.

30. KARI actively carried out pre- and post-launch calibration of KOMPSAT-2 sensors and established product validation sites over the Korean Peninsula for the validation of data application products.

31. Domestic user groups can use KOMPSAT-2 data at the cost of production for non-commercial, public and research purposes. They are required to register the names of their organizations. Commercial and foreign users can purchase KOMPSAT-2 data from the Korea Aerospace Industry Ltd. (KAI) and SPOT Image, which are the marketing agencies for KOMPSAT-2 data. KARI contracted with KAI for marketing in Korea, the United States and the Middle East, and with SPOT Image for marketing to other countries.

32. KARI established an on-line data catalog search system of KOMPSAT-2 data. Registered users can search KOMPSAT-2 data via the Internet. The catalog search system includes the satellite browse image and related information such as date, time, geographical location, cloud cover and so on.

33. KOMPSAT-1 data have been widely used in various areas such as mapping, land cover classification and disaster monitoring. KOMPSAT-2, with a higher spatial resolution of one metre, will bring stronger competitive power and more possibilities to remote sensing in Korea.

(b) Space science

34. Space science research in Korea has been carried out by KARI, the Korea Astronomy Observatory, SaTReC of the Korea Advanced Institute of Science and Technology and major universities in Korea. As the satellite and sounding rocket programmes evolved in the 1990s, space science research also became more active in the Republic of Korea. Before that the data analysis of foreign programmes or ground-based observations had constituted the major portion of space science research in Korea. The Science and Technology Satellite series has measured global high-energy particle distribution and the Earth's magnetic field.

35. The KOMPSAT-I carries out global ionosphere measurements as well as high-energy particle experiments. The sounding rocket programmes have also contributed to ionosphere and ozone layer experiments. Other experiments in ultraviolet and X-ray observation are also rapidly growing subjects for upper atmospheric science and astronomy using satellites and sounding rockets.

5. Korean astronaut project

36. The Korean astronaut project started on 16 November 2005 as the national space development plans and the selection of astronaut candidates began with a 3.5-km running test on 2 September 2006. The final two astronaut candidates among 36,206 applicants were chosen on 25 December 2006 after various stages of physical, mental and intelligence tests. Finally, on 5 September 2007, the Astronaut Selection Committee at KARI selected San Ko as the primary astronaut and Soyeon-Yi as a back-up astronaut.

37. The two Korean astronauts have been undergoing astronaut training at the Gagarin Cosmonaut Training Centre in the Russian Federation since March 2007. In April 2008, after finishing training, the primary astronaut will fly to the International Space Station aboard a Soyuz spacecraft and perform several scientific experiments there.

38. The Korean astronaut project has very important technical and social significance in Korea. It will bring us advancement in science and technology and enhancement of Korea's international status by securing manned space technology, as well as the creation of economic value from the far-reaching ripple effects throughout industrial circles. Also, by successfully sending an astronaut into space, this project inspires national self-respect and pride in all Koreans and provides an opportunity for the younger generation to foster a dream of scientific technology.

6. Conclusion

39. Korea has been carrying out its space programme step by step according to the Long-Term Plan for National Space Development Promotion. In 2007, Korea solidified its space technology basis upon its accomplishments in space development and prepared for another leap in the years to come.

Thailand

[Original: English]

1. Thailand focuses its international cooperation primarily on the area of Earth observation, in which it cooperates with many countries, such as Canada, China, France, India, the Islamic Republic of Iran, Japan, the Lao Democratic People's Republic, the United States of America and Viet Nam.

2. Thailand is an active member of the following international bodies and organizations: the Asian Conference on Remote Sensing, the Asia-Pacific Advanced Network, the Asia-Pacific Regional Space Agency Forum, the Asia-Pacific Space Cooperation Organization, the Centre for Space Science and Technology Education in Asia and the Pacific, the Committee on Earth Observation Satellites, the Group on Earth Observations, the Committee on the Peaceful Uses of Outer Space and the Economic and Social Commission for Asia and the Pacific.

3. Other activities include:

(a) The first Earth observation satellite of Thailand (Thailand Earth Observation System, THEOS) is scheduled to be launched in early 2008;

(b) ALOS ASEAN sub-node: cooperation with the Japan Aerospace Exploration Agency to set up the ALOS data-receiving station and services covering 10 countries of the Association of Southeast Asian Nations (ASEAN).

Tunisia

[Original: French]

1. National Commission for Outer Space Affairs

1. The National Centre for Remote Sensing (CNT) was set up in 1988 on the recommendation of the National Commission for Outer Space Affairs (CNEEA), which was established in 1984 to implement Tunisia's space policy. At that time, an ambitious programme to promote the use of space technologies to benefit the country's development programmes was set up.

2. Article 2 of the decree establishing a National Commission for Outer Space Affairs defined the Commission's mandate, focusing on the following main areas:

(a) Recommendation of a national policy on the peaceful uses of outer space;

(b) Coordination of the activities of ministerial departments and agencies dealing with outer space affairs and promotion of the possibilities offered by outer space techniques;

(c) Awareness-raising, information and information monitoring.

3. The establishment of CNT was among the recommendations of CNEEA that have actually been implemented and the Centre has served as a tool created by the authorities for the implementation of space policy, as it existed at that time.

4. As far as the national space programme is concerned, CNT was given no guidance or specific work programmes by CNEEA that would have enabled it to orient or define more precisely the structural missions assigned to it by the decree under which it had been created. In this context, CNT was, in May 1998, assigned two tasks, which had until that time been entrusted to the Regional Institute for Computer Sciences and Telecommunications, which was then undergoing privatization, as follows:

(a) To act as the technical secretariat of the National Commission for Outer Space Affairs, while the administrative secretariat function remained with the Ministry of Scientific Research and Skills Development;

(b) To coordinate the national space programme.

5. Since then, the Commission, which was supposed to meet at least every quarter, has met twice: in March and September 1999. CNT presented the national report on activities relating to the peaceful uses of outer space at the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III) in July 1999. The report was prepared on the basis of the available information and to a lesser extent as the result of national consultations extending to all the national stakeholders involved.

6. CNT proposed changes in the membership of the Commission and the preparation of a programme of work. A meeting was eventually held in March 2003 at the offices of the Ministry of Higher Education, Scientific Research and Technology and its main recommendation was to emphasize the need to review the membership of the Commission, a recommendation that has not been implemented.

2. Space activities in Tunisia

7. From its earliest days, CNT endeavoured to organize many training activities, open days, workshops, seminars and other scientific and technical activities in order to increase the awareness of the national institutions responsible for monitoring, administration and conservation of natural resources and those responsible for development programmes, about remote-sensing techniques and the benefits they can bring.

8. These various activities have allowed a certain national momentum to develop, shown in particular by the national programmes based on remote sensing, to which CNT has made a considerable contribution.

9. The effect of CNT's activities on the private geographical information sector should also be noted: from the 1990s onwards, many new consulting firms have been established specializing in the processing of space data from various sources,

founded by people who received some or all of their training from CNT or in projects organized by it.

10. In accordance with its mandate, CNT makes use of remote sensing and geographical information systems (GIS) to contribute to national projects on priority topics in areas such as agriculture and natural resources, the environment, land use planning and databases related to sustainable development.

11. Immediately after its creation, the Centre began studies on projects using remote sensing and dealing with priority topics in the sectors described above.

12. CNT built on this preliminary work by extrapolating the acquired methodologies in order to implement projects on the topics described below.

(a) Environment

13. In accordance with the recommendations of Agenda 21, Tunisia attaches the greatest importance to the environment, since environmental protection will guarantee sustainable development in a healthy environment.

14. Because it provides an overall view and its observations are repeated frequently, remote sensing increases the sum of knowledge about the state of the environment and allows developments to be monitored, providing updated information to help decision makers in the implementation of environmental protection measures.

15. For this purpose, a number of projects and studies using satellite images as a source of information have been conducted by CNT. They may be classified into three groups: coastal and marine environment, desertification and natural risks.

(i) Coastal and marine environment

16. The projects implemented by the Centre using the remote-sensing tool are:

(a) Study of marine pollution in the Gulf of Gabès;

(b) Protection of the Hammamet coast;

(c) Simulation of airborne space technologies for the evaluation, analysis and monitoring of marine ecosystems in the southern Mediterranean (the AMED project);

(d) The COSMOS coastal environment monitoring system (an extension of the coastal protection project);

(e) Phyto-ecological cartography of Sabkhit Ariana;

(f) Use of remote sensing for monitoring and protection of the Tunisian and Libyan coasts.

(ii) Desertification

17. In the area of desertification, the Centre has contributed to the following projects:

(a) Study of the dynamics of desertification in the Menzel Habib region;

(b) Satellite surveillance of desertification in southern Tunisia (VSD);

(c) Use of Radarsat data for the interpretation of natural phenomena (GlobeSAR);

(d) Changes in arid Mediterranean ecosystems in the long term and Earth observation (CAMELEO);

(e) Environment and population dynamics (DYPEN);

(f) Monitoring of desertification in the countries of the southern Mediterranean: implementation of pilot projects in Morocco and Tunisia, study on extension to Algeria (local initiatives for urban environment programme (LIFE); TCY/00/TN/018);

(g) Application of a methodology based on remote-sensing techniques and GIS for monitoring and control of desertification with a view to extension to other Arab countries;

(h) Maghreb drought early-warning system;

(i) Using satellite images and terrain spectroradiometry to describe areas of erosion and deposit following changes in land use in mountainous areas (MENA);

(j) Prevention of environmental degradation due to drought and reduction of its impact using an early-warning system permitting regular monitoring of environmental changes in Algeria, Morocco and Tunisia (SMAS).

(b) Natural risks

18. In this context, CNT has conducted the following studies in partnership with the relevant institutions:

(a) Evaluation of damage caused by the floods of January 1990 in the Sidi Bouzid area;

(b) Design and implementation of a Tunisian system for the prevention and control of forest fires.

(c) Agriculture

19. Agriculture, which is of crucial importance to the national economy, is a sector where remote sensing can make a valuable contribution to decision-making. The studies and projects conducted by CNT in this field cover natural resources and agricultural planning and production.

(i) Natural resources

20. The following projects related to inventory and management of natural resources have been conducted:

(a) Forest inventory through remote sensing (INFOTEL);

(b) Inventory of forest clearings in the Siliana governorate;

(c) Inventory of oases in the Kebili governorate;

(d) Geological cartography in northern Tunisia;

(e) Selection of suitable sites for the installation of hill catchments in the Bajah region;

(f) Selection of suitable sites for aquaculture;

(g) Use of images from the National Oceanic and Atmospheric Administration of the United States for monitoring and controlling surface water resources;

(h) Sustainable management of scarce resources in the coastal zone (SMART);

(i) Sustainable groundwater management in the Jeffara Basin;

(j) Use of remote sensing to count olive trees;

(k) Development of decision-support products for the management of the Jeffara Basin to promote the use of satellite data for monitoring and management of natural resources (AQUIFER);

(l) Optimization for sustainable water resources management (OPTIMA).

(ii) Agricultural planning and production

21. Projects implemented in this area are:

(a) Crop inventory in the Bajah governorate;

(b) Food security;

(c) Remote sensing as applied to Tunisian agricultural statistics (TASAT; an extension of the food security project);

(d) Regional agricultural maps.

(d) Land use planning

22. Land use plans make use of baseline studies to assess the status of various aspects of the environment – physical, ecological and socio-economic. Traditional methods of investigation permit a quantified approach, but the results are incomplete and provide only a snapshot; they do not cover all components of the environment. They require considerable human and material resources over a considerable period of time. In this context, remote sensing can make a valuable contribution to land use management studies.

23. Among the many projects and studies conducted relating to urban and rural land use planning, infrastructure and capital development, the following may be mentioned:

(a) Urban land use planning. Study of urban pressure on agricultural land in the districts of Tunis, Greater Sousse, Mahdia and Zarzis;

(b) Rural land use planning:

(i) Cartography of water and soil preservation works;

(ii) Management and programming of public services in dispersed rural habitats (in particular, electrification based on solar energy);

(c) Infrastructure and capital development:

(i) Study on the selection of an airport site;

(ii) Remote sensing study of integration of a stretch of motorway;

(iii) Land use master plan for the South-West economic region.

3. Activities affecting the region and the continent

24. Tunisia hosts the Regional Centre for Remote Sensing of the North African States, of which the following countries are members: Algeria, Egypt, Mauritania, Morocco, Sudan and Tunisia. From 1990 to 2006, Tunisia chaired the Governing Council of the Centre.

25. Tunisia chairs the Governing Council of the African Organization of Cartography and Remote Sensing.