



# General Assembly

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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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## I. Replies received from Member States

### Costa Rica

[Original: Spanish]  
[18 October 2012]

#### **Report by the National Council of Aerospace Research and Development**

The National Council of Aerospace Research and Development (CONIDA) was established pursuant to Ministry of Science and Technology Executive Decree No. 36102-RE-MICIT, which was signed on 25 July 2010 by the President of the Republic, Laura Chinchilla Miranda.

Under the Decree, CONIDA is the body responsible for drawing up the policies needed to further the development of the aerospace industry in Costa Rica. It is made up of the following institutions:

- (a) Ministry of Foreign Affairs and Religion;
- (b) Ministry of Science and Technology (which chairs CONIDA);
- (c) Ministry of Public Education;
- (d) National Learning Institute;
- (e) Foreign Trade Corporation of Costa Rica (PROCOMER);
- (f) Asociación Estrategia Siglo XXI (twenty-first century strategy association);
- (g) Costa Rican Investment Promotion Agency (CINDE);
- (h) National banking system;
- (i) Central American Association for Aeronautics and Space (ACAE).

#### **Current developments**

As an organization still in its early stages, CONIDA, which is chaired by the Ministry of Science and Technology through the Directorate of Innovation and Technology Transfer, has concentrated on achieving the following objectives:

- (a) Ensuring the participation of all the bodies comprising it;
- (b) Meeting regularly every two months;
- (c) Building a strategic framework (mission, vision, objectives);
- (d) Developing a plan of action for the country's aerospace sector.

There has been outstanding progress in achieving these objectives: CONIDA meets regularly and has made progress in designing the components of the strategic framework. It is hoped that, by the end of 2012, a defined and agreed mission, vision and objectives will be in place. Work has also started on benchmarking with

other countries and studying national capacities, which are essential elements of the development of a plan of action for the sector.

### Specific projects

Space-related activities undertaken by the CONIDA institutions included training, events, experiments, research, skills development and other activities. In 2012, the institutions also participated in activities relating to the aerospace industry. Those activities included the following:

(a) *Korea Aerospace Research Institute (KARI) International Space Training Programme 2012, held from 7 to 18 May 2012.* Professors Johan Carvajal Godínez and Oscar Monge Ruiz of the Schools of Electronic Engineering and Electromechanics, respectively, of the Costa Rica Institute of Technology participated in the training;

(b) *Twenty-second United Nations/International Astronautical Federation Workshop, entitled "Space technologies applied to the needs of humanity: Experience from cases in the Mediterranean area", held in Naples, Italy, from 28 to 30 September 2012.* Costa Rica won a place in the Emerging Space Leader Grant Programme of the International Astronautical Federation. Magaly Sandoval, a mechatronics engineering student from the Costa Rica Institute of Technology, took part as one of the 12 young people who were chosen among over 95 candidates from more than 30 countries worldwide. Ms. Sandoval is a member of the ACAE Board. A paper by Carlos Alvarado, entitled "The impact of an aerospace organization in a developing country", was presented at the Workshop;

(c) *Earth and Space 2012 Conference, organized by the Aerospace Division of the American Society of Civil Engineers (ASCE) and held in Pasadena, California, the United States of America.* Carlos Alvarado, President of ACAE, participated in the Fifth National Aeronautics and Space Administration (NASA)/ASCE Workshop on Granular Materials in Space Exploration and other topics. Contact was made with an expert from the NASA Jet Propulsion Laboratory to discuss the question of structures in extreme environments;

(d) *International Aerospace Supply Fair (AIRTEC 2012) held in Frankfurt am Main, Germany, from 6 to 8 November 2012.* Victor Hernández, member of the Aeronautics Committee of the Costa Rica Institute of Technology, attended the Fair;

(e) *The Third Aeronautics Symposium, organized by the Costa Rica Institute of Technology;*

(f) *Visits to the headquarters of various multinational companies with a view to promoting Costa Rica as a possible investment location, organized by CINDE;*

(g) *International Astronautical Congress (IAC 2012), held in Naples, Italy;*

(h) *Article and report on the impact of aerospace development in Costa Rica by Johan Carvajal Godínez, Professor of the Costa Rica Institute of Technology and member of ACAE.*

*Information on research in the field of near-Earth objects*

ACAЕ launched stratospheric balloons. Out of five launches, three were successful and two resulted in loss of load:

- (a) *Launch in Guanacaste in 2010 (failed);*
- (b) *Launch in Tilarán in 2010 (failed);*
- (c) *Launch in Tilarán in 2010 with a successful recovery.* Images of over 20 km altitude were obtained;
- (d) *Launch conducted by the National Biodiversity Institute of Costa Rica in 2012 with a successful recovery.* Images and atmospheric data of over 30 km altitude were obtained;

(e) *Launch in Parque de la Paz in 2012 with a successful recovery.* Images and atmospheric data from over 35 km altitude were obtained. In addition, two experiments were carried out by the University of Costa Rica and one by the Ad Astra Rocket Company Costa Rica.

The following short- and medium-term projects by ACAЕ have been planned:

(a) *A Rocket Launch for International Student Satellites (ARLISS): Annual competition, held from 10 to 14 September, in Nevada, United States, with participants from universities from the United States, Japan and other countries;*

(b) *Rockets with payloads to be launched at 12,000 feet above sea level with two modalities: fly-back and come-back;*

(c) *NanoRacks.* This is a company in the United States that is developing a standardized low-cost programme to send experiments to the International Space Station for periods of up to one month. The company's DreamUp! programme has aroused interest in science among schoolchildren in Costa Rica. Valley Christian School, a school in California, United States, designed and sent an experiment to the International Space Station.

The following medium- and long-term projects by ACAЕ have been planned:

(a) *Picosatellite.* This is a joint project between ACAЕ and the Costa Rica Technical Institute, with advice from the Ad Astra Rocket Company Costa Rica. It is contributing to the capacity of Costa Rica to carry out space missions. Its mission is to act as a transponder in orbit for the transmission of data between remote forest monitoring stations and a central data collection centre;

(b) *Aerospace Cluster.* This is a project with advice from InterFlight Global, which aims to fulfil the statute of a non-profit-making association with political neutrality to bring the aerospace sector together and to coordinate development work more effectively.

## France

[Original: French]  
[15 November 2012]

The achievements in 2012 testify to the commitment of France to the development of innovative space missions in the fields of telecommunications, Earth observation and exploration of the universe. France continues to invest heavily in the space sector, notably through its specialized agency, the Centre national d'études spatiales (CNES).

### Access to space

Through CNES, France is the design authority for the Ariane family of launchers and for the Guiana Space Centre, and extends to the European Space Agency (ESA) its full cooperation for the implementation of these programmes.

The inaugural flight of the Vega launcher from the Guiana Space Centre took place on 13 February 2012. Europe now has at its disposal a complete range of operational launchers to meet its needs for autonomy in access to space: Ariane 5 for heavy launches, Soyuz for medium loads and Vega for light loads in a low orbit. The Ariane 5 launcher has had 51 consecutive successes since February 2003. The Soyuz launcher has just completed its third flight successfully. Detailed studies are in progress, in cooperation with ESA partners, to allow these unique capabilities to be maintained and improved over the long term.

### Earth, environment and climate

France is designing and implementing innovative space systems for observing the environment and its evolution. It is present in all fields of Earth observation: operational oceanography, climate study and meteorology, study of continental surfaces, solid Earth.

Observation from space offers the advantage of an overall view and allows long-term research needs to be met. Continuity of measurements is of prime importance for the quality of climate studies and the pertinence of future responses.

Most operational systems for Earth observation need to be developed and exploited at the European level (inter alia, in the context of the Global Monitoring for Environment and Security (GMES) programme) and at the international level.

French space imaging made a technological leap with the launching of the first Pléiades satellite in late 2011. This new observation system, supplementing Spot 5, will eventually result in two satellites, combining a unique acquisition capacity, exceptional agility and very high resolution.

The space missions concerned with optical or radar observation, meteorology and oceanographic altimetry have reached the operational stage. The accumulation of data supplied by the Topex-Poseidon and Jason missions has thus shown that the average level of the sea is rising by 3 mm a year, and by more in certain areas. The combination of these data, which will be completed by Jason 3 from 2014, has become the world reference in operational altimetry implemented by "Mercator Océan".

**Greenhouse gases: a French-German world first in preparation**

As a contribution to the study of climate change, CNES, carried out in 2011 a feasibility study together with the German Aerospace Centre (DLR), on the Methane Remote Sensing LIDAR Mission (MERLIN), which measures from space the methane contained in the atmosphere. CNES, the prime contractor for the satellite, provided the new-generation Myriade Evolutions platform, and DLR contributed the Light Detection and Ranging (LIDAR).

**Megha-Tropiques in orbit, for better understanding of monsoons**

The joint French-Indian Megha-Tropiques space mission, which was launched in October 2011, is intended to research the water cycle, storm systems and climate in the tropical atmosphere. It will also be useful for monitoring and forecasting dangerous events, such as tropical cyclones and violent monsoon rains.

**Steady development of operational space altimetry**

The AltiKa mission, soon to be launched as part of the Satellite with Argos and AltiKa (SARAL) space programme, is a contribution to the operational side of space altimetry. The launch is being planned for the end of 2012. The mission will provide continuity with the current service of the Jason 1 and 2 satellites. The SARAL space programme, like Megha-Tropiques, is the result of collaboration between France and India. This environmental monitoring mission involves launching the Argos, AltiKa and Doppler Orbitography and Radiopositioning Integrated by Satellite (DORIS) instruments from a platform developed by the Indian Space Research Organization (ISRO). AltiKa is a Ka-band altimeter with an integrated radiometer function. DORIS provides the precise orbitography required for altimetry and Argos complements the Argos series of localization and environmental data-collection systems.

**Space and major disasters**

Adopted in 2000 on the initiative of CNES and ESA, the Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters now has 15 members. Over the period 2000-2012, the Charter has been activated 354 times.

The aim of the Charter is to activate an integrated and coordinated system for obtaining optical and radar images in emergencies, and to provide such data free to relief agencies. At the outset, the intention was that it would respond primarily to catastrophes arising out of meteorological, seismic or volcanic events.

Wherever a major disaster occurs, authorized users may request the activation of the Charter under a simple and rapid procedure. However, the Charter provides services throughout the world, and not only to its members. Over 100 countries have benefited from it to date. CNES is actively involved in 90 per cent of activations every year. With the Pléiades satellites, relief services will be provided with optical images that will be even more capable of meeting particular challenges.

### **Consumer applications**

Space makes it possible to develop a growing number of high-value added applications and services. France is committed to developing new digital services (high-definition television, three-dimensional (3D) television or mobile television and high-speed or very high-speed Internet for fixed or mobile services) and making them more accessible. It is therefore investing in space telecommunication activities. At a time when fixed and mobile services are converging, satellites can be integrated into new generation networks, naturally complementing fibre optics for fixed services or complementing third- or fourth-generation terrestrial networks for mobile services. Whether in telecommunications, broadcasting or navigation or localization by satellite, it is a major challenge to develop and implement latest-generation space systems for the benefit of individuals and business on two fronts.

On the one hand, it is an economic challenge, because technological developments in the area of space provide a foundation for making the industry more competitive in world markets and in society. On the other hand, in telecommunications in particular, high-speed Internet access for remote and thinly populated areas can avoid the digital divide, providing an increase in speed between urban and rural areas that will not be available using fibre optics for a long time.

France is also considering the most appropriate solutions for the global deployment of fourth-generation technology by 2014, using both terrestrial networks and space facilities.

Two projects conceived in response to developments in use and market requirements are aimed at improving performance and competitiveness. The first, called "Satellites of the future", should help consolidate the position of the leading French space experts in the world market in communications satellites. The second, called "Very high-speed Internet", will give rural areas all the advantages of digital technology and will help set up a French industrial sector that will be competitive in the emerging world of very high-speed satellites.

### **Space science**

France is deeply involved in space exploration. Priority is given to the mandatory ESA scientific programme and to the global cooperation that enables such missions to be carried out. With regard to the exploration of Mars, France has made a decisive contribution to two instruments on the Curiosity Mars mission: the Chemistry and Camera (ChemCam) instrument and the Sample Analysis at Mars (SAM) instrument. On the ESA Solar Orbiter mission, which observes the Sun, and Euclid, which observes dark energy, CNES coordinates all the various French instruments and data-processing tools.

## **Pakistan**

[Original: English]  
[1 November 2012]

### **Pakistan's space activities in 2011**

Pakistan, being a strong supporter of using space for peaceful purposes, believes that there is a need to enhance international cooperation to realize the shared goals of socioeconomic development, as well as the prevention and mitigation of natural disaster.

Pakistan's national space agency, the Space and Upper Atmosphere Research Commission (SUPARCO), is emphasizing space-related activities to address various socioeconomic issues of the country. It made significant progress during 2011 in satellite technology, applications of space science, environmental monitoring, remote sensing, the Geographical Information System (GIS) and others, utilizing data and images purchased from remote-sensing satellite operators.

Paksat-1, the leased communication satellite providing services to various potential users in Pakistan, completed its 15 years service life and was replaced with a new communication satellite, Paksat-1R, launched on 12 August 2011 from China. To monitor and control the satellite, two satellite ground station facilities have been established at Karachi and Lahore.

Paksat-1R is expected, not only to play an important role in the socioeconomic development of the country, but to also provide opportunities in educating and training people from various segments of society, to extend better health services to remote areas and to stimulate private sector business and investment.

Pakistan is a firm believer of applying space technology as a catalyst in various aspects of socioeconomic development. The demand for space technology-based data in areas such as agriculture productivity, monitoring of crops, food security, watercourses management/hydrology, disaster relief and management, ecology and geological/mineral studies has increased manifold in recent years. There is also growing use of tele-education and telemedicine in Pakistan, and the facility is being extended to rural and remote areas.

Some of the activities undertaken during 2011 in the area of international cooperation in the peaceful uses of outer space are summarized below.

### **National Environmental Management Information System**

The project was initiated under the Ministry of Disaster Management of the Government of Pakistan in collaboration with the United Nations Development Programme for effective implementation of the National Environmental Information Management System (NEMIS) at the national level. The aim of the project is to promote sustainable environmental development through capacity-building, management, planning and utilization of environmental changes covering parameters such as air pollution, water, biodiversity (agriculture, forest), desertification (water logging, salinity) and sea surface temperature mapping and trend analysis. Some of the specific objectives of the project are to review and analyse the current situation of environmental data/information management in



Pakistan; to establish an appropriate institutional and technical framework; to develop sectoral and inter-sectoral databases of existing environmental information in the country; to establish a functional national environmental information system; and to build and strengthen the capacity of key organizations involved in the establishment and sustainable operation of NEMIS.

### **Agriculture**

Pakistan is a country of diverse agro-climatic regions. The agricultural sector of the country plays a pivotal role in the national economy, accounting for 21 per cent of the gross domestic product. It provides employment for 45 per cent of the country's labour force. Satellite-based monitoring of crops was initiated in 2005 in collaboration with the Food and Agriculture Organization of the United Nations (FAO). The integrated use of remotely sensed data has been conclusively demonstrated to improve reporting on agriculture statistics in Pakistan. Since 2007, country-wide statistics have been provided to decision makers and stakeholders for agricultural development, planning and policy formulation. A monthly bulletin, entitled "Pakistan Satellite-based Crop Monitoring System" has also been published since January 2011. It provides critical and timely actionable reports to agencies engaged in monitoring agriculture products. The bulletin is available at [www.suparco.gov.pk/pages/pak.scms.asp](http://www.suparco.gov.pk/pages/pak.scms.asp).

### **Land-cover mapping**

The project was initiated by SUPARCO in collaboration with FAO. It aims to map the land cover of the country in two phases. The elements of the projects are to develop a harmonized land-cover classification and mapping strategy for Pakistan using Land Cover Classification System (LCCS) concepts and methods, to improve links between global, regional and national studies on land cover and the environment. The first phase of the project is planned to be completed in October 2012.

### **Space system-based disaster management support**

The support of Pakistan for the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER), a programme of the Office for Outer Space Affairs of the Secretariat, is to ensure equitable access of space-based information regarding the disaster management cycle to all Member States. A Regional Support Office for UN-SPIDER is functioning at SUPARCO. Under this Programme, SUPARCO is working closely with federal and provincial disaster management agencies, employing space technology in all phases of disasters, from relief and rescue to early recovery. UN-SPIDER provided medium- and high-resolution images to Pakistan during the 2011 floods, helping SUPARCO in disaster monitoring, relief and rescue activities in the Sindh Province. Reports were generated and provided to concerned agencies and are also available on the official website of SUPARCO ([www.suparco.gov.pk](http://www.suparco.gov.pk)).

### **Support to Fisheries Resource Appraisal in Pakistan**

The Fisheries Resource Appraisal project was carried out in collaboration with FAO and the Marine and Fisheries Department. Its aim is to provide training to research and management institutions in Pakistan for developing capacity in

national fisheries. SUPARCO assisted them in mangrove mapping using remote sensing and GIS techniques, using Système pour l'observation de la Terre (SPOT) data identifying small and large creeks.

#### **Collaboration with the Asia-Pacific Space Cooperation Organization**

Pakistan is one of the founding members of the Asia-Pacific Space Cooperation Organization (APSCO), established in 2005. It actively participates in council, administrative, financial, programme planning and expert group meetings, in scientific and technical projects initiated by APSCO and in seminars and workshops on various themes, as well as in long- and short-term training courses for building capacity in the fields of space science, technology and their applications. The activities carried out in the past year include the following:

- (a) First ad hoc committee on applied high-resolution satellite project, April 2011;
- (b) Third meeting of administrative heads on budget planning of APSCO projects, April 2011;
- (c) Second audit commission meeting, May 2011;
- (d) Fourth and fifth council meetings, January and September 2011;
- (e) Nine-month MASTA-2011 programme on SATCOM, September 2011;
- (f) Third APSCO International Symposium on Earthquake Monitoring and Early Warning Using Space Technology, September 2011;
- (g) First expert group meeting on the feasibility study of telecommunication satellite project and communication satellite applications project, November 2011;
- (h) First meeting of the small student satellite project, November 2011;
- (i) Two-week training course on environment and disaster monitoring through space technology, November-December 2011.

#### **Asia-Pacific Regional Space Agency Forum**

Pakistan, as a member of the Asia-Pacific Regional Space Agency Forum (APRSAF), took part in its activities. In 2011, a delegation from SUPARCO participated in APRSAF-18, and a teacher and a student participated in the water rocket experiment and poster competition held during APRSAF-18. Pakistan is also a member of the Joint Project Team (JPT-2) of the Sentinel Asia initiative to support disaster management activity in Pakistan.

#### **Activities under National Research on Space Debris, the safety of space objects with nuclear power sources on board and problems relating to their collision with space debris**

Pakistan regularly participates in discussions on the agenda item entitled "Space debris" during sessions of the Committee on the Peaceful Uses of Outer Space. Since it has no research facility in Pakistan to monitor and undertake research on space debris, there is no progress related to the safety of space objects with nuclear power sources on board and their collision with space debris.

### **Near-Earth objects**

There is no research facility on near-Earth objects in Pakistan. There is thus no progress reported for consideration by the Working Group on Near-Earth Objects of the Scientific and Technical Subcommittee.

### **Peru**

[Original: Spanish]  
[9 November 2012]

The National Commission for Aerospace Research and Development (CONIDA) is involved in the following projects:

(a) South America Very Low Frequency Network (SAVNET): a project conducted jointly by Argentina, Brazil and Peru involving the study of solar activity through monitoring of the low ionosphere using very low frequency radio waves; monitoring of ionospheric and mesospheric variations, ozone layer variation, remote astrophysical objects and gamma-ray bursts; and study of pre-seismo-electromagnetic events;

(b) e-CALLISTO project: a network of solar radio spectrometers currently being trialled for later integration into the project.

### **Republic of Korea**

[Original: English]  
[16 November 2012]

### **Space policy**

In December 2011, the Republic of Korea established the 2nd Space Development Basic Plan, in accordance with the Space Development Promotion Act of 2005, which mandates the Government to establish and update a national space plan every five years. As an update to the 1st Space Development Basic Plan, the 2nd Plan sets the vision and objectives of the national space programme for 2012-2016. The 2nd Plan will focus on achieving technological self-reliance; establishing systems to promote space application and services; increasing private participation to build up the space industry; strengthening the workforce base and support infrastructure; improving the national space management systems; and diversifying international cooperation activities.

### **Satellite programmes**

The first geostationary satellite of the Republic of Korea, the Communication, Ocean and Meteorological Satellite (COMS), was successfully launched in June 2010 from the Guiana Space Centre in Kourou. With a required minimum operational life of seven years, COMS entered into official service in April 2011, offering useful meteorological and oceanic data for domestic and international users. The Meteorological Imager of COMS delivers near real-time weather images at 15-minute intervals during normal operation, and at 8-minute intervals during

high impact weather events (such as typhoons and floods). The Geostationary Ocean Color Imager (GOCI) of COMS, the first of its kind to be placed in geostationary orbit, makes eight observations of the ocean around the Korean peninsula per day.

A new geostationary satellite programme, GEO-KOMPSAT-2, is currently under way as part of a COMS mission. GEO-KOMPSAT-2 comprises two satellites: GEO-KOMPSAT-2A for meteorological missions and GEO-KOMPSAT-2B for ocean and environmental monitoring.

Following Korea Multi-Purpose Satellite-1 (KOMPSAT-1), which completed its mission in 2008, the remote sensing satellite of the Republic of Korea in low-Earth orbit, KOMPSAT-2, continues to operate successfully. Launched in 2006, it has outlived its designed lifespan of more than three years, and its life expectancy has been extended further, to June 2013. KOMPSAT-2 carries a multispectral camera capable of capturing 1-metre resolution panchromatic images and 4-metre resolution multispectral images. Carrying a high-resolution electro-optical camera of 0.7 m, KOMPSAT-3 was successfully launched in May 2012. KOMPSAT-3 was designed to provide high-resolution images for GIS and other environmental, agricultural and oceanographic monitoring applications.

In the coming years, the Republic of Korea expects to operate a fleet of low-Earth orbit satellites as part of the KOMPSAT series. Planned to be launched in late 2012 or early 2013, KOMPSAT-5 will carry the first synthetic aperture radar payload of the Republic of Korea and will serve the GIS, ocean and land management and disaster and environment monitoring mission (GOLDEN mission) on the Korean peninsula. KOMPSAT-3A, to be launched in 2014, will carry an infrared sensor and electro-optical instrument for Earth observation.

In late 2012, Science and Technology Satellite-2C (STSAT-2C) will be launched by Korea Space Launch Vehicle-1 (KSLV-1) at the Naro Space Center, which is located in Oenaro Island, off the southern coast of the Republic of Korea. Equipped with a laser retro-reflector array, a space radiation effects monitor, a femto second laser oscillator and other technologies, STSAT-2C aims to demonstrate the operation of space science instruments and to perform a new space technology demonstration in orbit. In addition, the development of the Science and Technology Satellite-3 (STSAT-3) with a hyper-spectral camera and an infrared camera for space and Earth observation has been completed, and will be launched in early 2013. The development plan of the Next Generation Small Satellite-1 (NEXTSat-1) space programme series, which is the subsequent STSAT space programme to demonstrate the space science and core space-technology, has been established. The NEXTSat-1 programme has been running since June 2012, and NEXTSat-1 will be expected to be launched in 2016.

### **Launch vehicles**

Following the successful development of sounding rockets (KSR-I, KSR-II, KSR-III) for scientific research, the Republic of Korea has been developing the Korea Space Launch Vehicle-I (KSLV-I) since 2002. Launched in 2009 and 2010 from the Naro Space Center, KSLV-I is aimed at putting a small scientific satellite (100 kg) in an elliptical orbit. With STSAT-2C, KSLV-1 is to be launched once again by the end of 2012.

Research and development for KSLV-II began in 2010. Planned for launching in 2021, the purpose of KSLV-II is to launch an application satellite of the 1.5-ton class into a 600-800 km Sun-synchronous orbit.

### **International cooperation**

In 2012, the Republic of Korea continued to expand and strengthen international cooperation within the space community, ranging from governmental entities to universities. After its entering into cooperation with the National Aerospace Laboratory of the Netherlands in 2010, the Korea Aerospace Research Institute (KARI) established a cooperative relationship with the Netherlands Space Office (NSO), signing a memorandum of understanding in 2012, by which the two countries built up a cooperative system in the field of aerospace research and development.

The Korea Astronomy and Space Science Institute (KASI) and Japan Aerospace Exploration Agency (JAXA) signed a memorandum of understanding in 2012 to formalize the transfer of technical goods and data that are required to explore the potential for cooperation on the Space Infrared Telescope for Cosmology and Astrophysics (SPICA) mission. Recognizing the importance of millimetre and submillimetre wavelength for space observation, KASI also agreed to cooperate and collaborate on the construction and operation of the Atacama large millimetre/submillimetre array, an international space observation facility funded by European, East Asian and North American countries and Chile.

Following the international space training programmes organized by KARI in 2010 and 2011, KARI held its third international space training programme in May 2012, with 20 participants from 11 countries (Costa Rica, Indonesia, Iraq, Jordan, Mongolia, Pakistan, Romania, Singapore, Thailand, Turkey and Viet Nam). The programme offered courses in satellite systems, such as system engineering, spacecraft subsystems and payloads, satellite assembly and integration, satellite operation, remote sensing and application, and space communication, as well as in space science, including hands-on training on ground system operation.

KASI signed an agreement with the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) in 2012 to facilitate the establishment of a GPS permanent station at the University of the Philippines for the purpose of the generation of space science data. This agreement is a part of the strategic plan of KASI of delivering societal benefits of astronomy and space science.

The Republic of Korea has been continuing its best efforts to contribute to fostering international cooperation for the benefit of all States in the field of humanitarian aid. In line with these efforts, KARI, a member of the Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters, makes its satellite data available for the purpose of disaster management, such as disaster relief and rehabilitation. It provided disaster-affected countries with KOMPSAT-2-captured satellite footage on a total of 44 occasions, including the provision of new footage on 27 occasions and archived footage on 17 occasions, as of October 2012. Examples include the flooding in Cameroon, Chad, India, the Niger, the Russian Federation and Senegal and the earthquake in the Islamic Republic of Iran.

### **Space science**

The Republic of Korea has cooperated with NASA in solar and space physics (heliophysics) and space weather research since 2010. As a result of such cooperation, in May 2012, KASI successfully built a 7-metre parabolic antenna to receive space weather data from the Radiation Belt Storm Probes (RBSP) mission. The RBSP mission, as part of the NASA Living with a Star geospace programme, is designed to help us understand the Sun's influence on the Earth and near-Earth space by studying the planet's radiation belts on various scales of space and time. KASI utilizes the RBSP real-time data for forecasting space weather to protect national space assets from the severe space environment.

### **Space education**

Understanding the importance of space-related education in ensuring the sustainability and predictability of space activities, the Republic of Korea is strengthening its efforts to spread space-related knowledge to the general public and to build capacity at the international and national level. To that end, KARI officially joined the International Space Education Board (ISEB) in 2012. By joining the Board, KARI will be able to take part in any activities to be carried out under ISEB and share information with other space agencies easily. In this connection, six students from the Republic of Korea majoring in aerospace-related technology actively participated in the 63rd International Astronautical Congress in Naples, Italy.

### **Space debris**

Since 2010, KARI has been developing a space debris collision risk management system (KARISMA) to mitigate the space debris hazard. The preliminary design was completed in 2011 and the detailed design is currently under way. The development of KARISMA is expected to be completed by the end of 2013, following its test in early 2013. KARISMA will be used to prevent the collision of satellites of the Republic of Korea, such as the KOMPSAT series and COMS.

### **Qatar**

[Original: Arabic]  
[10 October 2012]

In line with the ambitious vision of the State of Qatar to build a solid basis for the economy of knowledge and the development of its economic and human capacities for global competitiveness, Qatar adopted a series of measures to enable it to actively participate at the global level, to accede to international conventions and to become a member of international organizations in a number of relevant sectors, including the space sector, given its strategic significance. Qatar also intends to benefit from outer space for the following peaceful uses.

### **Qatar Satellite Company (Es'hailSat)**

Qatar Satellite Company was established in 2010 under the name Es'hailSat. It will be the owner of satellites, including the operational rights thereof, for the provision of various services to consumers, corporate entities and the State sector.

The launch of Es'hail 1, the first satellite to be owned by Es'hailSat, was scheduled to be undertaken during the second quarter of 2013. Es'hail 1 will provide television transmission, communication and Internet services to all public and private sectors in the Middle East and North Africa.

In line with the strategic objectives of Qatar in the field of information and communication technologies, as well as of the peaceful uses of outer space, Es'hailSat endeavours, on the basis of these priorities, to provide the following satellite services:

- (a) Securing the freedom of information and television broadcasting;
- (b) Communications;
- (c) Disaster management;
- (d) Public health (telemedicine).

Es'hailSat intends to participate in all relevant activities, including, more importantly, the following:

- (a) Introduction and implementation of space debris mitigation measures and guiding principles developed by relevant international entities;
- (b) Construction of ground infrastructure for the control of satellites;
- (c) Building capacity through education and training in the field of the use of space science and technology applications for sustainable development.

### **Saudi Arabia**

[Original: Arabic]  
[5 December 2012]

### **Space Research Institute**

The Space Research Institute implements programmes and plans in line with the national science and technology policy of Saudi Arabia, which complies with the requirements of national security and sustainable development and aims to transfer, advance and localize space science technology, and promotes awareness of the importance of space science and related technology by participating in national, regional and international conferences and events.

### **International cooperation and bilateral agreements**

King Abdulaziz City for Science and Technology, represented by the Space Research Institute, has signed a memorandum with the National Aeronautics and Space Administration (NASA) of the United States of America resulting in:

- (a) Recognition of the Lunar and Near-Earth Object Science Centre in King Abdulaziz City for Science and Technology as an affiliate partner of the NASA Lunar Science Institute;
- (b) A cooperation agreement in the field of space geodesy;
- (c) A cooperation agreement on the Aerosol Robotic Network (AERONET);
- (d) A cooperation agreement to run scientific experiments aboard the International Space Station (ISS).

In cooperation with the Ministry of Education and Training, King Abdulaziz City for Science and Technology has set up programmes to give secondary school students the opportunity to carry out scientific experiments on board the ISS.

### **Remote Sensing Centre**

It is 25 years since the establishment of the Saudi Remote Sensing Centre, when it began to receive satellite images from Landsat, and data and images from NOAA-8. The Centre was keen to multiply the sources of satellite images and therefore developed the station to receive images from SPOT 1, 2, 3, 4, 5, RADARSAT-1 and other satellites, through signing agreements to receive images. The Centre has received, processed and analysed images, in order to be in a position to build up specialized scientific talent, who have conducted outstanding research in various applications. Space images are also received from high-contrast commercial satellites such as GEOEYE1 and IKPNOS and, in line with directives to satisfy governmental authorities, the Centre provides images and data to governmental, academic and private sector bodies. Institute specialists are updating the processing and analytical equipment, in order to bring it into line with the latest ways of processing and analysing the information that has been used in applied research on remote sensing, such as the applications of natural, agricultural and mineral resources, urban planning, and developing studies to identify the quality of agricultural crops, groundwater and surface water.

In recent years, Saudi Arabia has been experiencing heavy rains and flash floods that have resulted in loss of life and property. The Space Research Institute in King Abdulaziz City for Science and Technology has therefore set up a national project to study the possibility of reducing the risk of floods and flash floods in the cities of the Kingdom through the production of digital elevation models and three-dimensional satellite images, in order to determine the boundaries of watersheds and the course of valleys and their directions, to manage a water apportionment plan, build dams and avoid disaster.

States in arid and semi-arid regions rely on non-renewable groundwater sources, so the Kingdom is suffering from the drying up of this vital source, as agriculture accounts for a large share — more than 70 per cent — of the water used. Protecting this vital source requires guidance in the use of water, especially in agriculture. Therefore, the Ministry of Water and Electricity has, on the basis of the



qualified capacities and capabilities available to the Space Research Institute, signed a project to limit the consumption of groundwater used in the irrigation of various agricultural crops, in order to find ways, scientific alternatives and methodologies to maintain food security and reduce the consumption of groundwater.

### **Geographic Information Systems Centre**

The Space Research Institute established the Geographic Information Systems Centre to undertake studies and conduct applied research in the field of geographic information systems, and to develop them in ways that serve the purposes of development in the Kingdom. So the Centre focuses on the formation of a national network that is used to exchange information in accordance with precise specifications, regulations and mechanisms. The Centre updates geographical and geological maps and converts them into digital maps, and this has contributed to national projects and the conclusion of agreements with governmental authorities, such as:

- (a) A project to produce basic maps of all the major towns in Saudi Arabia;
- (b) A geographic information system project to accompany education that covers almost 30,000 schools (state and private) in cooperation with the Ministry of Education;
- (c) Training programmes in the field of geographic information systems, remote sensing and the Global Positioning System.

### **Lunar and Near-Earth Object Research Centre**

Since 1957, the investigation and peaceful uses of outer space, including the Moon and the other celestial bodies, has led States to study space debris and near-Earth objects that are a danger to Earth. In view of progress in the expansion of the global network to detect near-Earth objects, and in cooperation with international organizations and local and foreign associations, the Centre has developed specifications and the installation of surveillance equipment in the form of high-capacity telescopes and imaging devices, which were linked to the completion of a project to monitor asteroids in terms of size, speed and direction.

In cooperation with international scientific bodies, the Lunar and Near-Earth Object Research Centre has participated in studies related to the Moon and near-Earth objects as part of the outstanding international effort by using communications in the international lunar science network. The Lunar and Near-Earth Object Research Centre is a member of the Executive Council of the NASA Lunar Science Institute, and participates in the monthly meetings of the executive and supervisory committee. The Centre focuses on presenting the programmes of the national academic network for lunar sciences, and social communications programmes at the service of communities that want to learn more about lunar sciences and near-Earth objects, and providing those interested in lunar sciences and near-Earth objects with information, as well as inviting them to attend and participate in future conferences and seminars.

### **Space Geodesy Centre**

The movement of slow moving and constantly changing tectonic plates produces mountains, earthquakes and volcanoes, and these phenomena affect the environment and climate. The Kingdom forms the major part of the Arabian Plate (Arabian Shield).

In 1975 the Space Research Institute established the laser observatory station, linked with the international network of laser observatories, in order to identify and monitor the movement of tectonic plates and the Earth's rotation, to project the spatial and temporal variables in the Earth's gravity field, and to measure the total masses of the Earth (land, oceans and atmosphere).

It is the only station in the Middle East and is considered one of the 10 best stations in the world. The station is distinguished by the high degree of accuracy and the quality of its data.

On the basis of the agreement signed for cooperation in the field of space geodesy with NASA, the Space Geodesy Centre has carried out a project to develop and update the laser observatory station, to develop and configure monitoring and data archiving system programmes. Therefore, Microcosm programmes have been implemented and developed to study solar radiation pressure, the Earth's gravity and rotation, the movement of tectonic plates, and to send and receive the time variables that contribute to climate change studies, and to the precise monitoring of variables in the Earth's crust.

The Centre has also established continuous monitoring stations for geodesic data by positioning 16 continuous monitoring stations throughout the Kingdom. The satellites rely on multiple frequency data positioning system satellites (GNSS) so they are precisely defined and harmonized with the International Terrestrial Reference System (ITRS).

A control centre has been established for the continuous monitoring stations. It gathers and analyses data in order to support the Space Geodesy Centre in applied research, so that it benefits from the data, the satellite laser ranging measurements of the laser observatory station, very long baseline interferometry, and GNSS. Moreover the output will be of meaningful benefit to the support of scientific research and applications at the global and regional levels, in the use of geographic information systems, Earth science applications and navigational and weather operations.

### **National Satellite Technology Centre**

Communications and information technology are of the highest importance and play an important role in the world today, thus they are of concern to King Abdulaziz City for Science and Technology. It has established the National Satellite Technology Centre, which, over the past decade, has designed, manufactured and launched 12 small experimental satellites for communications and to conduct research experiments, one of which was a satellite to monitor Earth (SaudiSat-3). Specialists are now designing and manufacturing the second generation of Earth-monitoring satellites.

During that period, it has aimed to increase numbers of specialized staff, through scholarship and employment, which has contributed to the completion of the national plan for the localization of technology and the training of others.

The design, manufacture, launching and exploitation of the earlier satellites have served to run scientific applications, such as tracking fixed and moving property, and monitoring oil pipelines extending from the east to the west of the Kingdom. Systems will be developed for satellite communications to track property in 2013.

The National Satellite Technology Centre is also designing and manufacturing a fixed communications satellite in geostationary orbit to be launched in 2015 to meet the requirements of governmental bodies.

The National Satellite Technology Centre has also produced several filters that can be used in a number of wireless communications circuits, such as receiving and transmitting circuits, and in satellite receiving and transmitting stations:

- (a) New broadband bandpass filter for S-band;
- (b) Compact broadband bandpass filter for C-band;
- (c) Highly compact UBW bandpass filter of a new design for bundled lines.

The National Satellite Technology Centre is building specialized factories and laboratories for the manufacture of microwave circuits, PCB panels, an optics laboratory and UV-LED.

The National Satellite Technology Centre is focusing on training and employing scientific staff of both genders. It is also training male and female university and technical college students.

Specialists at the Centre have published a number of scientific and specialized papers that have been presented at global forums and conferences.

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