



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

I. Introduction

1. In the report on its forty-seventh session, the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space made a recommendation, endorsed by the Committee on the Peaceful Uses of Outer Space at its fifty-third session (A/65/20), that the Secretariat continue to invite Member States to submit annual reports on their space activities (A/AC.105/958, para. 19).
2. In a note verbale dated 13 August 2010, the Secretary-General invited Governments to submit their reports to the Secretariat by 22 October 2010. The present note was prepared by the Secretariat on the basis of reports received from Member States in response to that invitation.

II. Replies received from Member States

Austria

[Original: English]
[28 October 2010]

Austrian Space Applications Programme

Projects relevant to the United Nations Platform for Space-based Information for Disaster Management and Emergency Response and disaster management

The Conceptualization of a Global Virtual Academy for the Space-based Information for Disaster Management and Emergency Response project is being funded under the Austrian Space Applications Programme (ASAP). It will provide a



conceptual framework to support the launch of an e-learning programme for the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER).

Other projects that address disaster management in a broader context, such as the project on global monitoring of soil moisture for water hazard assessment, with a special focus on Africa, and the project on a data model for land-use/land-cover data acquisition on a national scale are also being funded under ASAP.

ASAP is an initiative of the Austrian Federal Ministry for Transport, Innovation and Technology and is managed by the Aeronautics and Space Agency of the Austrian Research Promotion Agency.

Seventh call for proposals for the Austrian Space Applications Programme

The seventh call for project proposals for ASAP took place in early 2010, with the submission deadline being 28 May 2010. ASAP has been redesigned, focusing on space sciences, space technology development and space technology applications. In the space technology applications domain, satellite navigation, Earth observation and satellite telecommunications continue to play a major role. Various project proposals related to the Global Monitoring for Environment and Security programme and UN-SPIDER were handed in. The evaluation process was conducted in July and contract negotiations for the selected project proposals were scheduled for September and October.

United Nations/Austria/European Space Agency Symposium 2010 in Graz, Austria

In 2009, a three-year series on space technology and its applications was launched as part of the United Nations/Austria/European Space Agency symposia. It is dedicated to capacity-building in space technology development, with a particular focus on small satellites. Because of their comparatively low cost, the development of small satellites is within the reach of developing countries and countries with limited resources for space activities. At present, institutions in more than 50 countries have active small satellite development programmes. Owing to fast advances in this technology, small satellites are increasingly being used for operational applications such as satellite communications, remote sensing and space science.

The 2010 Symposium was entitled “Small Satellite Programmes for Sustainable Development: Payloads for Small Satellite Programmes”. It built on the outcomes of the 2009 Symposium and focused on the development and applications of payloads for small satellites in the 1-100 kilogram class. The Symposium was attended by 117 participants from more than 35 countries. The lectures and working groups focused on the status of worldwide small satellite activities, international and regional cooperation, the potential for using small satellites for education, research and operational applications, the technical and programmatic issues of developing payloads for small satellites, and relevant regulatory issues such as frequency allocations, space debris mitigation and registration of satellites. For further details on the Symposium, including presentations, see www.unoosa.org/oosa/en/SAP/act2010/graz/index.html.

The symposia series is part of the Basic Space Technology Initiative, implemented under the United Nations Programme on Space Applications (see www.unoosa.org/oosa/en/SAP/bsti/index.html).

TUGSAT-1/BRITE-Austria

TUGSAT-1/BRITE-Austria, the first Austrian nanosatellite, is currently in the assembly and testing phase at the Graz University of Technology. The project is aimed at investigating the photometric variations of massive luminous stars by using two Austrian nanosatellites (BRITE-Austria and UniBRITE) that observe on two different wavelengths. The development and manufacture of TUGSAT-1 is being undertaken in collaboration with the Space Flight Laboratory of the Institute for Aerospace Studies of the University of Toronto in Canada. BRITE-Austria is funded by the Austrian Federal Ministry for Transport, Innovation and Technology, through ASAP. Discussions are under way on other nanosatellites from Canada and other countries that may join the project at a later stage.

In October 2009, a memorandum of understanding for the launch of the satellite was signed between the Graz University of Technology and the Institute for Aerospace Studies of the University of Toronto. The spacecraft is expected to be launched by the Polar Satellite Launch Vehicle of the Indian Space Research Organisation from the Satish Dhawan Space Centre in Sriharikota, India, in the second or third quarter of 2011.

In the area of microgravity research, Joanneum Research, Austria, and QinetiQ/Space, Belgium, are in the process of completing the Miller-Urey Experiment in space, under contract from the European Space Agency (ESA). The aim of this experiment is to demonstrate the formation of amino acids, the basic building blocks of life, from elementary gases and water in comets and circumstellar accretion discs. The experiment will be carried out in a microgravity environment on board the International Space Station in 2013 at the earliest.

Space education

The Aeronautics and Space Agency of the Austrian Research Promotion Agency supports national institutions in their efforts to stimulate interest in space in general, in particular in schools. It serves as a contact and information point for schools and promotes competitions, campaigns, demonstrations and the use of ESA teaching materials.

The Aeronautics and Space Agency assists graduate scientists and undergraduate students in taking advantage of educational and advanced training opportunities and securing work placements at key space research centres in Austria and abroad. The opportunities offered range from the annual Alpbach Summer School and courses offered by the International Space University to training and grants available from ESA.

Alpbach Summer School

Sixty young, highly qualified European science and engineering students meet annually for 10 days at this summer school in the Austrian Alps. Students learn how to approach the design of a satellite mission and explore new and exciting ideas, while being supported by experts. The Alpbach Summer School has been providing

in-depth teaching on different areas of space science and technology, with lectures and concentrated working sessions on mission studies in self-organized working groups, for over 30 years. The Summer School is organized by the Austrian Research Promotion Agency and is co-sponsored by ESA, the International Space Science Institute and the national space authorities of ESA member and cooperating States.

The objectives of the Summer School are to motivate participants to see space as an exciting and challenging endeavour; to work in international, multidisciplinary teams by posing challenging topics for designing space missions; to explore a wide range of scientific topics relevant to future science missions, and different aspects of the complex interplay between scientific objectives and requirements, mission and spacecraft design and mission costing; to develop the ability to work in teams towards a common goal; to prepare presentations and reports under serious time constraints; and to enjoy the unique Alpbach experience.

The Summer School is also aimed at fostering practical application of knowledge derived from lectures, developing organizational and teamwork skills and encouraging creativity. The teams select a subject for the project from within the topic chosen for the year and decide on their own working methods and structure. By the end of the Summer School, they present a proposal for a unique space mission.

Each year, a challenging topic is offered that can benefit future space missions. The students are put into four teams, each of which designs a space mission intended to answer some of the key questions relating to the topic. The students face real-life challenges, such as working in new fields with new techniques and working in teams, as scientists and engineers. By the end of the workshop, the teams will have considered not only the instrumentation that can meet scientific requirements but also the spacecraft's orbit, construction, subsystems and launch, together with a cost estimate. The results of the project are presented to an expert review panel.

The 2010 Alpbach Summer School was held from 27 July to 5 August and focused on "New Space Missions for Understanding Climate Change", addressing innovative mission concepts with the objective of increasing knowledge of key processes of the global climate system. The students learned how to approach the design of a space mission that would meet specific goals to improve understanding of the Earth's climate system. Twenty well-known European experts presented existing climate change missions and gave lectures on the role of Earth observation satellites in climate monitoring and research.

The challenge to the student teams was twofold: choosing from the many observable parameters contributing to the assessment of climate change and its underlying processes; and identifying objectives and designing a mission that had not yet been attempted by space agencies.

The 2010 Alpbach Summer School students presented the following missions:

(a) Atmospheric Water Vapour from an Active Limb-Sounding Observing Network, a mission for understanding climate change aimed at very high vertical and horizontal resolution in measuring water vapour in the lower stratosphere, where the outgoing long-wave radiation from the Earth was controlled;

(b) Evolution and Radiative Impact of Contrail Cirrus mission, whose objective was providing observations to help understand the formation and effects of anthropogenic contrail cirrus in the atmosphere;

(c) A mission to measure Fire Radiative Power in order to assess the amount of carbon emitted (biomass burning is considered to be responsible for as much as 40 per cent of global carbon dioxide emissions; some biomass burning takes up almost all the carbon emitted after the fires, so the net biomass burning contribution is about 26 per cent);

(d) The Dual Retrieval of Precipitation, which used both liquid (rain) and solid (snow) phases, along with higher resolution than used previously, to better understand the precipitation process and thus contribute to understanding of the regional and global water cycles.

International Space Camp 2010

International Space Camp was created in 1990 to promote international cooperation in space science education. Each summer, two pupils (15-18 years old) and one teacher are invited to a two-week camp at the Space and Rocket Center in Huntsville, Alabama, United States of America. Teachers and international students participate in a comprehensive educational programme designed to promote interest in space science and exploration. The Aeronautics and Space Agency of the Austrian Research Promotion Agency acts as the national point of contact for Austria and selects national representatives by organizing, together with the Austrian Federal Ministry for Education, Arts and Culture, a nationwide school contest. In 2010, a pupil from Salzburg and a pupil and a teacher from Upper Austria were nominated for participation in International Space Camp 2010.

Italy

[Original: English]
[27 October 2010]

Space activities — 2010

Italy promotes space activities through the Italian Space Agency (ASI) and through national and international cooperation programmes in Europe and throughout the world. According to the three-year plan of activities 2010-2012, the ASI budget for national and international missions for 2010 is 750 million euros.

In 2010, several new cooperation agreements between ASI and other space agencies were established, paving the way for new partnerships and strengthening old ones. In particular, bilateral cooperation was enhanced with Australia, Egypt, Israel, the Republic of Korea and South Africa.

Italy is highly involved in Earth observation activities with its Constellation of Small Satellites for Mediterranean Basin Observation (COSMO)-SkyMed programme. ASI is completing the deployment of the COSMO-SkyMed dual constellation, which comprises four X-band radar satellites dedicated to monitoring natural resources, disaster management and national security. With the fourth COSMO-SkyMed satellite launched on 29 October from the Vandenberg Air Force

Base in California, United States, the first constellation has been completed, and the second-generation satellite system has already been planned.

During 2010, the three COSMO-SkyMed satellites in orbit provided images of natural disasters all over the world. The first images of the earthquake in Haiti were acquired on 14 January, two days after it struck, and the COSMO-SkyMed system has continued to provide useful information for assessing the severe damage caused by the earthquake.

During intense rainfall in the first week of March in the Murray Darling Basin, Australia, when several rivers burst their banks, flooding urban centres and cultivated fields and causing millions of dollars of damage, e-GEOS, an ASI/Telespazio company, processed and made available COSMO-SkyMed satellite data and evaluation maps of the flooding in the towns of Taroom and St. George to the University of New South Wales, which provides technical support to Australian civil defence forces.

On 20 April, COSMO-SkyMed satellites obtained multitemporal images of the Icelandic volcano Eyjafjallajökull.

Following a series of earthquakes in April, ASI, alerted by the Italian National Civil Protection Authority, directed the COSMO-SkyMed radars towards the Etna volcano and activated the ASI Volcanic Risk System Project. The ASI team involved in the project was able to respond quickly to the request, using the data collected by ASI on the volcano over several months.

In May, the COSMO-SkyMed system monitored the daily movements of the oil slick in the Gulf of Mexico.

On 1 August, an iceberg measuring 250 square kilometres was calved from the Petermann Glacier near the Nares Strait that separates the island of Ellesmere from Greenland. The satellites of the COSMO-SkyMed constellation are monitoring the movements of that giant block of ice.

From 5 to 31 August, guided by the needs of European civil protection, the COSMO-SkyMed satellites have acquired daily images of flooded areas in Pakistan, providing data to create detailed maps of the most affected zones.

In May, e-GEOS, the exclusive distributor of COSMO-SkyMed data, developed a partnership with Google Enterprise to develop and distribute geospatial solutions in Italy based on Google Earth Enterprise technology.

The collaboration between ASI and the Italian National Civil Protection Authority has been reinforced after an agreement was signed in September in Rome. The agreement deals with the operative involvement of the Italian National Civil Protection Authority in the ASI project "Satellite solutions for applications and communications services", which intends to create new applications for space technologies for the benefit of public institutions and citizens.

After the success of the Italian logistic modules Leonardo, Raffaello and Donatello, used by the National Aeronautics and Space Administration (NASA) of the United States for 10 years to transport equipment, supplies and experiments to the International Space Station, under the ASI-NASA Memorandum of Understanding for the design, development, operation and utilization of three Mini Pressurised Logistics Modules, signed in October 1997, it was possible to modify

the Leonardo module to a permanent and attached module of the International Space Station. On 1 November, the Permanent Multipurpose Module is scheduled to be sent to the International Space Station with the space shuttle mission STS-133. The mission is carried out by the Anomalous Long Term Effects on Astronauts, an Italian facility used previously on the International Space Station for human physiology and radiation monitoring, as a dosimeter as part of ASI-NASA and ESA collaboration.

Some scientific missions in which the Italian scientific community has participated with important payloads, are still successfully in progress, such as the interplanetary Cassini-Huygens mission, launched in 1997; the Swift mission, launched in 2004; the Fermi Gamma-ray Space Telescope mission, which is dedicated to the study of gamma-ray bursts and was launched in 2008; the ASI Astro-rivelatore Gamma a Immagini Leggero mission, which focuses on the study of the high-energy universe and was launched in 2007; the NASA Dawn mission to observe the asteroids Vesta and Ceres, launched in 2006; the Shallow Subsurface Radar payload on the NASA Mars Reconnaissance Orbiter mission; and the Mars Advanced Radar for Subsurface and Ionosphere Sounding payload, which joined the ESA Mars Express Mission in 2005 with the goal of finding liquid water and ice in the subsurface of Mars.

The Planetary Fourier Spectrometer, built by the Italian National Institute for Astrophysics, on board the Mars Express, is mapping the abundance of water vapour and methane in the Martian atmosphere. Other significant missions with Italian instruments on board include the ESA Venus Express, currently orbiting Venus, and the Rosetta spacecraft, on its way to comet 67P/Churyumov-Gerasimenko.

Italy is taking part in the international space project “Alpha Magnetic Spectrometer”, a high-energy particle physics experiment that will be installed on the International Space Station in February 2011 with the STS-134 mission. The Italian astronaut Roberto Vittori is to be a member of this Shuttle mission team, which will investigate the composition of cosmic rays and search for the existence of anti-matter nuclei and the origin of dark matter.

Paolo Nespoli, assigned to expedition 26/27, is going to be the first Italian astronaut undertaking a long-duration mission to the International Space Station. The missions are scheduled for launch from the Baikonur base in December.

In October, ASI took over the presidency of the Committee on Earth Observation Satellites (CEOS) for 2010-11 from the National Institute for Space Research (INPE) of Brazil.

Together with the European Union, Italy organized the Fifth Meeting of the International Committee on Global Navigation Satellite Systems in Turin from 18 to 22 October; and hosted the 16th Ka and Broadband Communications, Navigations and Earth Observation Conference in Milan from 20 to 22 October. Further details about the two conferences will be presented at the forty-eighth session of the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space.

Japan

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[29 October 2010]

Participation in the International Space Station programme

The International Space Station programme is the largest international cooperative science and technology programme ever attempted in the new frontier of space. It will contribute to the further utilization of outer space and improve the quality of our lives.

Japan has been active in promoting the International Space Station programme in cooperation with the other countries involved. The contributions of Japan to the programme include the development of the Japanese Experiment Module (Kibo) and the H-II Transfer Vehicle (HTV).

The assembly of Kibo was completed last year and is contributing to new scientific insights and innovations in various fields. The experiments that were planned are achieving landmark results in the areas of protein crystallization; Earth observation, through the Superconducting Submillimeter-wave Limb-Emission Sounder (SMILES); and astronomy, using the Monitor of All-sky X-ray Image (MAXI). The Japan Aerospace Exploration Agency (JAXA) is now carrying out preparations for experiments that will take place after 2010.

In July, JAXA established a new office, the Kibo Utilization Office for Asia, which will promote the utilization of Kibo in Asia.

Japanese astronaut Soichi Noguchi stayed on board the International Space Station for more than five months. While he was there, Naoko Yamazaki also visited, making it the first time that two Japanese astronauts had been on board at the same time.

HTV is now playing an important role in transportation to the International Space Station. Following HTV1, which was successfully completed in 2009, HTV2 is scheduled to be launched by H-IIB rocket on 20 January 2011.

Remote sensing

Japan has been promoting international cooperation in a number of other fields. In the field of Earth observation, Japan cooperates closely with space-related organizations through the Committee on Earth Observation Satellites. As a co-chair of the Architecture and Data Committee of the Group on Earth Observations, Japan has been promoting the establishment of the Global Earth Observation System of Systems, and continues to take a leading role in efforts towards its establishment, in line with the 10-year implementation plan.

JAXA is currently serving as the 2009-2010 Chair of the CEOS Strategic Implementation Team, which is contributing to the space technology activities of the Group on Earth Observations. Japan plays a leading role, mainly in greenhouse gas and climate change monitoring and forest and carbon tracking.

Additionally, Japan has been promoting international cooperation using the Advanced Land Observing Satellite (ALOS), also known as Daichi, in the following areas:

(a) In the field of forest and carbon tracking, the Daichi Phased Array type L-band Synthetic Aperture Radar (PALSAR) can be used for forest classifications in areas that cannot be monitored by ground measurements. JAXA has continued with its global observation of forests; in particular, Daichi is currently monitoring illegal deforestation in the Amazon region, in cooperation with Brazilian forest management entities. In cooperation with members of the Group on Earth Observations and CEOS, Japan plans to evaluate forest classification using data obtained by Daichi, and to produce a global data set to validate the outcomes of satellite data. Through these activities, Japan continues to contribute to global initiatives such as the United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries.

(b) JAXA uses Daichi as part of the Tropical Andes Project, in partnership with the World Bank, to assess the effects of the rapid retreat of a glacier. It also works with the United Nations Educational, Scientific and Cultural Organization (UNESCO) to monitor World Heritage Sites about twice a year and to produce a database of World Heritage Site images.

(c) JAXA has signed an agreement with the Ramsar Convention secretariat for a global survey of the Wetlands of International Importance using Daichi satellite images. Under this agreement, JAXA will provide ALOS satellite images of a selected number of Wetlands of International Importance to the Ramsar secretariat. In addition, JAXA will create a database of the ALOS satellite images of the selected wetlands. The Ramsar Convention secretariat will use ALOS satellite images for wetland inventories, assessment and conservation.

In addition to contributions by Daichi, Japan is currently creating high-resolution, global digital elevation model data sets based on data obtained by a satellite operated in collaboration with the United States.

Asia-Pacific Regional Space Agency Forum

The Asia-Pacific Regional Space Agency Forum (APRSAF) was established in 1993 to enhance space activities in the Asia-Pacific region. Space agencies, governmental bodies and international organizations such as the United Nations, as well as companies, universities and research institutes from over 30 countries and regions have taken part in APRSAF, which is the largest space-related conference in Asia and the Pacific. With increasing participation by high-ranking officials, APRSAF offers a good opportunity to discuss international cooperation in space activities.

APRSAF currently organizes working groups on earth observation, communication satellite applications, space education and awareness, and space environment utilization, to share information about the activities and plans of each country and region in those areas. APRSAF also supports the establishment of international projects that can help with disaster management and environmental protection and that enhance cooperation between participating parties.

The 16th session of APRSAF, held in Bangkok from 26 to 29 January 2010, was entitled “Space Applications: Contributions towards Human Safety and Security”. It was aimed at strengthening the capabilities of countries in Asia and the Pacific to improve the quality of their peoples’ lives through the enhanced use of space-based systems, activities and services. Jointly organized by the Ministry of Science and Technology of Thailand and the Geo-Informatics and Space Technology Development Agency of Thailand, the Ministry of Education, Culture, Sports, Science and Technology of Japan and JAXA, the session was attended by approximately 310 participants from 27 countries and regions, and 10 international organizations.

The 17th session of APRSAF took place in Melbourne, Australia, from 23 to 26 November 2010. Its theme was “The role of space technology and industry in addressing climate change” and it was co-sponsored by the Department of Innovation, Industry, Science and Research of Australia.

During presentations and discussions in the four working groups and plenary sessions over the past few years, APRSAF has launched the following three cooperative activities to resolve regional issues:

(a) Space Applications for Environment, an initiative to contribute to climate change issues using Earth observation satellites;

(b) Satellite Technology for the Asia-Pacific Region (STAR), an initiative to develop small satellites in collaboration with APRSAF researchers and engineers for capacity-building purposes;

(c) Sentinel Asia, which is an international joint project for which Japan provides the secretariat. It was created with the aim of disaster management and rescue support in large-scale disasters in Asia and the Pacific by applying technology such as Earth observation satellite data. In April 2010, the project moved to the second stage, which involves an increase in the number of satellites that provide necessary data and a high-speed, large-capacity experiment of transmitting disaster information using the Japanese satellite Kizuna. This experiment has been conducted by Japan, the Philippines and Thailand since July 2009; Mongolia and Nepal joined in September 2010 (for more information, visit <http://sentinel.tksc.jaxa.jp/>). With the aim of enhancing services, Japan will continue its work through JAXA to promote this project with the cooperation of 60 organizations from 24 countries and regions and nine international organizations.

Norway

[Original: English]

[21 October 2010]

Norway has a long history of space activities, owing largely to its northern latitude. The country has leading scientists in several space-related fields and is an established user of satellite communication, satellite navigation and Earth observation. It also has an internationally competitive space industry.

Space research

Norwegian space science is concentrated on relatively few areas. This concentration is a result of limited resources, both in terms of funding and personnel. The main scientific activities relate to middle and upper atmospheric physics and solar physics. Cosmology has also been a growing field in recent years.

Andøya Rocket Range, with its launching site for scientific rockets, is an important site for space science in Norway. Another important facility is the international Arctic Lidar Observatory for Middle Atmosphere Research (ALOMAR), which uses lidars (light detection and ranging) to study the middle and upper atmosphere. At Tromsø and on Svalbard, European Incoherent Scatter (EISCAT) radars probe the nature of the magnetosphere. In 2008, the Kjell Henriksen Observatory, the world's largest northern lights observatory, was inaugurated. In this facility, international groups can rent "a room with a view" for their scientific instruments and control them remotely from their home institutions.

Norwegian solar scientists are active in several international space projects and are deeply involved in the ongoing ESA-NASA Solar and Heliospheric Observatory project, which will continue until 2012. The scientific data from the Japanese Hinode mission are downlinked to the Svalbard and Troll ground stations and are processed and distributed at a European data centre at the University of Oslo. Norwegian scientists are also involved in the NASA Solar Dynamics Observatory mission, launched in 2010.

Scientists at the Norwegian Defence Research Establishment and the universities of Oslo, Bergen and Tromsø participate in several experiments on sounding rockets and spacecrafts, which measure particle currents, electric fields, X-ray radiation and dust. This includes the ESA Cluster mission, which represents a constellation of four satellites, flying in formation around the Earth to provide a three-dimensional map of the magnetosphere. The University of Bergen is developing a camera for the Atmosphere-Space Interactions Monitor (ASIM) that will be mounted on the International Space Station. ASIM is designed to study the mysterious lightening phenomena high up the Earth's atmosphere known as sprites, jets and elves. Norway is also participating in the ESA missions Planck and Rosetta.

The Norwegian Defence Research Establishment also actively contributes to the International Earth Rotation and Reference Systems Service through analysis of global positioning system and very long baseline interferometry measurements.

In addition, Norway is involved in microgravity research. The University of Tromsø conducts cutting-edge research in dust formation in space and the upper atmosphere, and will take part in an experiment to produce this dust on board the International Space Station. The Plant Biology Centre at the Norwegian University of Science and Technology hosts the user support operation facility for one of the key experiments on board the International Space Station.

Earth observation

For many years, Norway has focused on the development of Earth observation applications for maritime and polar areas. National user needs have been the driving force for this, furthered by close cooperation with major users, research institutes and industry. One example is radar satellite images, which, together with Automatic

Identification System data, have become an essential tool for the management of Norway's vast maritime areas. Radar satellites are also used in the study of melting permafrost and in the monitoring of areas at risk of rockslides and tsunamis.

Kongsberg Satellite Services operates satellite stations at Svalbard, Tromsø and Grimstad and an antenna at the Troll station in Antarctica. These ground stations support a large number of both national and international satellites and offer very reliable services.

Industry

Norwegian industry is involved in the International Space Station programme, the Ariane 5 launchers, space telescopes and satellites for Earth observation, communication and navigation. Key companies in the Norwegian space industry are Telenor, Tandberg Television, Norspace and the Kongsberg Group. In 2009, the Norwegian space industry had a turnover of about 5 billion kroner, over 70 per cent of which was exported.

Communications

Telecommunications account for most of the Norwegian space industry, generating two-thirds of the sector's annual turnover. Telenor is the principal company, offering services and products for mobile satellite communications, television broadcasting and, increasingly, satellite systems for multimedia and broadband.

Ship and oil spill detection

The first Norwegian satellite for space-based automatic identification system monitoring service of ship traffic, AISSat-1, was launched into low-Earth orbit (sun-synchronous) on board an Indian launcher on 12 July 2010. The launch and commissioning of the satellite have been successful.

Kongsberg Satellite Services provides satellite-based monitoring and rapid reports of illegal discharges and accidental oil spills at sea. The combination of the AISSat-1 ship identification and the detection of oil spills from radar satellites is a powerful tool for identifying and catching polluters.

Satellite navigation

With its vast land areas and territorial waters, low population density and sub-Arctic to Arctic weather, Norway benefits immensely from the global positioning system. As a member State of ESA, as well as through cooperation agreements with the European Union, Norway is now taking part in the development of Europe's global navigation satellite system, Galileo.

Infrastructure

Norway's high latitude is a valuable asset for its space activities. Northern Norway and Svalbard, in particular, have geographical advantages for observing northern lights and communicating with polar orbiting satellites.

Rockets launched from the Andøya Rocket Range are well placed to study phenomena related to Sun-Earth interactions, as Andøya lies under the middle of the

magnetic belt around the North Pole, where auroral activity peaks. Scientists can use sounding rockets launched from Svalbard to study the interactions of solar wind with the polar magnetic cusp near the magnetic north pole.

Northern Norway and Svalbard are also well located for studying the processes taking place in near-Earth space above the Arctic that can give indications of global climate changes.

Polar orbiting satellites pass near the North and South Poles 14 times a day. The SvalSat ground station on Svalbard has an optimal location for spacecraft control and for downloading data, as it can see all 14 daily satellite orbits. With the added capacity of the Troll ground station at Dronning Maud Land in Antarctica, Norway possesses a pole-to-pole downlink capability.

Republic of Korea

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[28 October 2010]

The Republic of Korea's first geostationary communication, ocean, meteorology satellite (COMS) was successfully launched in June from the Guiana Space Centre. The satellite is currently operating in trial mode and aims to provide commercial services by the end of 2010. The satellite was developed by the Korea Aerospace Research Institute (KARI), in cooperation with EADS Astrium, France, under the national space development programme.

COMS carries three payloads: a geostationary ocean colour imager for ocean monitoring, a meteorological imager for weather observation and a communications payload for experimental communications services in Ka-band.

The oceanography payload (the geostationary ocean colour imager) will monitor marine environments around the Republic of Korea and will assist the local fishing industry by collecting data, for example on the production of chlorophyll. It will also monitor both long- and short-term changes in the marine ecosystem. The meteorology payload will provide continuing image monitoring by extracting high-resolution meteorological data from its multi-spectral imager. This will allow for the early detection of hazardous weather conditions, including storms, floods and sandstorms. It will also provide data on long-term changes in sea surface temperatures and cloud patterns. The observational data from the geostationary ocean colour imager and the meteorological imager will be made available to end users around the world. Lastly, the communications payload on board COMS will allow "in-orbit verification" of advanced communication technologies and will provide wideband multimedia communication services.

Additionally, the Republic of Korea plans to launch two more satellites next year: Korea Multi-Purpose Satellite-5 (KOMPSAT-5), which will carry the first synthetic aperture radar payload of the Republic of Korea; and Science and Technology Satellite-3 (STSAT-3), which is a small scientific satellite that will carry two main payloads (a multi-purpose infrared imaging system and a compact imaging spectrometer).

Building on these national achievements, the Republic of Korea expanded its cooperation with the international space community by establishing new partnerships with countries such as India, Italy, Kazakhstan and the Netherlands, and strengthening existing partnerships in various areas of aerospace research and development, including joint research on satellite technology and its applications, Earth science and space exploration.

KARI also commenced its first free international space training programme, with 22 participants from 11 different countries (China, France, Kazakhstan, Mongolia, Romania, Seychelles, Singapore, Thailand, Tunisia, Turkey and Viet Nam). The programme included various training courses on satellite systems, such as system engineering, spacecraft subsystems and payloads, satellite assembly and integration, satellite operation, remote sensing and application, space communication, and space science. On-site training for ground system operations was provided and the participants had the opportunity to visit the Naro Space Center, as well as other research institutions and industrial complexes in Korea. The Republic of Korea hopes that this programme will help participants to use space technology to improve the quality of life in their home countries, and also promote the sharing of such technology with other countries.

The Korea Astronomy and Space Science Institute (KASI) plays a key role in the field of solar activity and space weather in the Republic of Korea. It is currently operating the Solar Flare Telescope, a solar spectroscopic telescope, a sunspot telescope, a solar radio spectrograph, magnetometers, a scintillation monitor and an all-sky imager. KASI initiated a new project in 2004 that included the development of the Korean Solar Radio Burst Locator and the joint construction of a 1.6-metre new solar telescope. Through active participation in this project, the Republic of Korea has effectively developed an observational system that can monitor solar activities and space weather, and at the same time, has effectively concentrated on the research of space weather and its effects on modern space technologies.

Slovakia

[Original: English]
[22 October 2010]

Institutes of the Slovak Academy of Sciences, universities and other research institutions in Slovakia are continuing activities in space research in collaboration with laboratories abroad. (For a more detailed account of these activities, see the biannual reports of the Slovak National Committee of the Committee on Space Research, available at <http://nccospar.saske.sk>.)

Over the past three years, the Institute of Experimental Physics of the Slovak Academy of Sciences in Košice has participated in two experiments for energetic particle measurements in space (see <http://space.saske.sk>). The Institute is continuing its work on future measurements in space by participating in the development of part of the plasma instrument for the ESA BepiColombo mission and the RadioAstron mission of the Russian Federation. Supporting work has also begun for the Extreme Universe Space Observatory on board the Japanese Experiment Module on the International Space Station.

Slovakia has a history of research in the areas of space physics, geophysics and astronomy. The Institute of Experimental Physics has analysed earlier energetic particle measurements on the Russian satellites Active, Coronas-F, Interball-Aurora and Interball-Tail, and energetic neutral atom measurements on the TC-2 satellite. It has also done some work for the Venus-Express magnetometer.

The Faculty of Mathematics, Physics and Informatics of the Comenius University in Bratislava contributed to research on the interaction of cosmic rays with material objects and to the study of upper atmosphere response to solar proton events. Current space projects being undertaken by the Faculty include genetic relations between meteoroid streams and near-Earth objects, orbital evolution of arbitrarily shaped cometary and asteroidal dust particles, and diagnostics of the non-thermal distributions in solar flare plasma.

The Geophysical Institute of the Slovak Academy of Sciences in Bratislava and Hurbanovo investigated a number of issues important for space weather studies. The Academy's Astronomical Institute in Tatranská Lomnica focused its research on solar and stellar physics using different satellite data (see www.astro.sk). For solar research, data from various satellites were used. Stellar data from several satellites, such as the International Ultraviolet Explorer and the Hubble Space Telescope, were analysed as part of the research of various variable stars. Solar and space weather research activities of the Slovak Central Observatory in Hurbanovo comprise observation of sunspots, solar flares, prominences, solar spectrum and solar eclipses, in addition to the study of north-south asymmetry of solar activity.

The Institute of Materials and Machine Mechanics of the Slovak Academy of Sciences, which focuses on the development of advanced materials, technologies and material architectures such as high-temperature materials for applications in extreme conditions, ultra-light composites and alloys and extremely stable metallic systems, is also a cooperating partner in the ESA project "Gravity Dependence of CET in Peritectic TiAl Alloys" and in the integrated project of the European Commission and ESA, "Intermetallic Materials Processing in Relation to Earth and Space Solidification".

In life sciences, a project on activity of the catecholaminergic system in hypergravity was performed by the Institute of Experimental Endocrinology, the Institute of Animal Biochemistry and Genetics, and the Institute of Measurement Sciences, all of which are part of the Slovak Academy of Sciences. The Academy's Institute of Normal and Pathological Physiology focuses its research on space physiology.

Remote sensing activities were carried out at the Institute of Geography of the Academy in Bratislava and at the Slovak Environmental Agency in Banská Bystrica, where, over the past few years, they have been focused on the Corine Land Cover 2006 project, with the aim of providing data on land cover and developments from 2000 to 2006 in Europe using satellite images. The Slovak Environmental Agency is the national coordinator and major technical contributor of this project in Slovakia. The Institute of Geography also participates in the Urban Atlas project, which is part of the Global Monitoring for Environment and Security programme. The aim of this project is to produce detailed mapping of more than 300 European cities using satellite images. The Institute is supporting the interpretation of control points on satellite images under a contract with the French National Geographic Institute.

The Soil Science and Conservation Research Institute in Bratislava focused its activities on the control of area-based subsidies, crop yield forecasting and other satellite image interpretations. The National Forest Center in Zvolen studied the forest ecosystem's response to global environmental changes.

The main activities in space meteorology focused on receiving and processing meteorological satellite data. The Slovak Hydrometeorological Institute in Bratislava is the main body in Slovakia in the area of space meteorology.
