

UNITED NATIONS
OFFICE FOR OUTER SPACE AFFAIRS

United Nations Programme on Space Applications



UNITED NATIONS



THE UNITED NATIONS PROGRAMME ON SPACE APPLICATIONS

It was on 4 October 1957 when the space age began with the launch of the first artificial satellite, Sputnik 1. Soon after this event the Member States of the United Nations declared that space should be used for exclusively peaceful purposes to improve life on Earth and for the benefit of all countries, irrespective of their degree of economic or scientific development.

In the following decades the applications of space activities expanded quickly and demonstrated their usefulness in making important contributions to social and economic development. Today space activities support a wide range of efforts towards sustainable development in fields such as biodiversity and resources management, environmental monitoring, disaster mitigation and prevention and in addressing the consequences of climate change.

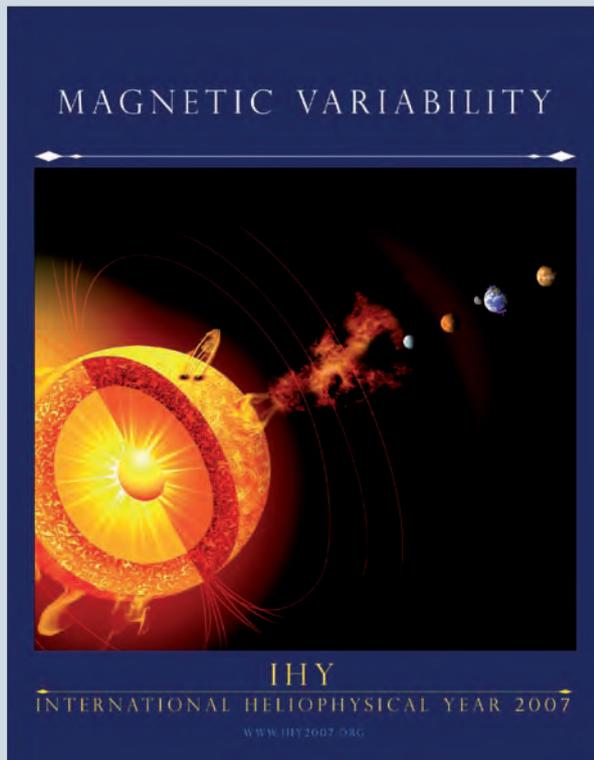
Initially many countries lacked the human, technical and financial resources to fully utilize the benefits of space technology. Consequently, Member States at the first United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE), held in 1968, recommended the creation of a dedicated programme to assist those countries, in the framework of the United Nations. In 1971 the United Nations Programme on Space Applications was established.

Following the second UNISPACE Conference held in 1982, the mandate of the Programme was broadened ultimately resulting in the establishment of four Regional Centres for Space Science and Technology Education, affiliated to the United Nations. The goal of the Centres, located in the regions that correspond to the United Nations Economic Commissions for Africa, Asia and the Pacific, and Latin America and the Caribbean, is to develop, through in-depth education, capabilities for research and applications of space science and technology.

The third and latest UNISPACE Conference, held in 1999, aimed to further increase the benefits that could be derived from space technology and its applications. Among other achievements it led to the establishment of the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER) for space-based disaster management and the International Committee on Global Navigation Satellite Systems (ICG), a forum of providers and user communities of Global Navigation Satellite Systems (GNSS).

Since its inception the Programme has organized more than 200 training courses, workshops, seminars and conferences and provided funding support for approximately 11,000 participants, mainly from the developing countries. In addition to the support provided to the four Regional Centres for Space Science and Technology Education the Programme is also cooperating with academic institutions to offer long-term fellowship programmes.

Nearly forty years after its establishment, the United Nations Programme on Space Applications continues to evolve by taking into account the latest developments in the field of space activities to serve the capacity-building needs of countries and to ensure that space-based solutions contribute to improving life on Earth.



The United Nations Programme on Space Applications addressed solar-terrestrial interactions in the framework of the International Heliophysical Year 2007.

BASIC SPACE SCIENCE

Education and research activities in astronomy and astrophysics and related to the space environment—commonly also referred to as basic space science—are considered to be among the initial steps for countries seeking to establish indigenous capacities in the development and use of space technology and its applications. Beginning in 1991, the Programme on Space Applications launched a long-term effort for the development of basic space science and for international and regional cooperation in this field on a worldwide basis, particularly in developing countries.

A series of workshops, supported by the European Space Agency (ESA), the Japan Aerospace Exploration Agency (JAXA) and the National Aeronautics and Space Administration (NASA) held from 1991 to 2004, addressed the status of basic space science in Africa, Asia and the Pacific, Latin America and the Caribbean, and Western Asia. The workshops contributed to the inauguration of small astronomical facilities for research and education programmes at the university level in developing countries. In addition, educational materials for teaching and observing programmes for small optical telescopes were developed or recommended for use in these facilities.

From 2005 to 2009, the workshops were dedicated to promoting activities related to the International Heliophysical Year 2007 and the International Year of Astronomy 2009. These two events provided unique opportunities for the coordination of observations from the current fleet of international space missions with data collected from ground-based observatories. The Programme on Space Applications contributed to the establishment of several worldwide ground-based instrument networks.

Starting in 2010, the workshops will focus on the International Space Weather Initiative (ISWI), which will be discussed as part of a three-year workplan in the years 2010 to 2012 in the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS).

BASIC SPACE TECHNOLOGY

There has been considerable progress in the use of space technology and its applications since the organization of the third United Nations Conference on the Peaceful Uses of Outer Space (UNISPACE III) in 1999. Space-based solutions are increasingly integrated into public infrastructures and contribute to policy- and decision-making to improve people's lives and in

support of sustainable development. A growing number of countries is weighing the options of establishing basic capacities for the development of basic space technology to help them further enhance their capabilities in making the most efficient and effective use of space applications.

Universities and space-related organizations in those countries show an interest in space technology education and in mastering the development and operation of small satellites, which are expected to play an increasingly important role in a wide range of operational applications.

For this reason, the Programme on Space Applications has launched a dedicated series of activities related to basic space technology development in which it seeks to organize workshops and training courses, develop an education curriculum and provide long-term fellowship opportunities and a framework for international cooperation in the development and use of basic space technology and its applications.

GLOBAL NAVIGATION SATELLITE SYSTEMS

Global navigation satellite systems (GNSS) are constellations of satellites that provide geo-spatial positioning data to users on a continuous and worldwide basis. To date, the United States' Global Positioning System (GPS), the Russian Federation's GLObal NAVigation Satellite System (GLONASS), and elements of the Europe's Galileo and China's Compass/BeiDou systems have been deployed. Satellite navigation has a large number of applications in a wide variety of fields, such as surveying and mapping, timing, aviation, marine, rail and road and traffic, marine, precision agriculture, monitoring of the environment, recreation, and public safety, disaster prevention, mitigation and relief.

The Programme on Space Applications is conducting activities that focus on building capacity for the use of GNSS in support of sustainable development. These activities concentrate on providing support for education and training in satellite navigation and location-based services, and on organizing workshops on the use of GNSS technologies for scientific applications.

The Office for Outer Space Affairs also serves as the Executive Secretariat to the International Committee on Global Navigation Satellite Systems (ICG), a venue for coordination and cooperation to improve overall GNSS service provision to benefit people around the world.



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A growing range of applications, such as car navigation and precision farming, is benefiting from using global navigation satellite systems (GNSS).



©COSPAS-SARSAT

Satellites of several countries are part of the COSPAS-SARSAT satellite search and rescue system.



©NASA Earth Observatory Collection

This high-resolution satellite image shows the rescue efforts underway to salvage a floundering Brazilian oil platform located 80 km off the coast of Rio de Janeiro, Brazil.

SATELLITE-AIDED SEARCH AND RESCUE

Since 1999, the Programme on Space Applications has organized training courses for experts in the operational use of the international COSPAS-SARSAT satellite search and rescue system, which assists search and rescue operations at sea, on land and in the air. The system comprises emergency beacons which send distress alert signals and location information via satellites that then transmit the information to search and rescue teams. By February 2009 approximately one million beacons had been installed worldwide on maritime and air vessels and on land vehicles.

Established in the late 1970s by Canada, France, the former Soviet Union and the United States, the COSPAS-SARSAT system started operating in 1982 and has so far saved around 27,000 persons in distress in approximately 7,300 search and rescue events. The system has seen continuous growth and 36 other countries have joined the founding nations in operating 66 ground stations and 29 mission control centres worldwide or in serving as search and rescue points of contact. The system, which has recently been upgraded to address piracy and terrorist attacks, is available to all countries, free of charge for the end-user, and continues to be a model for international space cooperation.

NATURAL RESOURCES MANAGEMENT AND ENVIRONMENTAL MONITORING

Space applications play important roles in the areas of natural resources management and environmental monitoring. Remotely sensed data, in particular, provide an unparalleled view of the Earth for studies that require synoptic or periodic observations such as inventory, surveying, and monitoring in agriculture or applications for hydrology, geology, mineralogy, land cover, land use and environment. Remote sensing from space is a rapidly growing and maturing technology and operationally integrated with other disciplines such as photogrammetry, cartography, geodetic reference systems, global navigation satellite systems and geographic information systems.

The Programme on Space Applications organizes workshops and meetings to assist developing countries with the use of space-based solutions, in particular

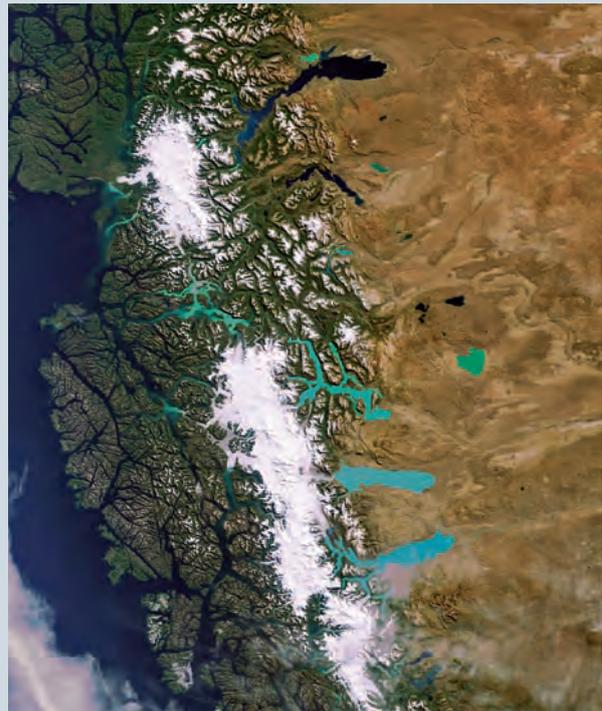
remote sensing data, for managing natural resources and monitoring the environment. Training is also provided through the Regional Centres for Space Science and Technology Education, affiliated to the United Nations. The workshops, in particular, provide unique opportunities for bringing together experts, decision-makers and practitioners to share their experiences and knowledge with the aim to further enhance the use of space technology and its applications for natural resources management and environmental monitoring.

SPACE APPLICATIONS FOR MOUNTAIN AREAS

Mountains cover approximately a quarter of the Earth's land surface. All of our planet's mountains with a height above 7,000m are located in Asia, and all of the fourteen peaks with altitudes above 8,000 are situated in the Greater Himalaya range, extending along the southern rim of the Tibetan Plateau. Up to 80 per cent of the planet's fresh surface water comes from mountains. About 12 per cent of the world's population lives in the mountains and more than half of the world's population are directly or indirectly dependent on mountain resources. Mountains are also among the most environmentally delicate regions with their own particular problems, including soil erosion, flooding, avalanches, droughts, forest fires and water shortages. Precious mountain ecosystems are being affected by climate change, exploitative mining, environmental degradation and conflicts. As a consequence, mountain people are among the world's poorest and most disadvantaged.

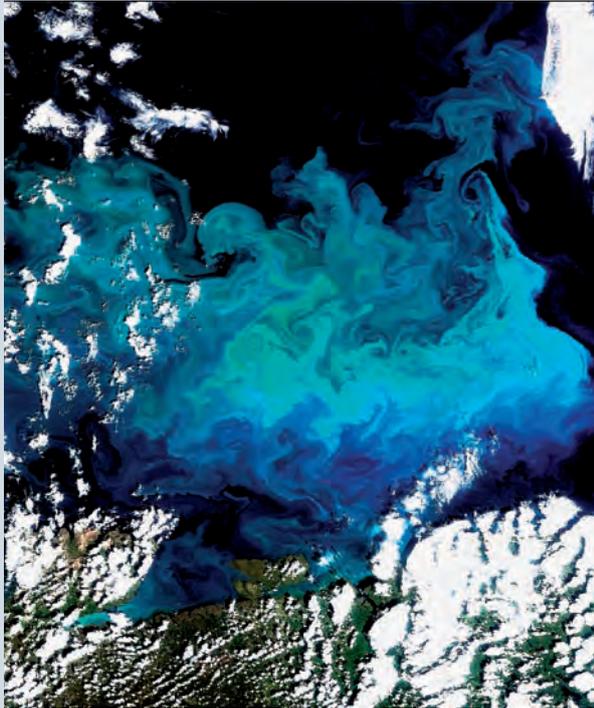
Mountain areas thus require special commitments for their protection and sustainable development. Availability of reliable and up-to-date space-based information is often crucial to effectively use scarce resources in mountainous areas. Remotely-sensed data from satellites is often used for monitoring different aspects of the regional environment such as hydrology, geology, mineralogy as well as agricultural outputs. Space applications of remote sensing, satellite communications and global navigation satellite systems can provide essential information needed for the protection of mountain ecosystems on Earth.

The Programme on Space Applications helps countries make use of these technologies for the sustainable development of mountainous regions. Since 2004, the Programme, in cooperation with its partners, has organized relevant workshops, expert meetings and pilot projects for mountain experts in the Hindu Kush-Himalayan and the Andean regions.



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Satellite images, such as this image of the Andes Mountains, provide essential information to support the sustainable development of mountain regions.



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A plankton bloom larger than Greece stretching across the Barents Sea off the tip of northern Europe. Long-term observations of the Earth from space can monitor minute changes in the environment and contribute to the detection of climate change.



©ESA Integrated and telecommunications applications

Space-based telehealth units can be quickly deployed to provide life-saving medical services in emergency situations.

CLIMATE CHANGE

The use of satellites to monitor processes and trends at the global scale is essential in the context of climate change. Minute variations in the average temperature of planet Earth due to climate change can only be detected through continued observations and long-term monitoring over several decades. Space agencies around the world in cooperation with several United Nations entities are involved in implementing a Global Observing System for Climate in Support of the United Nations Framework Convention on Climate Change (UNFCCC).

The Programme on Space Applications conducts a variety of awareness, training and capacity-building activities related to the collection of, access to, and use of satellite-based data and information in support of sustainable development in the context of climate change.

SPACE TECHNOLOGY APPLICATIONS AND HEALTH

There are about 1,400 infectious diseases, some of which are among the most important causes of death in developing countries. Half of the world's population lives in affected areas. Malaria alone infects up to 300 million persons each year, killing almost one million. The consequences of climate change play a role in the transmission of many infectious diseases. Ultimately the impact of all climate change threats to the environment, economy and security will be on human health. To combat epidemics with coordinated responses, there is a need to establish an integrated global alert system.

Information derived from Earth observation and meteorological satellites in combination with global navigation satellite systems and geographic information systems makes it easier to integrate ecological, environmental and other information to predict the spread of some of these diseases.

Earth observation satellites provide a transnational picture of vector-borne diseases, irrespective of national borders. Space-based data can contribute to combating infectious diseases by helping to predict high-risk areas before outbreaks occur. The Programme on Space Applications assists countries in making use of space-based solutions to fight the spread of diseases.

Another major aspect addressed by the Programme is in the area of telehealth and telemedicine. Telehealth

and telemedicine applications embrace computer and telecommunications technologies, including satellite communications, to bring medical experts into virtual contact with patients or doctors in remote and rural areas, thus avoiding a costly relocation to hospitals in urban areas, which could prove detrimental to the patients' health.

REGIONAL CENTRES FOR SPACE SCIENCE AND TECHNOLOGY EDUCATION, AFFILIATED TO THE UNITED NATIONS

Following the second United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE'82), the United Nations General Assembly endorsed the recommendation to create regional centres for space science and technology education in developing countries. Subsequently, under the auspices of the United Nations, through the Programme on Space Applications, four Regional Centres for Space Science and Technology Education located in the regions that correspond to the United Nations Economic Commissions for Africa (Morocco, Nigeria), Asia and the Pacific (India), and Latin America and the Caribbean (Brazil and Mexico) were established. The Regional Centres are affiliated to the United Nations through the United Nations Office for Outer Space Affairs.

Each Regional Centre is conceived as an institution that should offer to the participants the best possible education and, research opportunities in all of its programmes. Their principal goal is the development of skills and knowledge of university educators and research and applications scientists, through rigorous theory, research, applications, field exercises and pilot projects in those aspects of space science and technology that contribute to sustainable development in each country. The overall goal of the Centres is to develop, through in-depth education, an indigenous capability for research and applications in the core disciplines of remote sensing and geographical information systems, satellite communications, satellite meteorology and global climate, and space and atmospheric sciences.

The United Nations Programme on Space Applications, with the support of prominent educators, has developed standard education curricula, which were adopted by the Regional Centres for teaching in the core disciplines.



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The African Regional Centre for Space Science and Technology Education in Nigeria (ARCSSTE-E) is providing education and research opportunities to space experts in the region.

Additional model curricula are being developed under the auspices of the United Nations in disciplines such as global navigation satellite systems and space law. These will be included into the future education programmes of the Regional Centres.

The Regional Centres can be contacted through the following websites:

- Centre for Space Science and Technology Education in Asia and the Pacific (CSSTEAP) www.cssteap.org
- African Regional Centre for Space Science and Technology Education in English (ARCSSTE-E) www.arcsstee.org
- African Regional Centre for Space Science and Technology Education in French (CRASTE-LF) www.enssup.gov.ma/craste/
- Regional Centre for Space Science and Technology Education for Latin America and the Caribbean (CRECTEALC) www.crectealc.org

INFORMATION ON THE UNITED NATIONS PROGRAMME ON SPACE APPLICATIONS

For additional information on the United Nations Programme on Space Applications and its activities, including the application forms and procedures for events co-sponsored by the Programme and for fellowship opportunities, please visit the website of the United Nations Office for Outer Space Affairs at www.unoosa.org.



*The United Nations Office for Outer Space Affairs
is responsible for promoting international cooperation in
the peaceful uses of outer space and assisting developing
countries in using space science and technology.*

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