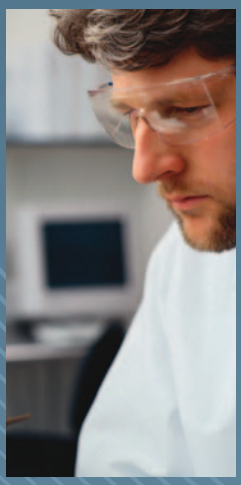
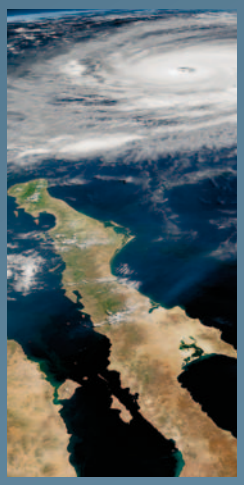
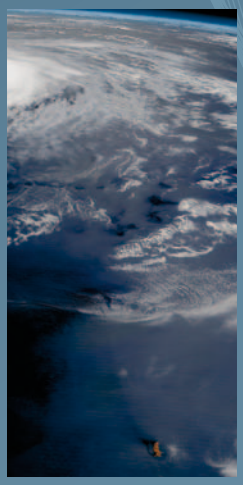
UNITED NATIONS
OFFICE FOR OUTER SPACE AFFAIRS

United Nations

Programme on Space Applications

UNITED NATIONS

THE UNITED NATIONS PROGRAMME ON SPACE APPLICATIONS

The space age began on 4 October 1957 with the launch of the first artificial satellite, Sputnik 1. Soon after that event, the Member States of the United Nations declared that space should be used exclusively for 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. The use of space science and technology could be of benefit in various areas, such as aviation, maritime and land transportation, urbanization, mapping and surveying, human health, disaster management, food security and sustainable agriculture, environmental monitoring and natural resources management.

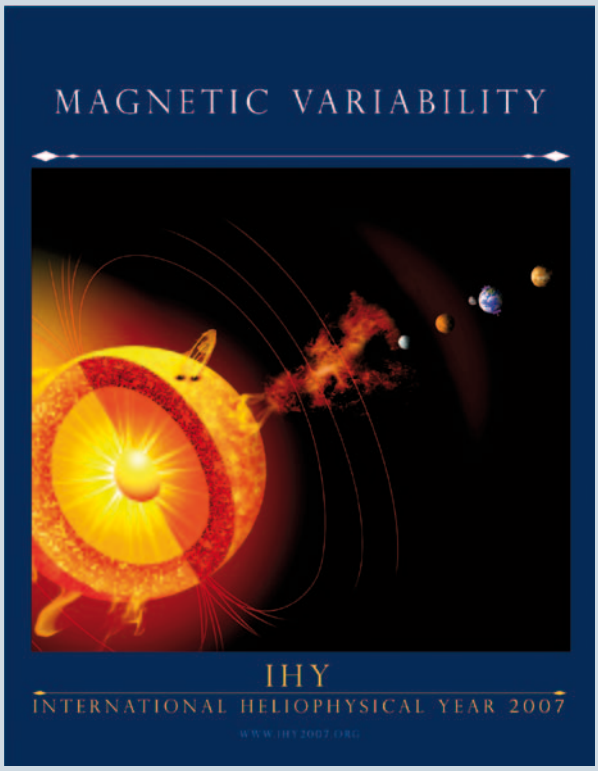
At the first United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE) held in 1968, Member States recommended the creation of a dedicated programme in the framework of the United Nations. In 1971, the United Nations Programme on Space Applications was established in what was then the United Nations Outer Space Division.

Following the second United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE 82) held in 1982, the mandate of the Programme was broadened and ultimately resulted in the establishment of five Regional Centres for Space Science and Technology Education, affiliated to the United Nations.

The third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III) held in 1999, aimed to further increase the benefits that could be derived from space technology and its applications. It led to the establishment of the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER) 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 approximately 300 training courses, workshops, seminars and conferences and has provided funding support for more than 18,000 participants, mainly from developing countries. In addition to the support provided to the five Regional Centres for Space Science and Technology Education, the Programme also cooperates with academic institutions to offer long-term fellowship programmes.

More than 40 years after its establishment, the United Nations Programme on Space Applications, under the Office for Outer Space Affairs, continues to evolve by taking into account the latest developments in space science and technology to serve the capacity-building needs of countries to ensure that space-based solutions contribute to improving life on Earth and to promoting international cooperation.



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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, also related to the space environment—commonly 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 science and technology and its applications.

The Programme on Space Applications has implemented a long-term initiative for the development of basic space science and for international and regional cooperation in this field on a worldwide basis, particularly in developing countries. From 1991 to 2004, a series of workshops 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 and planetariums were developed or recommended for use in these facilities.

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

From 2010 to 2012, the workshops focused on the International Space Weather Initiative (ISWI), which was 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). Several worldwide space weather instrument arrays have been established through ISWI. These arrays collect data for use in research and education, required for the better understanding of the impact of solar activity on planet Earth. In 2012, ISWI also led to the establishment of the International Centre for Space Weather Science and Education in Japan.

The Basic Space Science Initiative (BSSI) will continue providing support to operators of planetariums, astronomical telescopes, and ISWI instruments.

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 Exploration and Peaceful Uses of Outer Space (UNISPACE III) in 1999. More and more countries are weighing the options of establishing fundamental 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 have an interest in space technology education to establish indigenous capacities in basic space technology, particularly 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.

In response to this growing interest, the Basic Space Technology Initiative (BSTI) was launched in 2009. Its objectives are to:

- Address the increasing role of small (nano-) satellites for education, basic space science and for operational applications
- Assist countries to ensure adherence to the relevant regulatory frameworks and promote the use of standards
- Promote international cooperation and information exchange in capacity-building in basic space technology

Under BSTI, the Programme on Space Applications is organizing an annual symposium on space technology development with a focus on small satellites. A long-term fellowship programme on Nano-Satellite Technologies has been established in cooperation with the Kyushu Institute of Technology (KIT) and the Government of Japan. BSTI also provides information on relevant regulatory and legal issues, such as the registration of satellites, liability issues, space debris mitigation, frequency coordination and launch opportunities. Another expected outcome of BSTI will be the development of a space engineering education curriculum in cooperation with relevant educational institutions.

Under its Basic Space Technology Initiative the Programme on Space Applications is addressing the development and deployment of small, low-cost satellites, their applications and relevant legal and regulatory issues.

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Humankind enters space—stepping out from the orbital outpost into the harsh vacuum of space, an astronaut conducts a spacewalk.

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The International Space Station is a massive laboratory complex located at an altitude of approximately 400 kilometres above the Earth. Astronauts stay on the ISS to perform various activities that take advantage of the unique microgravity environment in space.

HUMAN SPACE TECHNOLOGY

Human space flight began when Yuri Gagarin flew into space and orbited the Earth in 1961. Eight years later, Neil Armstrong set foot upon the Moon. Throughout the years, human space flight has not only advanced science and technology but also deepened and changed our perception of the Earth and the universe. In 1999, UNISPACE III encouraged international cooperation in the utilization of the International Space Station (ISS), a remarkable achievement of space technology, which is used as a platform for exploration of space and at the same time improves life on Earth.

In 2010, the Human Space Technology Initiative (HSTI) was launched, aiming at promoting international cooperation in human space flight and space exploration-related activities; creating awareness among Member States of the benefits of utilizing human space technology and its applications; and building capacity in microgravity education and research.

HSTI annually organizes expert meetings, workshops and symposiums to disseminate information on human space technology and to discuss how to facilitate international cooperation. HSTI also develops educational materials, focusing on space and its unique environment where the force of gravity is reduced to one millionth of that experienced on Earth—a condition called microgravity. New scientific knowledge can be obtained in conditions of microgravity by studying unique physical and life sciences phenomena, and new technology will be used for the well-being of countries. In order to promote research as well as educational activities on the effects of gravity, HSTI distributes, through an international selection process, experimental instruments that simulate microgravity on the ground to educational and research institutions worldwide.

GLOBAL NAVIGATION SATELLITE SYSTEMS

The use of the signals received from existing Global Navigation Satellite Systems (GNSS), the best known being the Global Positioning System (GPS) of the United States and the Global Navigation Satellite System (GLONASS) of the Russian Federation, has become a cross-cutting tool to support growth in precise positioning applications. With Europe's Galileo satellite navigation system and China's Compass/BeiDou navigation system currently being developed and deployed, the number of satellites visible to a receiver at any given time will greatly increase, thereby enhancing the quality of the services and increasing the number of potential users and applications. A number of space-based augmentation systems and regional navigation satellite systems will add more satellites and signals to multiple systems of satellites and, as a result, improve positioning performance in terms of accuracy, availability, reliability and integrity.

The Office for Outer Space Affairs serves as the Executive Secretariat to the International Committee on Global Navigation Satellite Systems (ICG), a platform for coordinating and cooperating to improve overall GNSS service provision to benefit people around the world. ICG addresses the pursuit of freely available worldwide access to civil satellite navigation systems and the compatibility and interoperability of these systems.

To build capacity related to satellite navigation and location-based services in developing countries, the Programme on Space Applications organizes workshops, training courses and expert meetings that focus on a variety of applications of GNSS on land, at sea and in the air, and include the use of GNSS technologies as tools for scientific applications in various disciplines, such as geodesy, geophysics, space weather and meteorology.

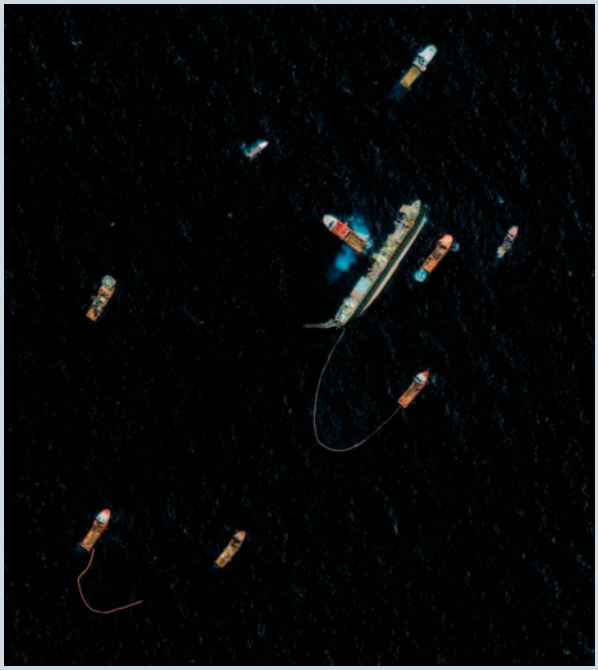
In recognition of a number of ongoing projects and initiatives on the establishment of regional reference frame networks, such as the African Geodetic Reference Frame project (AFREF), the European Position Determination System (EUPOS), the International Association of Geodesy Reference Frame Sub-Commission for Europe (EUREF), the Geocentric Reference System for the Americas and the Asia-Pacific Reference Frame Project (SIRGAS), cooperation between GNSS providers and the regional reference frames was established. This cooperation will enhance applications in fields such as geodesy, mapping, surveying, geo-information, natural hazards mitigation, and earth sciences. Facilitated through the Regional Centres for Space Science and Technology Education, affiliated to the United Nations, it will also be a major springboard for the transfer and enhancement of skills and knowledge in GNSS and its applications.

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

ICG International Committee on Global Navigation Satellite Systems

©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.

DISASTER RISK REDUCTION AND EMERGENCY RESPONSE

Covering complementary areas of interest to the Programme on Space Applications, the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER) was established in the Office for Outer Space Affairs in 2006 to provide universal access to all types of space-based information and services relevant to disaster risk reduction.

UN-SPIDER implements the web-based Knowledge Portal that centralizes content material on space-based information and solutions to support disaster risk management and emergency response. UN-SPIDER also organizes workshops and expert meetings to promote the use of space-based information for the full disaster management cycle as well as providing technical advisory supports to ensure that countries receive systematic and continuous technical advisory assistance for using space-based solutions in their disaster management plans and policies and in the implementation of risk reduction activities.

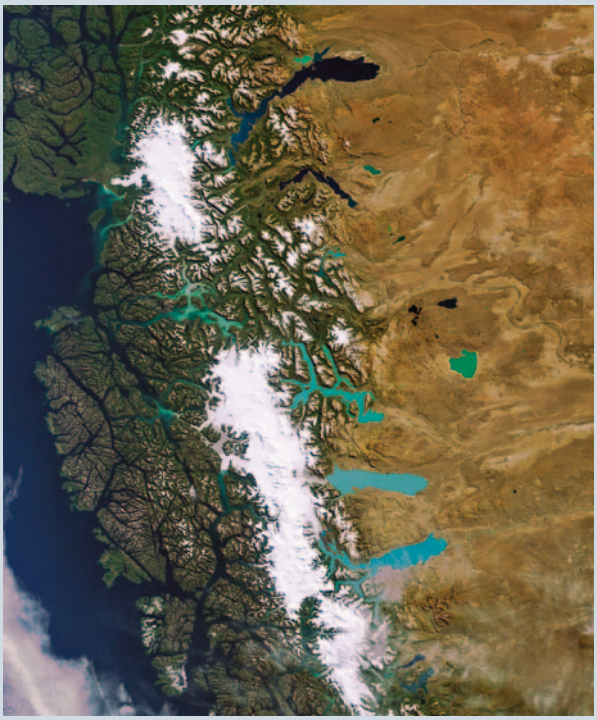
The international COSPAS-SARSAT satellite system provides distress alert and location information to search and rescue services throughout the world for maritime, aviation and land users in distress. The system comprises emergency beacons which send distress alert signals and location information via satellites that then transmit the information to search and rescue teams. By February 2012, more than one million beacons had been installed worldwide on maritime and air vessels and on land vehicles. Since 1999, the Programme on Space Applications has organized training courses to increase the number of experts, particularly from developing countries, in the use of this emergency system.

NATURAL RESOURCES MANAGEMENT AND ENVIRONMENTAL MONITORING

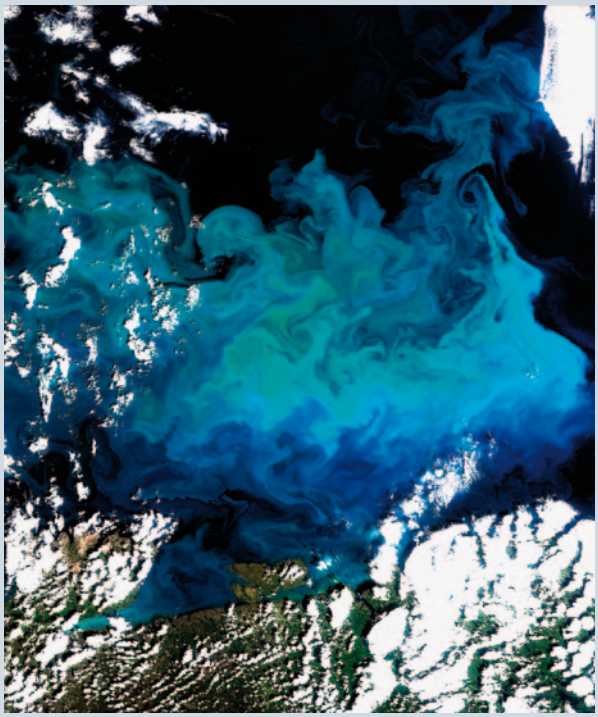
Space applications play an important role in the areas of natural resources management and environmental monitoring. Remotely sensed data, in particular, provide an unparalleled view of the Earth for studies that require synoptic or periodic observations such as inventory, surveying, agriculture, hydrology, geology, mountain ecological studies, mineralogy, land cover, land use and environment.

Space-derived information, its analysis and its visualization, offer substantial input into decision-making processes throughout the world, and can become critical in actions developed towards achieving internationally agreed sustainable development goals, particularly in developing countries.

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 of further enhancing the use of space technology and its applications for natural resources management and environmental monitoring.



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



©ESA

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.

CLIMATE CHANGE

Climate change has been called the defining challenge of our time. Its impacts are already evident and will intensify over time if left unaddressed. There is overwhelming scientific evidence, as shown in the Fourth Assessment report of the Intergovernmental Panel on Climate Change (IPCC), that climate change will threaten economic growth and long-term prosperity as well as the very survival of the most vulnerable populations. IPCC projections indicate that if emissions continue to rise at their current pace, the world will face serious impacts including sea-level rise, shifts in growing seasons, and increasing frequency and intensity of extreme weather events such as storms, floods and droughts.

As part of the global array of networks of systems to monitor climate change, satellites now provide a vital and important means of bringing observations of the climate system together for a global perspective. Satellites contribute to the monitoring of greenhouse gases related to deforestation and industrial processes, the changing of ice in polar caps and glaciers, sea-level rise, temperature changes, as well as several essential climate variables. For satellite data to contribute fully and effectively to the determination of long-term records, it is important to ensure that satellite-based data are accurate and homogeneous.

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 to monitor the atmosphere, improve the use and management of environmental resources and highlight the connection between climate change and disasters caused by natural hazards thus reducing vulnerability.

SPACE TECHNOLOGY APPLICATIONS AND HEALTH

Worldwide 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 people each year, killing almost one million people. To combat epidemics with coordinated responses, there is a need to establish an integrated global alert system.

In recent years, information derived from Earth observation and meteorological satellites in combination with GIS and GNSS has increasingly been used to study disease epidemiology, enabling greater use of spatial analysis to identify the ecological, environmental and other factors that contribute to the spread of vector-borne diseases by locating "hot spots", monitoring disease patterns and defining the areas that require disease-control planning. Data collected by satellites and validated by fieldwork are used extensively for monitoring changes in disease patterns and delineating risk areas. When incorporated in a geographic database, such data products could be used to develop spatial models for combating infectious diseases by helping to predict high-risk areas before outbreaks occur. The Programme on Space Applications assists developing countries in making use of space-based solutions to fight the spread of these diseases.

To promote solutions provided by space technologies and data to address practical and operational needs of Member States in the area of global health, the Programme on Space Applications organizes workshops, conferences and training courses with the primary objectives of:

- Building capacity in developing countries
- Facilitating provision and integration of space-based, health and environmental information
- Assisting Member States in developing strategic frameworks, including policies, infrastructures and leadership

The Programme on Space Applications coordinates its efforts with the appropriate United Nations entities and international organizations, such as the World Health Organization (WHO) and the European Space Agency (ESA), which undertake initiatives and programmes to address the needs of developing countries in telehealth and tele-epidemiology.

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

In 2011, experts from the world over got together in Hanoi, Vietnam, to discuss how to utilize space technology for socio-economic benefits.

SPACE TECHNOLOGY APPLICATIONS AND SOCIO-ECONOMIC BENEFITS

The last decades have witnessed space technology becoming increasingly applicable and relevant in daily life, which has brought about an increase in the awareness of the importance of space-based solutions. At the same time, a decrease in the cost of space products and ancillary equipment has contributed to the growth in the number of space actors in the developing world, integrating space capabilities into their national development programmes.

Actions are required to demonstrate to decision-makers the cost-effectiveness of these applications and to sensitize them to relevant legal and institutional obligations. In 2010, the Programme on Space Applications commenced a new series of workshops to promote the use of space technology and its applications for socio-economic benefits, particularly in developing countries. In this context, the Office for Outer Space Affairs provides support for the development of institutional capacity that would strengthen and sustain space-related activities.

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

Following UNISPACE 82 in 1982, the United Nations General Assembly endorsed the recommendation of the Scientific and Technical Subcommittee of UNCOPUOS to establish 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, five 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), Latin America and the Caribbean (Brazil and Mexico), and Western Asia (Jordan) 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 offers its participants the best possible education and research opportunities in all of its programmes. The principal goal is the development of skills and knowledge of university educators and scientists, through rigorous theory, research, applications, field exercises and pilot projects in 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 long-term 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 each of the core disciplines. A new education curriculum on Global Navigation Satellite Systems has recently been finalized. Additional model curricula are being developed for space law, basic space technology and human space technology and will be included in future education programmes of the Regional Centres.

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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.

©CRASTE-LF

The Regional Centres organize workshops, training courses and expert meetings dealing with a wide range of space-related topics.

The Regional Centres can be contacted through the following websites:

African Regional Centre for Space Science and Technology Education in the English Language (ARCSSTE-E)
www.arcsstee.org

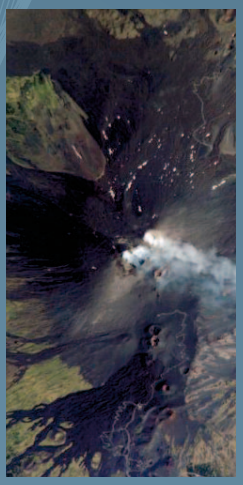
African Regional Centre for Space Science and Technology Education in the French Language (CRASTE-LF)
www.crastelf.org.ma

Centre for Space Science and Technology Education in Asia and the Pacific (CSSTEAP)
www.cssteap.org

Regional Centre for Space Science and Technology Education for Latin America and the Caribbean (CRECTEALC)
www.crectealc.org

Regional Centre for Space Science and Technology Education for Western Asia
www.unoosa.org/oosa/en/SAP/centres/western-asia.html






www.unoosa.org

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

INFORMATION ON THE UNITED NATIONS PROGRAMME ON SPACE APPLICATIONS

For additional information on the United Nations Programme on Space Applications and its activities, including 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

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