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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

Contents

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I. Introduction

1. In the report on its forty-first session, the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space recommended that the Secretariat continue to invite Member States to submit annual reports on their space activities (A/AC.105/823, para. 20).

2. In a note verbale dated 5 August 2004, the Secretary-General invited Governments to submit their reports by 29 October 2004. 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

Azerbaijan

[Original: English]

1. The Azerbaijan National Aerospace Agency (ANASA) began its activity as a scientific centre, Caspiy, within the Academy of Sciences of the Republic of Azerbaijan in 1974. In 1981, the Centre became the Scientific Production Association of Space Research and formed a part of the Ministry of General Machine-Building of the former Union of Soviet Socialist Republics from 1985 to 1992. During that period, work was carried out in different scientific fields, including astrophysics, development of space- and air-borne apparatus and equipment and remote sensing. After the collapse of the Soviet Union, the Scientific Production Association of Space Research evolved into ANASA.

2. ANASA implements programmes for the coordination of fundamental scientific and applied activities in the field of Earth observation from space and uses the results for the benefit of the national economy. ANASA's scientific and industrial activities are related, inter alia, to the development of corresponding principles in the implementation of remote sensing research, establishment of systems for gathering, processing, dissemination and application of data, environmental monitoring and forecasting of disasters.

3. From 1992 to 2002, ANASA came under the State Committee for Special Machine Construction and Conversion of the Republic of Azerbaijan. In 2003, ANASA once again became a part of the Azerbaijan National Academy of Sciences.

4. At present, ANASA consists of six scientific and technological units: the Institute for Space Research on Natural Resources, the Scientific Research Aerospace Informatics Institute, the Institute of Ecology, the Special Space Device Development Bureau, the Experimental Plant for the Construction of Space Devices and the Special Technological Construction Bureau (Lenkoran Region).

5. As a result of ANASA's new structure, the following research objectives have been established by the Agency:

(a) Development of a scientific-methodological base for identification of the parameters of natural and technological objects using their radiating characteristics;

(b) Development of a complex, scientific and technological monitoring system for the protection of the environment in Azerbaijan;

(c) Development of methods of processing space-based information and geographical information systems (GIS) technology;

(d) Development of technical equipment for remote sensing and information-gathering systems.

6. ANASA has developed instruments for various spectral ranges, such as the X-ray telescope-spectrometer PC-17, which was used on Salut-7 and Soyuz T-11, and a technologically advanced version of an X-ray spectrometer, which was used on the Quantum astrophysical module of the Mir orbital station. The instruments were designed and manufactured in collaboration with the Institute for Space Research of the Academy of Sciences of the former Soviet Union. Other instruments developed by ANASA include a videospectral complex VSK-3, working in the range of 0.4-0.9 microns, an infra-red radiometer intended for similar measurements in the infra-red band, a Fournier spectrometer, as well as a microwave-radiometer.

7. International cooperation has been a priority for ANASA since its establishment. From 1977 to 1980, seminars organized by the United Nations on the application of remote sensing were held in Baku. Representatives of ANASA participated in sub-satellite experiments held in Bulgaria, Germany, Hungary and Mongolia within the framework of the Intercosmos programme. Following Azerbaijan's independence, ANASA began taking an active role in international programmes and projects.

8. The first large-scale international multilevel experiment, Gunesh-84, was carried out in Azerbaijan in 1994, as part of an international project on the analysis of dynamics of geosystems through remote sensing, within the framework of the Interspace programme. During the experiment, ANASA carried out synchronized measurements from the orbital station Mir, plane-laboratory, helicopter-laboratory, as well as from mobile, terrestrial and marine information-gathering systems.

9. In 1994, ANASA representatives participated in the first Ministerial Conference on Space Applications for Development in Asia and the Pacific and took part in the implementation of the Regional Space Applications Programme for Sustainable Development. ANASA represents Azerbaijan in the Economic and Social Commission for Asia and the Pacific (ESCAP) and is a member of the Intergovernmental Consultative Committee on the Regional Space Applications Programme for Sustainable Development in Asia and the Pacific. Representatives of ANASA also take part in the bodies set up by ESCAP for meteorology, natural disaster management, remote sensing and GIS.

10. Representatives of ANASA play an active role in the implementation of some joint projects with various international organizations. ANASA closely cooperates with the Office for Outer Space Affairs of the Secretariat. In cooperation with ESCAP, the Food and Agricultural Organization of the United Nations and the European Space Agency, the Joint Seminar on Spatial Information Technology Applications for Planners and Decision Makers was held in Baku in 1997.

11. Within the framework of the Science for Peace programme of the North Atlantic Treaty Organization, a review of environmental projects of the Caspian Sea for the planning of future activities was made in 1999, in cooperation with the

countries of the Caspian Sea region. The main purpose of the project was to develop an action plan to monitor the Caspian Sea.

12. Within the framework of the European programme on the use of space techniques for major risks management, seismic parameters of active tectonic structures were ascertained and estimation and forecasting of earthquakes were conducted in 1998 and 1999. This work was carried out jointly with scientific centres in France, Georgia, Greece and the Russian Federation. As part of the work, a project on space technologies and GIS for seismic risk monitoring and active tectonic structures was carried out.

13. From 1999 to 2001, ANASA, in cooperation with the Food and Agriculture Organization of the United Nations, implemented a project to strengthen capacity in inventory of land cover/land use by remote sensing, using GIS-technology and LANDSAT 5TM space images for the creation of land cover/land use maps on a scale of 1:50,000, covering the entire territory of Azerbaijan. The resultant maps and archived data of aerial photography are being used by ANASA to map the process of degradation of arid areas of the coastal zone of the Caspian Sea, salt crusts, landslides, flows and other disasters.

14. Since 1999, ANASA has worked extensively with the International Scientific Centre of the Inter-Islamic Network on Space Sciences and Technology Applications, located in Karachi, and participates in all its activities.

15. On 29 October 2002, a memorandum of understanding concerning cooperation in the exploration and use of outer space for peaceful purposes was signed by ANASA and the Romanian Space Agency (ROSA) with a view to strengthening and broadening cooperation in the exploration and use of outer space exclusively for peaceful purposes between the two space agencies for their mutual benefit, taking into account their respective obligations. The memorandum of understanding covers such areas as space astronomy and astrophysics, environmental monitoring, agriculture, agronomy, geodesy and monitoring of natural and man-made hazards, space biology and medicine. According to the memorandum of understanding, ROSA will assist ANASA to join various international organizations. ANASA already became a member of the International Astronautical Federation in 2003.

16. In January 2004, a protocol was signed between the Governments of Azerbaijan and Turkey in the field of the peaceful uses of nuclear energy, according to which joint laboratories and devices will be set up to measure levels of radiation, to develop preparatory documents for construction and to train specialists and exchange personnel. Other joint activities will also be organized.

17. In April 2004, a protocol was signed between ANASA and the Russian Aviation and Space Agency (Rosariakosmos) covering new areas of cooperation between the two space agencies, including setting up a ground complex to receive and process space information in Azerbaijan; carrying out activities for exploring oil and gas fields; monitoring the ecology of oil-processing and oil-extraction areas; assessing the current and future status of agricultural areas; detecting illicit drug crop cultivation; monitoring ecological and technological risks; and developing and producing receivers for global navigation satellite systems (GNSS) and supplying them to the Azerbaijani domestic market.

18. ANASA runs an extensive programme of space and remote sensing education at the professional level. Young specialists working at the Agency increase their skills and knowledge of up-to-date space science and applications by participating in training courses in such regional educational centres as the Asian Institute of Technology in Thailand, the Centre for Space Science and Technology Education in Asia and the Pacific, affiliated to the United Nations, in India, Dresden Technical University, Germany, through the online German Academic Exchange Service, and the Chinese National Space Administration, among others.

Institute for Space Research on Natural Resources

19. The Institute carries out activities in the following areas:

(a) Using aerospace information on agriculture, water reserves, melioration, geology and the environment;

(b) Installing and developing sub-satellite information-gathering systems;

(c) Developing underground experiments and air-borne devices for gathering information and monitoring natural resources;

(d) Applying methods of spectral decoding and algorithms, as well as methods of receiving aerospace information about the Earth and the environment, and developing a programme to process aerospace data.

20. The scientific activity of the Institute focuses on the establishment of an aerospace geo-information centre; the creation of a specialized pilot laboratory information-gathering system for research using remote sensing; and the development and installation of sub-satellite automated aerospace information-gathering systems.

Scientific-Research Aerospace Informatics Institute

21. The main objectives of the Scientific Research Aerospace Informatics Institute are to solve current scientific and technical problems, as well as problems relating to the social environment and economy of the country; and to develop programme algorithms, systems of data processing and new information and computer technologies.

22. Starting in 1994, scientific research has extended to cover the most important fields of agriculture. The algorithms for processing aerospace information and special programmes were implemented using the latest computer techniques. As a result of this, the Institute can report the following achievements:

(a) Spectral images of soil types that are characteristic of Azerbaijan were studied and mapped using aerospace data;

(b) Changes in the level of the Caspian Sea and its coastal zone have been estimated and the ecological factors underlying those changes analysed;

(c) Methods of studying plants by satellite, key to the economy of Azerbaijan, have been developed and the automatization of programme algorithms for forecasting productivity has been successful.

23. Its work in forecasting of sudden natural disasters and hazards using aerospace methods and investigations has made the Institute one of the leading organizations

in its field. Computer models of real events have already been created. The mathematical dependence that characterizes disaster processes has been analysed and their parameters have been estimated.

24. At present, the creation and development of GIS in Azerbaijan is a priority in the scientific field. New versions of GIS programmes, as well as new principles of using them in the processing of aerospace data, have already been studied by the Institute. As a result of the various means of processing aerospace data, as well as the creation of computer-electron maps of natural dynamic processes, satisfactory progress has been made.

25. In connection with the study of the processing of aerospace information and natural processes, researchers at the Institute have been successful in using ultrasound acoustic measuring instruments that could have applications in water management and the petrochemical industry.

26. The results achieved by the Institute have been applied to different fields of agriculture and have attracted the attention of several international organizations.

Institute of Ecology

27. The main focus of the Institute of Ecology lies in the following fields:

(a) Use of space data to determine regions that are affected by man-made interventions;

(b) Investigation of the surface water ecosystems of Azerbaijan using aerospace methods;

(c) Ecological investigations of the atmosphere;

(d) Ecological investigations of plant cover;

(e) Development and implementation of an ecological monitoring system for the Caspian Sea;

(f) Forecasting and mapping of natural disasters using aerospace methods;

(g) Development of control systems to mitigate the effects of air and water pollutants;

(h) Radio-ecological investigations: the system analyses the distribution of heavy metals in the environment;

(i) Development, creation and exploration of the Standard State Ecological Monitoring System (SSEMS).

Special Space Device Development Bureau

28. Since its establishment in 1975, the ANASA Special Space Device Development Bureau has been involved in the development of technical means of studying the Earth from space. Together with leading experts from related bodies in the former Soviet Union, staff of the Bureau have designed a number of scientific devices for space research, such as the RS-17 Pulsar radio- and scale spectrometers, and set up a device on the space station Mir, which has reliably transmitted signals to and from the Earth. Under the Canopus state programme, experts developed an array of equipment for research into physical and dynamic parameters and a

chemical compound of micro-particles (10-12 grams), which is the technical basis for studying the distribution of the density of micro-meteorites in circumterrestrial space.

29. For the past few years, the Bureau has changed its scientific focus and started manufacturing scientific instruments for the national economy. This has allowed science to be used in solving specific problems of the State, such as the economy.

30. Besides government budgetary orders, the Bureau has also worked on other economic contracts such as the sea geology project for the Azneft industrial trust, the State Customs Committee and others. Economic contracts with the State Oil Company and the Aviation Academy cover 2004 and 2005.

31. The principal scientific objectives of the Bureau are:

(a) Development of science-based information-gathering systems for environmental control;

(b) Application of space technology in the development of scientific devices;

(c) Development and creation of means to control radiation levels;

(d) Research into the application potential of functional microelectronics in the development of scientific devices.

Experimental Plant of Construction of Space Devices

32. The main purposes and tasks of the self-financing Experimental Plant for the Construction of Space Devices are to develop scientific devices to respond to the needs of the country's economy and of the general population. One of the tasks of the Plant is also to improve the social and economic conditions of workers.

33. The main fields of production of the Plant are mechanical collection, electronics and microelectronics. The mechanical collection production field consists of units for the processing of metals, galvanization, dyeing, welding, collection and adjustment. Manufacturing of the photomaster-photomask, collection, mounting and adjustment of digital electronic devices and production of stamp plates are carried out in the electronics production field. The microelectronics production field is responsible for the dusting of metals in vacuum, photolithography, chemical cleaning and collection and adjustment of hybrid-integral schemes.

Special Technological Construction Bureau (Lenkoran Region)

34. The main scientific activities of the Special Technological Construction Bureau are:

(a) Creation of a remote sensing, ecological monitoring system;

(b) Forecasting of dynamic processes and estimation of regional water, forest and agricultural plant reserves using aerospace methods;

(c) Development and implementation of information-gathering systems for use in agro-meteorological research.

35. A number of practical results have already been obtained and maps have been created for the estimation of the parameters of natural and anthropogenic objects, based on the model for the Lenkoran Region.

Finland

[Original: English]

1. Administration

1. The Finnish bodies involved in space activities are described in table 1.

Table 1
Finland: bodies involved in space activities

Organization	*Place in government*	*Major activities*
National Technology Agency (Tekes)	Reports to the Ministry of Trade and Industry	Established in 1983, Tekes is responsible for Finland's relations with the European Space Agency, global and bilateral space cooperation, space technology programmes, funding and implementation of the technological and industrial part of the Finnish space programme; secretariat of the Finnish Space Committee.
Finnish Space Committee	Inter-ministerial coordination body; reports to the Ministry of Trade and Industry	Established in 1985, the Committee is responsible for drafting national space policy; appointed by the Government for a three-year mandate period (2004-2007).
Academy of Finland	Reports to the Ministry of Education	Provides financing for the space science programme.

2. A new Finnish space strategy for 2002-2004, prepared by the Finnish Space Committee, was released in August 2002 with a summary in English. The newly appointed Space Committee is currently working to update the Finnish space strategy for 2005-2007, which will be published in 2005.

3. There are 50 companies and research units in Finland that either do business in satellite equipment supply chains or study space technology. There are seven universities in Finland that teach remote sensing or space science. Navigation technology and new services are developed by 30 companies and 7 research units in Finland. More information is available on the following websites:

http://www.tekes.fi/eng/publications/Space_Directory_2003.pdf

http://www.tekes.fi/eng/publications/Mobile_Location_Directory_Finland.pdf

2. Outlook

4. The history of Finland's space activity and its outlook are described in detail in the note by the Secretariat of 2 December 2002 (AC.105/788).

5. Finland became a member of the European Southern Observatory in July 2004. This will have an impact on the funding of astronomy and space research carried out by the Academy of Finland.

3. Budget trend

6. The Finnish space budget has remained the same since 1995, though the share devoted to European Space Agency (ESA) programmes has increased. The contribution of ESA accounted for the main part of the budget in 2004. State parliamentary elections were held in March 2003. For the next few years, the Finnish space budget will remain at a constant level.

7. Finnish space funding comes mainly from the National Technology Agency (Tekes). Its contribution amounts to 18.5 million euros (€) in 2004. Several other ministries also fund space activities.

4. National activities

8. Finland's main interests in space are described in detail in the note by the Secretariat of 2 December 2002 (A/AC.105/788).

9. Finland's participation in the ESA-European Union joint Galileo programme is described in detail in an addendum to the note by the Secretariat of 26 November 2003 (A/AC.105/816/Add.1).

10. The Antares space science programme started in April 2001 and ended in April 2004. It was funded jointly by Tekes and the Academy of Finland. It funded 11 research consortia that studied Earth observation science and space science. The total cost of the programme was about €17 million.

11. The Avali space technology programme is described in detail in the note by the Secretariat of 2 December 2002 (A/AC.105/788).

12. A memorandum of understanding and an implementing arrangement concerning cooperation in the development of commercial and operational satellite remote sensing applications were signed in 2003 by the Canadian Space Agency and Tekes. Jointly funded remote sensing cooperation projects were initiated in 2004. The projects are funded within the framework of the ongoing Avali programme.

13. New programmes are being planned in the fields of satellite remote sensing and space science.

5. Ongoing international programmes and projects

14. Finnish involvement in ongoing international space programmes and projects is shown in table 2.

Table 2
Finnish involvement in international space programmes and projects

Country or organization	*Finnish involvement*
European Space Agency	
Atmospheric Dynamics Mission (ADM)—Aeolus	Power supply units, instrument electronics
Cluster II	Power supply units, 2 instruments
Cryosat	Power supply units
Environmental Satellite (ENVISAT-1)	Participation in the global ozone monitoring by occultation of stars instrument: global ozone measurement equipment data processing upgrade unit and ground segment
Galileo (Global Navigation Satellite System-2)	Participation in pre-development
The Gravity Field and Steady-State Ocean Circulation Mission	On-board software
Herschel	Primary mirror polishing
Huygens	Saturn's Titan moon lander: radio altimeter and atmospheric instrumentation
Integral	Participation in the joint European X-ray monitor (2 detector units), flight software validation
Mars Express	Power supply units, participation in instruments
Meteosat Second Generation	On-board software validation
MetOp-1	Power supply units for Global Ozone Measurement Equipment
Planck	Participation in low frequency instrument; cryostat control unit
Rosetta	Primary structure, power distribution system units, contributions instruments
Small Mission for Advanced Research in Technology	Space potential, electron and dust experiment instrument; demonstration of a compact imaging X-ray spectrometer/X-ray solar monitors
Soil Moisture and Ocean Salinity	Participation in radiometer instrument
Solar and Heliosphere Observatory	Two instruments: Costep-Erne particle analysis collaboration and solar wind anisotropies
Venus Express	Power supply units, participation in the energetic neutral atom analyser instrument
X-ray Multi-Mirror Mission Newton	Telescope tube structure and mirror thermal control unit
Belgium/ESA	Space debris detectors and their data-processing units on project for on-board autonomy mission
Canada	Radarsat, etc., remote-sensing-related collaboration (Memorandum of Understanding)
Denmark	On-board data handling unit for the Roemer spacecraft
Sweden	Microwave instrument on the Odin satellite
France/ESA	Participation in MetLander Marslanders for the Centre national d'études spatiales (CNES) 2009 mission; mission cancelled by CNES; work discontinued in Finland

Country or organization	*Finnish involvement*
Netherlands/United States of America (National Aeronautics and Space Administration (NASA))	Ozone-monitoring instrument on the NASA Earth observing system Aura spacecraft
Italy	X-ray instrument hardware for the X-ray astronomy satellite
United States (NASA)	NASA two wide-angle imaging neutral-atom spectrometer mechanisms
	NASA Cassini mechanisms, participation in the Cassini plasma spectrometer instrument
	NASA high-energy transient explorer II X-ray instrument
	International Space Station debris instrument
	NASA Contour; instrument participation; mission failure after launch in 2002
	NASA near Earth asteroid rendezvous X-ray instrument: mission ended successfully in 2001
	NASA Stardust instrument participation
	NASA magnetospheric multiscale instrument participation
Japan	International Space Station X-ray instrument
Russian Federation	Silicon X-ray array for spectrum-X-gamma: project in hibernation
	Radioastron very-long-base interferometry instrument: project in hibernation
	MetLander Marslanders
China, France, Germany, Italy, Russian Federation, Spain, Switzerland, United Kingdom of Great Britain and Northern Ireland, United States	Alpha magnetic spectrometer; particle physics experiment on the International Space Station (search for antimatter)
	Finland: silicon tracker, ground support and data handling

Guinea

[Original: French]

1. Applications in telecommunications are centred on broadcasting (radio and television), long-distance telephony, computer networks (Internet, etc.), assistance for aerial and marine navigation and the rapid location of distress calls. Satellite-based positioning services are utilized through data collection and transmission platforms, the Argos system and global navigation satellite systems (GNSS).

2. The satellite images obtained by remote sensing are used for mapmaking, natural resource management (crop trends, deforestation, monitoring of bush fires and desertification), meteorology (weather forecasting and climate change), hydrology, the management of natural disasters (floods and earthquakes), land-use planning, urban development and protection of the environment (atmospheric and marine pollution).

3. Scientific research is carried out in the field of astronomy and the observation of solar phenomena using telescopes.

4. Guinea maintains friendly relations with all countries on the basis of respect for agreements and conventions and the principle that space belongs to all humanity, as stipulated in article 1 of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (General Assembly resolution 2222 (XXI), annex).

5. Guinea cooperates closely with the space agencies and international organizations involved with telecommunication and Earth observation satellites, such as the International Telecommunications Satellite Organization (INTELSAT), Afristar and the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT).

India

[Original: English]

The 2003-2004 Annual Report of the Government of India Department of Space will be distributed during the forty-second session of the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space, to be held from 21 February to 4 March 2005.

United Kingdom of Great Britain and Northern Ireland

[Original: English]

UK Space Activities 2004, the annual report of the British National Space Centre, will be distributed during the forty-second session of the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space, to be held from 21 February to 4 March 2005.