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Committee on the Peaceful Uses of Outer Space

Coordination of space-related activities within the United Nations system: directions and anticipated results for the period 2009-2010

Report of the Secretary-General*

Summary

In its resolution 63/90, the General Assembly invited the Inter-Agency Meeting on Outer Space Activities to continue to contribute to the work of the Committee on the Peaceful Uses of Outer Space and to report to the Committee on the work conducted at its annual sessions. The present report of the Secretary-General on the coordination of space-related activities within the United Nations system contains information provided by entities of the United Nations system on their coordinated plans for space-related activities to be carried out in the biennium 2009-2010. The report has been compiled for the purpose of promoting inter-agency coordination and cooperation and preventing duplication of efforts related to the use of space applications by the United Nations.

At its twenty-eighth session, in 2008, the Inter-Agency Meeting on Outer Space Activities had identified four key issues for inter-agency coordination for the period 2008-2009: (a) strengthening further the Inter-Agency Meeting as the United Nations central mechanism for coordination of space-related activities; (b) reinforcing the contributions made by United Nations entities to the implementation of the United Nations Spatial Data Infrastructure; (c) enhancing the use of space-based assets in support of disaster management; and (d) reinforcing the contributions made by United Nations entities to the Global Earth Observation System of Systems of the Group on Earth Observations and making optimal use of the System's benefits in order to strengthen the capacity of the United Nations (A/AC.105/909, para. 14).

* The present report was reviewed and revised by the Inter-Agency Meeting on Outer Space Activities at its twenty-ninth session, held in Vienna from 4 to 6 March 2009, and finalized following the session.



At its twenty-ninth session, in 2009, the Inter-Agency Meeting on Outer Space Activities agreed that those key issues remained valid for the period 2009-2010 and reiterated the need to continue strengthening the Inter-Agency Meeting on Outer Space Activities as the central mechanism of the United Nations for the coordination of space-related activities and, in particular, for encouraging synergies and promoting the sharing of information with other existing mechanisms for coordinating space-related activities of United Nations entities at the operational level, such as the United Nations Geographic Information Working Group and the Inter-Agency Coordination and Planning Committee for Earth Observations, which interacts with the Group on Earth Observations.

The following report shows, inter alia, the following: United Nations entities continue to actively contribute to the protection of the Earth environment and the management of natural resources through the operation of global observing systems that rely on space-based data; activities of the United Nations in the fields of human security and welfare, humanitarian assistance and disaster management increasingly benefit from the use of space technology and its applications in operational environments; several United Nations entities conduct a range of programmes that support capacity-building, training and education in the area of space-related activities; and satellite communications and applications of global navigation satellite systems are fully integrated into the operational activities of several United Nations entities.

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I. Introduction

1. The Inter-Agency Meeting on Outer Space Activities serves as the focal point for inter-agency coordination and cooperation in space-related activities. Since the Committee on the Peaceful Uses of Outer Space, at its eighteenth session, in 1975, recommended that the Secretary-General prepare an integrated report on the plans and programmes of United Nations entities related to outer space activities for consideration by the Scientific and Technical Subcommittee of the Committee,¹ the Inter-Agency Meeting has been assisting in the preparation of the annual report on the coordination of space-related activities within the United Nations system. The present report has been compiled for the purpose of promoting inter-agency coordination and cooperation and preventing duplication of efforts related to the use of space applications by the United Nations.

2. The present report, which is the thirty-third annual report of the Secretary-General on the coordination of space-related activities within the United Nations system, was compiled by the Office for Outer Space Affairs of the Secretariat on the basis of submissions from the following United Nations entities: the Division for Sustainable Development of the Department of Economic and Social Affairs, the Department of Peacekeeping Operations, the Department of Field Support, the Office for Outer Space Affairs, the United Nations Office on Drugs and Crime (UNODC), the Economic Commission for Europe (ECE), the Economic and Social Commission for Asia and the Pacific (ESCAP), the Economic Commission for Africa (ECA), the Office of the United Nations High Commissioner for Refugees (UNHCR), the United Nations Institute for Training and Research (UNITAR), the Food and Agriculture Organization (FAO), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the International Civil Aviation Organization (ICAO), the International Telecommunication Union (ITU), the World Meteorological Organization (WMO) and the International Atomic Energy Agency (IAEA).

3. Information on the current space-related activities of United Nations entities and their coordination is available on the website dedicated to the coordination of outer space activities within the United Nations system (www.uncosa.unvienna.org). The website contains documents, news and announcements related to the Inter-Agency Meeting on Outer Space Activities, a directory of organizations including information on the space-related activities of the United Nations entities participating in the Inter-Agency Meeting, contact information and links to the websites of those entities, and a schedule of space-related activities of United Nations entities. The website is updated on a quarterly basis by the focal points of the United Nations entities belonging to the Inter-Agency Meeting.

¹ *Official Records of the General Assembly, Thirtieth session, Supplement No. 20 (A/10020)*, para. 44.

II. Policies and strategies pertaining to the coordination of space-related activities

4. Space science and technology and their applications are increasingly being used to support a wide range of activities of the United Nations. At least 25 United Nations entities and the World Bank Group routinely use space applications. Space technology and applications make important and sometimes essential contributions to the work of the United Nations, including in the implementation of recommendations of international conferences such as the World Summit on Sustainable Development and the World Summit on the Information Society, as well as of the recommendations of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III), in efforts towards sustainable development and in the implementation of the United Nations Millennium Declaration (General Assembly resolution 55/2).

5. Coordination, cooperation and synergy are essential for effectively carrying out those activities of the United Nations system. The annual sessions of the Inter-Agency Meeting on Outer Space Activities are the main means of achieving that synergy. The effectiveness of the Inter-Agency Meeting has been further enhanced by the holding, since 2004, of an open informal session immediately following the conclusion of the session, as a means of engaging Member States, in a direct and informal setting, in important space-related developments in the United Nations system.

6. In its resolution 63/90, the General Assembly welcomed the increased efforts to strengthen further the Inter-Agency Meeting on Outer Space Activities as the central United Nations mechanism for building partnerships and coordinating space-related activities within the framework of the ongoing reforms in the United Nations system to work in unison and deliver as one, and encouraged entities of the United Nations system to participate fully in the work of the Inter-Agency Meeting. In that resolution, the Assembly also urged entities of the United Nations system, particularly those participating in the Inter-Agency Meeting on Outer Space Activities, to continue to examine, in cooperation with the Committee on the Peaceful Uses of Outer Space, how space science and technology and related applications could contribute to implementing the development goals of the United Nations Millennium Declaration, particularly in the areas of food security and increasing opportunities for education.

7. As agreed by the Committee on the Peaceful Uses of Outer Space at its fifty-first session, in 2008, the Inter-Agency Meeting will, starting in 2009, report directly to the Committee under a new agenda item entitled "Use of space technology in the United Nations system". Under that agenda item, United Nations entities are invited to inform the Committee of their space-related work.

8. At its ninth meeting, held in Vienna from 5 to 7 November 2008, the United Nations Geographic Information Working Group continued the discussion on the definition of an institutional governance framework for the United Nations Spatial Data Infrastructure (www.ungiwg.org). In February 2009, the Office for Outer Space Affairs and ECA assumed the chair of the Working Group. The United Nations Spatial Data Infrastructure is a major inter-agency initiative based on a clear set of deliverable results aimed at standardizing data sets and best practices

and optimizing the use of financial, technical and human resources among United Nations agencies, Member States, non-governmental organizations and private sector partners. The Spatial Data Infrastructure has been acknowledged in the United Nations information technology strategy prepared by the Chief Information Technology Officer of the United Nations. The activities of the Working Group are closely linked with the relevant activities carried out in the framework of the Group on Earth Observations (GEO) and the Global Earth Observation System of Systems (GEOSS).

9. The Hyogo Framework of Action, 2005-2015: Building the Resilience of Nations and Communities to Disasters,² adopted by the World Conference on Disaster Reduction, held in Kobe, Hyogo, Japan from 18 to 22 January 2005, calls for the promotion of the use, application and affordability of recent information, communication and space-based technologies and related services, as well as Earth observations, to support disaster risk reduction, in particular for training and for the sharing and dissemination of information among different categories of users.

10. United Nations entities continue to contribute to activities of GEO, including those related to GEOSS. In 2008, ECA became a participating organization of GEO.

11. In 2005, United Nations entities with mandates for the operation of observing systems (the Global Climate Observing System, the Global Terrestrial Observing System and the Global Ocean Observing System) established the Inter-Agency Coordination and Planning Committee for Earth Observations as a permanent interagency collaboration mechanism to coordinate their activities within GEO. The Committee comprises the United Nations Environment Programme (UNEP), FAO, UNESCO, including its Intergovernmental Oceanographic Commission, and WMO.

12. At the fifth plenary session of GEO, held in Bucharest on 19 and 20 November 2008 to review the progress made in implementing GEOSS, the Office for Outer Space Affairs and the Inter-Agency Coordination and Planning Committee for Earth Observations reported on their contributions to GEOSS. The Inter-Agency Meeting on Outer Space Activities serves as a framework to exchange information and ensure consistency among the GEO-related activities of United Nations entities that belong to the Inter-Agency Coordination and Planning Committee and those that do not.

13. At its sixteenth session, in May 2008, the Commission on Sustainable Development carried out a review and assessment of progress made on achieving internationally agreed sustainable development goals relating to agriculture, rural development, land resources, drought, desertification and the region of Africa. It was recognized that access to space technologies and their applications, including systems of Earth observation meteorological satellites and communications, and access to satellite navigation systems for the monitoring and evaluation of the environment provided a way to better monitor and map desertification processes and drought events. The Commission noted the need to build capacities for the utilization of space technologies and applications in order to improve the knowledge base for drought management, climate change adaptation and crop forecasting, including the prediction of harvest periods. The Commission recognized the importance of investment in the application of space technologies for monitoring

² A/CONF.206/6 and Corr.1, chap. I, resolution 2.

changes in land use, and support by the international community in that regard was encouraged. At its seventeenth session, in May 2009, the Commission will take policy decisions on those issues.

14. Over the years, United Nations entities have increasingly purchased ever greater numbers of satellite images to support diverse applications for humanitarian, peacekeeping, security and environmental management purposes. It was realized that some geographical areas were of interest to several United Nations entities and that there was overlap in terms of the resolution and scenes of the satellite images purchased by different United Nations entities. In order to achieve a more streamlined, effective and efficient way of working, the systems contract approach was initiated in 2002, with the following objectives: reduce redundancy and duplication in the procurement by United Nations entities of satellite images through the use of single- and multiple-user licences enabling partner United Nations agencies to purchase images of the same geographical area at a favourable price; facilitate the procurement procedure through the use of a single contract reference, thus enabling the faster processing and delivery of the satellite images; and include data from high- and medium-resolution sensors in the purchase package, in order to provide a wider range of products, responding to the needs of different United Nations entities. In 2004, the United Nations (the Procurement Division, the Department of Management, the Engineering Section of the Department of Field Support and the Department of Peacekeeping Operations) established a systems contract with Radarsat International, which expired at the end of 2007. In October 2008, the United Nations (the Procurement Division and the Cartographic Section of the Department of Field Support) established a new systems contract with MacDonald, Dettwiler and Associates. The current systems contract includes data from the IKONOS, QuickBird and Radarsat satellites and might be expanded to include additional sensors in the future. United Nations entities wishing to purchase satellite data through that system contract are encouraged to contact the Cartographic Section of the Department of Field Support.

III. Coordination of current and forthcoming space-related activities

A. Protection of the Earth environment and management of natural resources

15. United Nations entities continue to participate in the Committee on Earth Observation Satellites, increasingly contribute to GEO and continue to lead the Global Climate Observing System, the Global Terrestrial Observing System and the Global Ocean Observing System. In addition to the activities reflected in the report of the Secretary-General on the coordination of space-related activities within the United Nations system for the period 2008-2009 (A/AC.105/910), the following new activities are planned for the period 2009-2010.

16. Study Group 7, on science services, of the Radiocommunication Sector of ITU, in cooperation with the Steering Group on Radio Frequency Coordination of WMO, developed a new version of the ITU/WMO handbook *Use of Radio Spectrum for Meteorology: Weather, Water and Climate Monitoring and Prediction*, which

describes modern radio-based technologies and systems (space and terrestrial) used for environmental monitoring and the prediction, detection and mitigation of the negative effects of natural disasters.

17. Human migration, usually in the form of internal displacement, is likely to occur as a result of increases in sea level and gradual desertification. Such migrations may occasionally involve populations that are forced to move to other countries. Climate change will also cause cases of catastrophic weather and emergency conditions brought by famine or drought and will continue to precipitate armed conflict and the creation of refugees. A preliminary small-scale geographic analysis conducted by UNHCR in 2008 clearly indicated that many currently displaced populations are suffering or will suffer added difficulties owing to the effects of climate change. In the period 2009-2010, UNHCR will carry out a larger-scale analysis of both the impact of displaced populations on factors influencing the climate and the measures required for mitigation and adaptation. The pilot analysis will rely on the study of current and past satellite images to map changes over time in land use and natural resource extraction and on current imagery to map refugee camps in selected areas in order to obtain information useful in facilitating the provision of needed humanitarian aid to displaced persons.

18. UNITAR flagship programmes in the areas of the environment, climate change and dangerous chemicals will benefit from the inclusion of space technology-derived components in their training and application methodologies. That will be done by making use of the results of applied research on space applications carried out by the UNITAR Operational Satellite Applications Programme (UNOSAT) in the training and capacity development modules of UNITAR programmes dedicated to environmental matters. A number of events and distance-learning initiatives are planned for 2009 and 2010, which will generate feedback and lessons learned that may be disseminated through the Inter-Agency Meeting on Outer Space Activities and through information dissemination tools such as those offered by the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER).

19. The Intergovernmental Oceanographic Commission of UNESCO, WMO and the International Council for Science jointly support the World Climate Research Programme, whose core projects include the space-based observation of the cryosphere through the Climate and Cryosphere programme, the study of stratospheric chemistry through the Stratospheric Processes and Their Role in Climate programme and the observation of overall water and energy processes through the Global Energy and Water Cycle Experiment. In cooperation with the Working Group on Information Systems and Services (WGISS) of the Committee on Earth Observation Satellites, the Coordinated Energy and Water Cycle Observations Project (CEOP) of the Global Energy and Water Cycle Experiment has developed the WGISS Test Facility–CEOP Distributed Data Integration System. That service provides online access to space- and surface-based data related to reference sites for the purposes of climate research.

20. The Global Climate Observing System, which is co-sponsored by UNEP, the Intergovernmental Oceanographic Commission of UNESCO, WMO and the International Council for Science, has defined detailed requirements for satellite observations for climate, as a supplement to the Global Climate Observing System Implementation Plan. An update of those requirements will be prepared in 2009.

21. To address those challenging requirements, WMO has developed a new “Vision for the Global Observing System to 2025”, for submission to the WMO Commission for Basic Systems in March 2009. The scope and benefits of the Global Observing System in future will encompass the fields of meteorology, climate monitoring including the oceanic and terrestrial domains, hydrological and environmental services and related disaster detection and monitoring. The space-based component of the Global Observing System will continue to rely on partnerships with the Coordination Group for Meteorological Satellites and the Committee on Earth Observation Satellites. The new Global Observing System is expected to be a major component of GEOSS, serving several GEO societal benefit areas.

22. In the period 2009-2010 and beyond, ECA will continue to assist the African Union, Member States and economic communities of the region in implementing the African Monitoring of the Environment for Sustainable Development project and establishing the Global Monitoring for Environment and Security Africa programme.

23. UNEP, FAO, UNESCO, WMO and the International Council for Science will continue to participate in the Global Terrestrial Observing System (www.fao.org/gtos). Key activities of the system include the Terrestrial Ecosystem Monitoring Sites database, the Terrestrial Carbon Observation project, the Global Terrestrial Network and the Net Primary Productivity project. The primary functions of the secretariat of the Global Terrestrial Observing System are standards-setting, communications and networking. The system is continuing with the assessment and development of international standards for the 13 terrestrial essential climate variables (including land cover and biomass) and the development of an international terrestrial framework mechanism, as specifically requested by the Conference of the Parties to the United Nations Framework Convention on Climate Change and by the Subsidiary Body for Scientific and Technological Advice of the Convention.

B. Human security and welfare, humanitarian assistance and disaster management

24. In addition to the continuation of the activities included in the report of the Secretary-General on the coordination of space-related activities within the United Nations system for the period 2008-2009, the following activities for the period 2009-2010 are reported.

25. UN-SPIDER, implemented by the Office for Outer Space Affairs, provides a platform that supports all United Nations agencies in accessing and using all types of space-based information and services relevant to disaster management and contributes directly to the International Strategy for Disaster Reduction (ISDR) and to the implementation of the Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters. The office of UN-SPIDER in Bonn, Germany, is fully operational, and the office of UN-SPIDER in Beijing is planned to be opened in 2009. In accordance with General Assembly resolution 61/110, the Office for Outer Space Affairs is working with Algeria,

Iran (Islamic Republic of), Nigeria, Pakistan, Romania, South Africa and Ukraine in the establishment of UN-SPIDER regional support offices (www.unspider.org).

26. The Office for Outer Space Affairs has been working closely with the Executive Secretariat of the Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters since the Office was accepted as a cooperating body of the Charter in March 2003. Through the mechanism provided under the Charter, any entity of the United Nations system can access the Charter and request satellite imagery in support of its response to a disaster. The United Nations has become the single largest beneficiary and user of the Charter, having activated the Charter a total of 55 times by the end of 2008, 12 times in 2008 alone.

27. The Office for Outer Space Affairs organized the fifth United Nations-wide meeting on the use of space technologies for emergency response and humanitarian assistance, held in Bonn, Germany, on 16 and 17 October 2008. Thirty-one representatives of 25 United Nations entities and partner institutions attended the meeting, which focused on understanding the current evolving operational environment and the need for closer coordination among United Nations entities and other entities. Representatives of United Nations entities updated the “Common Vision for 2009” on the United Nations and the use of space technologies for emergency response and humanitarian assistance in order to reflect the discussion points raised and conclusions reached during the meeting. All United Nations representatives present at the meeting reaffirmed the role of the Office for Outer Space Affairs as a cooperating body of the Charter and agreed that all requests for activation of the Charter from entities of the United Nations system should be sent only through the Office for Outer Space Affairs.

28. UNHCR will continue to use satellite imagery and derived products to increase the number of geographic information system data sets on refugee camps and sites of internally displaced populations. The methodology for mapping is being reviewed to accommodate new technologies (such as collaborative geographic information systems and open source solutions), new partnerships (such as the RESPOND network of the European Space Agency and the European Global Monitoring for Environment and Security) and to increase accessibility of the refugee/displaced person distribution layers.

29. Geographic information system data sets on refugee camps and sites will better support the management of health issues, supply distribution and security and telecommunication issues. Refugees in urban areas present challenges different from those of refugees protected by UNHCR in camps. UNHCR has mapped the location of refugees and their access to assistance and protection in large cities such as Cairo, Damascus and Nairobi.

30. UNITAR will continue its active engagement in supporting the humanitarian community with satellite-derived analysis for in-field coordination and damage assessment. The experience accumulated since 2003, with more than 900 operational maps and analyses performed by UNOSAT constitutes a good basis for advancing the use of satellite-based applications for human security and humanitarian assistance. In 2009, UNITAR will include space-derived applications in its training related to peacekeeping and preventive diplomacy, thus enlarging the field of applications of space science in the general area of human welfare and

security. As a complement to that ongoing approach, UNITAR will use the same methodologies to support its training for local authorities and communities in the areas of disaster prevention and vulnerability reduction, with the active participation of UNITAR in the ISDR platform at global and regional levels.

31. In recent years, ESCAP has been promoting the use of space-based technical tools for disaster management in cooperation with many United Nations entities. In cooperation with ITU, ESCAP jointly organized, together with the Japan Aerospace Exploration Agency (JAXA), a special session on information and communication technology and disaster risk reduction, on the occasion of the Pacific Information and Communication Technology Ministerial Forum, held in Nuku'alofa on 17-20 February 2009. In the framework of the United Nations Special Programme for the Economies of Central Asia, ESCAP, in cooperation with ECE, organized the High-level Meeting on Improving Awareness of Information and Communication Technology Applications for Disaster Management, held in Bishkek on 25-27 February 2009. Those two events focused on raising awareness among authorities in the fields of information and communication technology and disaster management with respect to the use of space-based technical tools for disaster management, including remote sensing, communications and geographic information systems, and with respect to opportunities to establish institutional arrangements at the subregional and regional levels for easier access to and more effective use of such technical tools.

32. ESCAP is developing institutional arrangements in the Asia-Pacific region to enable Member States to gain easier access to and make more effective use of space-based technical tools for disaster management. The current progress in the region will contribute greatly to the UN-SPIDER programme, which, in turn, will benefit the region. ESCAP has been cooperating with the Office for Outer Space Affairs in activities of UN-SPIDER in the Asia-Pacific region. ESCAP supported the Office for Outer Space Affairs in the organization of the United Nations regional UN-SPIDER workshop entitled "Building upon regional space-based solutions for disaster management and emergency response for the Pacific region", held in Suva on 16-19 September 2008. The newly established Asia-Pacific Space Cooperation Organization, launched in Beijing on 16 December 2008, has also expressed its determined intention to cooperate with ESCAP in space applications for development and disaster management.

33. ITU, in collaboration with the Office for the Coordination of Humanitarian Affairs of the Secretariat (OCHA), the Sub-Working Group on Emergency Telecommunications of the Inter-Agency Standing Committee and other entities, as appropriate, is developing and arranging the dissemination of standard operating procedures and relevant spectrum management practices for use in the event of a disaster. The ITU published the *Handbook on Emergency Telecommunications* and a special supplement of the ITU Radiocommunication Sector on emergency and disaster relief. In 2008, ITU developed an online database (www.itu.int) for frequency management in disaster situations to facilitate access by administrations, national regulatory authorities, disaster relief agencies and organizations and, in particular, the Emergency Relief Coordinator, in accordance with the operating procedures developed for disaster situations.

34. The Illicit Crop Monitoring Programme of UNODC was established after the twentieth special session of the General Assembly, in 1998. The programme

supports national monitoring systems, which use satellite imagery for monitoring the cultivation of illicit crops from which narcotic drugs are produced. The programme monitors opium poppy cultivation in Afghanistan and South-East Asia (the Lao People's Democratic Republic and Myanmar) and coca cultivation in Bolivia (Plurinational State of), Colombia and Peru. UNODC also monitors the extent of cultivation of cannabis in Morocco. The methodology used to monitor illicit crops combines ground surveys and the interpretation of satellite imagery, including very-high-resolution products. The surveys are conducted annually, and the reports provide important information to Member States and the international community on the extent and evolution of illicit crops. Some surveys also provide socio-economic information on rural households cultivating illicit crops. The resulting information helps to guide the design and implementation of illicit crop elimination programmes, including the provision of alternative development assistance. Through the activities of the Illicit Crop Monitoring Programme, UNODC is transferring the technical know-how of illicit crop detection to the national counterpart agencies in several countries.

35. The Illicit Crop Monitoring Programme cooperates with UNOSAT of UNITAR to optimize the acquisition of satellite imagery for the monitoring of illicit crops and determine the most suitable image sources. UNODC has also established cooperation agreements with selected research institutes and universities for the purpose of improving and updating the methodologies for interpretation and analysis of satellite images, taking into account new developments in satellite technology and the dynamics of illicit crop cultivation.

36. Satellite observations play a crucial role in the detection, monitoring, characterization and the prediction of the evolution of tropical cyclones, which is addressed by WMO in collaboration with regional entities, in particular the WMO/ESCAP Panel on Tropical Cyclones and the Hurricane Committees of Regional Associations IV and V. As part of its Disaster Risk Reduction Programme, WMO is currently involved in two projects to identify observation requirements and provide added-value products, based on the integration of satellite information with meteorological, hydrological and climate information and forecasts, with the following objectives: to support humanitarian response and recovery in working with regional and international humanitarian agencies, such as OCHA, the World Food Programme (WFP), UNICEF and the International Federation of Red Cross and Red Crescent Societies, involved in the ISDR system; and to support the development of financial risk transfer markets, including catastrophe insurance and bonds and weather risk management markets, in partnership with WFP, the World Bank, the Weather Risk Management Association and the Munich Re insurance company.

37. Several projects have been initiated to demonstrate and document good practices by which early warning systems are properly supported by governance and legislation, as well as organizational coordination mechanisms and operational frameworks. A pilot project on early warning systems for hydrometeorological hazards in Central America was proposed to the World Bank by WMO, in collaboration with OCHA, WFP, ISDR, the International Federation of Red Cross and Red Crescent Societies and the Government of the United States. The Second Experts' Symposium on Multi-hazard Early Warning Systems will be held in Toulouse, France, in May 2009 to address ways of improving contributions from

satellite networks to the four components of early warning: risk identification; hazard observation, monitoring and forecasting; emergency preparedness and response; and communication and dissemination.

38. UNEP and FAO continue to cooperate in the Global Land Cover Network and have established regional collaborative networks for East, West and Southern Africa, South and Central America, the Middle East and Central and South-East Asia. The Global Land Cover Network also contributed to the creation of GlobCover, published in September 2008, which is a collaborative project, involving UNEP, FAO, ESA, the Global Observation of Forest and Land Cover Dynamics, the Global Terrestrial Observing System, the International Geosphere-Biosphere Programme, the Joint Research Centre of the European Commission, that has produced a fine-resolution (300 metre) global land cover map from satellite data from the period 2005-2006, using the FAO Land Cover Classification System.

C. Capacity-building, training and education

39. The Office for Outer Space Affairs invites all Members of the Inter-Agency Meeting on Outer Space Activities to continue or to establish cooperation and coordination, through the Office, with all the regional centres for space science and technology education, affiliated to the United Nations.

40. In 2008, ESCAP, continuing a long-term practice, provided five fellowships for Government officials from developing countries to attend the training course of the Centre for Space Science and Technology Education in Asia and the Pacific.

41. The Virtual Laboratory for training in satellite meteorology established by WMO and the Coordination Group for Meteorological Satellites is the cornerstone of the efforts of the WMO Space Programme to promote capacity-building in pursuit of its strategic aim of maximizing the benefit of environmental satellite products to the worldwide user community. The existing network of centres of excellence of the Virtual Laboratory consists mainly of WMO regional training centres and is sponsored by meteorological satellite agencies. The network includes centres located in Beijing and Nanjing (China), Bridgetown (Barbados), Buenos Aires (Argentina), Cachoeira Paulista (Brazil), Melbourne (Australia), Muscat (Oman), Nairobi (Kenya), Niamey (Niger) and San José (Costa Rica). Two new centres of excellence are being established, hosted by the South African Weather Service in Pretoria and by the Russian Federal Service for Hydrometeorology and Environment Monitoring (Roshydromet) in Moscow.

42. A new five-year strategy for the Virtual Laboratory was adopted in November 2008. The new training strategy contains the following key elements: further implement centres of excellence for training in order to cover the needs of all WMO regions in the official languages of WMO; strengthen the virtual resource library and make it accessible through a single portal; conduct training events using a learning approach combining distance and face-to-face learning; maintain updated skills and support sharing of knowledge through virtual regional focus groups supported by each centre of excellence, to hold regular online briefings, following the successful example of Central America; and expand the syllabus of Virtual Laboratory activities over the coming years to embrace wider GEO societal benefit areas. The United Nations Programme on Space Applications, implemented by the

Office for Outer Space Affairs, uses the Virtual Laboratory as a primary training resource for satellite meteorology for the regional centres for space science and technology education, affiliated to the United Nations.

43. In the period 2009-2010 and beyond, ECA, in collaboration with specialized regional centres (the Regional Centre for Training in Aerospace Surveys and the Regional Centre for Mapping of Resources for Development) will continue to develop training programmes for resource technicians, managers and scientists in the fields of geo-information technologies and their applications for resource assessment, planning, management and monitoring.

44. During the International Year of Astronomy 2009 and in 2010, UNESCO will develop materials in astronomy for primary and secondary students and teachers, in cooperation with International Astronomical Union Commission 46, on Education, and the regional centres for space science and technology education, affiliated to the United Nations. In addition, low-cost and easy-to-assemble “Galileoscopes” will be donated to schoolchildren in several developing countries.

D. Enabling technologies for development, including information and communications technology and global navigation satellite systems

45. The International Committee on Global Navigation Satellite Systems (ICG) was established on a voluntary basis, as a forum to promote cooperation, as appropriate, on matters of mutual interest to its members related to civil satellite-based positioning, navigation, timing and value-added services, as well as cooperation on the compatibility and interoperability of global navigation satellite systems (GNSS), and to promote the use of GNSS to support sustainable development, particularly in developing countries. The establishment of ICG is a concrete result of the implementation of recommendations of UNISPACE III. A Providers Forum has been established with ICG to enhance the compatibility and interoperability of current and future regional and global navigation satellite systems. The Office for Outer Space Affairs, which acts as the Executive Secretariat of the ICG, invites other United Nations entities to participate in ICG and to contribute to further developing the programme on GNSS applications.

46. The World Radiocommunication Conference agreed on the frequency allocation and sharing criteria for satellite systems in the radio navigation satellite service (RNSS) and established a consultation meeting on Conference resolution 609, for administrations operating or planning to operate RNSS systems.

47. ECA pursued its effort to develop, through the African Geodetic Reference Frame Project, a unified geodetic reference frame for Africa so that maps and other geo-information products can be represented on the same datum. The reference frame project will be based on current satellite positioning technologies and will provide the geodetic infrastructure for multinational projects requiring precise geo-referencing (e.g. three-dimensional and time-dependent positioning, geodynamics, precise navigation and geo-information). Like other continental geodetic reference frames, it will be part of the global geodetic infrastructure. As such, it is being implemented, and will be maintained, in close cooperation with international partners with expertise and interest in geodetic reference frames, in

particular the Office for Outer Space Affairs, the International Association of Geodesy and the International GNSS Service.

48. At ECE, Geographic Information System (GIS) technology is used to develop spatial information on European road and rail censuses, as well as to generate maps of transport routes for the Trans-European Motorway, Trans-European Railway and Euro-Asian Transport Links projects. In addition, satellite images and global positioning systems are widely applied in contemporary forestry activities associated with ECE. In addition to improving mapping and inventory practices, those technologies play an important role in everyday managerial practices (such as logging, transportation, fire control and rescue activities). While satellite-based technologies have not been directly applied by the ECE Timber Section, remote sensing and positioning data is used in the ECE forest information system. The FAO global remote sensing survey is expected to be an important tool for the evaluation of forest dynamics in countries in the ECE region. The survey combines the best existing global imagery from 1975, 1990, 2000 and 2005 with national ground-based forest area assessment estimates. The results are expected to be published in 2011. Satellite monitoring and measuring of critical loads and levels of air pollutants also continue in the framework of the Convention on Long-range Transboundary Air Pollution.

49. ICAO and the International Maritime Organization (IMO) will continue their involvement in the operation of the World Area Forecast System. ICAO will also continue to pursue the transition to satellite-based navigation for all phases of flight. On matters related to navigation policy and the radio frequency spectrum, ICAO will continue to coordinate its work with IMO and ITU. It will also continue to coordinate closely with the International Satellite System for Search and Rescue (COSPAS-SARSAT) in matters relating to the carriage by aircraft of emergency locator transmitters.

50. In response to interest expressed in improved information and communication services by Pacific leaders at the sixty-second session of ESCAP, in 2006, the Commission conducted a study on Pacific connectivity, with support from the Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States and the Special Unit for South-South Cooperation of the United Nations Development Programme (UNDP). The ESCAP report *Enhancing Pacific Connectivity*, launched at United Nations Headquarters in the first quarter of 2008, considers the technical viability of various options for improving connectivity in the subregion, including creative approaches to cable, terrestrial wireless and satellite technology (including solar-powered satellite phones for universal service). The report also assesses issues of economic and commercial viability and presents financing options for enhancing Pacific connectivity. As a follow-up to the conclusions of the study, the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States, in collaboration with UNDP, made a presentation on the report at Headquarters on 5 November 2008 and held a discussion on related follow-up activities with small island developing States and their partners, in particular private sector entities, in which representatives of ESCAP and the ITU regional office for Asia and the Pacific participated by teleconference.

51. In 2008, the Office for Outer Space Affairs, through the United Nations Programme on Space Applications, organized regional workshops on tele-health in Cuba, Burkina Faso and India. The workshops raised awareness of the benefit of using space technologies for tele-health, in particular, tele-epidemiology; promoted the exchange of information on the current status of tele-health practices in Africa, Asia and the Pacific, and Latin America and the Caribbean; and provided a forum of discussion on issues, concerns, and approaches in developing tele-health in those regions and on how to support the activities of the Action Team on Public Health (action team 6). Fellowship grants on tele-epidemiology continue to be provided by the Governments of Argentina and Italy. In 2009, the Programme will organize follow-up activities in Bhutan and Iran (Islamic Republic of). The Programme cooperates and seeks to widen cooperation with the World Health Organization and other United Nations entities.

52. GEONETCast is a near-global, environmental information delivery system utilizing communication satellites and digital video broadcasting transmission standards (www.geonetcast.org). It was initially established by WMO, the European Organization for the Exploitation of Meteorological Satellites and the National Oceanic and Atmospheric Administration of the United States of America as an enabling technology project in the context of GEOSS. The system can broadcast data and products generated by local centres to users via a satellite multicast, access-controlled, broadband capability. Initially focused on weather and climate data, the system is expanding to include environmental products in support of GEO societal benefit areas such as disasters, water, health and agriculture. GEONETCast has the potential to support several United Nations programmes requiring the timely and cost-effective dissemination of environmental information. GEONETCast will also be increasingly used for capacity-building, particularly in developing countries, through the implementation of a training channel.

53. ITU is organizing a global multi-stakeholder partnership, “Connect”, (www.itu.int/ITU-D/connect) to mobilize the human, financial and technical resources required to bridge major gaps in information and communication technology infrastructure, with the aim of supporting affordable connectivity and applications and services to stimulate economic growth, employment and development worldwide.

54. Operational data management at UNHCR is being standardized and consolidated through various information technology and organizational efforts. The UNHCR GeoPortal (<https://geoportal.unhcr.org>), built around an Internet-based geographic information system, is now functional and will be used in UNHCR operations and by partners and the public (including by donors and academia) in 2009. The GeoPortal will offer web services for sharing the locations of refugees and internally displaced populations. It will establish links with other systems such as the UNOSAT satellite rapid mapping service and the United Nations Joint Logistic Centre system for road network GIS. These services will be more efficiently channelled to support interventions of UNHCR and its partners.

55. The UNHCR Internet-based geographic information system, an open source application, offers synchronization of offline files and editing tools that allow specialists to access, use and modify geographic information to accommodate their needs in the field. Tools for user support, including webcasts, will be made available in 2009 and 2010. The GeoPortal also contains geospatial information on the

GeoNetwork Metadata catalogue, which will facilitate access to and sharing of GIS data generated in the field and at UNHCR headquarters.

56. UNHCR will continue its collaboration with tools such as Google Earth and Virtual Earth. UNCHR is collaborating with Google to build a collaborative platform for UNHCR operations in the eastern Democratic Republic of the Congo and in Malaysia (in collaboration with CartONG, a non-governmental organization, that is a partner of UNHCR in the field of GIS). Replicability of methods, tools and approaches are the key criteria for the success of those initiatives. ECE, in partnership with the Organization for Economic Cooperation and Development, is developing a Google Earth application to present, through a web portal, the locations worldwide of facilities reporting on pollutant releases and transfers.

57. UNEP, FAO and WFP completed the latest version of GeoNetwork, an Internet-based spatial information catalogue. The GeoNetwork is currently implemented and operated by OCHA, UNEP, UNHCR, WFP, UNITAR, FAO, the World Health Organization, the Consultative Group on International Agricultural Research, ESA, the Famine Early Warning Systems Network of the United States Agency for International Development (USAID) and the Somalia Water and Land Information Management System.

E. Advancing scientific knowledge of space and protecting the space environment

58. In June 2008, the WMO Executive Council acknowledged that space weather had an increasing impact on meteorological infrastructure such as meteorological satellites and noted the role of meteorological satellites to monitor the space environment. It also noted the impact of space weather on a growing number of human activities and considered the potential for synergy between the delivery of meteorological information and of space weather warnings. The Executive Council thus endorsed the involvement of WMO on the issue of space weather in order to support international coordination in that field in close cooperation with the International Space Environment Service and other relevant entities, such as the Committee on the Peaceful Uses of Outer Space ITU, ICAO and IMO. A workplan will be developed and discussed by the Commission for Basic Systems and the Commission for Aeronautical Meteorology of WMO.

IV. Other activities

59. Since 2003, IAEA has participated in the work of the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space on developing the objectives, scope and attributes of an international technically based framework of goals and recommendations for the safety of planned and currently foreseeable nuclear power source applications in outer space. The Scientific and Technical Subcommittee and IAEA established a Joint Expert Group in early 2007. In accordance with IAEA procedures, the draft Safety Framework for Nuclear Power Source Applications in Outer Space developed by the Joint Expert Group was reviewed by the IAEA safety standards committees and agreed by the IAEA Commission on Safety Standards in May 2008. It was submitted to States members

of IAEA for consultation in July 2008. Taking into consideration the comments from member States, the Joint Expert Group finalized the draft Safety Framework during the forty-sixth session of the Scientific and Technical Subcommittee, in February 2009. Following adoption by the Subcommittee, the Safety Framework has now been submitted for final agreement by the IAEA Commission on Safety Standards at its meeting in April 2009. The Safety Framework is expected to be issued in 2009, one year in advance of the initial schedule, as a joint publication of the Scientific and Technical Subcommittee and IAEA.

60. In the context of the African Information Society Initiative, all activities in the field of geospatial science and technology for the production, processing, management, dissemination and utilization of geo-information in Africa have been designed based on the concept of spatial data infrastructures. Since the last report, progress was made in strategic areas of geo-information development, with internal legislative bodies and external regional forums endorsing policies and strategies formulated by ECA.
