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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 2010-2011

Report of the Secretary-General*

I. Introduction

1. The Inter-Agency Meeting on Outer Space Activities has served as the focal point for inter-agency coordination and cooperation in space-related activities since 1975, with the aim 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-fourth 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 Department of Peacekeeping Operations, the Department of Field Support, the secretariat of the United Nations Framework Convention on Climate Change, the United Nations Environment Programme (UNEP), the Office for Outer Space Affairs of the Secretariat, the United Nations Office on Drugs and Crime (UNODC), the Economic Commission for Africa (ECA), the Economic Commission for Europe (ECE), the Office of the United Nations High Commissioner for Refugees (UNHCR), the United Nations Institute for Training and Research (UNITAR), the International Atomic Energy Agency (IAEA), the International Civil Aviation Organization (ICAO), the International Telecommunication Union (ITU), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the World Health Organization (WHO) and the World Meteorological Organization (WMO).

* The present report was reviewed and revised by the Inter-Agency Meeting on Outer Space Activities at its thirtieth session, held in Geneva from 10 to 12 March 2010, and finalized following the session.



3. Information on space-related activities of United Nations entities is available on the website dedicated to the coordination of outer space activities within the United Nations system (www.uncosa.unvienna.org).

4. In addition to the activities described in the report of the Secretary-General on the coordination of space-related activities within the United Nations system for the period 2009-2010 (A/AC.105/940), the present report reflects activities planned for the period 2010-2011.

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

5. In its resolution 64/86, 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, 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.

6. The United Nations Geographic Information Working Group, an informal inter-agency body set up to improve the coordination of geospatial activities in the United Nations system, is actively pursuing a number of relevant tasks and actions to standardize and improve access to geographic data (including space-based data) across the United Nations. The Remote Sensing Task Group of that Working Group addresses issues related to sharing and access to space-based data and information for all members of the Working Group. The Working Group will continue to improve inter-agency coordination in the geospatial domain through the implementation of the United Nations Spatial Data Infrastructure (UNSDI).

7. ITU, as the steward of the global framework for spectrum and satellite orbits, provides the radio-frequency spectrum and orbit resources for all kinds of satellite systems. ITU develops and, taking into account technological achievements, amends mandatory international regulations and international standards for the creation and effective operation of satellite systems. The ITU Radio Regulations and Recommendations serve as a basis for the development of space systems that provide communications facilities, environmental monitoring and emergency radiocommunications used by the other United Nations agencies.

8. After the sixth plenary session of the Group on Earth Observations (GEO), held in Washington, D.C., on 17 and 18 November 2009, the Inter-Agency Coordination and Planning Committee (ICPC) for Earth observations met to discuss the status of the memorandums of understanding governing the United Nations-sponsored Global Climate Observing System (GCOS), Global Terrestrial Observing System (GTOS) and Global Ocean Observing System (GOOS). The participating

entities reported to the meeting that the review of the memorandums of understanding, within their respective organizations, was ongoing.

9. With the increasing use of satellite-based technology for humanitarian, peacekeeping, peacebuilding, security, development and environmental purposes, the United Nations has seen the advantages of establishing systems contracts to provide a more streamlined, effective and efficient way of procuring satellite images. The Cartographic Section of the Department of Field Support and the Procurement Division of the Department of Management have established two systems contracts for satellite image acquisition: one for high-resolution images (IKONOS, QuickBird, Radarsat, GeoEye, WorldView) and the other for medium-resolution images (SPOT). Additionally, in order to maximize the asset acquisition of peacekeeping and peacebuilding operations in the field missions, systems contracts for geographic information system (GIS) software and standard and high-end global positioning systems have also been established for use by all United Nations entities. The Cartographic Section continues to work with the Procurement Division to maintain and expand the services provided to develop new systems contracts that will benefit the United Nations system.

III. Coordination of current and forthcoming space-related activities

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

10. Under the United Nations Framework Convention on Climate Change, issues relevant to science, research and systematic observation in the context of climate change are regularly being considered by the Subsidiary Body for Scientific and Technological Advice (SBSTA). The fifteenth session of the Conference of the Parties to the Framework Convention, held in Copenhagen in December 2009, adopted a decision on systematic climate observations containing a number of elements relevant to climate observations from space. In particular, in that decision the Conference of the Parties encouraged the Committee on Earth Observation Satellites to continue coordinating and supporting the implementation of the satellite component of GCOS, co-sponsored by UNEP, the Intergovernmental Oceanographic Commission of UNESCO, WMO and the International Council for Science. The Conference also urged parties and invited relevant United Nations agencies and organizations to work towards addressing the priorities and gaps identified in the report on progress with the GCOS implementation plan. One of those priorities for the next five years is the continued encouragement of the coordinated implementation and long-term continuity of the cross-cutting space-based component of GCOS. Prior to the fifteenth session of the Conference, GCOS issued a provisional updated implementation plan. Review comments are currently being incorporated into the final version of that plan, to be submitted to the secretariat of the Framework Convention for the thirty-third session of the Subsidiary Body for Scientific and Technological Advice, in November and December 2010.

11. The ITU Radiocommunication Sector (ITU-R), in cooperation with WMO, carries out studies and approves ITU-R recommendations, reports and handbooks used for further development and effective operation of environment-monitoring systems based on space-borne remote sensing. Common studies are ongoing to prepare methods to satisfy the agenda of the 2012 World Radiocommunication Conference, one of whose items is on needs for additional radio-frequency spectrum for scientific services to better monitor climate changes and global warming and reduce the effects of meteorological and natural disasters.

12. As was reported last year, to address both GCOS and other programme requirements, WMO has developed a new “Vision for the Global Observing System in 2025”, which was endorsed by the WMO Executive Council at its sixty-first session, in June 2009. The future scope and benefits of the Global Observing System (GOS) will encompass the fields of meteorology, monitoring of climate in the oceanic and terrestrial domains, hydrological and environmental services and related disaster detection and monitoring. The space-based component of GOS will continue to rely on partnerships with the Coordination Group for Meteorological Satellites (CGMS) and the Committee on Earth Observation Satellites. The new GOS will continue to serve as one of the major systems in the GEO Global Earth Observation System of Systems (GEOSS), thereby serving several of the GEO societal benefit areas.

13. The third World Climate Conference, organized by WMO, was held in Geneva from 31 August to 4 September 2009. Heads of State, environmental ministers and senior policy officials from around the world met to discuss findings of the technical expert segment held in advance of the high-level segment. The result of these deliberations led to an agreement to create a global framework for climate services. The continued participation and active involvement of all United Nations organizations having an interest in, or whose activities are affected by, climate variability and change are needed.

14. UNEP, together with the European Environment Agency (EEA) and the European Space Agency (ESA), and including data from SPOT-Image’s Planet Action initiative, has prepared the multimedia “European atlas of environmental change”, illustrating changes in land cover and other Earth surfaces over a 30-year period, and covering 12 distinct sites across the European continent. The multimedia atlas was launched at a special event on the margins of the fifteenth session of the Conference of the Parties to the Framework Convention on Climate Change. An expanded, hard-copy version of the atlas is planned for the biennium 2010-2011.

15. The African Regional Spatial Data Infrastructure, with dedicated online applications and streamlined electronic delivery of products and services for targeted economic sectors, including agriculture, climate change, carbon sequestration, water resources management, natural disasters and other regional challenges, comprises a number of databases: (a) the Programme of Infrastructure Development in Africa geospatial database, covering all existing and planned infrastructure facilities on the continent; (b) the agricultural commodity value-chain database and interface, developed with data from international and regional partners (Food and Agriculture Organization of the United Nations (FAO), World Food Programme (WFP), International Fund for Agricultural Development (IFAD), International Food Policy Research Institute (IFPRI), ECA African Centre for

Statistics, United States Department of Agriculture); and (c) the African Climate Policy Centre climate-change activities database.

16. Public health mapping and GIS technologies continue to be a core component of WHO activities to improve outbreak awareness, preparedness and response and routinely provide support for the daily activities of the WHO Centre for Strategic Health Operations. These technologies are especially well suited to the dynamic nature of outbreaks and have significantly advanced the ability to track and visualize the real-time evolution of local outbreaks and epidemics. WHO continues to work with a diverse community of partners, including partners within the GEO community, for the provision of information and development of models to support preparedness response and control strategies.

17. WHO also continues to work with technical institutes and other partners, including WMO, to promote the integration of remotely sensed environmental and Earth science data with in situ public health surveillance data for a better understanding of the relationship between potential risk factors and the behaviour of infectious diseases for improved early warning and forecasting, and collaborates with the UNITAR Operational Satellite Applications Programme (UNOSAT) for the provision of vector files.

18. The Meningitis Environmental Risk Information Technologies (MERIT) project has been established as a collaborative initiative of WHO and other international organizations, research institutes and members of the environmental, public health and epidemiological communities to facilitate the use of environmental information in public health decision-making. The primary objective of the project is to reduce the burden of epidemic meningococcal meningitis across Africa's "meningitis belt" by integrating knowledge of environmental influences on outbreaks in sub-Saharan Africa, such as absolute humidity, absorbing aerosols, rainfall and land cover, to develop a decision-support tool and inform the current vaccination strategies. A number of research projects within the MERIT framework are engaging national, regional and international institutions, including WMO, national meteorological services, the African Centre for Meteorological Applications for Development, the Goddard Institute for Space Studies and the Jet Propulsion Laboratory of the National Aeronautical and Space Administration (NASA), and the National Oceanic and Atmospheric Administration, to increase the use of relevant satellite-derived information and tools in these efforts.

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

19. After the earthquake on 12 January 2010 in Haiti, the Cartographic Section began to coordinate with the United Nations Stabilization Mission in Haiti (MINUSTAH), the Office for the Coordination of Humanitarian Affairs (OCHA), the Department of Safety and Security, the Office for Outer Space Affairs and other United Nations agencies, such as WFP, in order to establish practices for the sharing and dissemination of data in immediate response to and support of disaster relief operations. By 13 January, essential maps and geo-databases produced by the MINUSTAH geographical information services were shared with the humanitarian community. The Haiti crisis operations team was established to streamline efforts to

meet urgent demands. In order to re-establish basic communication links, ITU, in cooperation with such partners as Inmarsat, Iridium, Qualcomm, Vizada and Wireless Reach, deployed 100 satellite terminals, and a further 60 units with broadband capabilities have been dispatched to disaster zones, along with experts to operate them.

20. The Cartographic Section, through the Office for Outer Space Affairs, triggered the International Charter on Space and Major Disasters to obtain post-event satellite imagery, and on behalf of the Department of Field Support activated the rapid mapping service of the Global Monitoring for Environment and Security (GMES) Management of Operations, Situation Awareness and Intelligence for Regional Crisis (G-MOSAIC) services, a European Union initiative to provide intelligence data that can be applied to early warning and crisis prevention as well as to crisis management and rapid interventions in hot spots around the world. A detailed block-level damage and trafficability assessment of Port-au-Prince and other areas that were hard hit by the earthquake was completed jointly by G-MOSAIC and the Cartographic Section, on the basis of satellite images available immediately after the earthquake. The German Aerospace Centre (DLR) provided additional damage assessment information, and the European Commission Joint Research Centre (EC/JRC) provided landslide risk analysis. The damage assessment and risk data were shared with the United Nations and non-governmental organizations.

21. In response to the earthquake in Haiti, there has been an outpouring of goodwill in an effort to make high-resolution satellite and newly collected aerial images available free of charge for humanitarian operations on the ground. The Cartographic Section continues to work with OCHA and other United Nations entities, as well as non-United Nations strategic partners, in support of the operations on the ground. Along the same lines, the Office for Outer Space Affairs, through its Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER) programme, acted as a mediator and facilitator of access to space-based data and information minutes after the earthquake hit, coordinating and communicating closely with all United Nations agencies, the World Bank and major non-governmental organizations involved in the response, as well as with operators of space assets to ensure fast and easy access to all satellite imagery and other aerial imagery collected. Web map services were set up for much of the new imagery, thus allowing for fast, low-bandwidth access to the data soon after they were made available.

22. In the immediate aftermath of the earthquake in Haiti, UNITAR/UNOSAT produced information in the form of maps, analyses, reports and geographic data in line with the specific needs of a number of users on the ground, including satellite-identified concentrations of internally displaced persons, and road and bridge obstacles. At the request of the United Nations Development Programme (UNDP), UNITAR/UNOSAT assessed the damage to buildings and infrastructure. This work was done in cooperation with various institutions and initiatives from outside the United Nations, such as EC/JRC, Sertit of France, DLR of Germany, the Research Centre for Earth Operational Monitoring and Scanex of Russia, ITHACA, the International Charter on Space and Major Disasters and Google. In the context of the Post-Disaster Needs Assessment and Recovery Framework, UNITAR/UNOSAT, the World Bank and EC/JRC jointly compiled their damage assessments into one

comprehensive damage assessment for all affected areas. In all this work, UNOSAT cooperated with the Haitian National Centre for Geospatial Information (CNIGS). UNOSAT is making a specific effort to help with the rehabilitation of CNIGS and ensure its participation in the post-disaster needs assessment. To this end, UNOSAT, with the support of UNDP, has committed technical assistance and a cash grant to CNIGS.

23. After the earthquake on 27 February 2010 in Chile, the Office for Outer Space Affairs, on behalf of WFP, triggered the International Charter on Space and Major Disasters to obtain post-event geographic information, while the Cartographic Section requested the activation of G-MOSAIC services, as well as European Union Satellite Centre services for rapid image mapping and damage assessment of the affected area. The Cartographic Section also obtained high-resolution satellite images from the service providers. The satellite images and damage assessment maps were shared with the United Nations, the Chilean Government and non-governmental organizations.

24. There are currently 13 United Nations-administered peacekeeping and political missions with a GIS component. Owing to the lack of up-to-date maps for the mission areas, the missions often rely on satellite images to create image maps in support of their ground operations. In addition, the Cartographic Section's GIS Centre at the United Nations Logistics Base at Brindisi, Italy, provides large-scale topographic mapping for various missions through feature extraction of satellite images (e.g. United Nations Disengagement Observer Force, United Nations Interim Force in Lebanon, African Union-United Nations Hybrid Operation in Darfur, United Nations Organization Mission in the Democratic Republic of the Congo), and in some of those projects the Cartographic Section has been collaborating with the Multinational Geospatial Cooperation Programme and individual Member States in using common mapping standards.

25. While the main activities of GIS sections and units are in support of mission mandates, they often collaborate with other United Nations agencies and international partners on the ground. Field missions of the Department of Peacekeeping Operations and the Department of Political Affairs coordinate with other United Nations offices, such as OCHA, WFP, UNHCR, UNDP and WHO, to collect, process and disseminate geographic products and services in mission areas. Through the satellite imagery systems contract, United Nations agencies can benefit from the images purchased by the mission by paying the imagery provider a small fee to upgrade the licence to a United Nations system-wide licence. This reduces the cost to the United Nations as a whole for acquiring satellite imagery.

26. UNITAR/UNOSAT continues to develop its rapid mapping services. A collaboration agreement has been signed with Google, making UNOSAT its focal point within the United Nations system for matters related to humanitarian emergencies and preparedness. Moreover, UNITAR/UNOSAT can request the triggering of the International Charter for Space and Major Disasters on the basis of requests for assistance from United Nations operational agencies when a major natural disaster occurs. In the context of the Global Disaster Alert and Coordination System (GDACS), which is a cooperation framework for OCHA, EC/JRC and UNITAR/UNOSAT and includes a wide range of stakeholders from Member States and the early response community, UNITAR/UNOSAT operates as the focal point for satellite imagery and maps, as well as Chair of the GDACS working group on

maps and satellite images. At the request of GDACS stakeholders, since 2009 UNOSAT has been developing and testing a satellite mapping coordination system. This tool was presented to the GDACS meeting on maps and satellite imagery in 2009 and is currently being evaluated for operational implementation in 2010. The expected benefits are to reduce duplication and improve knowledge within the satellite imagery and mapping community. In this context, UNITAR/UNOSAT continues its policy of sharing data as frequently as possible, and is currently testing new methods to deliver data automatically over the Internet as Web map services and Web feature services.

27. The UNEP Division of Early Warning and Assessment-Europe has conducted modelling and research and helped to author the 2009 global assessment report on disaster risk reduction. The report is the first biennial global assessment of disaster risk reduction prepared in the context of the implementation of the International Strategy for Disaster Reduction (ISDR). It was coordinated by the ISDR secretariat, in collaboration with UNEP, UNDP, the World Bank, WMO, UNESCO, the ProVention Consortium, the Norwegian Geotechnical Institute and a wide range of other ISDR partners. For the modelling of several natural hazards, remote sensing techniques and derived products were used. The PREVIEW tropical cyclones database also contains information collected via remote sensing. The UNEP Division of Early Warning and Assessment-Europe gathered all data from 1975-2008 on tropical cyclones and processed them in order to compute a wind-speed profile. This was then used to compute population exposure to tropical cyclones.

28. UNHCR needs ground-truthed interpretation of high-resolution satellite imagery to develop GIS layers on camps for refugees and internally displaced persons. Since 2009, the EU Services and Applications for Emergency Response (SAFER) project, replacing the ESA Humanitarian Global Mapping programme, has been delivering products to UNHCR (e.g. maps for two internally displaced persons sites in northern Yemen). For 2010-2011, UNHCR, through the SAFER External User Advisory Committee, under the coordination of WFP, is expecting additional products, the exact number, location and composition of which are to be defined in the first semester of 2010. Similar partnerships are also in development to broaden the coverage of such interpretation while providing better services to UNHCR for its emergency support. The GeoPortal of UNHCR is promoted as the platform for delivery and maintenance of those products.

29. UNODC continues to use satellite imagery to monitor the cultivation of illicit crops, specifically coca bush, opium poppy and cannabis. Through its global illicit crop-monitoring programme, the Office is transferring the technical know-how of illicit crop detection to national counterpart agencies in eight countries. In this context, a technical expert from the Office for Outer Space Affairs was temporarily assigned to UNODC to provide technical assistance to Member States. Likewise, a technical expert from UNODC was temporarily assigned to the Office for Outer Space Affairs to support the establishment of technical support for Member States in the context of UN-SPIDER. UNODC cooperates with the Cartographic Section and the Procurement Division in New York to make full use of the United Nations system contract for the acquisition of high-resolution satellite imagery. In 2009, the system contract was used for the first time, and further use is planned in 2010-2011.

30. Studies on radiocommunications for emergency situations and for protecting lives represent a major responsibility of ITU-R, in coordination with WMO, the

Working Group on Emergency Telecommunications and OCHA. ITU-R maintains an online database for frequency management in disaster situations and facilitates online access to it for administrations, national regulatory authorities, disaster relief agencies and organizations, in particular the United Nations Emergency Relief Coordinator, the Working Group on Emergency Telecommunications and OCHA, in accordance with the operating procedures developed for disaster situations.

31. Rift Valley fever outbreaks in East Africa have been associated with periods of heavy rainfall during the warm phases of the El Niño Southern Oscillation phenomenon. Such findings have enabled the successful development of forecasting models and early warning systems for Rift Valley fever using satellite images and weather forecasting data. In operation since 1999, the monitoring and prediction system developed by the NASA Goddard Space Flight Center relies on interpretation of rainfall and analysis of normalized difference vegetation index anomalies to map areas showing conditions that would support the emergence, production and propagation of Rift Valley fever vectors. The maps are made public on a monthly basis and warnings are sent to key partners, in real time. FAO and WHO are currently working on the definition of guidelines and options to improve the level of preparedness and the capacities of the countries for early response. Part of this effort is dedicated to early warning, as it is a key factor that may allow time for preventive measures before the amplification of the virus is out of control.

32. In order to enhance readiness to assist in boundary demarcation issues, the Cartographic Section has launched an international boundary information service project, aimed at creating and maintaining an accurate worldwide geodatabase on international boundaries. In developing the database, it is essential that satellite imagery be used in analysing and determining the course of the boundaries. The project is being carried out in collaboration with the Treaty Section of the Office of Legal Affairs for boundary treaty texts and maps, and the library of the United Nations Office at Geneva for historical and treaty maps from the League of Nations. In the context of the activities of the United Nations Geographic Information Working Group, the international boundary information service also liaises and collaborates with the Division for Ocean Affairs and the Law of the Sea of the Office of Legal Affairs for maritime boundaries and with WHO for the Second Administrative Level Boundaries project. Coastline data serve as the backbone for all these initiatives, and satellite imagery is used to verify the accuracy of the data. Furthermore, at the request of the Department of Political Affairs, the Cartographic Section has been tasked with providing detailed boundary analyses on border and territorial issues.

C. Capacity-building, training and education

33. In the biennium 2010-2011 the United Nations Programme on Space Applications, implemented by the Office for Outer Space Affairs, will continue to organize a series of conferences, workshops, symposiums and training courses addressing a wide range of topics related to capacity-building in space science, technology and education. These activities are supported by the regional centres for space science and technology education, affiliated to the United Nations. In organizing these events, the Office closely coordinates and cooperates with other relevant United Nations entities. Taking account of the growing interest in the use of

small satellites and their applications in support of sustainable development, the Programme has recently launched the United Nations Basic Space Technology Initiative, which will support indigenous capability in the development of basic space technology. In implementing the Initiative the Office is working closely with ITU to address issues of frequency allocation for small satellites.

34. With the aim of creating and managing knowledge on the African continent, ECA has continuously enabled Member States to participate in important regional geo-related events and partnered with African science and research institutions, as well as other sectors, to increase awareness of the relevance of geo-information for economic growth and social development. In 2010-2011 and beyond, ECA, in collaboration with the Regional Centres for Training in Aerospace Surveys and the Regional Centre for Mapping of Resources for Development, will continue to develop training programmes in geo-information technologies and their applications in resource assessment, planning, management and monitoring for resource technicians, managers and scientists.

35. Capacity-building and education using remote sensing and information and communications technology (ICT) are among the most important activities carried out by UNEP Global Resource Information Database (GRID) centres. The GRID-Warsaw centre has been promoting the use of satellite images and image-processing software as a tool for education on environment-related topics in Polish secondary schools. Students engage in investigations of land cover changes in their schools' surroundings. Landsat images obtained at different periods are subject to visual interpretation and computer processing, and maps are the final product. The results and reasons for observed changes are discussed with local administrations.

36. 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 includes centres located in Beijing and Nanjing (China), Bridgetown, Buenos Aires, Cachoeira Paulista (Brazil), Melbourne (Australia), Muscat, Nairobi, Niamey and San José. Two new centres of excellence were established in 2009, hosted by the South African Weather Service in Pretoria and by the Russian Federal Service for Hydrometeorology and Environment Monitoring in Moscow. The United Nations Programme on Space Applications uses the Virtual Laboratory as a primary training resource for satellite meteorology for the regional centres for space science and technology education.

37. WHO has established the Vulnerability and Risk Analysis and Mapping programme (VRAM) in the Mediterranean Centre for Health Risk Reduction in Tunis, with the primary objective of supporting Member States and partners in strengthening their capacity to assess, visualize and analyse health risks and incorporate the results of the analysis in disaster risk reduction, emergency preparedness and response programmes. In 2009 VRAM collaborated with WFP in Ghana and United Nations Children's Fund in Nigeria. Discussions regarding collaboration with other United Nations entities, such as UNDP, UNITAR and the Office for Outer Space Affairs, are currently under way.

38. UNITAR/UNOSAT has signed a cooperation agreement with the Faculty of Geo-Information Science and Earth Observation of the University of Twente (Netherlands) with a view to developing training workshops and e-learning courses in 2010-2011 and developing a roster of GIS experts. Furthermore, UNOSAT is developing training modules for the curricula of other UNITAR programmes.

39. In the framework of the UNESCO Space Education Programme, space education workshops were held in Ecuador, Peru and the Syrian Arab Republic in 2009, and workshops are foreseen for Egypt and the Philippines in 2010-2011. Support is being provided for the development of a teacher-training module on the applications of space-based technology, focusing on sea-level rise, deforestation and water pollution, led by NASA and the Argentine National Commission on Space Activities under the Eduflow initiative of the Committee on Earth Observation Satellites Working Group on Education, Training and Capacity-Building. This module will be tested by Argentine teachers in 2011 and will be replicated for other countries in succeeding years. An exercise book on space technology applications for secondary students is also foreseen under the Eduflow initiative, which will be tested by schools selected by the regional centres for space science and technology education, among others. As a follow-up action to the International Year of Astronomy (2009), a teacher-training module in astronomy will be developed in 2010-2011 and will be tested by teachers in Ecuador and Peru and from schools selected by the regional centres for space science and technology education.

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

40. The International Committee on Global Navigation Satellite Systems (ICG) continues to make significant progress towards achieving compatibility and interoperability among global and regional space-based positioning, navigation and timing systems and in promoting the use of global navigation satellite systems (GNSS) and their integration into national infrastructures, particularly in developing countries. The Office for Outer Space Affairs, as the executive secretariat of ICG, works with ITU, ICAO, the International Maritime Organization (IMO) and other United Nations entities to further develop programmes on GNSS applications.

41. ITU, in cooperation with WMO and ICAO, studies new radiocommunication technologies and, on the basis of the results of the studies, amends ITU Radio Regulations and Recommendations for all radiocommunication systems, including space-based systems. For example, the ITU-R study groups are currently preparing proposals for the 2012 World Radiocommunication Conference regarding agenda items related to such matters as the use and sharing of some frequency bands by space and terrestrial services and the use of frequency bands above 275 GHz for environment monitoring.

42. ICAO and 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, notably in the framework of the ICAO performance-based navigation programme. 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 on matters relating to the carriage by aircraft of emergency locator transmitters. Satellite-based aircraft communications in conformity with ICAO standards continue to be extensively used over oceanic and continental areas.

43. ECA provides regional focus and leadership with regard to geospatial techniques and methodologies in Africa, and continues to partner with United Nations agencies to develop and implement geospatial datasets, applications and procedures relevant to the African development agenda, through the Geographic Information Working Group and UNSDI. It also continues to augment its networking capabilities and to facilitate and encourage linkages with regional and international initiatives and programmes such as GEO/GEOSS, GMES, the Terrestrial Initiative of Global Environmental Research and the International Geodynamics Service. ECA pursues its effort to develop, through the African Geodetic Reference Frame project (AFREF), a unified geodetic reference frame for Africa so that maps and other geo-information products can use the same set of reference points. Like other continental geodetic reference frames, it will be part of the global geodetic infrastructure. The Commission is currently undertaking the review of alternative computation methods and the development of guidelines for the computations, as well as assisting in enabling the first official computation of Africa's reference frame. When fully completed, AFREF will enable the conversion of all national surveying and mapping products to the same common continental reference system.

44. GIS technology is used by ECE to develop spatial information on European road and rail censuses, as well as to generate maps of 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 in areas 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 are 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.

45. UNEP, in partnership with the Environment Agency of Abu Dhabi, the Abu Dhabi Global Environmental Data Initiative, UNEP GRID-Sioux Falls and other partners, has been working on an Arab region environmental atlas, to be released in mid-2010. The atlas will be a unique publication providing evidence of environmental changes taking place in land, water and atmosphere in countries of the region, and also covering transboundary issues such as conservation areas, river basins and pollutants. One of the primary components of the atlas will be site-specific change studies based on visual presentation of current and historical remotely sensed imagery. "Before and after" satellite images will be used to show environmental changes such as land use change, urban growth, altered hydrology

(dams, river diversions and drained wetlands), degradation of land and desertification, coastal areas change, loss of valuable habitats, impacts of war and conflicts, impacts of climate change and shrinking bodies of water.

46. ITU organizes the World Telecommunication Exhibition and Forum with the participation of WHO, the World Intellectual Property Organization, IMO, the World Bank and the Organization for Economic Cooperation and Development, to reflect new industry needs and realities and greater collaboration and to promote high-level dialogue among political and industry leaders as a positive force for the ICT sector and on the role of ICT in addressing pressing issues such as climate change, global economic recovery and cybersecurity.

47. UNITAR/UNOSAT, with the support of the Centre national d'études spatiales (CNES) of France and in cooperation with UNHCR, the International Committee of the Red Cross, non-governmental organizations, private companies and universities, is developing a fleet management system for United Nations agencies and non-governmental organizations. This system will strengthen the security and safety of staff, vehicles and cargo, improve fleet effectiveness and reduce the environmental footprint.

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

48. In 2010, the Committee on the Peaceful Uses of Outer Space began consideration of a new agenda item on the International Space Weather Initiative, under a three-year workplan. The main objectives of the Initiative are to contribute to the development of the scientific knowledge necessary to understand and forecast near-Earth space weather and to contribute to education and public outreach. Building on the work conducted in the framework of the International Heliophysical Year 2007, a series of ground-based networks for the monitoring of space weather have been established.

49. Recalling the increasing impact of space weather on meteorological infrastructure such as meteorological satellites, and on a growing number of human activities, the potential for synergy between the delivery of meteorological information and of space weather warnings, and the role of meteorological satellites to monitor the space environment, the WMO Executive Council confirmed the involvement of WMO in support of international coordination and standardization of space weather observations, data and services. It established an Inter-programme Coordination Team on Space Weather, which will work in cooperation with the International Space Environment Service and relevant United Nations entities, including the Office for Outer Space Affairs, ITU, ICAO and IMO.

IV. Other activities

50. The Science and Technology Division of ECA is undertaking a study programme with the aim of introducing and discussing various challenges and issues associated with the new vision of spatially enabled government and society. The next step will be to develop a toolkit and to apply the relevant methods to pilot countries to calibrate the indicators for general application and mainstream

geospatial science and technology services into various sectoral e-strategies in member States (e-health, e-commerce, e-education and e-services for rural development).

51. In 2009 UNEP undertook a pilot activity for the development of a risk and vulnerability assessment methodology project in Jamaica. The purpose of the project is to identify the risk and vulnerability of countries in the context of declining ecosystems and climate change, integrating these considerations for improved disaster risk reduction approaches and practices. Small island developing States and coastal ecosystems in particular are targeted in the first phase of the project, with vulnerability to tropical cyclones featured in the initial study. Future pilot activities for the project will focus on coastal, dryland and mountain ecosystems, most likely in the Asia-Pacific region, the Caribbean and the Sudan.

52. UNEP GRID-Europe, through its institutional partnership with the University of Geneva, is coordinating and/or participating in several large transnational cooperative projects of the Seventh Framework Programme for Research and Technological Development of the European Commission. The European Union/Seventh Framework enviroGRIDS project (<http://www.envirogrids.net>) is aimed at building capacity for a Black Sea catchment observation and assessment system supporting sustainable development. The project began in April 2009 and will last four years, and its consortium of 27 European institutions is coordinated by the Division for Early Warning and Assessment-Europe and the University of Geneva. The project is aimed at bringing in several newly emerging information technologies to gather, store, distribute, analyse, visualize and disseminate crucial information on past, present and future environmental conditions. The Division for Early Warning and Assessment-Europe is particularly involved in the development of a spatial data infrastructure that will permit data interoperability, information-sharing and data delivery among all actors and end-users in the consortium and beyond.

53. Working towards integrated solutions, UNITAR/UNOSAT, with the support of the European Commission, is contributing to the development of tools allowing the transmission via satellite of geo-tagged field pictures for rapid and easy insertion in space-based maps.

54. After consideration and agreement by the IAEA Commission on Safety Standards in April 2009, the Agency has published, jointly with the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space, the Safety Framework for Nuclear Power Source Applications in Outer Space (A/AC.105/934). IAEA will continue to maintain close working relations with the Subcommittee and its Working Group on the Use of Nuclear Power Sources in Outer Space, with a view to promoting and facilitating the implementation of the Safety Framework.

55. In celebration of the International Year of Astronomy 2009, proclaimed by the General Assembly in 2007, numerous outreach and capacity-building activities in astronomy were implemented by UNESCO in cooperation with the International Astronomical Union (IAU) to bring science closer to society and to enhance science education, especially in developing countries. Low-cost, high-quality, easy-to-assemble "Galileoscopes" were donated to schools in several developing countries. A global office for the development of astronomy will be established by IAU in

2010, with the main function of coordinating existing and planned activities in astronomy in the areas of education, sustainable global development and capacity-building.

56. As part of the International Health Regulations programme, WHO is engaged with external partners to create yellow fever risk maps for the development of international travel and health guidelines, as well as supporting preparedness. Risk-mapping activity serves the purposes of minimizing the adverse effects of vaccine on travellers and also of preventing the spread of the disease. The maps utilize remote sensing and satellite imagery to incorporate factors such as elevation and vegetation to identify and demarcate areas and populations at risk. Efforts are also being made to use satellite imagery to improve the surveillance and control of plague in several countries in Central Asia where it is endemic, where the gerbil is the main animal reservoir of the disease and where movements of human populations into previously uninhabited areas are increasing the risk of human cases. In collaboration with CNES and several research institutes, WHO is engaged in the development of a pilot project in Kazakhstan to develop the use of satellite imagery for improving the monitoring of the animal reservoir, the detection of epizootic diseases, the prediction of epidemics and the development of a software tool for data management, mapping and integration of satellite images.
