United Nations A/AC.105/1014

General Assembly

Distr.: General
16 March 2012

Original: English

Committee on the Peaceful Uses of Outer Space
Fifty-fifth session
Vienna, 6-15 June 2012

Coordination of space-related activities within the United Nations system: directions and anticipated results for the period 2012-2013 — the use of space-derived geospatial data for sustainable development

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 synergies and preventing duplication of efforts related to the use of space technology and applications in the work of United Nations entities.

2. In its resolution 65/97, the General Assembly welcomed the increased efforts to strengthen further the Inter-Agency Meeting on Outer Space Activities, which is the central United Nations mechanism for building partnerships on 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.

3. In that resolution, the Assembly also invited the Committee on the Peaceful Uses of Outer Space to consider how it could contribute to the objectives of the United Nations Conference on Sustainable Development ("Rio+20"), to be held in Rio de Janeiro, Brazil, in 2012.

4. The Committee identified the use of space-derived geospatial data as the overarching theme for its contribution to the objectives of the United Nations

* The present report was reviewed and revised by the Inter-Agency Meeting on Outer Space Activities at its thirty-second session, held in Rome from 7 to 9 March 2012, and finalized following the session.

V.12-51790 (E) 110512 140512

Conference on Sustainable Development (see A/AC.105/993). The Committee also recognized that information generated from space-derived geospatial data (information and data with explicit geographic positioning obtained from space-based platforms) was essential for making informed decisions for sustainable development at the local, national, regional and global levels and in both the public and private domains.

5. At its 30th session, held in Geneva from 10 to 12 March 2010, the Inter-Agency Meeting on Outer Space Activities acknowledged that the regular report of the Secretary-General on coordination of space-related activities within the United Nations system served as a strategic tool for the United Nations in the field of space science and technology, and agreed that future reports should be restructured to address the thematic clusters of the Commission on Sustainable Development. Given that future work in this field is still to be determined by the United Nations Conference on Sustainable Development, the present report focuses on the objectives of the upcoming Conference and the coordination of deeper and broader use of space-derived geospatial data in support of the economic, social and environmental pillars of sustainable development. In that sense, this report builds upon the contribution of the Committee to the Conference.

6. The present report, which is the thirty-fifth 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 on the basis of submissions from the following United Nations entities: the Department of Field Support, the Department of Safety and Security, the Statistics Division of the Department of Economic and Social Affairs and the Office for Outer Space Affairs of the Secretariat, the secretariat of the United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa, the secretariat of the United Nations Framework Convention on Climate Change, the United Nations Institute for Disarmament Research, the Economic Commission for Africa, the Economic and Social Commission for Asia and the Pacific, the Office of the United Nations High Commissioner for Refugees (UNHCR), the United Nations Institute for Training and Research (UNITAR) Operational Satellite Applications Programme (UNOSAT), the World Food Programme (WFP), the International Maritime Organization (IMO), the International Telecommunication Union (ITU) and the World Meteorological Organization (WMO).

7. 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).

8. Adding 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 2010-2011 (A/AC.105/961), the present report reflects activities planned for the period 2012-2013.

II. Use of space-derived geospatial data for sustainable development

A. Environmental protection

9. The use of space-derived geospatial data is indispensable in the context of climate change, environmental protection and management of natural resources. In this domain, United Nations entities employ space-based technology to monitor processes and trends on a global scale for informed decision-making within their respective mandates and jointly coordinate Earth observation through global climate, ocean and terrestrial observing systems.

10. Parties to the United Nations Framework Convention on Climate Change, as part of the Convention's global objective of addressing climate change, are called on to promote and cooperate in the systematic observation of the climate system. Systematic observation is regularly considered by the Framework Convention's Subsidiary Body for Scientific and Technological Advice, and a key component in supporting the Framework Convention in meeting essential needs for climate observations has been the cooperation and contributions from relevant global observations systems, in particular the Global Climate Observing System, Global Terrestrial Observing System (GTOS) and Global Ocean Observing System. Through the Global Climate Observing System, the Framework Convention secretariat regularly receives reports on systematic observation of the climate in the atmospheric, terrestrial and oceanic domains, including space-based observations as a cross-cutting component.

11. Following decisions of the Conference of the Parties to the United Nations Framework Convention on Climate Change in which the Conference called for a coordinated response from space agencies involved in global observations through the Committee on Earth Observation Satellites (CEOS), and for long-term continuity of observations and data availability, CEOS has been invited to report on major achievements relevant to the Convention. Further consideration will be given to matters related to systematic observation of the climate, including from space, during the sessions of the Subsidiary Body for Scientific and Technological Advice to be held in the course of 2012 and beyond.

12. The United Nations Environment Programme, the United Nations Educational, Scientific and Cultural Organization (UNESCO) Intergovernmental Oceanographic Commission, WMO and the International Council for Science (ICSU) co-sponsor the Global Climate Observing System (GCOS), which was established in 1992 with the aim of ensuring that observations required to address climate-related issues are obtained and made available to all potential users. Most observations of the essential climate variables that are needed to make significant progress in the generation of global climate products and derived information are space-based.

13. To assist space agencies involved in observing essential climate variables, the GCOS programme, in collaboration with the World Climate Research Programme, WMO and the climate community at large, prepared the GCOS satellite requirements for more systematic and coordinated observation of climate from space, which were updated in 2011. National and intergovernmental space agencies have taken coordinated action in responding to the GCOS requirements, both

individually and collectively through CEOS and the Coordination Group for Meteorological Satellites (CGMS). That action extends to the field of the climate-proof operation of satellite systems and the coordinated exploitation of acquired data sets, for example, in the Sustained, Coordinated Processing of Environmental Satellite Data for Climate Monitoring (SCOPE-CM) initiative. WMO, for its part, has incorporated GCOS requirements in the redesign of its Global Observing System, to take place over the next two decades.

14. The Global Ocean Observing System (GOOS), created in 1991, is led by the UNESCO Intergovernmental Oceanographic Commission and co-sponsored by the United Nations Environment Programme, WMO and ICSU. The establishment of GOOS was initiated by the UNESCO Intergovernmental Oceanographic Commission at the request of Member States, which recognized the importance of a unified ocean observation system.

15. Satellite data streams constitute an essential element of GOOS for monitoring sea level change, surface winds, sea ice extent and ocean colour (an indicator of biological activity). The requirements for ocean observations used for climate monitoring, research and forecasting are set by the Ocean Observations Panel for Climate, reporting to GOOS and the World Climate Research Programme, and through GCOS to the secretariat of the United Nations Framework Convention on Climate Change. An ongoing dialogue with CEOS and CGMS ensures continuity of key ocean data streams from satellite observations. The GOOS workplan for future activities includes emerging essential climate variables on ocean chemistry and ecosystems.

16. The Global Terrestrial Observing System (GTOS), an inter-agency programme of the Food and Agriculture Organization of the United Nations, the United Nations Environment Programme, the UNESCO Intergovernmental Oceanographic Commission, WMO and ICSU, has worked to raise awareness regarding the utilization of remote sensing data in supporting sustainable development during statutory meetings of the parties to the Convention on Biological Diversity, the United Nations Framework Convention on Climate Change, the United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa, the Ramsar Convention on Wetlands and the Convention on the Conservation of Migratory Species of Wild Animals.

17. The utilization of remote sensing data, together with in situ data and information, has generated great interest among the States parties to the above-mentioned Conventions in terms of reporting and overall monitoring of the sustainable use of natural resources. GTOS has been playing a leading role in defining the terrestrial essential climate variables within its overall mandate of improving the understanding of the terrestrial components of the climate system, biodiversity and desertification.

18. WMO has developed the new “Vision for the Global Observing System in 2025”. The scope and benefits of the WMO Global Observing System in the 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 the satellite agencies of WMO members,

in partnership with CGMS and CEOS. The new Global Observing System will continue to serve as one of the major systems in the Group on Earth Observations (GEO) Global Earth Observation System of Systems, thereby serving several of the GEO societal benefit areas. Of particular relevance to climate monitoring is the Global Space-based Intercalibration System, which will ensure the consistency of satellite measurements from different satellite operators and different programmes over time through cross-calibration using reference instruments and calibration targets. Furthermore, CEOS has created a dedicated Working Group on Climate, currently uniting twelve space agencies, GCOS, WMO and GEO in their efforts to coordinate the generation of satellite climate data records in support of the GCOS essential climate variables.

19. WMO, together with CEOS and CGMS, is developing the concept of an architecture for climate monitoring from space, building on the requirements established by GCOS and on existing mechanisms such as the CEOS Working Group on Climate. The architecture calls for an end-to-end system for the delivery of long-term and sustained space-based observations of the climate system, including a constellation of research and operational satellites, a broad, open data-sharing policy, provisions for data stewardship and contingency planning. The architecture is expected to bring the same continuity to long-term and sustained climate observations that is available for weather monitoring today.

20. Further to the adoption of its 10-year strategic plan for the period 2008-2018, the secretariat of the United Nations Convention to Combat Desertification has been implementing a new approach towards planning, monitoring and reporting, moving from the qualitative to the quantitative measurement of outputs, outcomes and impact. Quantitative data on the conditions of the dryland ecosystems and of the livelihood of its population are required to support policymaking and environmental management at all levels. In the biennium 2012-2013, efforts will concentrate on the measurement of ecosystems' primary productivity and rural poverty rate, the two impact indicators identified as mandatory for reporting by affected State parties. However, because desertification is a complex cross-sectoral environmental problem caused by multiple drivers, its monitoring requires the integration of human- and environment-related variables and should include the collection of information relating to climate change and biodiversity. As reported by countries participating in the recently concluded pilot impact indicator tracking exercise, availability of and access to data and information remains a critical issue.

21. To make geospatial information readily available and easily accessible for decision-making, the Economic Commission for Africa continues to promote more investments in the production of geospatial databases and in building fundamental core and thematic data sets at both the regional and national levels. These databases, including the Programme for Infrastructure Development in Africa geospatial database, the African Climate Policy Centre's climate change activities database and its agricultural commodity value-chain database and interface, form the core of the African Regional Spatial Data Infrastructure, with dedicated online applications and streamlined electronic delivery of products and services for targeted sectors including agriculture, climate change, carbon sequestration, water resources management and natural disasters and other regional challenges.

22. In 2012 and beyond, the Economic Commission for Africa will continue to assist the African Union, Member States and regional economic communities in

implementing the African Monitoring of Environment for Sustainable Development project and establishing the Global Monitoring for Environment and Security (GMES) Africa programme.

23. UNITAR/UNOSAT will provide technical capacity development and imagery analysis related to environmental monitoring in Central America and Asia through close collaboration with Member States.

B. Social development

24. There is increased interest by United Nations entities in using information generated from space-derived technology for a vast range of activities related to social development, from public health to human security and welfare, disaster management and humanitarian assistance.

25. In the area of health protection, remote sensing technology is well suited to the dynamic nature of outbreaks and epidemics of infectious diseases. The World Health Organization (WHO) uses these technologies to improve outbreak awareness, preparedness and response, and works with a diverse community of partners to provide information and develop models to support preparedness response and control strategies. The use of remote sensing has significantly advanced the ability of WHO to track and visualize the real-time evolution of local outbreaks and epidemics and map the geographic distribution of hazards to public health and critical public health infrastructure. WHO also uses geospatial information in its programmes for specific diseases, such as Rift Valley fever, meningitis, yellow fever, cholera, the plague and leptospirosis to develop a decision-support tool and inform the current vaccination strategies. UNITAR/UNOSAT works with WHO on satellite image mapping for polio eradication and rapid field deployments.

26. There were numerous cross-border and internal population displacements in 2011, affecting millions of families and placing great strain on the capacity of the humanitarian community to adequately respond to the security and protection needs of those new populations of concern, and access to critical areas was often limited or not possible at all. Remote sensing was an important data source for many operations, and 2011 saw many innovations in the way products are elaborated and used (including through social networks and crowdsourcing) and in the way partnerships are developed. Those situations will remain important areas of interest for UNHCR in 2012 and 2013.

27. Emergency deployments in countries with limited access or with very large territories will increasingly rely on rapid mapping and site characterization. Border analysis has become a typical request, in order to identify crossing points and better identify potentially useful infrastructure and settlements (where populations originate or where they may be reached), for the purpose of providing assistance. The mapping of camps of refugees or sites of internally displaced populations will remain a priority, and affordable, adapted and timely remote sensing products will be further used. The Horn of Africa drought and the creation of South Sudan will lead to the extension of existing camps or the creation of new ones. Remote sensing analysis through technical partnerships facilitates site planning and camp management. Following the European Space Agency's Respond Atlas (ESA-RESPOND) project and the European Seismic Early Warning for Europe

(EU-SAFER) project, both now completed, UNHCR will look forward to the European Commission GMES Initial Operations — Emergency Management Service Mapping (2012-2013) to expand those partnerships.

28. UNHCR will continue to explore the potential of satellite imagery coupled with solid demographic data to better estimate the population size for which UNHCR and its partners need to prepare. In addition to the above-mentioned entities, UNHCR is working closely with the European Commission Joint Research Centre and exploring how to work with groups such as crisis mappers and private and national image providers (also through the facilitation of the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER)). Hopefully, in the biennium 2012-2013, remote sensing products will become much more integrated in the normal programming and monitoring processes of UNHCR. Satellite communication in support of emergencies and to speed up analysis of data collected with mobile devices will become increasingly important. Finally, efforts to improve the visualization of geospatial information on three-dimensional viewers or open-source web-based platforms such as MapBox (TileMill) and Google Earth Builder will continue.

29. UNITAR/UNOSAT has an ongoing collaboration with UNHCR that will strengthen in-house capabilities to better plan the use of remote sensing products and optimize their reach in order to better assist decision-making. UNITAR/UNOSAT has a range of other ongoing activities related to social development, including HumaNav, a public-private partnership providing an integrated space solution for efficient fleet management. UNITAR/UNOSAT works with UNICEF on humanitarian assistance and the “Map your school” project being piloted in Central America and Middle East. UNITAR/UNOSAT and the Office of the United Nations High Commissioner for Human Rights collaborate on the use of satellite imagery and geo-localization tools in support of the Office’s rapid response and secretariat functions.

30. The Economic Commission for Africa has developed a prototype security database capable of generating the shortest or most convenient route to specified locations, and assists the Government of Ghana in the development of the national street addressing and numbering systems. In 2012 and beyond, the Economic Commission for Africa will continue to focus on the identification of multi-hazard or composite risk hotspots and develop an application for mapping vulnerability and monitoring disasters in order to better understand human and environmental impacts.

31. In disaster management, rapidly produced geo-referenced information on the impact of disasters, especially data on affected areas and populations, is of crucial importance. Depending on the type of disaster and the approximate extent of the affected areas, different types of satellite remote sensing data can be used, including: (a) low/medium-resolution multi-spectral optical imagery (e.g. MODIS, the Advanced Land Observing Satellite (ALOS), the Advanced Visible and Near Infrared Radiometer (AVNIR), the Disaster Management Constellation (DMC) and the Land Remote Sensing Satellite (Landsat)); (b) high-resolution optical data (e.g. the Satellite pour l’observation de la Terre (SPOT), Formosat, Ikonos and WorldView-1 and 2, Quickbird and GeoEye); (c) medium-resolution radar data (e.g. the Environmental Satellite (Envisat), Radarsat and the ALOS Phased Array

type L-band Synthetic Aperture Radar (PALSAR)); and (d) high-resolution radar data (e.g. Cosmo-SkyMed and TerraSAR-X).

32. Very-high-resolution optical data are generally analysed to identify damage to buildings and infrastructure (road accessibility, collapsed bridges etc.), landslides or temporary shelters. Unfortunately, this kind of data is affected by the cloud coverage that is often persistent during flood or cyclone events. Another important type of information requested by managers responsible for the distribution of humanitarian help is the number and distribution of potentially affected populations. A rapid estimate of that information can be obtained by overlaying potentially affected areas with population distribution data.

33. In 2011, WFP used analysis from remote sensing provided by the Information Technology for Humanitarian Assistance Cooperation and Action (ITHACA) Centre (a joint venture between WFP and Politecnico of Turin) in targeting its food aid and logistic support operation in several major humanitarian crises, including in Mozambique, Myanmar and Pakistan. In cooperation with the Global Facility for Disaster Reduction and Recovery of the World Bank and ITHACA, WFP has developed a geospatial data exchange platform based on open-source components, to be used mainly for data-sharing for both early impact and early warning activities, with outputs through Web GIS applications that are accessible anywhere through a common web browser.

34. As a humanitarian leader of the European Union Services and Applications for Emergency Response (SAFER) project (pre-operational phase), WFP has been proactive in defining the type of products and services that best support humanitarian operations. As part of its mandate, WFP has requested to activate the European Union emergency services to provide support in emergencies in Algeria, Iran (Islamic Republic of), Libya, Pakistan, Yemen, and the Horn of Africa. The products have been widely disseminated to partners and the humanitarian community.

35. The UN-SPIDER programme, established by the General Assembly in its resolution 61/110, continues to work to ensure that all countries and international and regional organizations have access to, and develop the capacity to use, all types of space-based information to support the full disaster management cycle. In particular and as noted in the report of the Secretariat on space-based information for crowdsource mapping (A/AC.105/1007), UN-SPIDER is taking a leading role in harnessing the potential of crowdsource mapping for the benefit of countries in need. The proposed UN-SPIDER workplan for the biennium 2012-2013 envisages the programme's role as a gateway to space-based information for disaster management, a bridge to connect the disaster management and space communities and a facilitator of capacity-building and strengthening institutions.

36. UNITAR/UNOSAT works closely with Google on the development, sharing and use of community-derived Map Maker data for local and national development, disaster risk reduction and disaster preparedness. UNITAR/UNOSAT and the Office for the Coordination of Humanitarian Affairs (OCHA) have a long-standing collaboration that continues to improve humanitarian coordination and response through satellite image-derived mapping, damage assessment, reporting and data-sharing with Member States, sister agencies and non-governmental organizations. To facilitate access to satellite-derived geographic information

system (GIS) data, UNITAR/UNOSAT will further increase its sharing of data during major disasters through automatic feeds, geo-database downloads and the development and sharing of common operational data sets in collaboration with OCHA.

37. Under the auspices of OCHA, the Global Disaster Alert and Coordination System (GDACS) facilitates alerts, coordination and GIS services for disaster managers and early responders. The system incorporates the European Commission Joint Research Centre automatic alerts and impact assessments and the virtual on-site operations coordination centre (Virtual OSOCC) of OCHA, a dedicated intranet for disaster managers and early responders, as well as facilitating satellite imagery-derived products, maps, GIS data and weather forecasts. The GDACS annual stakeholder meeting in Bergen, Norway reconfirmed support to that initiative and the practical solutions it provides in a timely fashion.

38. The United Nations Programme on Space Applications will continue its efforts aimed at further promoting, through regional and international cooperation, the use of space technology and its applications for sustainable economic and social development in developing countries by raising awareness among decision-makers of the cost-effectiveness and potential benefits; establishing or strengthening the capacity to use space technology; and strengthening outreach activities to disseminate awareness of the benefits obtained. The Programme will continue the series of workshops on space technology applications for socio-economic benefits, launched in 2010.

C. Economic development

39. The agricultural and industrial sectors are proven engines of economic growth. United Nations entities make full use of space-derived geospatial information in their efforts to promote sustainable agriculture and advance technological development.

40. In the area of sustainable agriculture, WFP and ITHACA are developing a global drought detection and monitoring system. The method used is based on the analysis of a series of drought-related variables and indices, obtained from satellite data, in order to define thresholds and triggers suitable for early warnings. The system was used to assess the temporal development of winter wheat crops in Afghanistan, as well as to evaluate the impact of two consecutive seasonal droughts in the Horn of Africa. It enabled the identification of affected areas ranked by magnitude of impact and the provision of assessments based on comparison with previous years. Land cover, land use, soil moisture, soil type and other relevant information may be integrated in the system to improve its effectiveness.

41. Working closely with Governments and key partners, WFP is introducing new approaches to risk transfer by using space-based and other climate information to inform food security interventions. One such example is the Livelihood Early Assessment and Protection (LEAP) software platform, a service using ground and satellite rainfall data to monitor the water requirement satisfaction index and quantify the risk of drought and excessive rainfall in different administration units of Ethiopia. LEAP is used to guide disbursements as the Government's safety net

programme is scaled up and to protect the livelihoods of populations affected by food insecurity in the event of a climate-related shock.

42. WFP also works to use spatial information to identify key livelihood and food security vulnerabilities. As part of an initiative within Climate Change, Agriculture and Food Security, a research programme of the Consultative Group on International Agricultural Research (CGIAR) analysing linkages between climate variables and food security indicators, climate data from weather stations and remote sensing imagery are being assessed for Nepal, in the search for recent changes in climate patterns and how they may impact food security in the country.

43. In addition to its use for agriculture, information derived from space-based platforms is extensively used in other sectors of economy. In the work of IMO, the United Nations specialized agency with responsibility for the safety, security and efficiency of shipping and the prevention of pollution by ships, satellite radio communication is of utmost importance for the safe, secure, efficient and environmentally friendly navigation of ships. Satellite communications are also actively used for operational and social correspondence by crew and passengers aboard ships. This includes voice and data communications, and the rapidly growing use of Internet-related services.

44. The IMO Global Maritime Distress and Safety System (GMDSS), Long-Range Identification and Tracking (LRIT) of ships system and Ship Security Alert System (SSAS) contain vital satellite components. Global navigation satellite systems provide vital information for the safe and efficient movement of ships as well as vital position information in distress situations. Certain services provided by these systems are recognized as safety-of-life services. Satellite systems recognized by IMO include, inter alia, Inmarsat, the International Satellite System for Search and Rescue (COSPAS-SARSAT), the Global Positioning System (GPS) and the Global Navigation Satellite System (GLONASS).

45. In order to maximize the benefits of the use and applications of global navigation satellite systems (GNSS) to support sustainable development, the Office for Outer Space Affairs, consistent with its role as the executive secretariat for the International Committee on GNSS (ICG), will continue to promote cooperation in issues related to GNSS compatibility, interoperability, performance and other space-based positioning, navigation and timing matters. The Seventh Meeting of ICG will be held in Beijing on 4-9 November 2012. The Office will also continue to foster cooperation between ICG and the regional centres for space science and technology education, affiliated to the United Nations, which also serve as information centres for ICG, and will focus on capacity-building, in particular on GNSS education.

46. The work of the Radiocommunication Sector of ITU (ITU-R) creates regulatory and technical bases for the development and effective operation of satellite climate monitoring and data dissemination systems by allocating the necessary radio frequency spectrum/satellite orbit resources and carrying out studies and developing treaty status international standards (Radio Regulations) and voluntary international standards (ITU recommendations) for space-based and other telecommunication systems and networks. In addition ITU-R provides guidance and support on the use of satellite systems for environment monitoring, prediction and

mitigation of the negative effects of disasters caused by climate change such as by means of the following:

(a) Earth observation satellites that track the progress of hurricanes and typhoons, and weather radars for tracking tornadoes, thunderstorms and the effluent from volcanoes and major forest fires;

(b) Radio-based meteorological aid systems that collect and process weather data;

(c) Different radiocommunication systems (satellite and terrestrial) used for the dissemination of information concerning different natural and man-made disasters.

47. The World Radiocommunication Conference (WRC-12) held in Geneva from 23 January to 17 February 2012 defined a new spectrum for meteorological satellite systems in order to improve operational meteorology, in particular with respect to numerical weather prediction; allocated an additional "spectrum window" for use by the Earth exploration satellite service in order to improve the measurement of hydrological cycle components; and adopted a resolution in which the Conference called for studies by ITU-R "on possible means to improve the recognition of the essential role and global importance of Earth observation radiocommunication applications".

48. ITU-R publications, including recommendation ITU-R RS.1883 (Use of remote sensing systems in the study of climate change and the effects thereof), report ITU-R RS.2178 (The essential role and global importance of radio spectrum use for Earth observations and for related applications), and the handbook *Earth-Exploration Satellite System*, published in 2011, are available on the ITU website (www.itu.int/ITU-R).

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

A. Promoting international cooperation and governance

49. The Committee on the Peaceful Uses of Outer Space, the primary United Nations body for coordinating and achieving international cooperation in space activities, in its contribution to the United Nations Conference on Sustainable Development, highlighted the value and the importance of space-derived information and recognized that space-derived geospatial data constituted a resource that could be used to support sustainable development policies at the local, national, regional and global levels, notably through the establishment of dedicated spatial data infrastructures.

50. The Committee on the Peaceful Uses of Outer Space has therefore provided a set of recommendations that could be summarized as the following ways and means of strengthening the use of space-derived geospatial data for the purpose of supporting sustainable development policies (see A/AC.105/993, para. 49 (a)-(k)):

(a) Establishing or enhancing non-redundant and sustainable national spatial data infrastructure in accordance with the international legal framework governing outer space activities;

(b) Enhancing autonomous national capabilities and building an enabling environment in the area of space-derived geospatial data, including the development of associated infrastructure and institutional arrangements;

(c) Promoting voluntary assistance to be rendered at the governmental or institutional levels by States with relevant expertise to countries wishing to develop their own capacity and expertise in the use of space-derived geospatial data;

(d) Engaging in or expanding international cooperation in the area of space-derived geospatial data and increasing awareness of existing initiatives and data sources;

(e) Supporting the United Nations in its efforts to access and use geospatial information in its mandated programmes to assist all Member States.

51. In July 2011 the Economic and Social Council, in its resolution 2011/24, established the United Nations Committee of Experts on Global Geospatial Information Management as the official United Nations consultative mechanism on global geospatial information management (GGIM). The main objectives of the Committee are to provide a forum for coordination and dialogue among Member States, and between Member States and relevant international organizations, and to propose workplans and guidelines with a view to promoting common principles, policies, methods, mechanisms and standards for the interoperability and interchangeability of geospatial data and services. The Committee is supported by the Statistics Division of the Department of Economic and Social Affairs and the Cartographic Section of the Department of Field Support.

52. The first meeting of the Committee of Experts was held in Seoul on 26 October 2011, when, among other decisions, it agreed to establish a working group to prepare the Committee's contribution to the United Nations Conference on Sustainable Development and to establish a working group to prepare an inventory of the issues that should be addressed at future sessions of the Committee.

53. The Economic Commission for Africa, taking the leading role in the GGIM initiative in Africa, will continue to coordinate the participation of African countries in GGIM, and to follow up on the recommendation of the African preparatory meeting on GGIM, held in August 2011 in Addis Ababa, to develop an African action plan on geospatial information management. As part of its commitment to creating and managing knowledge in the continent, the Economic Commission for Africa organized the second session of the Committee on Development Information, Science and Technology, at which the Committee recommended that the Commission continue providing assistance to Member States to develop their geo-information policies, spatially enabled data and services. Following a resolution adopted in September 2010 by the Third Ordinary Session of the African Union Conference of Ministers for Information and Communications Technology, the Economic Commission for Africa is also promoting efforts to create an African space agency.

54. The Economic Commission for Africa pursued its effort to develop, through the African Geodetic Reference Frame (AFREF) project, a unified geodetic

reference frame for Africa to enable the conversion of all national surveying and mapping products to the same common continental reference system. 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.

55. In addressing food security, disaster risk reduction and environmental issues, the Economic and Social Commission for Asia and the Pacific promotes strategic space applications as innovative solutions towards inclusive, sustainable and resilient development in the region through its comprehensive Regional Space Applications Programme for Sustainable Development (RESAP) in Asia and the Pacific. RESAP, since its inception more than two decades ago, has helped in fostering and coordinating space cooperation in the region, set up training and education networks in China, India and Indonesia, and developed institutional arrangements with Sentinel Asia for access to satellite data and value-added products in underserved and high-risk developing countries for response to disasters.

56. One of the key activities emanating from RESAP was the launching in September 2010 of the Regional Cooperative Mechanism on Disaster Monitoring and Early Warning, Particularly Drought, with the support of China, India, Thailand and other stakeholders. The Mechanism enables the sharing of coarse-resolution multi-spectral satellite data and derived products in conjunction with related hydrological, meteorological and socio-economic information for better characterization of drought. In the period 2012-2013, the Thematic Working Group for the Mechanism will work on standardization and combination of space-based and ground observation and historical data to identify high-risk drought-prone areas.

57. In addition, United Nations entities are pursuing coordination of efforts in the area of geospatial data with a number of regional and interregional policymaking mechanisms, such as the African Leadership Conference on Space Science and Technology for Sustainable Development, the Asia-Pacific Regional Space Agency Forum, the Asia-Pacific Space Cooperation Organization and the Space Conference of the Americas.

58. A number of national, regional and global initiatives, including activities in the framework of GEO, are addressing issues related to the consolidation of spatial data infrastructures that can support sustainable development, in particular, the following initiatives: the establishment of the centre of excellence for the United Nations Spatial Data Infrastructure under the auspices of the Office of Information and Communications Technology of the Secretariat; the agreement on principles of data-sharing in the framework of GEO; and the United Nations Initiative on Global Geospatial Information Management.

59. GEONETCast, a near-real-time, near-global, satellite-based environmental information delivery system, has significant potential to address bottlenecks in data dissemination. Through the use of low-cost receiving stations it can enhance access to a wide range of information and reach users in developing countries with limited or no access to high-speed Internet connections.

60. The work of CEOS is now fully integrated into GEO, in which CEOS is responsible for the space-based aspects of the Global Earth Observation System of Systems (GEOSS). In support of GEOSS, CEOS has developed the concept of virtual, space-based constellations that focus on the observation of particular parameters. CEOS also publishes and updates the Earth Observation Handbook, a comprehensive database of Earth Observation missions and sensors.

61. United Nations entities have also established or are exploring various partnerships with the private sector and non-profit organizations for better access to space-derived geospatial data. Specific examples include the ongoing partnership with the Google Map Maker team, which allows United Nations entities to access user-contributed geospatial data based on space-derived imagery provided free of charge and the cooperation with the Open Street Map volunteer community to access and contribute to the expansion of road network data.

62. ITU developed four new recommendations: recommendation ITU-R S.1001 (Use of systems in the fixed-satellite service in the event of natural disasters and similar emergencies for warning and relief operations), recommendation ITU-R M.1042 (Disaster communications in the amateur and amateur-satellite services); recommendation ITU-R M.1637 (Global cross-border circulation of radiocommunication equipment in emergency and disaster relief situations) and recommendation ITU-R M.1854 (Use of mobile-satellite service in disaster response and relief). The recommendations provide guidelines on the use of satellite networks in the event of natural disasters and similar emergencies, providing information about the overall system and terminal design that is suitable for disaster relief telecommunications.

B. Building capacities for advancing technological development

63. United Nations entities, including, but not limited to, the Department of Peacekeeping Operations and the Department of Field Support and OCHA, are actively developing valuable large-scale digital geospatial databases with the purpose of making available detailed and updated map products for various operational purposes in the countries covered. Such data could normally also be handed over to the national authorities on completion of United Nations missions, to further benefit local development.

64. To increase the efficiency of using the space-derived geospatial data, United Nations entities work to develop the capacity of Member States to establish and further develop national spatial data infrastructures and related national geo-information policies, and a growing number of countries are also actively developing and deploying their own remote sensing satellite systems and utilizing space-based data to advance socio-economic development.

65. In the biennium 2012-2013, the United Nations Programme on Space Applications, implemented by the Office for Outer Space Affairs, will continue to organize, in close cooperation and coordination with other relevant United Nations entities, 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, including within the frameworks provided by the United Nations Basic Space Technology Initiative and the Human Space Technology

Initiative, aimed at supporting relevant indigenous capabilities in small satellites for sustainable development and human space technology spin-offs respectively. Additionally, the UN-SPIDER programme contributes to capacity-building in the use of space-derived geospatial data in disaster-related situations.

66. UNITAR/UNOSAT conducts regular technical capacity development on the use of satellite imagery and related techniques in emergency response and disaster risk reduction for sister agencies and Member States in Asia, Africa and Central America, as well as for academic institutions, such as the University of Copenhagen, which offers a Master of Disaster Management. UNITAR/UNOSAT is involved in several research projects to enhance technological development and the user uptake of solutions, such as the European Commission-funded GMES GEO-PICTURES project, with a strong focus on geo-tagged ground photos taken by experts or volunteers (crowdsourcing).

67. The Economic Commission for Africa has organized a number of seminars to raise awareness and share knowledge on the importance of using geospatial technology for resources management. In 2011 and beyond, the Commission, in collaboration with the Regional Centre for Training in Aerospace Surveys (RECTAS) and the Regional Centre for Mapping of Resources for Development (RCMRD), 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.

68. Recent milestones under the Regional Space Applications Programme for Sustainable Development (RESAP) of the Economic and Social Commission for Asia and the Pacific include development of institutional capacity to address the needs of its more than 60 member countries, in particular less developed countries and Pacific small islands developing States, in areas such as estimation of production, floods and drought monitoring and assessment, coastal zone management and watershed development plans. RESAP efforts are complemented by the Commission's initiatives for capacity development carried out by the Asian and Pacific Training Centre for Information and Communication Technology for Development in Incheon, Republic of Korea, and the RESAP education and training hub at the Centre for Space Science and Technology and Education in Asia and the Pacific, located in Dehra Dun, India.

C. Streamlining the use of space-derived geospatial data within the United Nations system

69. The provision of data and services is mainly in the realm of the private sector, Governments and specialized agencies; and the technology and know-how to access, interpret, analyse and use the space-derived products require, in addition, the expertise of academia. There are bottlenecks and gaps with respect to the provision and usage of space-derived geospatial products and services. Notwithstanding that, space-derived geospatial data are widely used in the United Nations system, and efforts are being made to streamline the use of those data.

70. The United Nations Geographic Information Working Group (UNGIWG) (www.ungiwg.org), an ad hoc inter-agency coordination group of geo-spatial professionals representing more than 30 Secretariat departments, funds, programmes

and specialized agencies of the United Nations system, was established in 2000 to address technical coordination, geographic data-sharing, reduction of duplication and joint efforts in the context of all types of geospatial data use and development. In the period 2011-2013, UNGIWG is co-chaired by the Office of Information and Communications Technology and the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization.

71. In the context of UNGIWG activities, the Cartographic Section of the Department of Field Support has been acting in a technical advisory role on international boundary information through the International Boundary Information System (UNIBIS). The information in UNIBIS reflects cartographic practices and the information generated from authoritative sources such as treaty documents and maps, verified against multiple sources of geospatial information such as satellite imagery, geo-coded information and historical maps. The objective of UNIBIS is to ensure a common understanding and representation of international boundary information in the United Nations community.

72. The Second Administrative Level Boundaries data set project, launched in 2001 in the context of UNGIWG activities, provides access to a working platform for the collection, management, visualization and sharing of subnational data and information in a seamless way from the national level to the global level. The project, initiated and developed by WHO, was transferred to the United Nations Secretariat as of 1 January 2011. The Statistics Division of the Department of Economic and Social Affairs is responsible for the project's coordination, and the Cartographic Section of the Department of Field Support is responsible for technical coordination.

73. UNmap, the main knowledge asset of the Cartographic Section of the Department of Field Support, is a comprehensive digital map (geo-database) covering the entire globe and consists of basic cartographic and place name information at different scales. In line with the mandate of the Cartographic Section on map production and clearance, UNmap represents the standards of the United Nations Secretariat in regard to international boundary and naming conventions. UNmap is available for the United Nations Secretariat and field missions and United Nations Agencies that are working with geospatial information for map production, web applications and/or as reference material.

74. In 2005, UNGIWG agreed on the need to establish the United Nations Spatial Data Infrastructure (UNSDI) to begin to institutionalize common standards, the adoption of best practices and the governance required to develop and sustain mechanisms for successful geo-spatial information-sharing. Subsequently, UNGIWG developed the UNSDI strategy, a multi-phased road map that situates individual agency geospatial initiatives and inter-agency activities within a coherent information and communications technology action plan. This is intended to achieve substantial strides towards interoperability and contribute to the United Nations reform objective of "delivering as one".

75. In pursuing the UNSDI project in 2010, UNGIWG members agreed on the establishment of a centre of excellence for UNSDI under the responsibility of the Office of Information and Communications Technology. The Office assumed that responsibility in conformity with its mandate (endorsed by the General Assembly in 2010) to harmonize information and communications technology practices across

the United Nations system. In parallel, leading members of UNGIWG constitute the UNSDI Steering Committee, the governing body providing strategic direction to the UNSDI process. A trust fund has been established to receive voluntary contributions for project implementation.

76. In the context of disaster management, the United Nations is obtaining space-derived geospatial data through contractual purchase arrangements with commercial Earth observation operators as well as in the form of in-kind contributions through mechanisms such as the Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters (also called the International Charter on Space and Major Disasters).

77. The processing of space-derived geospatial data for maps and other products is partially conducted by experts of United Nations entities, such as the Department of Field Support, the Department of Peacekeeping Operations, the Department of Political Affairs, the Department of Safety and Security, OCHA, UNHCR, UNITAR/UNOSAT and WHO. To improve collaboration and enhance efficiency and coordination, UNITAR/UNOSAT is sharing its commercial FirstLook subscription licences for access to near-real-time satellite data with WFP and the Cartographic Section of the Department of Field Support.

78. Processed data and information are then shared among United Nations entities and made available through websites such as Relief Web, a global hub for time-critical humanitarian information on complex emergencies and natural disasters (www.reliefweb.int), Global Disaster Alert and Coordination System (www.gdacs.org), UNITAR/UNOSAT (www.unitar.org/unosat), the Inter-Agency Standing Committee's Common and Fundamental Operational Datasets Registry (cod.humanitarianresponse.info) and the UN-SPIDER knowledge portal (www.un-spider.org).

79. In United Nations field missions, 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 and the difficulty of reaching those areas, which are often remote and unsafe, the missions often rely on satellite images to create image maps in support of their ground operations. The use of satellite imagery for situational awareness is also rapidly increasing due to the technical evolution of sensors (spatial and temporal resolution) and to the growing number of new sensors, both optical and radar, coming into operation. That increased flow of ingress data means that more dynamic methods of information dissemination are required, as traditional paper maps are superseded by electronic network platforms supporting interactions with, and querying of, the final product.

80. The GIS function is providing a wide range of products using data from space-borne sensors to all the components of the United Nations field missions, often in collaboration with the European Union Satellite Centre and in activation of the GMES Management of Operations, Situation Awareness and Intelligence for Regional Crisis (G-MOSAIC) services. Such data are used, for example, for developing base maps in the form of image maps or topographic maps for optical data, monitoring border crossings and other sensitive locations using optical or radar satellite data, because of their all-weather day and night capabilities, and helping logisticians choose the right location for a camp, using optical data and remotely sensed digital elevation model, to run flood or lava flow simulations and supporting

security tracking vehicles in near-real-time using GPS data. Such processes are used daily to support missions plan and execute operations, respond to emergencies and crises, and accomplish their mandates.

81. The GIS Centre located in the United Nations Logistics Base and the Global Service Centre of the Department of Field Support (DFS) at Brindisi, Italy, is the technical centre of excellence to which missions (such as the United Nations Disengagement Observer Force, United Nations Interim Force in Lebanon, the African Union-United Nations Hybrid Operation in Darfur and the United Nations Organization Stabilization Mission in the Democratic Republic of the Congo) entrust their most technical and challenging projects, including the provision of large-scale topographic mapping through feature extraction from satellite images, and in some of those projects the Cartographic Section has collaborated with the Multinational Geospatial Co-production Programme and individual Member States in using common mapping standards. The GIS Centre is also using optical and radar satellite images to identify potential groundwater resources to support the operational needs of the United Nations Mission for the Referendum in Western Sahara, perform complex terrain analysis for campsite selection (United Nations Mission in South Sudan) and selection of sites for telecommunication towers (United Nations Support Mission in Libya).

82. While the main activities of GIS sections and units are in support of mission mandates, they often collaborate with other United Nations entities and international partners on the ground. Field missions of the Department of Peacekeeping Operations, the Department of Political Affairs and the Department of Field Support coordinate with other United Nations entities, such as WFP, UNHCR, the United Nations Development Programme and WHO, to collect, process and disseminate geographic products and services in mission areas.

83. Working in close collaboration with the Cartographic Section of the Department of Field Support, the Department of Safety and Security is actively integrating high-resolution images and geographic information systems into the security level system, which provides the United Nations with a consistent threat-measuring tool for system-wide reliability in determining the security levels of specific areas and locations in which the United Nations must operate. The high-resolution imagery can enable the Department of Safety and Security to better assess the situation awareness in the emergency response and the security operation.

84. 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 system contracts in order to provide a more streamlined, effective and efficient way to procure satellite images. The Cartographic Section of the Department of Field Support and the Procurement Division of the Department of Management have established two system contracts for satellite image acquisition: one for high-resolution images and the other for medium-resolution images. Additionally, in order to maximize the asset acquisition of peacekeeping and peacebuilding operations in the field missions, system contracts for GIS software and hardware, including standard and high-end GPS, 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 system contracts that benefit the United Nations system.

85. Easier access to and sharing of reliable geospatial information, including space-derived data, among United Nations entities could be further enhanced to ensure that geospatial data is exploited to the fullest extent possible. Procurement strategies that, inter alia, include the possibility of upgrading individual licences to a United Nations system-wide licence could reduce the cost to the United Nations system as a whole, enhance operational efficiency and improve the quality of services.

86. The use of space-derived geospatial data within the United Nations system could be increased by addressing gaps and bottlenecks through the following:

(a) Raising awareness of the benefits of space-derived geospatial data;

(b) Understanding and meeting the requirements of United Nations entities in terms of data discovery, data access and technical capabilities for information processing;

(c) Developing the overall capabilities of the United Nations entities relying on space-derived geospatial data in support of their operations;

(d) Using existing coordination mechanisms, such as UNGIWG and UNSDI, and existing United Nations support mechanisms, such as UN-SPIDER, UNITAR/UNOSAT, to the maximum extent possible, taking into account emerging and innovative sources of information;

(e) Promoting partnerships with the private sector, academia and Government agencies;

(f) Establishing, in a timely manner and where required, informal coordination mechanisms on the use of space-derived geospatial data on specific thematic areas on a voluntary basis.