
**United Nations Inter-Agency Meeting on
Outer Space Activities**

Twenty-ninth session

Vienna, 4-6 March 2009

Item 3 (c). Preparation of a report on initiatives and applications for space-related inter-agency cooperation

Space Benefits for Africa

Draft report of the United Nations Inter-Agency Meeting on Outer Space Activities

The annex to this document contains the draft report of the United Nations Inter-Agency Meeting on Outer Space Activities on the benefits of space technology and applications to the global efforts to achieve sustainable development in Africa, as well as the work of United Nations entities in promoting that international effort. The draft report is part of series of reports of the Inter-Agency Meeting on initiatives and applications for space-related inter-agency cooperation.

The draft was prepared on the basis of submissions received by the Office for Outer Space Affairs from entities of the United Nations system by February 2009, as well as the material from past reports of the Inter-Agency Meeting and of the Secretary-General on the coordination of space-related activities within the United Nations system. The draft was prepared bearing in mind the need to adhere to the page limit of 16 pages, or 8,500 words in total for all reports originating in the Secretariat.

The Inter-Agency Meeting will review the draft report and endorse it, in principle, with the view to circulating the endorsed report, after the session, to all focal points of the Inter-Agency Meeting for final comments. The report will be then formally edited and translated to all official languages of the United Nations, and consequently presented to the Committee on the Peaceful Uses of Outer Space at its fifty-second session in June 2009 and to the African Leadership Conference on Space Science and Technology for Sustainable Development in November 2009.

ANNEX

Space Benefits for Africa
Draft Report of the United Nations Inter-Agency Meeting on Outer
Space Activities*
(Vienna, 4-6 March 2009)

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* The present report was prepared by the Office for Outer Space Affairs in cooperation with the Economic Commission for Africa and consultation with members of the United Nations Inter-Agency Meeting on Outer Space Activities. The report was endorsed by the Inter-Agency Meeting on Outer Space Activities at its twenty-ninth session, held from 4 to 6 March 2009.

I. Introduction

1. The United Nations Inter-Agency Meeting on Outer Space Activities serves as the focal point for inter-agency coordination and cooperation in space-related activities. At its fortieth session, in 2003, the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space endorsed the proposal to strengthen inter-agency cooperation in the use of outer space within the United Nations system, as recommended by the Inter-Agency Meeting on Outer Space Activities, at its twenty-third session. The Subcommittee invited United Nations entities to submit annual reports on specific themes.
2. At its twenty-eighth session, in 2008, the Inter-Agency Meeting agreed that a report on the benefits of space science and technology for sustainable development in Africa should be prepared by the Office for Outer Space Affairs, in cooperation with ECA and in consultation with other United Nations entities. The report will be considered for endorsement by the Meeting in 2009 session and consequently presented to the third African Leadership Conference on Space Science and Technology for Sustainable Development, later in 2009.
3. The African Leadership Conference on Space Science and Technology for Sustainable Development is an important regional forum that aims to raise awareness among African leaders of the importance of space science and technology; provide a regular forum for the exchange of information among African countries; and enhance intra-African cooperation in the development and application of space technology. The first Conference was held in Abuja, Nigeria, in 2005, the second was held in Pretoria, South Africa, in 2007, and the next Conference will be hosted by Algeria in 2009.¹
4. The space technologies, applications and initiatives identified for inclusion in the report are those that have a potential for strengthening various forms of inter-agency cooperation. In most cases, the outlined technologies, applications and initiatives are implemented by individual United Nations entities, but can be further developed through inter-agency cooperation. The report will describe a number of important programmes and projects involving United Nations entities that use space technology and its applications and address overall sustainable development for Africa.

II. Space solutions for sustainable development in Africa

5. Space technology and its applications, such as Earth observation systems, meteorological satellites, satellite communications and global navigation systems, strongly support the implementation of actions called for at the World Summit on Sustainable Development and can make a significant contribution to the promotion of sustainable development in Africa. Space is benefiting Africa and its people in a number of ways. Space applications are effective tools for monitoring and

¹ More information on the first and second African Leadership Conference on Space Science and Technology for Sustainable Development can be found: <http://www.space.gov.za/conferences/alc2007/>

conducting assessments of the environment, managing the use of natural resources, providing early warnings of and managing natural disasters, providing education and health services in rural and remote areas and connecting people around the world.

6. Space-related applications are widely used in agriculture, which remains an important economic sector in much of Africa. However, African agriculture remains very fragile. Low soil fertility, scarce irrigation, poor rural infrastructure, insufficient rural finance and recurrent droughts are among the major challenges facing sub-Saharan African agriculture. African soils are diverse but characterized by limited fertility. Only 45 per cent of the lands is arable, 16 per cent has soil of high quality and about 13 per cent has soil of medium quality.² In that regard, Earth observation technology enables quick response with timely information to predict and simulate the production expected during one agricultural season.

7. Space-based information systems play a significant role in risk reduction and disaster management on the African continent, which is heavily affected by meteorological disasters, such as droughts, floods, storms and cyclones. Natural and man-made disasters result in damage of ground-based infra-structures such as communication cables and access roads, thereby making space technology a vital option for disaster management. The potential benefits of space information in disaster management can be grouped into two primary phases: the “hot phase”, dealing with the emergency response which includes warning and crisis management, and the “cold phase,” which is the period preceding or following the disaster and which includes risk reduction and damage assessment.

8. To increase the use of space technology in disaster management, a number of global initiatives based on space-based technology have been established to take advantage of space technology in disaster management. Some of those include the activities of the International Charter on Space and Major Disaster, the Committee on Earth Observation Satellites (CEOS), the Global Earth Observation System of Systems (GEOSS), Disaster Monitoring Constellation International (DMCII), the Integrated Global Observing Strategy-Partnership (IGOS-P) and the United Nations Space-based Information for Disaster Management and Emergency Response (UN-SPIDER).

9. Space-technology also contributes to getting a better understanding of global weather and climate change. Satellite systems now monitor temperature, rainfall, cyclones, and vegetation cover even in areas where few or no weather stations or other means of scientific observation exist. Regional monitoring mechanisms in Africa based on satellite-derived data allow early warning of drought and extreme weather events but also predictions of rainfall amounts and locust invasions. Instruments installed in remote areas where no telecommunication infrastructure exists use satellite-based communication systems to transmit data from anywhere to central processing hubs.

10. Due to the continuous rise of demand on natural resources, a rapidly growing population, processes of deforestation and desertification, the impact of climate change and resource mismanagement, access to natural resources is worsening in

² Report of the Secretary-General on Africa, E/CN.17/2008/8

the region. Earth observation is the frequently used tool to monitor the environmental impact of human activities on a local scale. It is used to monitor and manage natural resources such as forests and water resources. These resources are crucial for the livelihood as well as economic development in Africa.

11. Tele-epidemiology, a field heavily based on satellite imagery, allows identifying areas at risk of a disease outbreak, for example, by indicating the areas where climatic conditions are favourable for a rapid increase of malaria-transmitting mosquitoes. Satellites are also used to monitor air quality which is linked to public health, environmental protection and compliance monitoring. Air pollution is not only a health hazard, but also has a harmful impact on precipitation.

12. Space-related applications are heavily employed in transportation services, which is another essential field that contributes to the achievement of sustainable development in Africa. Access to transport allows mobility, promotes commerce and fosters education and health. In many African countries, transport access rates and network quality are low. In order to fill the transportation gap, many African countries have reformed the management of their infrastructure, including the utilization of global navigation satellites, which are used for precise determination of position in space and in time. Although initially designed as navigation tools, global navigation satellite systems (GNSS) have developed into a multidisciplinary tools for navigation geodesy, surveying, agriculture, atmospheric science and disaster management.

13. As space technology is becoming an indispensable tool for the development of Africa, a growing number of African countries are implementing national space programmes with a strong developmental focus. Because many of Africa's developmental challenges transcend national, cultural and linguistic differences, the collective impact of these national space programmes can be greatly enhanced through cooperation. Regional and interregional cooperation and coordination provide essential mechanisms for advancing such efforts.

14. The African Resource Management (ARM) System is expected to make the use of space more accessible to the final user and is underpinned by four pillars. The first is the ARM Satellite Constellation, launched by Algeria, Kenya, Nigeria and South Africa and aims at developing a constellation of satellites for mutual benefit and cooperation in the areas of agriculture, climate, environment, land use, border monitoring, disaster monitoring, water management and health. The second is ARM Application Infrastructure (ARMAC), which represents a number of applications that can be deployed by each of the African countries supporting one of three priority economic areas: 1) Food security, agriculture and coastal zone areas; 2) Environmental monitoring, conservation and tourism; and 3) Government planning and security. The third is ARM Information Services (ARMIS), which relate to the information products that are generated by the application infrastructure and need to be distributed to users as well as to the user support provided to interpret and use the information. The final pillar is the ARM Public Awareness (ARMPA) that supports the long-term success of using space for the benefit of the people of Africa by ensuring that space stays relevant to daily lives of people.

III. Space-related activities of United Nations entities in Africa

Agriculture and food security

15. Space technology and applications play a crucial role in promoting agriculture and addressing food security. Farming relies on weather forecasts derived from monitoring satellites. Crop irrigation depends on rainfall and evaporation measurements from satellites. Satellite imagery informs risk assessment of pest/disease threats to crop, while mapping crops from space helps forecasting agricultural yield. Effective use of existing Earth observation information therefore provides tools that enhance the collection, storage, analysis and dissemination of food security information. Remote sensing data, in combination with data gathered in the field, is essential for carrying out comprehensive studies on food security and vulnerability.

16. United Nations entities and programmes, such as the Food and Agriculture Organization of the United Nations (FAO), the United Nations Environment Programme (UNEP) and the World Food Programme (WFP), collaborate with various governmental and non-governmental entities to strengthen information systems to manage food security. WFP and FAO have carried out various initiatives in the framework of the Global Monitoring for Food Security project of the European Space Agency in the area of food security in Africa through agricultural meteorology. Three pilot countries - Ethiopia, the Sudan and Uganda - were selected as pilot cases, where a new methodology for estimating cultivated area, using radar data at the beginning of the cultivation season, will be applied.

17. In 2006, WFP, FAO and GMFS installed the GeoNetwork spatial information environment for the Southern African Development Community, the Regional Centre for Mapping of Resources for Development and AGRHYMET. Following the set-up of the spatial information environment in six WFP regional bureaux and several countries, including Ethiopia and the Sudan, WFP developed the concept of setting up mapping task forces, composed of GIS practitioners, at the country level, which complemented the mandate of each agency or local institution by sharing knowledge, information/data and capacity in order to ensure a better understanding of a country's situation.

18. The use of integrated space technology applications for monitoring climate change impact on agricultural development and food security was a subject of a regional workshop, organized by the Office for Outer Space Affairs, Kenya and ESA, in Nairobi, Kenya, in 2008.

BOX1: AGHRYMET

UNEP, UNDP, UNITAR, FAO, UNESCO and WMO are supporting the Regional Training Centre for Agrometeorology and Operational Hydrology (AGHRYMET), an institution of the Permanent Inter-State Committee for Drought Control in the Sahel (CILSS). AGHRYMET works to increase agricultural production in the member countries of CILSS and to improve management of natural resources in the Sahel region by, among other things, producing and disseminating information and providing training in the field of agricultural ecology. (<http://www.cilss.bf>)

Health and sanitation

19. Through the use of satellite communications, it becomes possible to provide high-quality and cost-efficient health services and medical care to people in areas with non-existent or underdeveloped healthcare infrastructures, such as in rural areas.³

20. Diseases like malaria afflict millions of people each year. Geospatial science and technology is used by the United Nations to assist in monitoring, evaluation and response management, as well as in understanding and characterizing the various environmental-climatic factors, which are known to perpetuate or exacerbate such disease, including temperature, precipitation, moisture, vegetation and land cover types.

21. WHO uses Global Positioning System (GPS) devices to collect data on the location of households and/or health facilities in various countries. In the context of the malaria control programme conducted in Botswana, Malawi, Mozambique, Namibia, Swaziland, Zambia and Zimbabwe, the location of both types of infrastructure are identified and integrated in GIS to monitor and map the spatial distribution of a number of malaria and other health indicators by household or health facility, which allow a better understanding of the malaria situation in countries and assists in cross-border malaria control. WHO also uses global navigation technology in the context of the Service Availability Mapping (SAM) initiative⁴ to assess and monitor the availability and coverage of health services. WHO and WMO share the information from the monitoring of rainfall, temperature, humidity and flooding during the rainy season with the Southern Africa Malaria Control Programme and assist in early detection of and response to malaria epidemics.

22. In Zambia, a project initiated by WHO, the Research on Equity and Community Health Trust of Malawi and the Southern African Network on Equity in Health⁵ has now developed into a capacity-building exercise aimed at addressing the needs in terms of geographic information and GIS capacities to support HIV/AIDS monitoring, evaluation and response. A total of 17 local and international institutions, including WHO and ECA, are now part of a working group that has been created in order to fill the existing gaps. A similar process is also under way in Malawi.⁶

23. The Telemedicine Task Force⁷ released a report entitled “eHealth for Sub-Saharan Africa: Opportunities for Enhancing the Contribution of ICT to Improve Health Services” in July 2007. The recommendations from the report were accepted

³ *Space for Sustainable Development: Contribution of the Committee on the Peaceful Uses of Outer Space to the work of the Commission on Sustainable Development for the thematic cluster 2008-2009*, UNOOSA, A/AC.105/892

⁴ <http://www.who.int/healthinfo/systems/serviceavailabilitymapping/en/index.html>

⁵ <http://www.equinet africa.org/>

⁶ Further information on the Malawi project may be found at www.who.int/whosis/database/gis/EQU/GIS_HIV_AIDS_MWI.htm

⁷ The Telemedicine Task Force comprises representatives of the European Commission, ESA, WHO, the African Union Commission, the New Partnership for Africa’s Development, the African Development Bank, the Central African Economic and Monetary Area, the Organization of Coordination for the Control of Endemic Diseases in Central Africa, the East African Community, the Economic Community of West African States, and the secretariat of the African, Caribbean and Pacific Group of States.

by the European Commission with the view to implementing two pilot projects, “Medical e-content via satellite for the African health work force” and “Satellite-based tele-consultation service for rural areas”, the results of which will form the basis for long-term actions to support the gradual development of an e-health network covering sub-Saharan Africa.

24. A regional workshop on using space technologies for tele-health to benefit Africa was organized by the Office for Outer Space Affairs in partnership with WHO, ESA, CNES and the government of Burkina Faso, in Ouagadougou, Burkina Faso, from 2-10 May 2008. The workshop aimed to raise awareness of the benefits of using space technologies in tele-health, exchange information on the current status of tele-health practices in the Africa region and discuss issues, concerns and approaches in developing tele-health for the region.

BOX2: AFRICA HEALTH INFOWAY

The “Africa Health Infoway” initiative, led by WHO in close partnership with ECA, ITU, and the African Union Commission, aims to strengthen health information management at the district level in Africa. The Infoway covers 53 African countries and is focused on district-level health data collection and processing and evidence-based decision-making in health. Satellite-based communication and long-distance wireless connectivity are among space-based applications planned for launch in the countries. (<http://www.who.int/africahealthinfoway/en>)

Protecting and managing the national resource base

25. Satellites provide a global view of the dynamic processes on the land, in the oceans and in the atmosphere of our planet. The satellite imagery compiled over many years is a vital resource, which allows the detection and monitoring of environmental changes. Satellites also provide the ‘hard evidence’ to enforce environmental legislation and serve as a powerful tool to communicate environmental issues to the wider segments of the global society.⁸

26. Climate change impact is one of the most challenging issues threatening Africa today. ECA will use geospatial technology to determine relevant indicators for the evaluation of climate change impact, assess magnitude and level of risk of vulnerable zones, and map African vulnerability.

27. In 2008, UNITAR/United Nations Organization Satellite (UNOSAT) continued its engagement in the United Nations Geographic Information Working Group and its support for the strategy towards a United Nations spatial data infrastructure, while it will increase its coordination with several GEO task teams. UNITAR/UNOSAT will also continue its participation in the process, initiated in Lisbon in 2007, leading to a Global Monitoring for Environment and Security programme for Africa. Also in 2008, UNITAR/UNOSAT planned to bring to fruition

⁸ Space Science and Technology for Sustainable Development, booklet of the National Working Group on Space Science and Technology of South Africa. (http://www.space.gov.za/downloads/Space_Brochure_2004.pdf)

its research partnerships in the area of integrated applications combining Earth observation with telecommunications and navigation systems.

28. Within the framework of the project “Distribution and use of available global Landsat data sets for sustainable development in Africa”, the Office for Outer Space Affairs, UNEP and FAO have distributed NASA-donated series of Landsat data sets from the 1970s, 1990s and 2000 to African institutions with the view to consolidating the use of space technologies to support activities in the area of environmental management, land cover management, disaster mitigation and sustainable development and with the end results being increased capacity for better monitoring of the environment and early warning of emerging environmental problems and threats.

29. Satellite based techniques have proved to be a key source of information for water resources management at local, national and regional scales. ECA uses geospatial technology to address concerns about spatial patterns of water resources (quantity, quality, and balance between multiple uses), surface water body monitoring, seasonal hydrological characteristics assessment, and flood forecasting.

30. The Division of Water Sciences of UNESCO has a regional strategy for the implementation of national projects in Africa as part of the UNESCO/European Space Agency (ESA) Earth Observation for Integrated Water Resources Management in Africa/Space Hydrology International Partnership (TIGER/SHIP) project, which is based on the recommendations of the World Summit on Sustainable Development and aimed at building national capacities in water resource management. Other UNESCO initiatives and programmes contributing to the goals of the World Summit on Sustainable Development and, in particular, to the New Partnership for Africa’s Development, include the system-wide World Water Assessment Programme; the cross-cutting project on the application of remote sensing for integrated management of ecosystems and water resources in Africa; the open initiative on the use of space technology for the monitoring of World Heritage sites; and the Intergovernmental Oceanographic Commission’s Regional Ocean Observing and Forecasting System for Africa.

31. FAO’s African Water Resources Database⁹ was set up under the guidance of the FAO Inland Water Resources and Aquaculture Service in collaboration with the Land and Water Development Division and the Environment and Natural Resources Service. The database is a GIS-based analytical platform that allows users to visualize and analyse the complex hydrological and ecological relationships within specific river reaches, larger-scale river basins or entire mega-basins.

32. Many entities of the United Nations system, including UNEP, the United Nations Development Programme (UNDP), FAO, UNESCO, WHO, the secretariats of the United Nations Framework Convention on Climate Change, the United Nations Convention to Combat Desertification in those Countries Experiencing Drought and/or Desertification, particularly in Africa, and the Convention on Biological Diversity, are involved in the Millennium Ecosystem Assessment,¹⁰ a project that helps meet ecosystem assessment needs by, among other things,

⁹ <http://www.fao.org/fishery/collection/awrd/en>

¹⁰ <http://www.millenniumassessment.org/en/index.aspx>

providing tools for planning management, assisting in building individual and institutional capacity to undertake integrated ecosystem assessments and to act on their findings, and filling data gaps with additional remote sensing information.

33. Under the Technical Cooperation Programme of WMO,¹¹ a number of data collection platforms were replaced or installed, in 2004, for the collection of meteorological and hydrological data via the geostationary meteorological satellites (Meteosat satellites) in Africa. Under the project, satellite receiving ground equipment in 47 African countries were replaced to enable them to receive data and products from the Meteosat second-generation (MSG) satellites.

34. UNEP has issued a number of publications on sustainable development in Africa. Among them is the 2008 publication entitled “Africa: Atlas of Our Changing Environment”¹² that brings to light stories of environmental change at more than 100 locations spread across every country in Africa. More specific issues in the field of environmental change in Africa are addressed in UNEP’s publications “Africa’s Lakes: Atlas of Our Changing Environment”¹³, which presents an overview of the location of the lake resources of Africa and human impact on them. UNEP/GRID-Sioux Falls (United States) studied rapid environmental changes in Lake Chad in West Africa, which was highlighted in a publication entitled “Analysing environmental trends using satellite data: selected cases”.¹⁴ Analysing the changes, by examining satellite data over various periods, provided scientific evidence and an early warning of the potential long-term consequences of development decisions.

BOX3: AFRICA ENVIRONMENTAL INFORMATION NETWORK

The UNEP Division of Early Warning and Assessment-Africa coordinates the technical implementation of the Africa Environment Information Network (AEIN) in response to a request of the African Ministerial Conference on the Environment. AEIN focuses on developing an infrastructure and support mechanism for collating and storing geospatial and bibliographic data, harnessing professional skills and expertise to analyse and generate policy-oriented information and using information and communication technologies to communicate that information to decision makers at various levels. (<http://www.unep.org/dewa/africa/aeoprocess/aein/aein.asp>)

Land Use and Management

35. Land use and management are important factors for development in rural areas. Accurate land-use data at the right spatial resolution is a primary source of information for decision makers. The generation of land-use products using Earth surface classification methods, which today is an automated process, reaps many benefits from the use of SAR images. Low-resolution satellite data, for example, moderate resolution imaging spectrometer data, advanced very high resolution

¹¹ http://www.wmo.int/pages/prog/tco/index_en.html

¹² <http://www.unep.org/dewa/africa/AfricaAtlas/> and http://www.unep.org/publications/search/pub_details_s.asp?ID=3993

¹³ <http://na.unep.net/AfricaLakes/>

¹⁴ http://www.unep.org/publications/search/pub_details_s.asp?ID=3570

radiometer data and ancillary data (such as data on precipitation and temperature, climatic maps, land-use maps, topographic and soil maps, life zone maps, vegetation maps and the historical record of droughts) are useful to predict land surface changes and to make recommendations for appropriate and effective interventions for sustainable land management. Satellite imagery can be used to make an inventory of previous landslides and to collect data on relevant parameters concerning, among other things, soil, geology, slope, geomorphology, land use, hydrology and faults. The selection of the most adequate high-resolution satellite data is essential in extracting land surface information.¹⁵

36. Land degradation affects more than one billion hectares in Africa, which corresponds to a loss of more than nine billion US dollars per annum across the continent. ECA is using geospatial technology to highlight and assess the trends, effects, and existing interrelationships between various causal factors that contribute to land degradation processes.

37. UNODC and the Government of Morocco have collaborated since 2003 in conducting the surveys of the country's cannabis cultivation and production of cannabis resin. The surveys aim to measure the evolution of the cannabis cultivation in Morocco, define the geographical boundaries of the crop, determine the production of cannabis and of its resin (hashish), analyze the cannabis producers' revenues, and collect socio-economic parameters. The information collected with the help of space technology by UNODC is essential for the sustainable development of regions, where illicit crops still provide a major reliable and profitable source of livelihood. Policy makers can use this information to design alternative development strategies for the region.

38. Launched by the United Nations in 2002, the Global Land Cover Network¹⁶ (GLCN) is a global alliance for standard multi-purpose land cover data production to improve the availability of global information on land cover and to develop international standards for data collection, which are important because they ensure that the same data can be used by different organizations around the world. Regional collaborative networks have already been established for subregions in Africa.

39. The United Nations has been also involved in the AFRICOVER project, which is based on the GLCN and aims to establish a digital geo-referenced database on land cover and a geographic referential (a type of reference map which includes place names, roads and water distribution). The project is based on Landsat TM and ancillary data for ten African countries - Burundi, the Democratic Republic of the Congo, Egypt, Eritrea, Kenya, Rwanda, Somalia, Sudan, United Republic of Tanzania and Uganda.

Infrastructure, transport and energy

40. Land use and infrastructure are important elements in achieving sustainable development. Accurate land-use data at the right spatial resolution is a primary source of information for decision makers. Remote-sensing products have wide

¹⁵ *Space for Sustainable Development: Contribution of the Committee on the Peaceful Uses of Outer Space to the work of the Commission on Sustainable Development for the thematic cluster 2008-2009*, UNOOSA, A/AC.105/892

¹⁶ http://www.glcnet.org/index_en.jsp

coverage and are therefore used to produce land-use and land-cover maps as the first step in various applications. Among other things, those data are used to establish rural land registers that also help to identify the capabilities and limitations of those land areas.¹⁷

41. Many African countries face recurring and deepening energy shortages, which are partly linked with the lack of rigorous assessments of energy potential in the continent. ECA uses geospatial technology to map energy potentials in Africa (biofuel production, wind energy, solar exposure, etc.) and assist in planning energy supply and demand.

42. The activities carried out by ECA assist Member States to develop and utilize their geo-information resources (production, management and distribution of geospatial data and products) and promote policies, standards and enabling legal frameworks for spatial information-based decisions. ECA activities cover the following: policies and coordination (assign custodianship responsibilities as appropriate); data (building fundamental, core datasets, thematic data); capacity-building and retention (critical mass of skilled persons); standards and interoperability (common geodetic framework, metadata standard); e-Services (development of online applications and streamlined electronic delivery of products and services to achieve more informed decisions).

43. Under the project “GPS Africa”, the Office for Outer Space Affairs is participating in the deployment of a GPS receiver network in Africa to enable the participation of developing nations in the studies of the Sun and Earth system in the framework of the International Heliophysical Year 2007 (IHY). The network included IHY instrument array from International Geodesy System (IGS), Analyse Multidisciplinaire de la Mousson Africaine (AMMA), Scintillation Network Decision Aid (SCINDA) and the African Receivers for Equatorial Electrodynamics Studies (AGREES).

44. Through the African Reference Frame (AFREF) Project, ECA works to develop a unified geodetic reference frame for Africa, so that maps and other geo information products can be represented on the same datum. AFREF will be based on current satellite positioning technologies, and will form the geodetic infrastructure for multinational projects requiring precise geo-referencing (e.g. three-dimensional and time dependent positioning, geodynamics, precise navigation, and geo-information). Like other continental geodetic reference frames, it will be part of the global geodetic infrastructure and is implemented in close cooperation with the international partners with expertise and interest in geodetic reference frames, notably the International Association of Geodesy (IAG), the International Committee on Global Navigation Satellite Systems (ICG) and the United Nations Office for Outer Space Affairs (UNOOSA).

45. The African continent is directly involved in the global navigation satellite systems (GNSS) through AFREF, a geodetic project aimed to unify the coordinate reference frames of Africa and which serves as the basis for the national three-dimensional reference networks fully consistent and homogeneous with the

¹⁷ *Space for Sustainable Development: Contribution of the Committee on the Peaceful Uses of Outer Space to the work of the Commission on Sustainable Development for the thematic cluster 2008-2009*, UNOOSA, A/AC.105/892

International Terrestrial Reference Frame (ITRF). When fully implemented, it will become key to infrastructure, planning and development projects and will include a network of continuous, permanent GPS stations, to which users anywhere in Africa would have free access.

46. The Economic Commission for Africa (ECA) is collaborating with the African Union to prepare a transport infrastructure master plan for Africa. The main objective of the programme of activities is to produce an optimum, integrated all-mode transport infrastructure master plan for Africa. Producing such a master plan requires access to data on all existing and planned networks and corridors of development, including railways, airports, roads, ports, harbours and waterways, and related social economic information. Those transport components need to be depicted in their correct spatial locations and cross-referenced with one another in order to perform a full analysis of all relevant factors. Since there is currently no database containing those necessary data sets, another major objective of the project is to create a database (using remote-sensing and global positioning system techniques) in a geographic information system in order to support the proper planning, design, operation and maintenance of infrastructure facilities. ECA works with WFP in sharing relevant data and satellite images.

BOX4: CONNECT AFRICA

Connect Africa, launched at a Summit of leaders in Kigali, Rwanda, in October 2007, is a global multi-stakeholder partnership to mobilize the human, financial and technical resources required to bridge major gaps in information and communication technology (ICT) infrastructure across the region, with the aim of supporting affordable connectivity and applications and services to stimulate economic growth, employment and development throughout Africa. The Connect Africa Summit was organized by ITU, the African Union, the World Bank Group and the United Nations Global Alliance for ICT and Development, in partnership with the African Development Bank, the African Telecommunication Union, ECA and the Global Digital Solidarity Fund. (<http://www.itu.int/ITU-D/connect/africa/2007>)

Disaster management and emergency response

47. When disasters strike, different types of satellites are employed to alleviate the suffering of people on the ground. Remote sensing satellites provide maps of the extent of the disaster and its impact, which are used to prioritize relief needs and to enable relief workers to locate and reach the victims. Communications satellites are essential for information flow and for relief coordination, when the disaster damages or destroys the ground communications infrastructure. When the disaster renders existing maps ineffective or if it strikes in remote, poorly mapped areas, navigation satellites allow relief workers to establish their location.

48. The International Strategy for Disaster Reduction (ISDR)¹⁸ aims at building disaster resilient communities by promoting increased awareness of the importance of disaster reduction as an integral component of sustainable development in order to reduce human, social, economic and environmental losses caused by disasters. To facilitate disaster risk reduction in Africa, ISDR has established its regional outreach office, ISDR Africa, in Nairobi in 2002, which aims to advance the disaster risk reduction process in Africa in partnership with major stakeholders in the region. With the support from ISDR Africa, the New Partnership for Africa Development (NEPAD), Africa Union Commission, African Development Bank, UNDP and UNEP have developed the Africa Regional Strategy for Disaster Risk Reduction to facilitate integration of that Strategy into development programmes of Member States and international organizations.

49. In December 2006, the United Nations General Assembly established the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER) as a programme to provide universal access to all types of space-based information and services relevant to disaster management. UN-SPIDER is implemented by the Office for Outer Space Affairs and is mandated to ensure that all countries and international and regional organisations have access to and develop the capacity to use all types of space-based information to support the full disaster management cycle. Several member states, including Algeria, Nigeria and South Africa have already offered to support UN-SPIDER's work with regional support offices, hosted by institutions in those countries. This will promote regional expertise within Africa and foster regional networks to support disaster risk management.

50. In the context of UN-SPIDER, the Office for Outer Space Affairs has supported several awareness raising and networking events in African countries, including those in Ghana, Morocco and Nigeria, and provides technical support to include the use of space-based information into national plans and policy. In 2008, a technical advisory mission was conducted in Burkina Faso to assess the current use of space-based information for disaster management. The expert team provided recommendations on how to improve access to and use of space-base information. A similar mission to Namibia in 2009, followed by a training, helped to improve the use of satellite imagery for flood early warning in the countries flood-prone northern provinces.

51. The International Charter "Space and Major Disaster"¹⁹ is an international mechanism through which United Nations entities can request and receive satellite images, free of cost, to support their disaster response activities in the field. Since its inception in 2008, over 180 activations have been carried out, including 20 of them on Africa. The Office for Outer Space Affairs continues to act as a cooperating body of the Charter for the United Nations.

52. UNITAR/United Nations Organization Satellite (UNOSAT) service continues to develop and disseminate satellite-based services and products for humanitarian relief and disaster prevention. ECA also continues to focus on the identification of multi-hazard or composite risk hot spots and develop vulnerability mapping and

¹⁸ <http://www.unisdr.org/>

¹⁹ <http://www.disasterscharter.org/>

disaster monitoring applications to better understand human and environmental impacts. In Africa, the International Charter has been activated 20 times, nearly all of which were made possible due to the close cooperation among United Nations entities. The Office for Outer Space Affairs and ECA are working closely to ensure that the Charter and other similar opportunities are accessible to all African countries.

Human security

53. The United Nations uses satellite and aerial imagery for the development of large-scale maps to support the movements, operations and planning of peacekeeping troops and to improve staff security and emergency preparedness in the field. Maps, derived from satellite imagery, also inform the deliberations of the Security Council on the ongoing emergencies in different parts of the world.

54. Peacekeeping operations are typically in areas devoid of up-to-date geospatial information. The United Nations therefore established GIS units in eleven United Nations peacekeeping missions. Those units integrate information from various sources with digital maps of the theatre of peacekeeping operations, which allows peacekeeping missions to enhance their operational readiness and capabilities. Satellite images and DTED/DEM data are crucial in planning and operations to support terrain and situational awareness, thematic and analytical mapping for military and police deployments, mine action, and underground water resource investigation, as well as movements of internally displaced persons and refugees.

55. The Cartographic Section of the United Nations provides support to the UN Secretariat in special projects, such as assistance and advice on delimitation of international boundaries, project management of GIS units within peacekeeping missions and the GIS Centre in Brindisi, Italy that prepares topographic base mapping. The United Nations International Boundary Evidence project, in collaboration with WHO, aims at creating and maintaining a geo-database of international boundaries. Under the aegis of UNGIWG, DPKO developed the Second Administrative Level Boundaries (SALB) data set project,²⁰ which provides contact information for national mapping agencies in collaboration with other United Nations partners, such as ECA and ECLAC, as well as several regional and global initiatives.

56. DPKO and the Office for the Coordination of Humanitarian Affairs has established the Sudan Inter-agency Mapping (SIM) group,²¹ which functions in cooperation with local authorities to promote and facilitate the sharing of standardized geospatial information to enable all members to develop compatible and reliable products to assist in their operations.

²⁰ http://www.who.int/whosis/database/gis/salb/salb_home.htm

²¹ The members of the group include the United Nations Mission in the Sudan, the Office for the Coordination of Humanitarian Affairs, the United Nations Mine Action Service, the United Nations Joint Logistics Centre, UNDP, the United Nations Children's Fund, WHO, WFP, the Humanitarian Information Centre for Darfur, the European Union Satellite Centre, the Sudan Central Bureau of Statistics and the New Sudan Centre for Statistics and Evaluation.

57. In 2006, the Office for the Coordination of Humanitarian Affairs leveraged the resources made available through the Geographic Information Support Team²² to service the geospatial data requirements of the humanitarian community, especially by channelling satellite imagery obtained from United States Government sources.

58. UNHCR uses satellite imagery, GPS receivers, existing maps and refugee registration data to develop a GIS. Camp mapping has been implemented for Tanzania, Chad, Kenya, Namibia, Sudan, Sierra Leone and Liberia. Refugee camp mapping on the Kenya and Somalia border (Dadaab) is planned in order to look at the impact of refugee camps on environment and changes in environmental conditions of the refugees (access to fuel wood, pasture lands, etc).

BOX5: COSPAS-SARSAT

In the framework of COSPAS-SARSAT, five African countries (Algeria, Madagascar, South Africa, Nigeria and Tunisia) currently provide location-related space-based search and rescue services, particularly for people and transportation systems in danger, for example air crashes, ship-wrecks and motor accidents. COSPAS-SARSAT is an international satellite-based search and rescue distress alert detection and information distribution system. The search and rescue activities operate on a worldwide basis by providing accurate, timely, and reliable alert and location data to the international community on a non-discriminatory basis. (<http://www.cospas-sarsat.org/>)

Regional cooperation

59. In line with ECA's support for regional priorities defined by the African Union and the New Partnership for African Development (NEPAD), several regional geospatial databases are developed to support regional initiatives: 1) The Infrastructure Development in Africa (PIDA) geospatial database, which covers all existing and planned infrastructure facilities in Africa, including all networks and development corridors for transport infrastructure, as well as power plants and power systems interconnection networks for the power sector; and 2) The Agricultural Commodity Value-Chain Database and Interface, which is an inventory of available data and information resources conducted through an extensive survey involving international and regional partners. The creation of the primary databases (ecological and crop production zones; optimum processing locations; markets & infrastructure) is on-going.

60. UNEP, ECA and WFP assist the African Ministerial Conference on the Environment in preparing the Africa Environment Outlook report,²³ which highlights the potential of the region's natural resource base to support the development agenda of the New Partnership for Africa's Development.

²² GIST membership consists of United Nations agencies with humanitarian operations, including the Department of Peacekeeping Operations, FAO, UNHCR, WFP and WHO, United States agencies, representatives of donor countries, non-governmental organizations and academic institutions, with the Office for the Coordination of Humanitarian Affairs providing secretariat services.

²³ <http://www.grida.no/publications/other/aeo/?src=/aeo/>

61. The UN-Affiliated African Regional Centres for Space Science and Technology Education, located in Morocco and Nigeria, offer programmes, including technical advisory services in Basic Space Sciences, Satellite Communications, Satellite Meteorology and Remote Sensing, for the benefit of their member States.

IV. Looking Ahead: Challenges and Opportunities

[This section will be completed following the discussions at the Inter-Agency Meeting and its open informal session. Currently, it includes unedited submissions from UN entities.]

62. [ECA] Leveraging potential and opportunities of Earth Observation and Geoinformation. The need for a positive approach in using earth observation and geospatial technology in solving Africa's problems has been underscored in several ways. Technical capabilities do exist, but the enabling environment (infrastructures, individuals, institutional arrangement) is still lacking. Moreover, geospatial technologies and earth observation are still too sophisticated for common and root level end-users. This calls for the need to give close attention to these common issues and develop strategic guidance on making information available to decision makers and the community in a form they can use (almost) immediately (packaging and communicating information). Among some of the basic priorities are: 1) Institutional priorities: Promoting policies (such as the African Regional Spatial Data Infrastructure) to improve data sharing; coordinating EO-related institutions focus areas and activities that are in synergy. 2) Technical priorities: Building appropriate communication infrastructures; developing operational environments such as Direct Ground Receiving Stations; construction of archiving and processing facilities; harmonizing spatial data management with common fundamental datasets and Geodetic reference. 3) Human priorities: Building critical mass of skilled personnel (expertise not only for application but also for production); promoting "User-Pull" and not "Technology-Push" programmes (needs must precede and determine the means to be used).

63. [UNHCR]1- Improved access to GNSS in many remote areas for better GPS measures. 2- Long term partnerships for remote sensing data re-use and for customised interpretation of high resolution imagery for tracking of displaced populations. 3- creation of collaborative platform for inter-agency actions in regions where Internet access is limited.

64. [UNODC] UNODC-Illicit Crop Monitoring Programme will continue monitoring cultivation and production of cannabis in Morocco. The challenge is to find new sensors that can differentiate crops with adequate spectral and spatial resolutions, with sufficient revisiting time and lower costs. There have been requests to do a global survey on cannabis, including Africa, however, this has not commenced since there are no resources available.

65. [UNOOSA] The disaster management agencies in Africa have to adapt to the increasing number of natural disasters, ranging between the extremes of drought and flood. Secondary impacts triggered by environmental conditions, such as locust

plagues, further degrade living conditions and food security of the local population. Despite the wide availability of space-based solutions to address many of the disaster-related problems in Africa, serious obstacles exist in fully utilizing space-based information and technology to reduce disaster risk and improve emergency response. The available bandwidth is too low to allow rapid downloading and sharing of satellite imagery and space-derived products, such as disaster maps, among different institutions. Many African countries do have some capacity in terms of know-how and equipment to potentially use space-based information for disaster risk management, however, this capacity is often not available to the institutions tasked with disaster risk management and emergency response. The UN-SPIDER programme will address these challenges through its programme specifically related to Africa and regional support offices in Africa.

66. [UNOOSA] The Space Applications Programme of the Office for Outer Space Affairs will focus on capacity building activities in priority thematic areas that include: climate change; space weather, through the promotion of the GPS Africa Network and the global array of space weather instruments; Search and Rescue, by promoting the utilization of the COSPAS-SARSAT system; tele-health/tele-epidemiology, through the establishment of the Africa Telemedicine Fellowship programme; and mountainous areas. The Office for Outer Space Affairs will continue to advocate space governance in Africa through its series of regional workshops on space law and space policy.