



General Assembly

Distr.: General
20 June 2011

Original: English

Committee on the Peaceful Uses of Outer Space

Contribution of the Committee on the Peaceful Uses of Outer Space to the United Nations Conference on Sustainable Development: harnessing space-derived geospatial data for sustainable development

Note by the Secretariat

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I. Introduction

1. In its resolution 65/97, the General Assembly expressed its conviction that the use of space science and technology and their applications in areas such as telemedicine, tele-education, disaster management, environmental protection and other Earth observation applications contributed to achieving the objectives of the global conferences of the United Nations that addressed various aspects of economic, social and cultural development, particularly poverty eradication.
2. In that resolution, the Assembly 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, to be held in Rio de Janeiro, Brazil, in 2012.
3. The objective of the Conference is to secure renewed political commitment for sustainable development, assessing the progress made to date and the remaining gaps in the implementation of the outcomes of the major summits on sustainable development and addressing new and emerging challenges. To that end, the focus is on two themes: (a) a green economy in the context of sustainable development and poverty eradication; and (b) the institutional framework for sustainable development.
4. The Committee has identified the use of space-derived geospatial data as an overarching theme for its contribution to the objectives of the Conference. The institutional framework for governance of international cooperation in the peaceful uses of outer space constitutes an important mechanism for strengthening efforts at all levels to harness geospatial data for sustainable development.
5. The present report endeavours to explain the increasing role of space-derived geospatial data in sustainable development. Recommendations are presented on ways and means of fostering international cooperation with a view to building up national infrastructures to use such data.

II. Governance of international cooperation in the peaceful uses of outer space

6. The Committee on the Peaceful Uses of Outer Space is the primary United Nations body for coordinating and achieving international cooperation in space activities. The Committee and its subsidiary bodies, the Scientific and Technical Subcommittee and the Legal Subcommittee, through their agendas, promote international cooperation in the peaceful uses of outer space for economic, social and scientific development, in particular for the benefit of developing countries.
7. The Committee evolved as a result of the recognition by the General Assembly, in its resolution 1348 (XIII), of the importance of using outer space exclusively for peaceful purposes and of the need to promote international cooperation in the conduct of space activities, and through the Assembly's establishment of the permanent Committee in Assembly resolution 1472 A (XIV).
8. The overall mandate of the Committee and its subsidiary bodies aims at strengthening the international legal regime governing outer space, resulting in

improved conditions for expanding international cooperation in the peaceful uses of outer space, and supporting efforts at the national, regional and global levels, including those of entities of the United Nations system and international space-related entities, in order to maximize the benefits of the use of space science and technology and their applications and to increase coherence and synergy in international cooperation in space activities at all levels.

9. Another central element in the work of the Committee is to further strengthen capacity, particularly of developing countries, in the use and applications of space science and technology for sustainable development and increase awareness among decision makers of the benefits of space science and technology and their applications in addressing societal needs for sustainable development through international cooperation among Member States and national and international space-related entities, including the private sector as appropriate.

10. The Committee has been instrumental in the development of the legal regime governing activities in outer space for peaceful purposes established through the five space law treaties and the five sets of principles and declarations on outer space. The fundamental principles laid down in the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (Outer Space Treaty) have been further made manifest in the subsequent treaties and sets of principles and declarations adopted by the General Assembly.¹

11. With regard to the use of space-derived geospatial data, the Principles Relating to Remote Sensing of the Earth from Outer Space (General Assembly resolution 41/65, annex) should be specifically noted, as well as the Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries (General Assembly resolution 51/122, annex).

12. The Committee, in its effort to strengthen the overarching institutional framework for governance of international cooperation in the peaceful uses of outer space, established in 2006 the International Committee for Global Navigation

¹ The five outer space treaties are the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (General Assembly resolution 2222 (XXI), annex); the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (Assembly resolution 2345 (XXII), annex); the Convention on International Liability for Damage Caused by Space Objects (Assembly resolution 2777 (XXVI), annex); the Convention on Registration of Objects Launched into Outer Space (Assembly resolution 3235 (XXIX), annex); and the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (Assembly resolution 34/68, annex); the five declarations and sets of legal principles are the Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space (Assembly resolution 1962 (XVIII)); the Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting (Assembly resolution 37/92, annex); the Principles Relating to Remote Sensing of the Earth from Outer Space (Assembly resolution 41/65, annex); the Principles Relevant to the Use of Nuclear Power Sources in Outer Space (Assembly resolution 47/68) and the Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries (Assembly resolution 51/122, annex).

Satellite Systems and the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER).

13. In its resolution 65/97, the General Assembly emphasized that regional and interregional cooperation in the field of space activities was essential to strengthen the peaceful uses of outer space, assist States in the development of their space capabilities and contribute to the achievement of the goals of the United Nations Millennium Declaration and to that end fostered interregional dialogue on space matters between Member States.

14. To that end, the Committee has a strong relationship with regional and interregional intergovernmental entities and mechanism for coordination and cooperation in space activities, such as the Asia-Pacific Space Cooperation Organization, the Asia-Pacific Regional Space Agency Forum, the African Leadership Conference on Space Science and Technology for Sustainable Development and the Space Conference of the Americas.

III. Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space and the contributions made to the multi-year programme of work of the Commission on Sustainable Development (2006-2011)

15. On 20 October 2004, the General Assembly conducted a five-year review of the progress made in the implementation of the recommendations of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III). The Assembly had before it the report of the Committee on the Peaceful Uses of Outer Space on the implementation of the recommendations of UNISPACE III (A/59/174), in which the Committee reviewed the mechanisms for and progress made in implementing the recommendations, identified synergies between the implementation of those recommendations and the results of global conferences held within the United Nations system and other global initiatives and proposed a plan of action for further implementing the recommendations of UNISPACE III.

16. The report of the Committee provided a road map for the further development of space capabilities to advance human development through making space tools more widely available by moving from the demonstration of the usefulness of space technology to a more broadly based operational use of space-based services. The Plan of Action, contained in that report (see A/59/174, sect. VI.B) and endorsed by the General Assembly in its resolution 59/2, constitutes a long-term strategy for enhancing mechanisms at the national, regional and global levels in developing and strengthening the use of space science and technology and their applications to support overarching global agendas for sustainable development; developing coordinated, global space capabilities; supporting specific agendas to meet human development needs at the global level; and supporting overarching capacity development.

17. The Committee, in its report (A/59/174, para. 227), noted that in implementing the Plan of Action, the Committee could provide a bridge between users and potential providers of space-based development and services by identifying needs of

Member States and coordinating international cooperation to facilitate access to the scientific and technical systems that might meet them, while observing the interaction between different stakeholders in the future implementation of the strategy and building upon the respective roles and needs of actors involved in the wider space community.

18. In its resolution 59/2 the Assembly endorsed the Plan of Action proposed by the Committee in its report, and requested the Committee to examine the contribution that could be made by space science and technology and their applications to one or more of the issues selected by the Commission on Sustainable Development as a thematic cluster and to provide substantive inputs for consideration by the Commission.

19. The contribution of the Committee on the Peaceful Uses of Outer Space to the work of the Commission on Sustainable Development for the thematic cluster 2006-2007 was described in document A/AC.105/872; its contribution to the thematic cluster 2008-2009 was described in document A/AC.105/892; and its contribution to the thematic cluster 2010-2011 was described in document A/AC.105/944. Those documents contain information about and highlight the benefits of space science and technology and their applications relating to the thematic clusters addressed by the Commission in those periods.

20. The thematic areas addressed by the Committee during the period 2006-2011 and reviewed in detail in the reports referred to in paragraph 19 above include considerations on the use of space science and technology applications for improving efficiency in energy; promoting industrial development; combating air pollution; addressing climate change and the role of space applications in agriculture, land use and rural development; preventing drought and desertification; enhancing transport networks; and using space technology for sustainable resource management, consumption and production. Cross-cutting areas identified by the Commission on Sustainable Development were also addressed, such as sustainable development in Africa and capacity-building and training opportunities for developing countries.

21. Paramount to the strategy for implementing the recommendations of UNISPACE III and contributing to the work of the Commission on Sustainable Development was the need to take into account the results of the global conferences held within the United Nations system in the 1990s that had identified priorities for promoting human development, as well as the goals and objectives of the conferences held since UNISPACE III, in particular the Millennium Summit of 2000 and the World Summit on Sustainable Development of 2002.

22. In its resolution 65/97, the General Assembly noted with satisfaction that a number of the recommendations set out in the Plan of Action of the Committee on the Peaceful Uses of Outer Space on the implementation of the recommendations of UNISPACE III (see A/59/174, sect. VI.B) had been implemented and that satisfactory progress was being made in implementing the outstanding recommendations, and that Member States continued to contribute to the implementation of the recommendations of UNISPACE III through national and regional activities and by supporting and participating in the programmes established in response to those recommendations.

IV. Harnessing space-derived geospatial data for sustainable development

A. Benefits of space-based data

23. Space science and technology and their applications can contribute more efficiently to the efforts of humankind to promote sustainable development in all countries and regions of the world. Information obtained from space-derived geospatial data is providing essential inputs for decision-making in areas such as disaster management and emergency response.

24. The term “geospatial data” is used to describe all data with explicit geographic positioning information. The term “space-derived geospatial data” refers to geospatial data obtained from space-based platforms. The potential value of such data for use in a wide range of applications had been predicted even prior to the beginning of the space age and was confirmed following the successful launch and operation of the first remote-sensing satellites.

25. Geospatial data from remote sensing of planet Earth from space is a rapidly growing and maturing technology and is operationally integrated with other disciplines such as photogrammetry, cartography, geodetic reference systems, global navigation satellite systems and geographic information systems.

26. In monitoring the Earth and its environment, satellites can provide the synoptic, continuous and long-term global observations needed to understand the Earth system more comprehensively, in conjunction with the use of modelling technology to address issues such as: (a) the influence of the Sun on the Earth’s environment; (b) global climate change; (c) changes in the ozone layer; (d) the impact of human activities on the environment; and (e) global health.

27. While the value of Earth observation images in the preparation of risk maps and mitigation of the effects of disasters has been recognized and those images are being used to some extent, satellites are also increasingly providing important information for early warning and management of natural or industrial disasters events when they occur.

28. Space technologies provide valuable data for weather forecasting, climate predictions, monitoring of natural resources and for various activities related to agriculture, and management of land and marine resources. In addition, satellite data are improving the prediction of rainfall using well-developed rainfall estimation techniques. The information derived from such prediction would be very useful for crop and flood forecasting. Especially in Africa, the increased use of satellite images would greatly assist in the early detection of army worm and locust breeding areas, as well as in drought prediction and monitoring of desertification.

29. Information and communication infrastructure is an essential component of development in any country, and space technology is a key tool in gathering information and communicating it rapidly and efficiently at the global level, in particular in remote areas. In addition to Earth observation systems, wide-ranging applications include distance learning and telemedicine, providing essential health and medical services and assisting in enhancing education opportunities, in particular in rural and remote areas.

30. Satellite communications are becoming essential in disaster mitigation and relief operations. Their use is vital in situations where ground-based infrastructure becomes unusable. Global navigation satellite systems (GNSS) offer public services that have numerous applications. The signals from GNSS are being used to enhance the safety and effectiveness of transportation by land, sea and air. With their extremely high accuracy, global coverage, all-weather capability and usefulness at high velocity, GNSS applications also support and improve a wide range of activities such as telecommunications, power systems, mapping and surveying, agriculture, crime prevention and law enforcement, as well as emergency response and disaster reduction.

B. Institutional framework

31. The Committee on the Peaceful Uses of Outer Space and its subsidiary bodies regularly consider, through their established agendas, items related to the use of space-based geospatial data and assess developments at the national, regional and international levels.²

32. The use of timely and high-quality space-derived geospatial data for sustainable development in application areas such as agriculture, deforestation assessment, disaster monitoring, drought relief and land management could yield significant societal benefits.

33. National spatial data infrastructures and related national geo-information policies have been established in several Member States, and a growing number of countries are actively developing and deploying their own remote-sensing satellite systems and utilizing space-based data to advance socio-economic development. There is also an increasing convergence of space-based data, geographic information systems and GNSS technologies generating valuable information for policy- and decision-making.

34. A number of national, regional and global initiatives, including activities under the framework of the Group on Earth Observations (GEO), are addressing issues related to the use of space-derived geospatial data for sustainable development, such as the Global Spatial Data Infrastructure Association, an umbrella organization for sharing experiences in the development of spatial data infrastructure whose small grant programme has directly benefited many African countries.

35. Another example is the Mesoamerican Regional Visualization and Monitoring System (SERVIR), based in Panama City, which is providing support in monitoring the environment, improving land use and agricultural practices and assisting local officials in responding faster to natural disasters. Following the success of the SERVIR project in Central America, an African node is being established in Nairobi.

36. While the benefits of space-derived geospatial data are widely known, there is still a need to enhance capacities in many countries to ensure that such data can be

² For example, the Committee, at its fifty-third session, in 2010, concluded, under a multi-year workplan for the period 2007-2010, its consideration of an agenda item entitled "International cooperation in promoting the use of space-derived geospatial data for sustainable development". The final report on that agenda item is contained in document A/AC.105/973.

exploited to the fullest extent possible. The increased availability of space-based data at little or no cost, including data provided by the Argentine Earth observation satellite SAC-C, the China-Brazil Earth resources satellites, the Greenhouse Gases Observing Satellite of Japan and the United States Landsat image archive, is an important factor in that regard.

37. Global open data access policies provide access to geospatial data either free of charge or at a nominal cost. For example, the United States Geological Survey (USGS) provides the international community, free of charge, with electronic access to all Landsat scenes held in the USGS-managed national archive of global scenes dating back to Landsat-1, launched in 1972. There are several other ongoing or planned satellite missions whose data sets will be disseminated in accordance with open data access policies.

38. Initiatives and programmes undertaken within regional and international frameworks, 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, the Space Conference of the Americas, the Committee on Earth Observation Satellites (CEOS), GEO, and through the Global Monitoring for Environment and Security, are promoting international cooperation in the use of remote-sensing technology. Recent developments include the setting-up of an African Resources and Environmental Management satellite constellation.

39. 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: (a) the establishment of the centre of excellence for the United Nations Spatial Data Infrastructure under the auspices of the Office of Information and Communication Technology of the Secretariat of the United Nations; (b) the agreement on principles of data sharing in the framework of the Group on Earth Observations; and (c) the United Nations Initiative on Global Geospatial Information Management.

40. 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.

41. The work of CEOS is now fully integrated into the Group on Earth Observations, 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. The Working Group on Information Systems and Services of CEOS is contributing to efforts to enhance international collaboration and to advocate and promote technologies enabling the search of and access to the data and services needed to support scientists, application providers and decision makers.

42. Several United Nations entities routinely use space-derived geospatial data, which constitute a vital source of essential information for a wide range of

mandated activities. To facilitate the coordination and exchange of experiences related to the use of space-derived geospatial data, United Nations entities are making use of the framework provided by the annual Inter-Agency Meeting on Outer Space Activities and the United Nations Geographic Information Working Group.

43. The Second Administrative Level Boundaries data set project, launched in 2001 in the context of the activities of the United Nations Geographic Information Working Group, is providing access to a working platform for the collection, management, visualization and sharing of subnational data and information in a seamless way from the national to the global level. The project involves the Economic Commission for Africa, the Economic Commission for Latin America and the Caribbean, the Economic and Social Commission for Asia and the Pacific, the World Health Organization and the Asian Institute of Technology.

44. The Office for Outer Space Affairs of the Secretariat, through its United Nations Programme on Space Applications, organizes meetings to provide unique opportunities for bringing together experts in space science and technology, decision makers and practitioners to share their experiences and knowledge with the aim of having geospatial data used for sustainable development as widely as possible. Capacity-building through long-term education is specifically provided by the regional centres for space science and technology education, affiliated to the United Nations, located in Brazil/Mexico, India, Morocco and Nigeria. All regional centres are holding nine-month postgraduate courses in satellite remote sensing and satellite meteorology, utilizing geospatial data for training, education, application and research purposes.

45. The General Assembly, in its resolution 64/251, on international cooperation on humanitarian assistance in the field of natural disasters, from relief to development, encouraged the further use of space-based and ground-based remote-sensing technologies, as provided by UN-SPIDER. In the implementation of its mandate, UN-SPIDER conducts programme activities related to knowledge management, horizontal cooperation, capacity-building and technical advisory support to ensure that the access to and use of space-based technology and geospatial information for disaster risk reduction and emergency response is being further improved. In addition, the UN-SPIDER programme works through an international network of regional support offices and national focal points. By taking advantage of that expert network and close end-user interaction, UN-SPIDER significantly contributes to the harnessing of geospatial data for sustainable development, in particular by supporting resilience to disasters and emergency relief efforts.

V. Recommendations on ways and means of fostering international cooperation with a view to building up national infrastructures to use geospatial data

46. The Committee recognizes the value and the importance of geospatial data, including in particular those provided by satellites systems, for the purpose of supporting sustainable development policies, and considers that space-derived geospatial data constitute a resource that could be managed at the local, national,

regional or global level, notably through the establishment of dedicated national spatial data infrastructures.

47. The Committee also emphasizes that the establishment of such national spatial data infrastructures, together with the appropriate training and education, could serve the purposes of supporting development policies in countries that would benefit from a larger use of geospatial data in their policies, notably in the fields of environment protection, land resources management, agriculture, urbanism, disaster prevention and monitoring and early warning systems.

48. In that regard, the Committee takes note of the activities of national, regional, and international intergovernmental and non-governmental organizations relevant to the use of space-derived geospatial data, and the range of issues relevant to the use of such data, including the sharing of data, data access policies, the use of open source software, the role of data dissemination and the importance of capacity-building.

49. In order to foster international cooperation in building up national infrastructures to use geospatial data, the Committee recommends that:

(a) In their international cooperation with developing countries, States should consider the need, the suitability and the feasibility of strengthening the use of space-derived geospatial data, notably through the establishment of a national spatial data infrastructure in those developing countries;

(b) States with expertise in the establishment, operation and/or maintenance of space-derived geospatial infrastructures and databases or in the use and exploitation of space-derived geospatial data for the purpose of supporting local, national, regional or global governmental policies, should assist those countries wishing to develop their own capacity and expertise in the use of space-derived geospatial data, on a voluntary basis;

(c) Such cooperation efforts could be organized and performed in the framework of general or ad hoc agreements or arrangements at the governmental level or at the institutional level;

(d) In addition to the above-mentioned aspects, States should pay particular attention to the creation at the national level of the adequate conditions required for the establishment of national spatial data infrastructure;

(e) States should use efforts in capacity-building, including short-term and long-term training, the development of associated infrastructure and institutional arrangements with the purpose of enhancing autonomous national capabilities to generate information for decision- and policymaking processes;

(f) In building up national infrastructure to use space-derived geospatial data for sustainable development, States should act in accordance with the Principles Relating to Remote Sensing of the Earth from Outer Space (General Assembly resolution 41/65, annex), as well as the Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries (General Assembly resolution 51/122, annex);

(g) In assessing the need and/or the suitability of establishing a national spatial data infrastructure, States should consider several criteria, such as

non-redundancy of the infrastructure regarding other accessible sources of data, long-term sustainability of the maintenance and the exploitation of the infrastructure or the actual interface between the national spatial data infrastructure and the rest of the State's agents in charge of defining, approving, funding and implementing the policies for the purpose of which the data are used;

(h) States should make their best effort to enhance visibility of existing channels through which space-derived geospatial data and related tools are available at low cost or free of charge;

(i) States should make special efforts to engage in or to expand international cooperation initiatives aimed at retrieving, classifying and sharing spatial data from remote-sensing sources, ground data acquired to facilitate analysis of remotely sensed data, digital maps from specific studies carried out abroad and other relevant data;

(j) States are encouraged to participate in and benefit from existing international initiatives dealing with space-derived geospatial data, such as the Group on Earth Observation and the Global Spatial Data Infrastructure Association;

(k) States should continue to support the United Nations in its efforts to access and use geospatial information in its mandated programmes to assist all Member States, including through the United Nations Geographic Information Working Group and the United Nations Spatial Data Infrastructure.
