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Committee on the Peaceful Uses of Outer Space

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

Space for sustainable development

Contents

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I. Introduction

1. The importance of space science and space applications for education, health, environmental monitoring, management of natural resources, disaster management, meteorological forecasting and climate modelling, satellite navigation and communications and the benefits and applications of space technologies in addressing the challenges of sustainable development was recognized and noted by the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III), held in Vienna from 19 to 30 July 1999 in its resolution "The Space Millennium: Vienna Declaration on Space and Human Development".[1] The Vienna Declaration, which was endorsed by the General Assembly in resolution 54/68 of 6 December 1999, provided a strategy for addressing global challenges in the future through the use of space science and technology and their applications.

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

3. On 20 October 2004, the General Assembly conducted a five-year review of the progress made in the implementation of the recommendations of UNISPACE III. The Assembly had before it the report of the Committee on the Peaceful Uses of Outer Space (A/59/174), in which the Committee reviewed the mechanisms for and progress made in implementing the recommendations, identified synergies between the implementation of the recommendations of UNISPACE III 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. In its resolution 59/2 of 20 October 2004, the General Assembly endorsed the Plan of Action as 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.

4. The contribution of the Committee on the Peaceful Uses of Outer Space to the work of the Commission on Sustainable Development contained in the present document seeks to inform about, promote and highlight the benefits of space science and technology and their applications with regard to the thematic clusters being addressed by the Commission in 2006 and 2007. In preparing its contribution, the Committee took into account the discussion paper submitted by the scientific and technological community entitled "Overview of recent scientific and technological developments in the fields of energy for sustainable development, air pollution/atmosphere and climate change" (E/CN.17/2006/5/Add.8).

II. Using space to achieve sustainable development

5. Space science and technology and their applications provide essential tools for addressing many of the global challenges facing the world and contribute to improving human living conditions. Space technology has become an indispensable and effective tool in addressing and resolving sustainable development issues and meeting many critical human needs, such as shelter, food, energy, communications, transportation, health and education. Space applications are effective tools for monitoring and conducting assessments of the environment, managing the use of natural resources, providing early warnings and managing natural disasters, providing education and health services to rural and remote areas and connecting people around the world.

6. The use and enhancement of space capabilities, such as Earth observation systems, geographical information systems (GIS), satellite meteorology, satellite communications and satellite navigation and positioning systems, strongly support the actions called for by the World Summit on Sustainable Development and can make a significant contribution to the thematic clusters being addressed by the Commission in 2006 and 2007.

7. Space applications are multifaceted and often offer, with a single instrument or application, the means for States to make development decisions with regard to distinct yet cross-cutting issues, as will be illustrated with information provided below on each of the themes of the cluster to be reviewed.

A. Space and energy for sustainable development

8. Earth observation from space brings home the realization of how fragile the Earth really is and the value of space observations in the management of the Earth's natural resources.

9. Space-based technologies play an important role in the identification of sources of new and renewable energy and facilitate the assessment of the threats associated with the sustained use of non-renewable, and especially carbon-based, fuels. Images from remote sensing satellites are being used to aid the search for oil reserves and to monitor oil spills. Satellite navigation systems are used to manage energy networks.

10. Space technology is also being used to improve the generation, transmission and use of energy on Earth. For example, the monitoring of space weather and solar storms can help in the management of electricity networks and can, as a result of the spin-offs of space exploration, lead to the improvement of solar cell efficiency.

11. Earth observation and satellite-based technologies play a vital role in determining the approximate quantity of hydroelectricity that could be produced in a given region and in identifying suitable locations for hydropower plants to minimize environmental impact.

12. Similarly, satellite technology can be used to identify suitable sites for tidal energy plants, enable the measurement of ocean temperatures and sea surface speeds and assist in the prediction of wave generation and height.

13. Space-based observation of “geo hot spots”, using satellite imagery and thermographs to locate geothermal areas, can be used to improve energy potentials. High-powered ultra-spectral infrared satellites with the capability of sensing below ground are expected to improve geothermal mapping of the planet.

B. The role of space in industrial development

14. Space has revolutionized communications worldwide and has had an enormous impact on the exchange of information. The ability to communicate quickly over reliable networks is one of the underlying factors in advancing industrial development.

15. Space provides critical and innovative solutions for transforming communications and broadcasting in the world. It provides new opportunities and platforms for business and industrial development and greatly facilitates access to and exchange of information, in particular in rural or remote areas.

16. Communication satellite services are necessary for enhancing industries such as banking, energy, commerce and trade, insurance, media and broadcasting, telephony and Internet services. Satellite services are even playing an essential role in education, health and medicine. The use of satellite communications makes it possible to provide high-quality and inexpensive health services and medical care to underprivileged people. Similar results and benefits are available for education.

17. Space spin-off technologies can also help to strengthen industrial processes and development. For example hydrogen industries have significantly benefited from spin-offs, in particular in relation to manufacturing, liquification, transportation and storage, and can also contribute with regard to instrumentation, design practices, operational use and safety procedures for the storage of hydrogen as a fuel, thus opening an arena for fuel cell research and development.

C. Using space to combat air pollution and observe the atmosphere

18. Space applications, such as remote sensing, are fast becoming vital tools in measuring the level of air pollution and monitoring and observing the atmosphere and its interaction with the Earth.

19. Among the primary areas of space research and applications is the determination of the quality of air and any changes in it and changes in the ozone layer.

20. The detection, transportation, spread and tracking of pollutants over large spatial domains and even localized regions can be effectively monitored by using space applications such as remote sensing. Furthermore, the interaction of air pollutants in the atmosphere can also be monitored and studied. These applications are also the only source of data for remote and rural regions where ground-based measurements are not available or possible.

21. Many satellites now carry sensors that are specifically designed to monitor atmospheric pollutants. Recent developments in space research and applications now make it possible to determine the spatial distribution of air pollutants like

nitrogen dioxide, carbon monoxide, sulphur dioxide and formaldehyde. This in turn allows the quality of the air in individual cities and urban agglomerations to be determined and emission inventories to be verified. It further allows, for the first time, the distribution of two important greenhouse gases, methane and carbon dioxide, to be determined on a global scale. Satellites designated to study the Earth's ozone and air quality contain sensors that specifically measure trace gases in the troposphere. Other satellites measure backscattered sunlight to determine pollution and smoke plumes in the atmosphere.

22. The data collected and research arising from these applications can assist policymakers and decision makers to monitor and manage atmospheric pollution and air quality in their countries.

D. Space solutions for addressing climate change

23. Satellite data have been providing scientists with both qualitative and quantitative information about the atmosphere, clouds and land and sea surface properties for more than 30 years.

24. The value of meteorological satellites, which provide essential data for weather forecasting to national weather services across the globe, is well known. These satellites can scan the Earth completely in 30 minutes.

25. Many other satellites are dedicated to environmental monitoring and the study of climate change, however. These satellites and the instruments they carry are examining the changes in the global climate caused by increasing concentrations of greenhouse gases and contribute to providing an accurate global picture of sea surface temperatures, greenhouse gases in the atmosphere and the ozone levels in the atmosphere. Satellite data also contribute to the study and forecasting of the El Niño event by monitoring unusual ocean currents and changes in sea surface temperature.

26. Over the next 25 years, the anticipated developments in space-based observing systems, data processing and information and communications technology will further improve space applications for environmental and climate change monitoring and research.

III. Capacity-building and training opportunities for developing countries in space science and technology and their applications

27. All countries, regardless of their degree of economic or scientific development, can benefit from the tools and applications resulting from the conduct of space activities. The recognition of the role that space technology plays in development has led many countries, including developing countries, to invest in developing their own space capabilities, needed for attaining their social and economic goals.

28. As capacity-building in the use of space science and technology and their applications, in particular in developing countries, is vital to ensuring that space

activities support development agendas, a number of national, regional and international efforts are being undertaken to develop and strengthen indigenous capacity in space science and technology at all levels, to establish networks among national, regional and international institutions and to facilitate and enhance collaborative research opportunities.

29. Among them are the activities of the United Nations Programme on Space Applications. The Programme was established in 1971 on the recommendation of the first United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE), held in 1968. The Programme carries out activities designed to promote awareness of the practical uses of space technology for sustainable development, in particular in developing countries.

30. The priority thematic areas of the Programme are the use of space technology for disaster management, satellite communications for tele-education and telemedicine applications, monitoring and protection of the environment, management of natural resources and education and capacity-building, including research areas in basic space sciences and space law.

31. Since its establishment, the Programme has conducted more than 170 training courses, workshops, seminars and conferences on space applications with approximately 8,000 participants from developing countries. The Programme has planned 10 workshops and seminars for 2006 (www.unoosa.org).

32. Through the Programme, regional centres for space science and technology education have been established for Africa (Morocco and Nigeria), Asia and the Pacific (India) and Latin America and the Caribbean (Brazil and Mexico). The centres are affiliated to the United Nations and are aimed at developing national capacities for education, research and applications in the core disciplines of remote sensing and GIS, satellite communications, satellite meteorology and global climate and space and atmospheric sciences. Each of the centres has adopted a set of standard curricula, developed with the support of prominent educators, for each of the core disciplines.

33. The importance of capacity-building in space science and technology and their applications was emphasized by the Committee on the Peaceful Uses of Outer Space in its report on the progress of implementing the recommendations of UNISPACE III (A/59/174) and a number of the actions in its plan to further implement the recommendations, endorsed by the General Assembly, are related to enhancing the capacity of developing countries to initiate space application programmes.

IV. Conclusion

34. Space science and technology and their applications, coupled with advances made in other fields of science and technology, can enable States to overcome obstacles to development and offer distinctive tools for ensuring sustainability.

35. By establishing a closer link between the Committee on the Peaceful Uses of Outer Space and the Commission on Sustainable Development, the synergies between the implementation of the recommendations of UNISPACE III and the

overarching development agenda set by the World Summit on Sustainable Development would be strengthened.

36. In accordance with the request of the General Assembly, the Committee will continue to examine the contribution that could be made by space science and technology and their applications to the issues selected by the Commission on Sustainable Development as a thematic cluster and will provide inputs for consideration by the Commission.

37. To strengthen its contribution to the work of the Commission and encourage interaction between the two bodies, the Committee invites the Director of the Division for Sustainable Development of the Department of Economic and Social Affairs of the Secretariat to participate in the sessions of the Committee to inform it on how it could best contribute to the multi-year programme of work of the Commission. The next session of the Committee will be held in Vienna from 7 to16 June 2006.

Notes

[1] *Report of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, 19-30 July 1999* (United Nations publication, Sales No. E.00.I.3), chap. I, resolution 1.