



**Committee on the Peaceful
Uses of Outer Space****Report on the United Nations/International Astronautical
Federation Workshop on Capacity-Building in Space
Technology for the Benefit of Developing Countries, with
Emphasis on Natural Disaster Management****(Vancouver, Canada, 2 and 3 October 2004)****Contents**

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I. Introduction

A. Background and objectives

1. In its resolution entitled “The Space Millennium: Vienna Declaration on Space and Human Development”,¹ the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III) recommended that activities of the United Nations Programme on Space Applications assist in the improvement of the capacity-building process in developing countries and countries with economies in transition by emphasizing the development of knowledge and skills.
2. At its forty-sixth session, in 2003, the Committee on the Peaceful Uses of Outer Space endorsed the programme of workshops, training courses, symposiums and conferences planned for 2004.² Subsequently, in its resolution 58/89 of 9 December 2003, the General Assembly endorsed the United Nations Programme on Space Applications for 2004.
3. Pursuant to General Assembly resolution 58/89 and in accordance with the recommendation of UNISPACE III, the United Nations/International Astronautical Federation Workshop on Capacity-Building in Space Technology for the Benefit of Developing Countries, with Emphasis on Natural Disaster Management, was held in Vancouver, Canada, on 2 and 3 October 2004, in conjunction with the 55th International Astronautical Congress, also held in Vancouver. The Workshop was organized by the Office for Outer Space Affairs of the Secretariat as part of the 2004 activities of the United Nations Programme on Space Applications and by the International Astronautical Federation (IAF) and was co-sponsored by the European Space Agency (ESA), the Canadian Space Agency (CSA) and the United Nations Educational, Scientific and Cultural Organization (UNESCO).
4. It was the fourteenth workshop on the subject organized jointly by the Office for Outer Space Affairs and IAF. The deliberations of the previous thirteen workshops, held between 1991 and 2003, had indicated that, while the potential benefits of space technology in developing countries were generally recognized, experience had shown that the successful use of space technology, especially in the area of natural disaster management, was subject to the resolution of some major issues, including the continuous development of human and budgetary resources, appropriate infrastructure and policy regulations.
5. The Workshop addressed those issues and discussed how capacity-building in space technology could help developing countries manage natural disasters. The main objectives of the Workshop were: (a) to increase the awareness among decision makers and managers dealing with disaster problems of the potential benefits of using space technologies in disaster prevention, management and rehabilitation; (b) to strengthen international and regional cooperation in those subjects; and (c) to develop a set of recommendations that could guide the incorporation of the use of space technologies in disaster management areas in developing countries and contribute to international and regional cooperation. The Workshop also provided a forum for discussion between space experts, policy and decision makers and representatives of the academic community and private industry from both developing and developed countries. All participants were

encouraged to share their experiences and to examine opportunities for better cooperation.

6. The present report includes the background and objectives of the Workshop as well as a summary of the discussions, observations and recommendations of the participants. It has been prepared for submission to the Committee on the Peaceful Uses of Outer Space at its forty-eighth session and to its Scientific and Technical Subcommittee at its forty-second session, both in 2005.

B. Programme

7. The programme of the Workshop was developed jointly by the Office for Outer Space Affairs and the programme committee of the Workshop, which included highly regarded and experienced representatives of a number of national space agencies, international organizations and academic institutions. A substantial contribution was made by the honorary committee of the Workshop, which consisted of prominent representatives of IAF, CSA, the International Space University and United Nations entities. The input received from both the honorary committee and the programme committee, as well as direct participation from members of those committees in the Workshop, ensured that the aims of the Workshop were achieved.

8. The programme of the Workshop focused on capacity-building in developing countries, which, in the area of disaster management, could be accomplished through international cooperation in various aspects such as the development of human and budgetary resources; adequate coordination among the technical and research organizations in charge of evaluating risks and responsible for emergency relief; and the development of infrastructure and policy regulations in that field.

9. The programme included five technical sessions: (a) disaster management support from space; (b) small satellite systems in support of disaster management; (c) capacity-building in developing countries; (d) international and regional cooperation; and (e) national case studies presented by the participants. A total of 29 oral technical presentations were delivered during the two-day Workshop, and nine papers were presented during the poster session. The presentations delivered during the Workshop focused on case studies of the use of space technologies in natural disaster management, as well as on the development of human, financial and technical resources required for building disaster management capacity in developing countries. International initiatives such as the Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters (International Charter on Space and Major Disasters) and the Integrated Global Observing Strategy, as well as efforts made by the Committee on the Peaceful Uses of Outer Space through its Action Team on Disaster Management, were also presented at the Workshop.

10. Opening statements were delivered by representatives of the Canadian Aeronautics and Space Institute, ESA, IAF, UNESCO and the Office for Outer Space Affairs. At the opening session, a keynote address was made by U. R. Rao (IAF) on the topic of “Dimensions of Capacity-Building for Disaster Management”. Closing remarks were made by representatives of Japan, IAF, UNESCO and the Office for Outer Space Affairs. The participants also benefited from a guest

presentation delivered on the second day of the Workshop by G. M. Nair, Chairman of the Indian Space Research Organisation.

11. Each of the technical sessions was followed by open discussions, which focused on specific topics of interest and provided additional opportunities for participants to voice their opinions. Those discussions were studied in-depth and summarized by four working groups established by the participants to develop a set of recommendations that could promote the use of space technologies for disaster management in developing countries and contribute to international and regional cooperation. The results of the deliberations of the working groups were summarized and presented at the closing session. A final discussion was held during that session, at which time the conclusions and recommendations resulting from the Workshop were adopted.

12. The detailed programme of the Workshop and its proceedings, along with the list of participants, have been made available on the web site of the Office for Outer Space Affairs (www.oosa.unvienna.org).

C. Attendance

13. The United Nations, on behalf of the co-sponsors, invited developing countries to nominate candidates for participation in the Workshop. Selected participants were required to have a university degree or well-established professional working experience in a field related to the overall theme of the Workshop. In addition, participants were selected on the basis of their working experience in programmes, projects or enterprises that were already using space technology applications or that could potentially benefit from using space technology. The participation of specialists at the decision-making level from both national and international entities was particularly encouraged.

14. The Office for Outer Space Affairs received over 90 applications for participation from more than 40 developing countries.

15. Funds allocated by the United Nations, ESA, IAF and CSA for the organization of the Workshop were used to cover in full the international air travel and per diem expenses of 20 speakers and participants from developing countries and countries with economies in transition. An additional five participants were provided partial funding to cover either air travel or per diem expenses or congress registration. Those 25 participants with full or partial funding came from 21 countries. The co-sponsors covered the cost of registration fees for 22 participants from developing countries to attend the 55th International Astronautical Congress, held immediately after the Workshop.

16. The Workshop was attended by a total of 91 participants from the following 33 countries: Bangladesh, Bolivia, Brazil, Canada, China, Czech Republic, Ethiopia, France, Germany, Honduras, India, Indonesia, Japan, Kenya, Malaysia, Mexico, Nepal, Nigeria, Pakistan, Philippines, Poland, Rwanda, Slovenia, Spain, Switzerland, Thailand, Timor-Leste, Turkey, Ukraine, United Kingdom of Great Britain and Northern Ireland, United States of America, Uzbekistan and Viet Nam. The following regional and international organizations and other entities were also represented at the Workshop: ESA, IAF, International Academy of Astronautics,

International Institute of Space Law, UNESCO and the Office for Outer Space Affairs.

II. Observations and recommendations

17. The Workshop participants recognized that space technologies could play important roles in providing information to assist in early warning and management after natural disasters. It was noted that information provided by Earth observation satellites and other space technologies were already an integral part of disaster management activities in many developed and developing countries.

18. Data from meteorological and Earth observation satellites provided essential information for hazard mapping, risk assessment, early warning and disaster relief and rehabilitation. Such data were particularly useful when combined with ground data and other information and integrated into geographical information systems for analysis and modelling of complex scenarios. Communications and navigation and positioning satellite systems were also important tools used for disaster prediction, warning and relief.

19. The Workshop recognized that participants at UNISPACE III had agreed to promote an integrated, global system, especially through international cooperation, to manage natural disaster mitigation, relief and prevention efforts, especially of an international nature, through Earth observation, communications and other space-based services, making maximum use of existing capabilities and filling gaps in worldwide satellite coverage. As a follow-up to the recommendation of UNISPACE III, the Action Team on Disaster Management had been established by the Committee on the Peaceful Uses of Outer Space to investigate the implementation of an integrated, space-based, global natural disaster management system. The Action Team had concluded its initial three-year work plan in the beginning of 2004 and had put forward a strategy which, when implemented, would contribute towards such a global system.

20. The Workshop also recognized the continued relevance of the observations and conclusions of the United Nations/International Astronautical Federation Workshop on Education and Capacity-Building in Space Technology for the Benefit of Developing Countries, with an Emphasis on Remote Sensing, held in Bremen, Germany, from 25 to 27 September 2003 (A/AC.105/812, paras. 18-37) to the following considerations regarding space-based applications for disaster management:

(a) The 700 global natural disasters occurring each year cost about US \$70 billion, caused about 60,000 deaths and affected some 200 million people. For a relatively small investment, space assets could reduce those social and economic costs significantly. For example, the advent of small satellite constellations made space more accessible for developing countries; the sharing of data and the transfer of technology from established space agencies to developing countries created synergy in the application of space technologies;

(b) Space assets were being used ever more effectively and in a more structured way to mitigate the effects of natural disasters; however, many aspects had not yet been sufficiently addressed by current operational capabilities. It was estimated that only 10 per cent of the potential demand for space information could be effectively serviced by existing space structures and organizations.

21. The Workshop noted that the international coordination of activities through the International Charter on Space and Major Disasters and the Disaster Monitoring Constellation was enabling developing countries to have immediate access to space-based data for disaster response.

22. The Workshop noted the need for better coordination and capacity development at the international, regional, national and local levels for the application of space systems to disaster vulnerability reduction, emergency response management, impact mitigation and post-disaster recovery.

23. The Workshop noted a lack of common standards for reference data. The wide availability of such standards would help in establishing preventive measures, reduce vulnerability to disasters and help in managing disaster responses.

24. The Workshop noted that, in several developing countries, the technical infrastructure necessary to make full use of the tools available to mitigate the effects of disasters did not exist at the local level.

25. The Workshop noted that the sources of funding to fully develop the capacity of space assets for disaster management had yet to be identified and committed.

26. Taking into account the above-mentioned observations, the Workshop made the following recommendations:

Partnership and organization

1. Responsible space entities should be encouraged to work with local, national and regional disaster management organizations in order to better coordinate and make use of space-based information systems to reduce the vulnerability of various regions to disasters;
2. The further development and worldwide application of the International Charter on Space and Major Disasters should be encouraged and support should be given to the creation of an integrated, space-based global natural disaster management system, as recommended by UNISPACE III;
3. Regional organizations such as the Organization of American States, the Intergovernmental Authority on Development, the Economic Community of West African States, the European Union and the Association of South-East Asian Nations should be encouraged, through their disaster management departments, to participate in promoting among their constituencies, space applications and international cooperating mechanisms already in place, such as the International Charter on Space and Major Disasters, in order to broaden their use, especially by countries that are more prone to disasters;

Capacity-building

4. Capacity-building in developing countries should be encouraged in order to better manage and mitigate the effects of, and reduce vulnerability to, disaster events;
5. The effectiveness of capacity-building should be increased by addressing national priorities and specific national disaster concerns and by focusing on the real-world application of the relevant space technology data and know-how;
6. United Nations entities should be encouraged to collaborate with one another and with local organizations in the development of curricula for the integrated use of remote sensing technology for disaster management, which would be applicable in regional, national and local areas;
7. Advanced courses should be organized on the space technologies relevant to the application of disaster management through the regional centres on space science and technology education, affiliated to the United Nations, or local universities in cooperation with regional initiatives. In order for the courses to be more widely available to local practitioners, the Regional Centres should make an effort to associate themselves with universities or technical institutes in the region to offer such courses. The training could be supported by technology-based learning programmes (e-learning);
8. Space technologies should be used to develop a means of closing the digital gap within developing countries and to provide all-weather access to broadband observation data, especially in disaster-prone rural areas;

Technical assets

9. Space technology advancements should be coordinated and developed in order to allow more rapid and comprehensive responses to natural disasters by enhancing observations and measurements (such as changes in the climate, environment and geophysical conditions) and communications capacities;
10. States should be encouraged to use the space assets available for disaster management under existing agreements, such as the International Charter on Space and Major Disasters;
11. States should be encouraged to consider acquiring their own small satellite assets and to work within a cooperative disaster monitoring constellation, in order to gain the benefits of freely accessible data; to stimulate national remote sensing capacity; to broaden the number of States that can contribute to the global coordination of Earth observation constellations for disaster management; and to improve revisiting frequency over crisis areas and develop a baseline database;
12. Space technologies should be used to provide all-weather access to broadband observation data within developing countries, especially in disaster-prone rural areas;

Databases and data access

13. A virtual library should be established, including case studies, pilot projects, Charter-triggered cases, and in-kind satellite data from space agencies to aid in modelling and analysis. Available metadata for library contents should be included when possible;
14. A network to share information should be established and further data deposits should be developed that are open to the disaster management community, through public image servers opened to authorized users;
15. The establishment and sharing of regional data repositories that contain data of local geographical environment should be encouraged. The regional practitioners should be responsible for organizing and maintaining the data repository;
16. Common standards and methods should be established for mapping global risks for various forms of possible natural disaster events, with a focus on the most vulnerable areas;
17. Data continuity should be maintained in order to preserve the value and applicability of the developed user infrastructure;

Involving the user community

18. The World Conference on Disaster Reduction, to be held in Kobe, Hyogo, Japan, from 18 to 22 January 2005, should be used as an opportunity to strengthen the dialogue between the space community and the disaster management community; to establish a long-term partnership between those communities; to enhance the global visibility of the International Charter on Space and Major Disasters; and to encourage the further development of the Charter beyond the space community;
19. The Workshop and the thematic session on space for disaster management should be used to prepare for action at the World Conference on Disaster Reduction;

Implementation focus

20. Organizations providing or using space assets for disaster management should be encouraged to increase prevention and proactive involvement by placing the focus of analysis on disasters with long lead indicators such as droughts, floods and landslides; to increase the awareness and capability of local practitioners in managing disasters with the use of space assets; and to develop appropriate global reference databases for use during and after disasters;
21. Focus on vulnerability reduction, mainly at the local community level;
22. Technology transfer should be promoted in order to empower the local population, which is a sine qua non condition for vulnerability reduction and further mitigation of the losses incurred by disasters;

Resources

23. Resource commitments should be sought at the higher political level for the development of institutional capabilities to fully utilize space technologies for disaster mitigation. Specific workshops targeting the interests of decision makers could help build needed support;
24. Efforts should be made to match investments in space technology with investments in appropriate computing and software facilities on the ground for exploitation of the data in local organizations and academic institutions;
27. In addition to the technical conclusions, the participants recommended that the United Nations/IAF workshops should continue and should be used as an important instrument in implementing the recommendations of UNISPACE III.

Notes

¹ See *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.

² *Official Records of the General Assembly, Fifty-eighth Session, Supplement No. 20 (A/58/20)*, para. 75.
