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Committee on the Peaceful Uses of Outer Space

United Nations/Chile/European Space Agency Workshop on the Use of Space Technology for Disaster Management in Latin America and the Caribbean

(La Serena, Chile, 13-17 November 2000)

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I. Introduction

A. Background and objectives

1. The Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III), in its resolution entitled "The Space Millennium: Vienna Declaration on Space and Human Development", [1] recommended that activities of the United Nations Programme on Space Applications promote collaborative participation among Member States at both the regional and international levels, emphasizing the development of knowledge and skills in developing countries.

2. Disaster management has been identified as one of the areas of focus. Earth observation satellites and other space-based technologies provide important and unique solutions in all phases of disaster management: disaster mitigation, disaster preparedness, disaster relief and disaster rehabilitation. Such solutions are already an integral part of disaster management activities in many developed and even developing countries.

3. Although national capabilities in the use of space technologies in developing countries have increased significantly in recent years, there is still a need to support in a more direct way the transfer of available solutions for use in disaster management activities, while fine-tuning some of the approaches to meet the specific needs of a country.

4. In order to promote the use of space technology for disaster management in developing countries and in countries with economies in transition, the Office for Outer Space Affairs, within the framework of the United Nations Programme on Space Applications, embarked on organizing, over a five-year period, six workshops (five regional workshops and one final international workshop, which will bring together experts from all five regions) on the use of space technology for disaster management, bringing together specialists who have already developed space-based technology solutions for dealing with disaster management and those responsible for dealing with disaster management and the use of space technology in developing countries.

5. The overall objective of the above-mentioned efforts is the successful integration of space technology solutions in a sustainable manner into the operational disaster management programmes of Member States, through the development and implementation of appropriate pilot projects. The regional workshops are the first step towards defining the pilot projects. In addition to the workshops and pilot projects, the approach also includes a training component and the presentation of best practices to high-level disaster managers and decision makers from national and international institutions, including potential funding institutions.

6. Together with the Government of Chile and the European Space Agency (ESA), the Office for Outer Space Affairs organized the United Nations/Chile/European Space Agency Workshop on the Use of Space Technology for Disaster Management in Latin America and the Caribbean. The Workshop was co-sponsored by the Ministry of Foreign Affairs, the Intendencia of the Fourth Region of Coquimbo, the International Air and Space Fair (FIDAE 2002), the

University of La Serena and its Centre for Aeronautical and Space Studies (CEADE). The Workshop was hosted by the University of La Serena and held in La Serena, Chile, from 13 to 17 November 2000.

7. The objectives of the regional workshops were: (a) to increase awareness among managers and decision makers involved in disaster management of the potential benefits and the cost-effectiveness of using space technologies; (b) to determine the types of information and communication needed in managing specific disasters and the extent to which they could be obtained using space technologies; and (c) to develop a blueprint of actions that could lead in the near future to one or more pilot projects that incorporated and tested the use of space tools in disaster management.

8. Several initiatives, many within the United Nations system, focus on making space technology solutions available to those responsible for dealing with disaster-related activities in developing countries. The workshops, together with the follow-up activities, are being planned and implemented taking into consideration the specific initiatives described below.

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9. In its resolution 54/68 of 6 December 1999, the General Assembly endorsed the resolution entitled "The Space Millennium: Vienna Declaration on Space and Human Development" (see para. 1) and urged organizations within the United Nations system to take the necessary action for the effective implementation of the Vienna Declaration. The Vienna Declaration included a number of recommendations, one of which called for action to be taken to implement 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.[2]

10. At its forty-fourth session, in 2001, the Committee on the Peaceful Uses of Outer Space decided that it would address several of the recommendations, including the one mentioned in paragraph 9 above, through action teams under the voluntary leadership of member States.[3] The Committee received offers from Canada, China and France to lead the Action Team on the implementation of an integrated, global system to manage natural disaster mitigation, relief and prevention efforts. The initial three-year work plan of the Action Team includes the compilation of information on user needs for disaster management, on national capacity for utilizing space-derived information on disaster management and on existing and planned operational space systems in support of disaster management.

International Strategy for Disaster Reduction

11. Recognition of the fact that disasters were an increasing problem led to the launching of the International Decade for Natural Disaster Reduction for the period 1990-1999, which in turn led to the establishment of the International Strategy for Disaster Reduction, a global strategy with two institutional components. The first is the Inter-Agency Task Force for Disaster Reduction and the second the secretariat of the Task Force and of the International Strategy. The International Strategy focuses on consolidating a global strategy to encourage and facilitate concerted action to

reduce risk and vulnerability to natural and related technological and environmental hazards, bringing together Governments, business, academia and civil society at the international, regional and local levels and facilitating concerted action and dialogue among experts, decision makers and project managers.

United Nations Educational, Scientific and Cultural Organization

12. Within the framework of the International Strategy for Disaster Reduction, the United Nations Educational, Scientific and Cultural Organization (UNESCO) is focusing on building a culture of prevention to counter disasters and reduce the vulnerability of populations at risk. UNESCO is engaged in the assessment and mitigation of risks arising from hazards of geological origin (earthquakes, tsunamis, volcanic eruptions and landslides) and contributes to the study of hazards of meteorological origin (storms, floods, prolonged drought and desertification).

13. UNESCO also fosters information, education, transfer of data and experience among countries and communities aiming at integrating geohazard knowledge and expertise in decision-making processes in order to encourage the adoption of policies and actions for sound planning and management of land-use and construction techniques and to promote the development of preventive and preparedness plans, including the implementation of global to local warning systems.

Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters

14. The Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters (also known as the International Charter "Space and Major Disasters") enables countries where a natural or technological disaster has occurred to receive products derived from satellite images to support disaster response activities. The institutions participating in the Charter are the European Space Agency (ESA), the Centre national d'études spatiales of France, the Canadian Space Agency, the Indian Space Research Organization, the National Oceanic and Atmospheric Administration of the United States of America and more recently the National Commission on Space Activities (CONAE) of Argentina. The Office for Outer Space Affairs is a cooperating body of the Charter, which enables the Office to provide access to the Charter to organizations of the United Nations system and Member States in the event of major disasters.

Committee on Earth Observation Satellites

15. The Committee on Earth Observation Satellites (CEOS) is an international organization charged with coordinating international civil space-borne missions designed to observe and study the Earth. CEOS, whose membership is comprised of space agencies and other national and international organizations, is recognized as the major international forum for the coordination of Earth observation satellite programmes and for interaction of those programmes with users of satellite data worldwide.

16. The CEOS Disaster Management Support Group completed its work in 2002, delivering its final report in November of that year during the CEOS plenary meeting. CEOS endorsed the recommendation that activities of the Support Group

be integrated into the International Charter "Space and Major Disasters", the workshops organized by the Office for Outer Space Affairs and their follow-up activities and the geohazards theme of the Integrated Global Observing Strategy (IGOS).

B. Programme

17. At the opening session of the United Nations/Chile/European Space Agency Workshop on the Use of Space Technology for Disaster Management in Latin America and the Caribbean, welcoming statements were made by representatives of the University of La Serena, CEADE, FIDAE 2002, the Ministry of Foreign Affairs of Chile, the Intendencia of the Fourth Region of Coquimbo, ESA and the Office for Outer Space Affairs.

18. The programme of the Workshop included a keynote address, seven thematic sessions and three panel discussion sessions. The representative of the International Strategy for Disaster Reduction delivered the keynote address, which was entitled "A strategy for disaster reduction: an overview of global needs and possible actions to be taken".

19. A total of 29 presentations were delivered in the seven thematic sessions, covering recent examples of economic and social impacts in various countries of the region and all aspects of the current use of space technology for disaster management. Three discussion panels, followed by general discussion, were held to identify the disasters of main relevance to the region of Latin America and the Caribbean. The purpose was to identify actions to be taken in the near term that could lead to pilot projects whereby interested national institutions responsible for disaster management could test and incorporate the use of space technologies through international cooperation. The discussions also aimed to establish synergies among initiatives already started in various areas of disaster management. Working group discussions held on the last two days enabled further deliberation on the main topics that subsequently formed the framework of a proposed plan of action with specific viable pilot projects and the definition of the steps forward.

C. Attendance

20. A total of 191 participants from the following 22 countries attended the Workshop: Argentina, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Ecuador, France, Guatemala, Guyana, Honduras, Jamaica, Japan, Mexico, Nicaragua, Peru, Russian Federation, Spain, United Kingdom of Great Britain and Northern Ireland, United States of America and Uruguay. The secretariat of the International Strategy for Disaster Reduction, the Office for Outer Space Affairs, the International Telecommunication Union (ITU), the World Meteorological Organization (WMO), the Pan American Health Organization (PAHO), the Committee on Earth Observation Satellites (CEOS), the European Association for the International Space Year (EURISY), the European Space Agency (ESA), the National Oceanic and Atmospheric Administration of the United States and Surrey Satellite Technology were also represented.

21. Funds allocated by the United Nations and ESA were used to defray the cost of air travel and living expenses of 22 participants as well as two representatives of the Office for Outer Space Affairs. The Government of Chile, through the entities mentioned in paragraph 6, provided room and board for an additional 15 participants, as well as the conference room, other meeting facilities and local transportation for all participants.

II. Observations and recommendations

A. Current status and needs

22. The seven thematic sessions focused on building an understanding of current needs, the current institutional environment and current available space-based solutions, with presentations covering the following topics: ongoing activities, current status and needs, enhancing disaster management through the use of space technology, specific United Nations system activities to support disaster management, current and future sources of Earth observation data and the possible role of the private sector.

23. After 29 presentations and three discussion panels, valuable observations were made, important conclusions were drawn and a plan of action was put forward. The observations and recommendations that follow are geared towards the operational use of satellite data for disaster reduction and emergency management.

24. The participants indicated that all disasters affected the lives and well-being of people and that to the extent possible action should be taken to incorporate the use of space technology to assist national institutions involved in disaster management to carry out their functions, taking into account that disaster reduction was multi-disciplinary and cross-sectoral in nature.

25. Participants identified 16 hazard themes that were of great importance to countries of Latin America and the Caribbean and that should be the subject of risk and vulnerability assessments and scenario development, monitoring, early warning and emergency management support, as appropriate. Those hazard themes are listed in paragraph 49.

26. The Workshop also emphasized that capacity-building, including training and on-the-job experience, was essential to the proper and increased use of space tools for disaster management. Awareness of the existing information systems and access to information and data were also required.

27. It was noted that capacity-building should focus on the need to continuously capacitate the end-user and to develop solutions specific to the region. Appropriate human resources could be considered the single most important resource to have available during a crisis, but the training of staff required time and effort.

28. The Workshop noted that there was a large amount of experience that had been gained through existing projects, programmes and other activities both within and outside the region of Latin America and Caribbean. Participants indicated that, where applicable, those experiences should be utilized and shared.

29. One of the objectives of the Workshop was to explore the feasibility of demonstration projects using space applications for disaster management by relevant national institutions. Participants agreed that the criteria for initiating such projects should include commitment by an institution to take the lead to carry out the project.

30. Participants recommended that the Office for Outer Space Affairs inform relevant organizations active in space applications for disaster management of the outcome of the Workshop and invite them to indicate their interest in participating in a pilot project in any of the areas of concern identified.

31. Participants also recommended that the Government of Chile inform the Committee on the Peaceful Uses of Outer Space of the results of the Workshop. Further to that recommendation, Ricardo Cabezas (Chile) made a presentation to the thirty-ninth session of the Scientific and Technical Subcommittee of the Committee, in 2001. In his presentation, Mr. Cabezas proposed a first-phase three-year plan that called for specific needs and interests to be identified during the first two years and for preparations for pilot projects to begin in the third year.

32. In accordance with that proposal, in 2003 the Office for Outer Space Affairs, in cooperation with CONAE, organized the first meeting of experts to launch pilot projects related to the use of space technology in the management of fires and floods (see paras. 62-66 below).

Overview of the technical presentations

33. Participants and speakers at the Workshop included programme managers from disaster management institutions. A number of presentations made by representatives of the National Forest Agency, the Metropolitan Technical University and the University of Antofagasta of Chile, the National Institute for Meteorology and Hydrology of Ecuador, the National Institute for Civil Defence of Peru and the National Centre for Disaster Prevention of Mexico illustrated the economic and social effects of various types of disaster in their respective countries as well as the difficulties that they encountered in managing those disasters.

34. It was noted that a number of available technologies could provide data for use in disaster management: remote sensing technologies (satellite images and aerial photography), which provided data on land use, land cover, bodies of water, vegetation and other terrain features; light detection and ranging (lidar) devices, which were being used to create digital elevation models for natural landscape features and buildings; ground-surveying tools, which produced maps for boundaries and other landscape elements; governmental censuses and surveys, which provided socio-economic data for defined spatial units; global navigation satellite systems (GNSS), which offered a means of obtaining positional information for stationary or moving objects; wireless telecommunication developments, which facilitated emergency communication and interpersonal contacts during disasters; wireless technologies, which provided a means for data logging in the field; and Internet products and services, which provided access to and dissemination and sharing of data, other information and knowledge on a real-time basis.

35. The presentations also addressed how to access satellite data and how to create databases for integration into geographic information systems (GIS), thus making possible GIS-based solutions that contributed to the analysis, evaluation and

monitoring of areas predisposed to disasters. The presentations further examined various measures to strengthen early warning systems and disaster relief and rehabilitation operations.

36. Several presentations gave participants the opportunity to learn of the extent to which space technology had been incorporated into disaster management activities in the region, in particular those relating to floods, droughts, cyclones, seismic activity, landslides, fire detection and monitoring, technological risks and volcanic activity. The presentations provided an opportunity to deepen understanding of the types of hazard that were specific to the region, the data needed to deal with such hazards, current data availability, including having access to the data at the appropriate time and in the appropriate format, and finally the existing technologies available and the solutions developed that made use of such technologies.

37. A presentation made on behalf of the CEOS Disaster Management Support Group provided an opportunity to learn about the work being done to consolidate a framework of user requirements (in terms of spatial, spectral and temporal resolution of satellite imagery) and the present capabilities of the existing Earth observation satellites to meet such requirements in the following hazard areas: earthquakes, fires, floods, landslides, oil spills, sea ice and volcanic activity (http://disaster.ceos.org).

38. A joint presentation by ESA and the British Columbia Forest Service of Canada described how the ESA REMSAT project, which integrates the use of Earth observation data and satellite communications to combat forest fires, was being introduced as an operational tool in the British Columbia Forest Service.

39. Existing satellite capabilities are being used as an integral part of a global programme for cyclone warning. Such proven solutions could be used in various countries, in particular for countries in the Caribbean and Central America.

40. Through a presentation made by ESA, participants learned about the Environmental Satellite (ENVISAT) to be launched in March 2002. The satellite was to carry on board 11 instruments that would make possible the simultaneous imaging of the Earth's surface by different sensors, thereby providing an invaluable source of data to support various areas, including disaster management.

41. Participants were also briefed on the Advanced Land Observing Satellite of Japan, which with its high-resolution optical and radar sensors could be used for disaster monitoring and in particular for digital elevation mapping.

42. Participants at the Workshop were informed about the planned disaster monitoring constellation of small, low-cost satellites, coordinated by Surrey Satellite Technology of the United Kingdom, which would give users the possibility, once all four planned satellites were launched, of a daily revisit over a disaster area.

43. A presentation made on behalf of the International Charter "Space and Major Disasters" informed participants that the Charter had become operational on 1 November 2000.

44. A presentation made on behalf of the International Strategy for Disaster Reduction stressed that in the previous 25 years both the number of occurrences of natural disasters and the number of people reported to be affected by those disasters had increased. That was due to the increase in the number of extreme events and the

vulnerability of people to natural and related technological and environmental hazards. The increase in extreme events was attributable to climate change and variability and also to the compound effect of several hazards occurring in the same area. The increase in vulnerability was due to increased poverty, environmental degradation, urban growth, the value of the constructed environment and unsuitable development processes.

B. A vision for Latin America and the Caribbean

45. Building upon the information provided during the thematic sessions, participants outlined a path leading to a common vision of how space technology should be incorporated into disaster management activities. A better understanding of identifying users was needed, so that solutions could be designed, from the bottom up, based on the needs of end-users.

46. Given that decision makers at disaster management institutions had diverse needs, the solution envisaged to make use of space technology for all was an integrated information platform that could accommodate information from different sources, in different forms and on varying scales. Solutions should be developed that considered the needs of disaster managers and took advantage of all types of space technology, such as Earth observation satellites, telecommunication satellites and GNSS, to meet those needs.

47. Capacity-building should be aimed at increasing the capability of organizations and individuals to use geospatial information effectively for disaster preparedness, response and recovery.

III. Plan of action for Latin America and the Caribbean

A. Building partnerships

48. The central point of the plan of action discussed at the Workshop was the need to build partnerships and carry out joint pilot projects to demonstrate the benefits of incorporating solutions based on space technology, thereby contributing to raising the level of awareness of decision makers. The starting point in defining possible partnerships was to seek common interests, through the identification of common hazard areas.

49. The Workshop took a two-stage approach in defining common hazard areas. During the first stage, participants defined 16 hazard areas that should be considered separately: forest and grassland fires, earthquakes and tsunamis, volcanic eruptions, floods, cyclones, drought, landslides, severe snowstorms, technological risks, impact on marine and coastal systems, extreme temperatures, epidemiological and entomological risks, avalanches and mudflows, desertification and deforestation, oil spills and plagues.

50. During the second stage, institutions expressed their interest in participating in each of the 16 hazard areas. A total of 36 institutions demonstrated their interest by making an initial commitment, in principle, to participating in efforts in one or more hazard areas. For 13 of the 16 themes, at least one institution involved in disaster

management was willing, in principle, to become leader of a team that would develop a proposal for a pilot project. Because of the high level of interest of the participating institutions and the fact that institutions outside the region of Latin America and the Caribbean had shown an interest in participating in some of the pilot project teams, two or three pilot projects were expected to be undertaken in the near term.

51. When identifying possible pilot projects, institutions should recognize work in progress, especially work that already had local commitment. Institutions involved would interact primarily using the Internet and facsimile, providing information to all interested institutions on activities being proposed or carried out and fostering viable partnerships among the different initiatives and interests.

52. The pilot projects will be designed and carried out with international cooperation and will be aimed at creating synergy among the regional initiatives of various institutions or groups of institutions. Institutions willing to cooperate on the pilot projects will be invited to participate in expert meetings to determine the terms of reference of the pilot projects and to prepare a joint implementation strategy.

53. It was agreed that the table indicating commitments in principle by institutions to specific hazard themes should develop into a regional network of cooperation and that the implementation of the regional network would involve the following activities: extending the network to other institutions; setting up a Web-based discussion list (to support both regional and global activities); setting up a web site to disseminate information on progress and achievements and following up on stated initial commitments.

54. The regional network proposed at the Workshop was aimed at attracting the participation of governmental and academic institutions, non-governmental organizations, private industry and entities of the United Nations system. Any institution that incorporated space technology for disaster management activities and was interested in developing activities in the region would be able to join the regional network.

55. In order to define the responsibilities of each institution, the terms of reference for suggested pilot projects and a strategy for their implementation, it was suggested that the interested institutions should convene expert meetings to discuss those topics.

56. Teams would work on a “best efforts” basis. Each institution would be responsible for its own expenses. If additional funding support was needed for satellite images or hardware and software, or other equipment, the team could contact interested space agencies or bilateral and multilateral development institutions, or both, to secure the additional support required.

57. In view of the participation of the CEOS Disaster Management Support Group and the secretariat for the International Strategy for Disaster Reduction, it is possible that one or more of the pilot projects resulting from the Workshop could be used to develop test procedures for the response by space agencies to specific disasters. Such action would increase the visibility of those projects for all the CEOS agencies and thus the likelihood of the support of additional agencies for the pilot projects. The report on the Workshop and of its follow-up activities will also contribute to the work of the Scientific and Technical Subcommittee as it addresses

its three-year work plan on the implementation of an integrated, space-based global natural disaster management system.

B. Role of the Office for Outer Space Affairs

58. It was agreed that, as follow-up to the initial commitments made at the Workshop, the Office for Outer Space Affairs would contact the institutions that had expressed an interest in joining the network and request them to confirm their participation in the hazard themes in which they were interested. The regional network database would be maintained and updated by the Office with the support from interested institutions.

59. The Office for Outer Space Affairs would also support, to the extent possible, expert meetings convened by institutions that used space technology for disaster management activities and that were interested in developing joint pilot projects. At those meetings, terms of reference for the pilot projects would be defined and implementation strategies would be developed, including the securing of any additional funding, if necessary.

60. The web sites of the Office for Outer Space Affairs (see www.oosa.unvienna.org/SAP/stdm) would be enhanced by the addition of relevant links and information on space technology applications for disaster management, for the benefit of the regional network. All participating institutions would be responsible for providing information to be posted on the web sites. A discussion list would also be set up to support participants of the regional network (www.ungiwg.org/mailman/listinfo/unoosa-stdm).

C. Moving forward with expert meetings

61. The Workshop demonstrated that space-based technologies had a real contribution to make in all areas of disaster management and that measures needed to be taken to ensure the deployment of the technologies currently available. The establishment of a regional network of institutions interested in fostering partnerships and developing joint pilot projects was an important step towards achieving greater use of space technology to support disaster management activities. It was noted that the institutions that had expressed an interest in participating, as well as the other institutions and the private sector that would be invited to join, should seize the opportunity offered by the available cutting-edge technologies to define and implement solutions to the pressing disaster threats that had become an everyday reality in the region.

62. A step further in the definition of those solutions, as discussed at the Workshop, was to convene expert meetings, bringing together institutions interested in developing together activities that incorporated space technology into disaster management activities. The first such meeting was held in Córdoba, Argentina, from 24 to 26 November 2003.

63. The expert meeting focused on space technology for flood and fire disaster management and was organized by CONAE with support (including funding for travel expenses of selected participants) from the Office for Outer Space Affairs and

ESA. The two-and-a-half-day meeting brought together 45 experts from Argentina, Bolivia, Brazil, Chile, Ecuador, France, Mexico, Paraguay, Peru, Spain and Venezuela and representatives of the Office for Outer Space Affairs and ESA.

64. Participants established two subgroups, with one group focusing on defining a project in the area of floods and the other on a project in the area of fire. The last morning was reserved for feedback to the group as a whole. The subgroups were attended by 22 or 23 experts each, providing an ideal environment for building upon the work already being carried out in Latin America. The fire project will focus on compiling base products to support early warning activities and also response and recovery activities. A regional network (REDLATIF) was created and responsibilities were assigned to several of the experts. Fire is a theme well developed in Latin America and minimum coordination through the network will maximize possible results.

65. The flood project focused on defining the implementation of an operational early warning system for floods and drought in South America within three years with concrete results for the region.

66. The meeting achieved its main objective, which was to develop a common understanding of how to move forward in Latin America with specific project activities that would contribute to the incorporation of space technology in the areas of flood and fire disaster management.

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.

[2] Ibid., sect. I, para. 1 (b) (ii).

[3] *Official Records of the General Assembly, Fifty-sixth Session, Supplement No. 20* and corrigendum (A/56/20 and Corr.1), paras. 44-62.