



# General Assembly

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## Committee on the Peaceful Uses of Outer Space

### Report of the Expert on Space Applications\*

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\* It was necessary to summarize in the present report each of the activities organized during 2009 under the United Nations Programme on Space Applications, the last of which was concluded on 3 December 2009.



## **I. Introduction**

1. At its forty-sixth session, in 2009, the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space reviewed the activities of the United Nations Programme on Space Applications. The Subcommittee noted that the activities of the Programme for 2008 had been carried out satisfactorily. On the recommendation of the Committee, the activities of the Programme for 2010 were noted with appreciation by the General Assembly in its resolution 64/86. The Subcommittee recommended to the Committee, for its approval, the activities scheduled for 2010 and noted the other activities of the Programme. All of the activities were to be implemented as part of the recommendations of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III) related to space applications,<sup>1</sup> as proposed in the report of the Expert on Space Applications (A/AC.105/925) submitted to the Scientific and Technical Subcommittee at its forty-sixth session, in 2009. Information on the activities carried out within the framework of the Programme in 2009 and those scheduled for implementation in 2010 are presented in annexes I and II.

## **II. Mandate of the United Nations Programme on Space Applications**

2. In its resolution 37/90, the General Assembly expanded the mandate of the United Nations Programme on Space Applications to include, in particular, the following elements:

(a) Promotion of greater exchange of actual experiences with specific applications;

(b) Promotion of greater cooperation in space science and technology between developed and developing countries as well as among developing countries;

(c) Development of a fellowship programme for in-depth training of space technologists and applications specialists;

(d) Organization of seminars on advanced space applications and new system developments for managers and leaders of space application and technology development activities, as well as seminars for users in specific applications;

(e) Stimulation of the growth of indigenous nuclei and an autonomous technological base with the cooperation of other United Nations organizations and/or States Members of the United Nations or members of the specialized agencies;

(f) Dissemination of information on new and advanced technology and applications;

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<sup>1</sup> 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).

(g) Provision or arrangements for provision of technical advisory services on space applications projects, upon request by Member States or any of the specialized agencies.

3. In its resolution 59/2, the General Assembly endorsed the Plan of Action proposed by the Committee on the Peaceful Uses of Outer Space for implementation of the recommendations of UNISPACE III (A/59/174, sect. VI.B), and urged all Governments, entities of the United Nations system and intergovernmental and non-governmental entities conducting space-related activities to carry out the Plan of Action on a priority basis for the further implementation of the recommendations of UNISPACE III, in particular its resolution entitled “The Space Millennium: Vienna Declaration on Space and Human Development”.<sup>2</sup>

### III. Orientation of the Programme

4. The Programme is aimed at further promoting, through international cooperation, the use of space technologies and data for sustainable economic and social development in developing countries by raising the awareness of decision makers of the cost-effectiveness and additional benefits to be obtained; establishing or strengthening capacity in developing countries to use space technology; and strengthening outreach activities to disseminate awareness of the benefits obtained.

5. The overall strategy of the Programme is to focus on selected areas that are critical for developing countries, defining and working towards objectives achievable in two to five years and built on the results of previous activities. These priority areas of the Programme, as noted by the Committee on the Peaceful Uses of Outer Space at its forty-seventh session<sup>3</sup> are: (a) disaster management; (b) satellite communications for tele-education and telemedicine applications; (c) monitoring and protection of the environment, including the prevention of infectious diseases; (d) management of natural resources; (e) developing capabilities in the use of global navigation and positioning satellite systems; (f) education and capacity-building, including research areas in basic space sciences; and (g) space law.

6. Additional Programme directions include spin-offs of space technology, promoting the participation of youth in space activities, capacity-building in basic space technology development such as small satellite applications and human space technology utilizing the International Space Station, and promoting the participation of private industry in the activities of the Programme.

7. At its forty-fourth session, in 2001, the Committee identified the recommendations of UNISPACE III that had the highest priority, noting that offers had been made by interested member States to exercise leadership in implementing some of those recommendations. The Committee agreed to establish action teams to implement those recommendations under the voluntary leadership of interested

<sup>2</sup> Ibid., chap. I, resolution 1.

<sup>3</sup> *Official Records of the General Assembly, Fifty-ninth Session, Supplement No. 20 and corrigenda (A/59/20 and Corr.1 and 2)*, para. 66.

member States.<sup>4</sup> Programme activities have supported those action teams as much as possible.

8. The Programme is implemented by:

(a) Providing support for education and training for capacity-building in developing countries through the regional centres for space science and technology education, affiliated to the United Nations;

(b) Organizing workshops and seminars on advanced space applications and short and medium-term training programmes;

(c) Strengthening its long-term fellowship programme to include support for the implementation of pilot projects;

(d) Supporting or initiating pilot projects as follow-up to activities of the Programme in areas of priority interest to member States;

(e) Providing technical advisory services, upon request, to Member States, bodies and specialized agencies of the United Nations system and relevant national and international organizations;

(f) Enhancing access to space-related data and other information.

## **IV. Activities of the Programme**

### **A. Training for capacity-building in developing countries**

#### **1. Regional centres for space science and technology education, affiliated to the United Nations**

9. In its resolution 64/86, the General Assembly noted with appreciation that the African regional centres for space science and technology education, in French language and English language, located in Morocco and Nigeria, respectively, as well as the centre for space science and technology education in Asia and the Pacific and the regional centre for space science and technology education for Latin America and the Caribbean, affiliated to the United Nations, had continued their education programmes in 2009. The Assembly agreed that the regional centres should continue to report to the Committee on their activities on an annual basis. The Assembly also welcomed the fact that the regional centres would serve as information centres for the International Committee on Global Navigation Satellite Systems (ICG).

10. The governing boards, which are the overall policymaking bodies, of all the regional centres are holding regular meetings.

11. The Programme has invited all the regional centres to submit reports on their educational activities and operational status and on recent developments in their work. Reports and presentations on the activities of the regional centres are available on the website of the Office for Outer Space Affairs of the Secretariat (<http://www.unoosa.org/oosa/en/SAP/centres/index.html>). A summary of those

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<sup>4</sup> Ibid., *Fifty-sixth Session, Supplement No. 20* and corrigendum (A/56/20 and Corr.1), paras. 50-55.

reports is contained in *Capacity-Building in Space Science and Technology: Regional Centres for Space Science and Technology Education, Affiliated to the United Nations (ST/SPACE/41)*. Based on those reports, the Programme carries out an annual global outreach campaign to raise the awareness of Member States and United Nations Development Programme offices on the activities of the centres.

12. The overall goal of the regional centres remains to develop, through in-depth education, an indigenous capability for research and applications in remote sensing and geographic information systems, satellite meteorology and global climate, satellite communications, and space and atmospheric science. Education curricula for those four disciplines have been developed through expert meetings held under the Programme. Two further model curricula are currently being developed under the auspices of the United Nations in the area of global navigation satellite systems (GNSS) and space law.

13. Highlights of the activities of all regional centres supported under the Programme are included in annex III.

14. At its fourth meeting, held in Saint Petersburg, Russian Federation, from 14 to 18 September 2009, ICG developed further the concept according to which the regional centres would act as ICG information centres.

15. The Programme is carrying out preparatory work to hold the fourth United Nations expert meeting on the regional centres for space science and technology education, in 2010. At that meeting, efforts will be made to revise, update and expand existing education curricula.

16. The centre for space science and technology education in Asia and the Pacific prepared a comprehensive document titled *CSSTEAP Performance Assessment and Outlook for the Future*, which was discussed at the thirteenth and fourteenth meetings of its governing board, held in November 2008 and September 2009, respectively. That document has been made available to all regional centres for space science and technology education, affiliated to the United Nations, and will be made available to the Committee and its subsidiary bodies.

## **2. Fellowship programmes for training**

17. In 2004, the Government of Italy, through the Politecnico di Torino and the Istituto Superiore Mario Boella and with the collaboration of the Istituto Elettrotecnico Nazionale Galileo Ferraris, initiated an offer of 12-month fellowships for postgraduate study on GNSS and related applications for specialists from developing countries. The sixth class of the fellowship programme commenced its studies in September 2009. Four representatives of governmental organizations and research and academic institutions from India and Pakistan were jointly selected by the Programme and the sponsoring organizations for fellowships to study at the Politecnico di Torino in Turin, Italy.

18. In 2007, the Programme and the National Commission on Space Activities (CONAE) of Argentina jointly established the United Nations/Argentina fellowship programme for advanced training in landscape epidemiology, an annual six-week training course held at the Mario Gulich Institute for Higher Space Studies in Córdoba, Argentina. It was established as a follow-up to the United Nations/European Space Agency/Argentina Workshop on the Use of Space

Technology for Human Health for the benefit of the countries in Latin America (A/AC.105/860), held in Argentina in 2005, and in support of the Action Team on Public Health of the Committee.

## **B. Space science, space technology and their applications**

### **1. Natural resources management and environmental monitoring**

19. The United Nations/Peru/Switzerland/European Space Agency Workshop on Integrated Space Technology Applications for Sustainable Development in the Mountain Regions of Andean Countries was held in Lima from 14 to 18 September 2009 (A/AC.105/968). To date, the Programme and host countries have organized four workshops on space technology applications in mountain regions, thus contributing to increasing the awareness of Member States about how satellite technology applications can contribute to the sustainable development of mountain regions. Thirteen projects are in various stages of implementation.

20. The main objective of the Workshop was to facilitate discussion of ways in which remote sensing and other technologies could be used to promote sustainable development in mountain areas and to start developing the following two projects: “Andesat”, which combines elements of agriculture, hydrology, geology, mineralogy and the environment and is the result of the United Nations/Argentina/Switzerland/European Space Agency Workshop on Sustainable Development in Mountain Areas of Andean Countries, held in Mendoza, Argentina, from 26 to 30 November 2007 (A/AC.105/913) and the “Andes in space” project.

21. A major outcome of the Workshop was the further development of a proposal on the use of remote sensing entitled “natural resources environmental management and socio-cultural sustainability in the Andes” and the decision to develop a new module entitled “Andes from space” in the framework of the Eduspace programme, which is led by the European Space Agency (ESA) and CONAE.

22. The United Nations/International Astronautical Federation Workshop on Integrated Space Technologies and Space-based Information for Analysis and Prediction of Climate Change was held in Daejeon, Republic of Korea, from 9 to 11 October 2009, just prior to the 60th International Astronautical Congress, which took place from 12 to 16 October. Participants in the Workshop discussed a wide range of space-related technologies, services and information resources available for analysing and predicting climate change, with the ultimate goal of exploring ways to solve social and economic problems caused by climate change and global warming. The meeting also discussed opportunities for increasing regional and international cooperation in that area.

23. Major critical issues and themes identified in the presentations delivered at the technical sessions were summarized in working groups and further discussed at a round table of leading managers of space agencies and other relevant institutions from both developing and developed countries, as well as from international organizations.

24. The main conclusions drawn from those discussions included the need to develop satellite-derived climate data standards and systems that would be globally available, either free of charge or at a low price, the need to establish regional

facilities that would enable collective access to relevant satellite data and the sharing of regional and global information on climate change, and the importance of improving coordination for sharing climate change-related information for responding to needs defined at regional levels, for providing standard format data and for supporting decision-making processes in the regions. The conclusions of the Workshop and its round table were presented at the International Astronautical Congress event devoted to that topic.

25. The Workshop on Applications of Telehealth to Service Delivery in Public Health and Environment for the benefit of States members of the South Asian Association for Regional Cooperation (SAARC), which was co-organized by the Government of Bhutan and the Government of India and supported by the Programme, was held in Thimphu from 27 to 30 July 2009. The main objective of the Workshop had been defined at the United Nations/India/European Space Agency Regional Workshop on the Use of Space Technology in Tele-epidemiology to Benefit Asia and the Pacific held in Lucknow, India, from 21 to 24 October 2008 (A/AC.105/925, para. 25), was to cost-effectively connect the hospitals of Bhutan and India via a broadband satellite communications channel.

26. As a result of the Workshop, hospitals of excellence in India have been connected with reference hospitals in Bhutan. The use of a prototype mobile health unit developed by India for developing countries was also demonstrated for tele-surgery, off-site radiology services, cardiac monitoring, dermatology, medical consultations, specialist referrals and correctional care.

27. At the 6th European Congress on Tropical Medicine and International Health, held in Verona, Italy, from 6 to 10 September 2009, the United Nations Office for Outer Space Affairs organized a workshop on space technology's contribution to infection surveillance and the health-related Millennium Development Goals. The principal goal of the workshop was to improve awareness among the medical community of the potential of satellite technology for monitoring and predicting the spread of infectious diseases. Information was provided to the 1,200 participants in the Congress on the outcomes of specific pilot projects using satellite data implemented in Asia and the Pacific, Europe and Latin America and the Caribbean.

28. Since UNISPACE III, the Programme has carried out, in cooperation with its partners, 23 activities that have been either partly or fully dedicated to telemedicine, tele-health and tele-epidemiology. Earth-observing satellites provide a transnational picture of vector-borne diseases and space-based data help scientists to combat infectious diseases and even to predict high-risk areas before outbreaks occur.

## **2. Enabling space technologies**

29. The United Nations/United States of America Training Course on Satellite-Aided Search and Rescue, which was organized by the Programme and the National Oceanic and Atmosphere Administration of the United States, was held in Miami, Florida, United States, from 19 to 23 January 2009. The Programme and the Secretariat of the International Satellite System for Search and Rescue (COSPAS-SARSAT) have jointly organized seven training courses on satellite-aided search and rescue. These training courses have improved the coordination between COSPAS-SARSAT member States and those developing countries which avail themselves of the distress alert information provided by COSPAS-SARSAT. Reports

on previous training courses on satellite-aided search and rescue are available at <http://www.oosa.unvienna.org/oosa/en/docsidx.html>.

30. The training course held in January 2009 was the second organized by the Programme and the United States for participants from Latin America and the Caribbean. The first such training course was conducted in 2004. The 2009 training course has improved formal interaction between distress alert data providers and users in Latin America and the Caribbean and increased the effectiveness with which COSPAS-SARSAT data is used in search and rescue operations, thus enhancing global operation of the system.

31. The United Nations/Azerbaijan/United States of America/European Space Agency Workshop on Applications of Global Navigation Satellite Systems, which was hosted by the Ministry of Communication and Information Technologies on behalf of the Government of Azerbaijan, was held in Baku from 11 to 15 May 2009 (A/AC.105/946). The Workshop was co-sponsored by the United States, through ICG, and ESA. The objectives of the Workshop were to do the following: (a) strengthen regional information and data exchange networks on the use of GNSS technology; (b) identify the specific needs of individual plans and projects on GNSS at the regional and international levels for short, medium and long-term applications; and (c) develop a regional plan of action that would contribute to the wider use of GNSS technology and its applications.

32. Participants established three working groups focusing on capacity-building and institutional strengthening, a geodetic reference network and GNSS applications. In the framework of the various ongoing projects and programmes of relevance to the region, participants agreed on follow-up activities to further strengthen the reference station networks through the European Position Determination System (EUPOS) and agreed that GNSS training courses and workshops should be organized for countries in the region that were not currently operating permanent reference stations. Participants also highlighted the importance of continuing education and training for experts and users and recommended the available online education materials to be used for distance learning or e-learning. A need for a new GNSS policy to promote the interoperability of navigation, positioning and timing systems in adjacent regions was outlined by the workshop participants.

33. Efforts to build capacity in space science and technology are considered a major focus of the Programme and are of specific interest to ICG. Two international training courses on satellite navigation and location-based services were organized jointly by the Programme, the African Regional Centre for Space Science and Technology Education — in French language and the Regional Centre for Space Science and Technology Education in Latin America and the Caribbean. The aim of the training courses was to initiate the development of a curriculum on GNSS. Participants were informed about relevant GNSS technologies in order to help them to gain an in-depth understanding of how those technologies could be used.

34. The United Nations/Austria/European Space Agency Symposium on Small Satellite Programmes for Sustainable Development was held in Graz, Austria, from 8 to 11 September 2009. The Symposium was co-sponsored by the Federal Ministry for European and International Affairs of Austria, the Federal Ministry for Transport, Innovation and Technology of Austria, the State of Styria, the City of

Graz and ESA. The primary objectives of the Symposium were to review the usefulness of small satellites and to harness accumulated experience in small satellite development for the purpose of conceptualizing national small satellite development programmes as well as to contribute to the development of indigenous capabilities in small satellite technology in the participants' institutions.

35. The Symposium consisted of four sessions on the following themes: (a) usefulness of small satellites for capacity-building; (b) establishment of a small satellite programme: policy, planning and implementation; (c) launch opportunities for small satellites and regulatory issues; and (d) hands-on activities for mission design. A technical visit to the ground station and satellite facilities in Graz was organized on the second day. During the Symposium, three working groups were formed to develop small satellite mission plans and proposals in the following application areas selected by the participants: (a) climate change monitoring and education; (b) disaster management; and (c) humanitarian missions. It was suggested that the working groups discuss a mission statement and operational concept, a timeline, budget estimations, possible partners and collaborators, the kind of education and training that would be needed and access to technical facilities. Low costs and a short development and production times, coupled with advances in electronic miniaturization and associated performance capabilities, make small satellite missions extremely attractive for governmental and private entities, as well as for educational institutions in developing countries.

36. The Programme continued cooperating with the International Academy of Astronautics (IAA) and its Committee on Small Satellite Missions in organizing a series of workshops on small satellites. The Tenth United Nations/International Academy of Astronautics Workshop on Small Satellites in the Service of Developing Countries was held on 13 October 2009 in Daejeon, Republic of Korea, within the framework of the 60th International Astronautical Congress. The objectives of the Workshop were to introduce small satellite programmes, demonstrate the effectiveness, including the cost-effectiveness of small satellites, and encourage educational and training activities at universities in developing countries.

37. The Workshop, which was an integral part of the Congress, was attended by some 60 participants. Most of the papers presented at the Workshop focused on the contribution that small satellites could make in supporting scientific, Earth observation and telecommunication missions. Particular emphasis was placed on international cooperation, on education and training and on the benefits of such programmes for developing countries. The Workshop was appreciated by participants and members of the IAA Committee on Small Satellite Missions, who suggested that a discussion on how developing countries could benefit more from small satellite projects should be held at the 62nd International Astronautical Congress, to be held in Cape Town, South Africa, from 3 to 7 October 2011, since that event would be attended by the heads of African space agencies.

38. It is expected that efforts will be made, in the framework of the Programme, in support of capacity-building in basic space technology development with a specific focus on small satellites and their applications. The Programme is seeking to develop an education curriculum for basic space technology development and will work with educational institutions worldwide to identify relevant long-term fellowship opportunities. It will build on the recommendations of the series of

United Nations/International Academy of Astronautics workshops on small satellites in the service of developing countries and on the outcome of the United Nations/Austria/European Space Agency Symposium on Small Satellite Programmes for Sustainable Development.

### **3. Space science and space law**

39. Initiated in 1990, the United Nations Basic Space Science Initiative has contributed to the international and regional development of astronomy and space science through annual workshops organized jointly by the United Nations, ESA, the National Aeronautics and Space Administration (NASA) and the Japan Aerospace Exploration Agency (JAXA) in the framework of the International Heliophysical Year 2007 and the International Space Weather Initiative (ISWI). The United Nations Basic Space Science Initiative has led to the establishment of planetariums, astronomical telescopes and International Heliophysical Year/International Space Weather Initiative instrument arrays worldwide, particularly in developing countries. In particular, the following instrument arrays have been developed in the framework of ISWI: the Scintillation Network Decision Aid (SCINDA), the Atmospheric Weather Electromagnetic System of Observation, Modeling and Education (AWESOME), the Sudden Ionospheric Disturbances (SID) monitor, the Remote Equatorial Nighttime Observatory for Ionospheric Regions (RENOIR), the Compound Astronomical Low-cost Low-frequency Instrument for Spectroscopy and Transportable Observatory (CALLISTO), the Magnetic Data Acquisition System (MAGDAS) and the African dual frequency GPS network (GPS-Africa). The United Nations Basic Space Science Initiative has also contributed to the extension of mirror sites of the NASA astrophysical data system, the use of virtual observatories and the implementation of the “Tripod” concept, which aimed at comprehensively using instruments, observing programmes and teaching materials at the university level in countries where space science was used as a tool for promoting socio-economic development. The first workshop on ISWI organized jointly by the United Nations, ESA, NASA and JAXA will be held in Luxor, Egypt, from 6 to 10 November 2010. ISWI is part of the programme on GNSS applications that is implemented by the Office for Outer Space Affairs, in its capacity as ICG Executive Secretariat, and that is co-sponsored by ICG.

40. At the United Nations/European Space Agency/National Aeronautics and Space Administration/Japan Aerospace Exploration Agency Workshop on Basic Space Science and the International Heliophysical Year 2007, held from 21 to 25 September 2009 in Daejeon, Republic of Korea, participants reviewed the basic space science activities that had been carried out in the framework of the International Heliophysical Year 2007 and the projects that had emanated from previous editions of the workshop. Participants in the Workshop focused on solar-terrestrial interaction to understand how the variability of the Sun could affect the Earth’s magnetosphere, ionosphere and environment, as well as the impact such interaction could have on space-based systems.

41. The Programme, through the United Nations Basic Space Science Initiative, provided financial support for the eleventh COSPAR capacity-building workshop on data analysis of the Fermi gamma-ray space telescope, to be held in Bangalore, India, from 8 to 19 February 2010. This series of workshops is co-sponsored by the Programme and is the result of the Initiative.

42. The United Nations/Islamic Republic of Iran Workshop on Space Law was held in Tehran from 8 to 11 November 2009 (A/AC.105/956). The main theme of the Workshop was the role of international space law in the development and strengthening of international and regional cooperation in the peaceful exploration and use of outer space. The Workshop was co-organized with the Iranian Space Agency and supported by the Asia Pacific Space Cooperation Organization.

43. The Workshop was the sixth in a series of United Nations space law workshops organized by the Programme together with host countries. The objectives of the workshop were the following: (a) to promote understanding, acceptance and implementation of the United Nations treaties and principles concerning outer space; (b) to promote exchange of information on national space legislation and policies for the benefit of professionals involved in national space activities; (c) to consider trends of and challenges to international space law, such as the commercialization of space activities and the increasing number of participants involved in space activities; (d) to consider the development of university-level studies and programmes in space law, with a view to promoting national expertise and capability in this field; and (e) to consider mechanisms for increasing regional cooperation in the peaceful uses of outer space.

44. The Workshop resulted in a set of recommendations, observations and conclusions addressing the implementation and application of the United Nations treaties at the national level; the role of regional cooperation mechanisms in supporting efforts to strengthen regulatory and policy frameworks, promoting education in space law and fostering educational programmes within the respective region; and means for promoting dialogue between educational institutions with established space law programmes and educational institutions wishing to develop such programmes.

45. In conjunction with the Workshop, on 12 to 13 November the Programme organized the second United Nations Expert Meeting on Promoting Education in Space Law. The overall aim of the Meeting was to further develop the education curriculum for a basic course on space law. The curriculum would be integrated into the education programmes of the regional centres for space science and technology education, affiliated to the United Nations. The Meeting resulted in a revised draft of an education curriculum on space law.

### **C. Technical advisory services and regional cooperation**

46. The 2009 edition of the Asia-Pacific Satellite Communications Council Satellite Conference and Exhibition was held in Kuala Lumpur from 29 September to 1 October 2009. A representative of the Programme delivered the keynote speech and agreed to lead an ad hoc session on space technology applications at the 2010 edition of the Conference.

47. The Programme provided advisory assistance and financial support to IAA and to the National Space Research and Development Agency (NASRDA) of Nigeria for organizing the third IAA African Regional Conference, which was held in Abuja from 24 to 26 November 2009. The event was entitled “Space for Africa: Joint Participation, Knowledge Development and Sharing”.

48. The Programme co-organized a workshop on establishing scientific and instrument collaborations for observing the consequences of space weather from Morocco, which was hosted by the Government of Morocco and held in Rabat from 18 to 24 November 2009. At its sixty-fourth session, in 2009, the Committee on the Peaceful Uses of Outer Space noted the importance of continuing to build upon the success of the International Heliophysical Year 2007 and noted with satisfaction the agreement reached by the Scientific and Technical Subcommittee at its forty-sixth session to consider a new agenda item entitled “International Space Weather Initiative” under a three-year workplan with specific focus on the effects of space weather on the Earth. Formal presentations from providers of instruments (CALLISTO, GPS-Africa, MAGDAS, RENOIR, SCINDA, SID and AWESOME) were made to prospective instrument hosts at Moroccan universities. Two MAGDAS magnetometers, two GPS receivers (GPS-Africa and SCINDA) and one radio spectrometer (CALLISTO) was to be transferred to Moroccan observation sites. The African Regional Centre for Space Science and Technology — in French language, which is located in Rabat, will participate in the operation of the two GPS receivers. The Hassan II Academy of Science and Technology and the ISWI Secretariat signed a memorandum of understanding on the development of distributed ionospheric observatories in a number of universities in Morocco.

49. The Programme co-organized, together with the Senate of Berlin, the International EUPOS Steering Committee, ICG and the Office for Outer Space Affairs, the Second International Symposium on Global Navigation Satellite Systems, Space-Based and Ground-Based Augmentation Systems and Applications. The Symposium, which was hosted by the Government of Germany, was held in Berlin from 30 November to 2 December 2009. The symposiums that have been organized in this series were initiated by the establishment of ICG and encouraged by the Programme, in its role as Executive Secretariat of ICG. The Symposium addressed objectives, activities, organization and achievements related to cooperation with EUPOS and with the International Association of Geodesy Reference Frame Sub-Commission for Europe (EUREF). The potential of space-based geodetic techniques, in particular GNSS and differential GNSS reference station networks, was recognized for the use of modern and precise continental reference frames in the Eurasian tectonic plate. Participants in the symposium were provided with information about the status of ICG and about the newly established ISWI. Eurasian countries were encouraged to participate in and contribute to ICG and ISWI.

50. The Programme provided advisory assistance and financial support to professionals from Africa to participate in the following two workshops: a workshop on satellite navigation science and technology for Africa held at the Abdus Salam International Centre for Theoretical Physics, in Trieste, Italy, from 23 March to 9 April 2009 and a workshop on establishment of GNSS permanent stations and data processing held at the Regional Centre for Mapping of Resources for Development, in Nairobi from 24 August to 4 September 2009.

51. Those workshops included formal lectures and hands-on practice on GNSS architecture, signal structure, hardware design, state-of-the-art applications and scientific exploration using GNSS. An on-site computer laboratory gave participants ample opportunities to perform positioning calculations; to use mapping and

surveying software; to plan a precision farming procedure; and to analyse atmospheric and ionospheric data — all from GPS measurements.

## **D. Summary of activities related to the United Nations Programme on Space Applications**

### **1. Activities of the Programme carried out in 2009**

52. In 2009, one symposium and seven workshops were conducted within the framework of the Programme. The list of activities is presented in annex I.

### **2. Activities of the Programme scheduled for implementation in 2010**

53. The meetings, seminars, symposiums, training courses and workshops scheduled for 2010, including their objectives, are listed in annex II.

### **3. Activities of the regional centres for space science and technology education, affiliated to the United Nations, for the period 2008-2011**

54. The nine-month postgraduate courses to be offered by the regional centres for space science and technology education, affiliated to the United Nations, in the period 2008-2011 are listed in annex III.

## **V. Voluntary contributions**

55. The successful implementation of the Programme activities in 2009 benefited from the support and voluntary contributions in cash and in kind from Member States and their institutions, as well as from the assistance and cooperation of regional and international governmental and non-governmental organizations.

56. The following Member States and governmental and non-governmental organizations provided support for the activities of the Programme in 2009:

(a) ESA provided US\$ 85,000 in support of those activities of the Programme in 2009 which it co-sponsored (see annex I);

(b) Austria, through its Ministry for European and International Affairs and its Ministry for Transport, Innovation and Technology, the State of Styria and the City of Graz, defrayed the costs of the international air travel of participants, local organization and facilities, and room, board and local transportation of participants in the United Nations/Austria/European Space Agency Symposium on Small Satellite Programmes for Sustainable Development, held in Graz, Austria, from 8 to 11 September 2009 (see annex I);

(c) The Government of Switzerland provided US\$ 7,500 in support of the United Nations/Peru/Switzerland/European Space Agency Workshop on Integrated Space Technology Applications for Sustainable Development in the Mountain Regions of Andean Countries, held in Lima from 14 to 18 September 2009;

(d) JAXA provided US\$ 10,000 in support of the United Nations/European Space Agency/National Aeronautics and Space Administration/Japan Aerospace Exploration Agency Workshop on Basic Space Science and the International

Heliophysical Year 2007, held in Daejeon, Republic of Korea, from 21 to 25 September 2009;

(e) The International Astronautical Federation provided €20,000 in support of the United Nations/International Astronautical Federation Workshop on Integrated Space Technologies and Space-based Information for Analysis and Prediction of Climate Change, held in Daejeon, Republic of Korea, from 9 to 11 October 2009. In addition, it provided enough funds for 23 participants in the workshop to attend the 60th International Astronautical Congress;

(f) The United States provided US\$ 100,000 in support of the implementation of the ICG workplan, focusing on information dissemination and capacity-building, as well as selected activities related to GNSS applications;

(g) Those host Governments of events held in the framework of the Programme which defrayed the costs of local organization and facilities, and room, board and local transportation for some participants from developing countries (see annex I). The in-kind support given in 2009 by such Governments is estimated to have amounted to US\$ 357,712;

(h) Those Member States and their space-related institutions, as well as regional and international organizations, which provided sponsorship for experts to make technical presentations and participate in deliberations on activities of the Programme (see annex I and reports on activities).

## **VI. Financial provisions and administration of activities in the biennium 2010-2011**

57. The activities of the Programme in 2010 covered in the present report will be implemented as follows:

(a) *Financial provisions.* Under the regular budget of the United Nations from the resource allocation for fellowships and grants in the programme budget approved by the General Assembly at its sixty-fourth session for implementing the activities of the Programme during the biennium 2010-2011, an amount of US\$ 424,500 will be used to implement the activities of the Programme in 2010. In order to carry out effectively its mandated and expanded activities, in particular those aimed at implementing the recommendations of UNISPACE III, the Programme must solicit additional funds, in the form of voluntary contributions, in support of its activities. Those contributions will be used to supplement the regular budget of the Programme;

(b) *Administration by and contributions and participation of staff.* The Office for Outer Space Affairs will carry out the activities described in the present report. In that connection, travel will be undertaken, as appropriate, by staff of the Office under the provisions of the travel budget of the Office for the biennium and, as may be necessary, from voluntary contributions.

## Annex I

### United Nations Programme on Space Applications: meetings, seminars, symposiums, training courses and workshops held in 2009

<i>Title of activity and place and date held</i>	<i>Sponsoring country</i>	<i>Sponsoring organization</i>	<i>Host institution</i>	<i>Funding support</i>	<i>Number of countries and entities represented</i>	<i>Number of participants</i>	<i>Document symbol of report</i>
United Nations/United States of America Training Course on Satellite-Aided Search and Rescue  Miami, Florida, United States of America 19-23 January 2009	United States	United Nations, National Oceanic and Atmospheric Administration (NOAA) of the United States	NOAA	The United Nations provided air travel and local transportation for 17 participants from 13 countries in Latin America and the Caribbean; NOAA provided daily subsistence allowance.	19	30	N/A
United Nations/Azerbaijan/United States of America/European Space Agency Workshop on the Applications of Global Navigation Satellite Systems  Baku 11-15 May 2009	Azerbaijan, United States	European Space Agency (ESA)	Ministry of Communication and Information Technologies of Azerbaijan	The United Nations, the United States of America and ESA provided funds to defray the costs of air travel and living expenses for 17 participants from developing countries	29	80	A/AC.105/946
Workshop on Applications of Tele-health to Service Delivery in Public Health and Environment  Thimphu 27-30 July 2009	Bhutan, India	United Nations	Ministry of Health of Bhutan	The United Nations provided funds to cover the cost of air travel and daily subsistence allowance for 10 participants from five countries of the South Asian Association for Regional Cooperation	12	77	N/A

<i>Title of activity and place and date held</i>	<i>Sponsoring country</i>	<i>Sponsoring organization</i>	<i>Host institution</i>	<i>Funding support</i>	<i>Number of countries and entities represented</i>	<i>Number of participants</i>	<i>Document symbol of report</i>
United Nations/Austria/Euro pean Space Agency Symposium on Small Satellite Programmes for Sustainable Development  Graz, Austria 8-11 September 2009	Austria	United Nations, ESA	Austrian Academy of Sciences, Institute of Space Research and Joanneum Research	The United Nations and co-sponsors provided full or partial financial support for 20 participants.	38	60	A/AC.105/966
United Nations/Peru/ Switzerland/European Space Agency Workshop on Integrated Space Technology Applications for Sustainable Development in the Mountain Regions of Andean Countries  Lima 14-18 September 2009	Peru	United Nations, ESA	National Aerospace Research and Development Commission of Peru	The United Nations and co-sponsors provided full financial support for 26 participants.	20	200	A/AC.105/968

<i>Title of activity and place and date held</i>	<i>Sponsoring country</i>	<i>Sponsoring organization</i>	<i>Host institution</i>	<i>Funding support</i>	<i>Number of countries and entities represented</i>	<i>Number of participants</i>	<i>Document symbol of report</i>
United Nations/European Space Agency/National Aeronautics and Space Administration/Japan Aerospace Exploration Agency Workshop on Basic Space Science and the International Heliophysical Year 2007	Republic of Korea	United Nations, ESA, National Aeronautics and Space Administration (NASA), Japan Aerospace Exploration Agency (JAXA)	Korea Astronomy and Space Science Institute (KASI)	The United Nations, ESA, NASA, JAXA and KASI provided funds to defray the cost of air travel and living expenses for 50 participants.	34	201	A/AC.105/964
Daejeon, Republic of Korea 21-25 September 2009							
19th United Nations/International Astronautical Federation Workshop on Integrated Space Technologies and Space-based Information for Analysis and Prediction of Climate Change	Republic of Korea	United Nations, International Astronautical Federation, ESA	Korea Aerospace Research Institute (KARI)	United Nations and co-sponsors provided full financial support for 22 participants and partial support to one participant. IAF waived the Congress registration fee for 22 participants.	40	80	A/AC.105/970
Daejeon, Republic of Korea 9-11 October 2009							

<i>Title of activity and place and date held</i>	<i>Sponsoring country</i>	<i>Sponsoring organization</i>	<i>Host institution</i>	<i>Funding support</i>	<i>Number of countries and entities represented</i>	<i>Number of participants</i>	<i>Document symbol of report</i>
Tenth United Nations/International Academy of Astronautics Workshop on Small Satellites in the Service of Developing Countries  Daejeon, Republic of Korea 13 October 2009	Republic of Korea	United Nations, International Academy of Astronautics	IAA	N/A	N/A	60	A/AC.105/971
United Nations/Islamic Republic of Iran Workshop on Space Law  Tehran 8-11 November 2009	Islamic Republic of Iran	United Nations, Asia-Pacific Space Cooperation Organization	Iranian Space Agency (ISA)	United Nations and ISA provided full financial support for 17 participants. ISA provided conference facilities, local transportation and technical and secretarial support.	19	184	A/AC.105/956

## Annex II

## United Nations Programme on Space Applications: schedule of meetings, seminars, symposiums, training courses and workshops for implementation in 2010

<i>Activity</i>	<i>Title</i>	<i>Place and date</i>	<i>Objective</i>
	United Nations/Argentina/Saudi Arabia International Conference on the Use of Space Technology in Water Management	Buenos Aires 2010	To follow up on the conference on the same subject held in Riyadh from 12 to 16 April 2008. Participants will continue to discuss how space technology can contribute to improving the way in which water resources are managed, including by combating desertification, ensuring access to safe drinking water and managing water-related emergencies in developing countries.
	United Nations/Moldova/United States of America Workshop on the Applications of Global Navigation Satellite Systems	Chisinau 17-21 May	To introduce global navigation satellite systems (GNSS) technology and its applications to transport and communications, aviation, surveying, mapping and Earth science, management of natural resources, the environment and disasters, and precision agriculture; to promote exchange of experiences with specific applications; to encourage greater cooperation in developing partnerships and GNSS networks, in the framework of the regional reference frames: the European Position Determination System (EUPOS) and the International Association for Geodesy (IAG) Reference Frame Sub-Commission for Europe (EUREF).
	United Nations/Switzerland/European Space Agency/United Nations Environment Programme Workshop on Space Technology Contribution to Sustainable Development of the Mountain Regions of Andean Countries	La Paz 28 June-2 July 2010	To continue discussing how remote sensing, satellite communications and GNSS technologies to the projects started at the previous workshops in this series (held in Argentina in 2007 and in Peru in 2009) can contribute to sustainable development in the mountain regions of Andean countries; to identify priorities for building capacity in remote sensing for the benefit of those regions.

<i>Activity</i>	<i>Title</i>	<i>Place and date</i>	<i>Objective</i>
	United Nations/ Turkey/European Space Agency Workshop on Space Technology Applications for Socio-economic Benefits	Antalya, Turkey 14-17 September 2010	To identify ways and means to facilitate governmental, institutional and industrial participation in the space arena; to address principles for national, regional and international cooperation in space technology development and its applications; to explore the socio-economic benefits of using satellite remote sensing, satellite meteorology, satellite communications and GNSS; to strengthen regional information and data exchange networks on the use of space science and technology; to initiate pilot projects for joint work at the regional and international level.
	United Nations/ Austria/European Space Agency Symposium on the Use of Small Satellites for Sustainable Development	Graz, Austria 21-24 September 2010	To promote the development and use of basic space technology, in particular small satellites, for sustainable socio-economic development.
	United Nations/ International Astronautical Federation Workshop on Applications of Global Navigation Satellite Systems	Prague 24-26 September 2010	To discuss GNSS technologies, applications and services that contribute to sustainable economic and social development programmes, primarily in developing countries; to increase awareness among decision makers and representatives of the research and academic community about ongoing activities and trends in the use of GNSS technologies, applications and services; to examine GNSS technologies, applications and services available for addressing social and economic issues; to strengthen institutional and human capacity in the area of GNSS technologies, applications and services; and to strengthen international and regional cooperation in GNSS technologies, applications and services.
	Eleventh United Nations/ International Academy of Astronautics Workshop on Small Satellites in the Service of Developing Countries	Prague 28 September 2010	To introduce small satellite programmes; to demonstrate the effectiveness, including the cost-effectiveness of small satellites; and to encourage educational and training activities at universities in developing countries.
	United Nations/Bangladesh Regional Workshop on the Use of Space Technology for Climate Change Studies	Bangladesh November 2010	To promote the use of space technologies and space-derived information and services for climate change monitoring and prediction, with the ultimate goal of exploring ways to address social and economical problems caused by disasters and environmental hazards induced by climate change, as well as to strengthen international and regional cooperation in this area.

<i>Activity</i>	<i>Title</i>	<i>Place and date</i>	<i>Objective</i>
	United Nations /European Space Agency/National Aeronautics and Space Administration/Japan Aerospace Exploration Agency Workshop on the International Space Weather Initiative	Luxor, Egypt 6-10 November 2010	To build upon the achievements of past workshops on basic space science and the International Heliophysical Year 2007; to inaugurate the International Space Weather Initiative by utilizing ground-based world-wide International Heliophysical Year/International Space Weather Initiative instrument arrays.
	United Nations/Thailand Workshop on Space Law	Bangkok, November 2010	To build capacity in space law, with particular reference to the United Nations treaties and principles related to outer space.

## Annex III

### Regional centres for space science and technology education, affiliated to the United Nations: schedule of nine-month postgraduate courses, 2008-2011

#### 1. Regional Centre for Space Science and Technology Education in Asia and the Pacific

<i>Year</i>	<i>Venue</i>	<i>Activity</i>
2009-2010	Indian Institute of Remote Sensing, Dehra Dun, India	Fourteenth Postgraduate Course on Remote Sensing and Geographic Information Systems (GIS)
2009-2010	Space Applications Centre, Ahmedabad, India	Seventh Postgraduate Course on Satellite Communications
2008-2009	Indian Institute of Remote Sensing, Dehra Dun, India	Thirteenth Postgraduate Course on Remote Sensing and GIS
2008-2009	Space Applications Centre, Ahmedabad, India	Sixth Postgraduate Course on Satellite Meteorology and Global Climate
2008-2009	Physical Research Laboratory, Ahmedabad, India	Sixth Postgraduate Course on Space and Atmospheric Science

#### 2. African Regional Centre for Space Science and Technology — in French language

<i>Year</i>	<i>Venue</i>	<i>Activity</i>
2008-2009	Mohammadia School of Engineers, University of Mohamed V, Agdal, Rabat	Sixth Postgraduate Course on Remote Sensing and GIS
2009-2010	Mohammadia School of Engineers, University of Mohamed V, Agdal, Rabat	Third Postgraduate Course on Satellite Meteorology and Global Climate
2010-2011	Mohammadia School of Engineers, University of Mohamed V, Agdal, Rabat	Seventh Postgraduate Course on Remote Sensing and GIS
2010-2011	Mohammadia School of Engineers, University of Mohamed V, Agdal, Rabat	Fourth Postgraduate Course on Satellite Communications

#### 3. African Regional Centre for Space Science and Technology Education — in English language

<i>Year</i>	<i>Venue</i>	<i>Activity</i>
2009-2010	Obafemi Awolowo University, Ile-Ife, Nigeria	Seventh Postgraduate Course on Remote Sensing and GIS

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**4. Regional Centre for Space Science and Technology Education in Latin America and the Caribbean**

<i>Year</i>	<i>Venue</i>	<i>Activity</i>
2009-2010	National Institute for Space Research, Santa Maria, Rio Grande do Sul, Brazil	Seventh Postgraduate Course on Remote Sensing and GIS
2009-2010	National Institute of Astrophysics, Optics and Electronics, Tonantzintla, Puebla, Mexico	Fifth Postgraduate Course on Remote Sensing and GIS
2010-2011	National Institute of Astrophysics, Optics and Electronics, Tonantzintla, Puebla, Mexico	Fourth Postgraduate Course on Satellite Communications

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