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Committee on the Peaceful Uses of Outer Space

Report on the United Nations/Austria Symposium on Space Science and the United Nations

(Graz, Austria, 22-24 September 2014)

I. Introduction

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

2. At its fifty-sixth session, in 2013, the Committee on the Peaceful Uses of Outer Space endorsed the programme of workshops, training courses, symposiums and expert meetings related to environmental monitoring, natural resource management, global health, global navigation satellite systems (GNSS), basic space science, basic space technology, space law, climate change, human space technology and the socioeconomic benefits of space activities to be held in 2014 for the benefit of developing countries.[2] Subsequently, the General Assembly, in its resolution 68/75, endorsed the report of the Committee on the work of its fifty-sixth session.

3. Pursuant to General Assembly resolution 68/75 and in accordance with the recommendations of UNISPACE III, the United Nations/Austria Symposium on

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[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, sect. I, para. 1 (e)(ii), and chap. II, para. 409 (d)(i).

[2] *Official Records of the General Assembly, Sixty-eighth Session, Supplement No. 20* (A/68/20, para. 66).

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Space Science and the United Nations was held in Graz, Austria, from 22 to 24 September 2014.

4. The Symposium, the twenty-first in a series of United Nations/Austria symposiums held since 1994, was organized by the United Nations in cooperation with the Austrian Academy of Sciences and Joanneum Research and supported by the Austrian Federal Ministry for Transport, Innovation and Technology, the Committee on Space Research (COSPAR), the European Space Agency (ESA), the Austrian state of Styria, the city of Graz and Austrospace. The Austrian Academy of Sciences hosted the Symposium on behalf of the Government of Austria.

A. Background and objectives

5. The United Nations has the mandate to promote international space cooperation and to assist its Member States with capacity-building in the use of space technology and its applications. For this purpose the United Nations established the Programme on Space Applications in 1971. It is implemented by the Office for Outer Space Affairs.

6. Since its inception, several hundred international conferences and training courses have been organized as part of the Programme, bringing together space experts from developed and developing countries. In cooperation with academic institutions from around the world the Programme provides long-term fellowship opportunities for education in various fields relating to space applications and in the development of small satellites. The Programme has also led to the establishment of regional centres for space science and technology education affiliated to the United Nations in Africa, in Asia and the Pacific, in Latin America and the Caribbean, and in Western Asia.

7. The initial focus of the Programme in the 1970s and 1980s was on remote sensing and satellite communication applications. However, it was soon recognized that many countries lacked the capacity and expert knowledge to make optimal use of space applications and that space science activities could offer a cost-effective, entry-level path for capacity-building in the use of space technology and its applications. To address this problem the Basic Space Science Initiative was launched in 1991 as part of the Programme (A/AC.105/2013/CRP.11).

8. The Initiative was a long-term effort to develop astronomy and space science through regional and international cooperation on a worldwide basis, particularly in developing nations. A series of workshops were held from 1991 to 2004 and astronomical telescope facilities and planetariums donated by Japan were established in several developing countries. From 2005 to 2008 the Initiative focused on the preparations for and the follow-up to the International Heliophysical Year 2007. Since 2009 the Initiative has actively contributed to the International Space Weather Initiative, which was concluded in 2012 and resulted in the establishment of 16 worldwide instrument arrays with close to 1,000 instruments recording data on solar-terrestrial interaction.

9. The Programme continually reviews and adjusts its activities to ensure that they remain relevant to the mandates and priorities of the United Nations and its Member States. Considering the accomplishments to date and the developments and

progress in the field of space activities in general and in the space sciences in particular, the purpose of the present Symposium was to review activities undertaken under the Initiative and to consider, together with the international space science community, the future role of space science within the overall framework of the United Nations and specifically in the Programme.

10. The primary objectives of the Symposium were as follows:

(a) To review the history and assess the past accomplishments of the Basic Space Science Initiative under the United Nations Programme on Space Applications and of past and ongoing activities of other United Nations entities;

(b) To discuss the future role of space science under the Programme and to compile a preliminary list of possible actions and activities that could be conducted under the leadership of the United Nations or in cooperation with other relevant entities.

11. In doing so, the Symposium participants were also to reflect on the direction the field of space science was taking and the roles that international cooperation and capacity-building could play in that regard. The secondary objectives of the Symposium were therefore as follows:

(a) To bring together policy and decision makers representing major governmental and non-governmental organizations active in space science to present and discuss their activities, in particular contributions to capacity-building and international cooperation in space science, including in developing countries;

(b) To discuss forthcoming and planned space science activities worldwide and consider the opportunities they may offer for capacity-building and international space cooperation.

12. In addressing those objectives, the Symposium participants were invited to consider the following questions:

(a) Should space science and its applications continue to be part of the Programme to support capacity-building and international cooperation in the field?

(b) Are there other frameworks or initiatives that must be considered so as to avoid duplication of efforts and identify possible areas for cooperation?

(c) Who would be the beneficiaries, stakeholders and potential cooperation partners in the proposed activities and what added value could they obtain from their involvement in the Programme?

(d) Should priority be given to particular space science disciplines or topics? If so, which ones?

(e) What could be the specific future roles and activities of the Programme?

(f) What resources would be required for the proposed activities and how could those be obtained?

13. The observations and recommendations made by the Symposium participants would be the basis for further consideration of the future role of space science activities in the Programme.

B. Attendance

14. Experts with policy and decision-making functions in the planning or implementation of space science activities in international or national space agencies, governmental and non-governmental organizations, research institutions, industry, universities and other academic institutions from developing and industrialized countries from all regions were sought by the United Nations to participate in and contribute to the Symposium.

15. The invitations to participate in the Symposium were disseminated worldwide through the offices of the United Nations Development Programme, permanent missions of Member States to the United Nations, various space science publications and mailing lists. In his statement at the fifty-seventh session of the Committee on the Peaceful Uses of Outer Space in 2014, the United Nations Expert on Space Applications invited all delegations to nominate qualified space science experts to participate in the Symposium.

16. Participants were selected from among the applications received on the basis of their qualifications and the relevance of their contributions to the Symposium. Applications from qualified female applicants were particularly encouraged.

17. The Symposium was attended by 50 space science experts from governmental and non-governmental institutions, industry, universities and other academic entities from the following 22 countries: Austria, China, Denmark, Ethiopia, France, Germany, Ghana, India, Ireland, Japan, Jordan, Mexico, Nepal, Nigeria, Republic of Korea, Russian Federation, Rwanda, South Africa, Spain, Sri Lanka, United Kingdom of Great Britain and Northern Ireland and United States of America.

18. Representatives of COSPAR, the European Organization for Astronomical Research in the Southern Hemisphere (ESO) and the International Astronomical Union (IAU) were among those participating in the Symposium.

19. Funds provided by the United Nations, the Government of Austria (through the Federal Ministry for Transport, Innovation and Technology), COSPAR, ESA, the Austrian state of Styria, the city of Graz and Austrospace were used to defray, fully or partially, the costs of the air travel and board and lodging of the participants. The sponsors also provided funds for local organization, facilities and the transportation of participants.

C. Programme

20. The programme of the Symposium was developed by the Office for Outer Space Affairs of the Secretariat in cooperation with the programme committee of the Symposium. The programme committee included representatives of national space agencies, international organizations and academic institutions. An honorary committee and a local organizing committee also contributed to the successful organization of the Symposium.

21. The programme consisted of an opening session, six technical sessions, followed by session reviews, discussions and a session to discuss and agree on observations and recommendations for future space science activities in the

framework of the United Nations. The presentations at the technical sessions were chosen from among the abstracts submitted by the Symposium applicants.

22. On the second day of the Symposium the participants were invited to join a guided tour of the Institute of Space Research of the Austrian Academy of Sciences. The Institute has a history of more than 40 years during which it has contributed more than 90 flight instruments to more than 30 international space science missions covering a wide range of space science disciplines. Closing remarks by the co-organizers concluded the Symposium.

23. The chairs assigned to the technical sessions provided their comments and notes as input for the present report. The detailed programme, the list of participants, background information and full documentation relating to the presentations made at the Symposium were made available on a dedicated website (www.unoosa.org/oosa/en/SAP/act2014/graz/index.html).

II. Summary of the Symposium programme

A. Opening session

24. At the opening session, welcoming remarks were made by representatives of the Austrian Academy of Sciences, the city of Graz and ESA and by the Director of the Office for Outer Space Affairs.

25. The formal opening of the Symposium was followed by two keynote addresses. The first was delivered by the representative of ESA and presented the ESA space science programme, which was driven by the scientific community. The space science missions had made important contributions to space science by exploring the solar system and observing the electromagnetic spectrum as a window to understanding the universe. Nearly all of the ESA space science missions had an element of international cooperation. A wide range of missions was either in development or under study, and they promised a flood of new results. The representative of the National Aeronautics and Space Administration of the United States (NASA) presented the second keynote address. It discussed the state of scientific research at NASA, which encompasses astrophysics, heliophysics, planetary science including Earth science, and space life and physical sciences. It was stressed that NASA scientific endeavours were a worldwide collaborative effort.

26. The opening session was concluded with a presentation by representatives of the Office for Outer Space Affairs that reviewed the role of space science under the Programme and presented the Symposium, its objectives and the expected outcome and follow-up activities. The presentation reiterated that many new developments had taken place since the early 1990s and the beginning of the Initiative, namely: (a) the evolution of space science programmes; (b) the emergence of new space nations; and (c) the appearance of new stakeholders and their space science activities. The reviews of space science activities in the framework of the Programme should ensure that they remain relevant to: (a) the mandate of the United Nations; and (b) the priorities of Member States and the needs of the space science community.

B. Space science and international organizations

27. This session provided an opportunity to international organizations involved in space science to present their activities, in particular those related to space science capacity-building.

28. The first presentation in the session was made by a representative of the Austrian Space Forum who played a leading role in the Basic Space Science Initiative from 1994 to 2006. In his presentation he made the case for continuing to build on the Initiative's past achievements in space science capacity-building and thus to foster rational thought and make a better world. Today meaningful scientific work can be done with relatively modest resources. In particular the Internet and the World Wide Web has acted as a great equalizer by putting space science data, data analysis tools and educational resources in the hands of scientists from all countries.

29. The representative of COSPAR highlighted the role of his organization in promoting international cooperation in space. COSPAR was established by the International Council for Science in 1958 with the primary goal to "provide the world scientific community with the means whereby it may exploit the possibilities of satellites and space probes of all kinds for scientific purposes, and exchange the resulting data on a cooperative basis". The COSPAR capacity-building programme featured training workshops held in various countries in the developing world, where students and young professionals were exposed to the most recent scientific data and techniques in space-related disciplines. A companion fellowship programme complemented those activities.

30. ESO is an intergovernmental treaty-level organization founded in 1962. It currently had 14 member States. Brazil was expected to become the first non-European member State in the near future. ESO had several observation sites in South America, including some of the world's premier astronomical facilities, such as the New Technology Telescope, the Very Large Telescope, the Atacama Large Millimetre/Sub-Millimetre Array and the European Extremely Large Telescope, which was currently under construction. ESO fostered a strong technology programme, the transfer of technology, and scientific exchanges, training and outreach.

31. IAU is a worldwide organization of professional astronomers with 11,000 members from 70 member States. It had initiated an ambitious programme to use astronomy as a tool for development, because astronomy and space help to build three of the pillars that support a developed society: fundamental science, cutting-edge technology and deep human culture. IAU had adopted an ambitious decadal strategic plan entitled "Astronomy for development 2010-2020", which built on the achievements of the International Year of Astronomy 2009. The plan provided for three task forces on: (a) astronomy for universities and research; (b) astronomy for children and schools; and (c) astronomy for the public. Although the plan is global in scope, it emphasizes capacity-building in sub-Saharan Africa. In 2011, IAU established the Office of Astronomy for Development in Cape Town as a joint venture with the National Research Foundation of South Africa. It coordinated several regional nodes and organized an annual call for project proposals.

32. The European Space Sciences Committee of the European Science Foundation currently had 67 member organizations in 29 countries and was an independent voice speaking for European space research and policy. It provided a policy framework for space research and offered a European platform for discussion by bringing together national space agencies, ESA member States, space research institutes and laboratories, and representatives of the scientific community. The Committee had set up four panels dealing with the following disciplines: (a) solar system and exploration; (b) research in weightlessness; (c) astronomy and fundamental physics; and (d) Earth sciences.

C. National and regional space science activities

33. The second session reviewed various ongoing national and regional space science activities and their potential contributions to capacity-building.

34. A representative of the Space Studies Board of the National Research Council of the National Academies of the United States presented the Council's findings and recommendations on international collaboration in space exploration. The presentation concluded that the future of space science was going to have a strongly international scope. International cooperation might be the only realistic option for undertaking some of the most ambitious and scientifically rewarding missions. But international agreements and plans for cooperation had to be crafted with care, because they could also carry risks. Success was not guaranteed, unless ways could be found to plan for, manage and execute international missions in a way that guarantees the best possible scientific returns for the investments undertaken by the world's space agencies.

35. The representative of the South African Council for Space Affairs, who had been personally involved with implementing the Basic Space Science Initiative made a presentation on experiences with and prospects of capacity-building in space science in Africa. Since 2005 the Working Group on Space Sciences in Africa, established as a result of discussions held under the Initiative, had gradually been replaced by a new mechanism, the African Leadership Conference on Space Science and Technology for Sustainable Development. The idea of establishing an African Institute of Space Sciences to facilitate capacity-building had been taken up by the African Union, which decided to establish a space science and technology node of the Pan African University, to be hosted by South Africa. Several new instrument facilities had been established, such as the Southern African Large Telescope, the High Energy Stereoscopic System and the Square Kilometre Array. There had clearly been much progress in Africa in the past two decades on which future capacity-building could build.

36. The session was concluded with presentations on national space science activities in India and Japan. In their presentations the representatives of the Indian Space Research Organization and the Japan Aerospace Exploration Agency discussed the past, ongoing and planned space science missions of their respective countries and the relevant institutional frameworks and infrastructures. Both countries promoted international cooperation by opening their space science missions to foreign participation and by contributing to the space science activities of other countries.

D. Space science and the United Nations Basic Space Science Initiative

37. The focus of this session was on space science activities and topics that had already been discussed during previous workshops of the Basic Space Science Initiative.

38. The first two presentations concerned the International Scientific Optical Observation Network (ISON), an open international project coordinated by the Keldysh Institute of Applied Mathematics of the Russian Academy of Sciences as an independent source of data about natural and artificial space objects for use in scientific research and space applications. ISON currently cooperated with 35 optical observatories and observation facilities operating 70 telescopes in 15 countries. The project included a telescope donation programme and provided software to coordinate the Network's activities. The presenters noted that ISON research areas were of topical interest to the Initiative and the Committee on the Peaceful Uses of Outer Space.

39. The Chair of the Action Team on Near-Earth Objects of the Committee on the Peaceful Uses of Outer Space made a presentation on the international response to the near-Earth object impact threat and the role of the United Nations in this regard. He presented the status of the International Asteroid Warning Network and the Space Missions Planning Advisory Group, which were currently being established. Space science related to near-Earth objects could also be considered under the Initiative.

40. A representative described the space science capacity-building activities of the International Centre for Space Weather Science and Education of Kyushu University, Japan, which included the Debris Data Acquisition System, the Magnetic Data Acquisition System and the Inter-University Upper Atmosphere Global Observation Network. The Centre also accepted space science students from developing countries, organized various space science schools in Africa and published the International Space Weather Initiative newsletter.

41. The two final presentations in this session reviewed the status of the World Space Observatory-Ultraviolet project, which was discussed during workshops held previously under the Initiative and is now being implemented by Spain and the Russian Federation. The mission is currently scheduled for launch in 2019.

E. Space science activities and the possible role of the United Nations

42. This session discussed space science activities and considered the role the United Nations could play in them.

43. A representative of Mars One, an organization aiming to establish a permanent human settlement on Mars by 2025, made a presentation on opportunities for the scientific community to be involved in its project, in particular the robotic precursor mission that it is working on.

44. The next three presentations addressed the question whether cells, bacteria and other microorganisms could be detected outside the Earth's atmosphere and, if so, whether they could be of extraterrestrial origin. One of the presenters reported that

recent balloon experiments indicated that living cells may be found at altitudes above 40,000 m. As it had not been possible to determine whether those were of terrestrial or extraterrestrial origin, it was important to conduct further experiments. The consequences of a discovery of extraterrestrial life and the impact it would have on humanity were also briefly discussed.

45. The last presentation in this session discussed Mars analogue research conducted by the Austrian Space Forum and the role this research played as a catalyst for citizen science and international scientific cooperation.

F. National and regional examples of space science capacity-building

46. The presentations in this session reviewed the status of space science capacity-building in various developing countries, its achievements and the challenges that remained.

47. The first three presentations discussed the space science activities conducted at the regional centres for space science and technology education affiliated to the United Nations. Presentations were made by the representatives of the African Regional Centre for Space Science and Technology Education, the Regional Centre for Space Science and Technology Education for Western Asia, 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.

48. The other presentations reviewed the status of space science activities in Ethiopia, Ghana, Mexico, Nepal, Nigeria, Rwanda and Sri Lanka. The presenters stressed the role space science played in their countries and referred to the role that the Basic Space Science Initiative and other entities had played in capacity-building efforts. The experience and lessons learned were reflected in the observations and recommendations of the present report.

G. Specific space science projects

49. This session presented specific space science projects and their possible links to the Initiative.

50. A representative of the Harbin Institute of Technology, China, reported on plans to establish a space environment simulation and research infrastructure as part of the country's national large-scale scientific infrastructure. The plans were approved in 2014 and the infrastructure was expected to become available within five to seven years. User agreements had been signed with more than 100 research units in 15 countries.

51. A small space platform for scientific and technological experiments was presented by the representative of a multinational aerospace company headquartered in Germany and with development centres in the Russian Federation and the United States. The platform consisted of a 10-13 kg satellite suited for scientific purposes and for applications in the fields of Earth observation, disaster monitoring, maritime traffic monitoring, and Global Positioning System and Global Orbital Navigation Satellite System occultation. Piggyback launch opportunities would be available on future Progress spacecraft missions bound for the International Space Station.

52. The representative of Beihang University, China, talked about results of and plans for experiments with bioregenerative life support systems (BLSS) conducted at its Lunar Palace 1 facility. BLSS are a key technology for long-duration space missions, deep space missions and multiple-crew missions. For this reason Beihang University was conducting large-scale BLSS experiments with humans in an ecologically closed loop. An experiment with a crew of four is planned for 2016. International counterparts are welcome to cooperate in joint experimental studies.

III. Observations and recommendations

53. Participants in the Symposium made the general observations and recommendations presented below.

A. Importance of space science capacity-building and continuation of the Basic Space Science Initiative

54. Space science spans a wide variety of scientific fields, ranging from astrophysics, human and robotic space exploration, and satellite-based communications and position services all the way to life sciences. Space science continues to be of fundamental importance to the ability of nations to utilize space technology and its applications for the benefit of their societies in that it advances our knowledge about the universe and humankind's role and destiny in it, stimulates the development of new technology, applications and solutions that enable us to address the challenges facing humanity, and inspires people from all walks of life, young and old. Space science is an ideal tool for global capacity-building in science and technology.

55. During the last few years COSPAR and IAU have both launched or strengthened their space science capacity-building activities. However, even today, only half of the 193 Member States of the United Nations have nationally organized professional space science bodies and are represented as members of COSPAR or IAU. Capacity-building in basic space science, especially in the developing countries, therefore remains essential in order to increase the number of countries with sound capabilities to participate in space science activities.

56. Because of its intergovernmental character, the United Nations has a unique connection to its Member States that could never be matched by international non-governmental organizations. This connection, together with the expertise and resources of non-governmental organizations, should be utilized to the extent possible to support space science capacity-building in developing countries.

57. The participants therefore recommended that symposiums and workshops of the Initiative held under the umbrella of the United Nations should continue in different regions of the world and that the Office for Outer Space Affairs should develop a strategy and workplan for future activities under the Initiative on the basis of the discussions of the Symposium and in consultation with permanent observers of the Committee and other relevant entities.

B. Implementing space science capacity-building

58. Participants agreed on the importance of:

(a) Supporting initiatives to use astronomy and space sciences for global capacity-building, such as those initiated by COSPAR and the IAU Office of Astronomy for Development;

(b) Exploring ways to cooperate with international, regional and national development agencies and with industry to support activities that use space science as a tool for global capacity-building;

(c) Reviewing other successful examples of cooperation in the field of space technology and applications as a possible model for cooperation in the field of space science, such as the Group on Earth Observations and its Global Earth Observation System of Systems.

59. With regard to the implementation of capacity-building in space science the participants made the following observations and recommendations:

(a) The World Data System and open data policies play an increasingly important role in the sharing of scientific information and the enhancement of space science capacity in developing countries;

(b) The education curricula prepared for the regional centres for space science and technology education affiliated to the United Nations are a useful resource for capacity-building. They should be updated regularly to keep them current with the advances made in the field of space activities;

(c) The availability and accessibility of educational resources in local languages is an important factor in successful space science capacity-building;

(d) Capacity-building in outreach to the general public is not the same as capacity-building in education and research. Outreach activities are necessary to promote space-related activities, but not sufficient to build capacity for the use of space science, technology and their applications;

(e) Today the Internet makes it possible to grant space scientists from all over the world access to the world's best ground- and space-based observation facilities, based on the scientific excellence of their research proposals. The development of a local space science observation infrastructure is therefore no longer a requirement for getting involved with space science activities;

(f) Capacity-building should include advice on the use of data that is freely available and accessible to the scientific community;

(g) Capacity-building is about people, not equipment. Therefore people need to be trained in the proper operation, use and maintenance of equipment, and suitable study and career options need to be created for them. Computer literacy is essential;

(h) Capacity-building should invest in young people to ensure that there is sufficient time and ability to drive development from the bottom up.

C. Scope of the Initiative

60. The original scope of the Initiative was defined at its first workshop (A/AC.105/489) and had been maintained throughout the series. The scope includes the following disciplines:

(a) Fundamental physics;

(b) Astronomy and astrophysics;

(c) Solar-terrestrial interaction and its influence on terrestrial climate;

(d) Planetary and atmospheric studies;

(e) Origin of life and exobiology.

61. Participants in the present Symposium reviewed that scope and agreed to redefine it as follows:

(a) Fundamental space physics;

(b) Astronomy, astrophysics, astrochemistry and astrobiology;

(c) Space environment research, including research into solar-terrestrial interaction and space weather;

(d) Planetary and atmospheric studies;

(e) Exploration, including by means of analogue missions, in coordination with the Human Space Technology Initiative of the United Nations Programme on Space Applications;

(f) Scientific study of space debris and near-Earth objects;

(g) Small satellite missions and other basic technology used in space science, in coordination with the Basic Space Technology Initiative of the United Nations Programme on Space Applications.

D. Stakeholders and cooperation partners

62. Participants further agreed that the following were possible stakeholders and potential cooperation partners for future activities under the Initiative:

(a) The scientific community worldwide;

(b) The Office for Outer Space Affairs and other United Nations bodies with a mandate related to relevant scientific activities;

(c) Governmental and non-governmental international organizations such as COSPAR, IAU, the International Academy of Astronautics, the International Astronautical Federation, the International Centre for Theoretical Physics and relevant permanent observers of the Committee on the Peaceful Uses of Outer Space;

(d) National and international space agencies and ESO;

(e) The regional centres for space science and technology education affiliated to the United Nations;

(f) Relevant space science programmes, such as the Scientific Committee on Solar-Terrestrial Physics and Variability of the Sun and its Terrestrial Impact;

(g) Academic and research institutions, and private sector entities;

(h) Any other relevant entities and their advisory organizations.

63. Considering that those stakeholders were operating at different levels and each implementing their own programmes, there was a need for better coordination. Funding sources often provided an area of overlap and could be used as leverage to effect coordinated change.

E. Criteria for potential future focus areas for the Initiative

64. Participants agreed that future activities of the Initiative should:

(a) Deal with scientifically and societally relevant issues, including items on the agenda of the Committee on the Peaceful Uses of Outer Space relevant to science;

(b) Contribute to capacity-building and outreach to promote the growth of space science, especially in the developing countries;

(c) Promote international cooperation;

(d) Avoid duplication of efforts by launching new initiatives or by complementing and strengthening ongoing efforts;

(e) Have low financial and technical entry barriers, for example by requiring only modest infrastructure investments or by making use of existing infrastructure, such as that used for earlier activities under the Initiative, and by making use of existing software tools and standards.

F. Possible future activities to be conducted under the Initiative

65. Participants recommended that the Initiative, in line with its redefined scope, should address areas of science relevant to the agenda of the Committee, including near-Earth objects, space weather, space debris and the long-term sustainability of outer space activities. In this way the Initiative could contribute to building a bridge between classical basic space science and applied space science, and could also contribute to capacity-building in those areas in the developing countries. This could augment the international research community and involve more teams in research in cutting-edge areas of outer space exploration.

66. Information-sharing was a key point in international cooperation in such areas as near-Earth objects, space weather, space debris and the long-term sustainability of outer space activities. The Initiative could provide significant input to efforts aimed at establishing appropriate information and data-sharing platforms for the international community as a further step towards establishing an international cooperation framework for a better common understanding of the challenges and threats facing humankind in near-Earth space exploration.

67. The International Scientific Optical Observation Network, which was developed during the last decade on the basis of low-cost technological solutions, was noted as a project that could be considered further under the Initiative.

68. Consideration should be given to holding dedicated workshops to discuss existing information platforms and the need for developing and implementing new information platforms in support of discussions under relevant items on the agenda of the Committee on the Peaceful Uses of Outer Space.

69. The participants in the Symposium noted that the World Space Observatory-Ultraviolet scientific mission, jointly operated by the Russian Federation and Spain, was equipped with instruments for imaging and spectroscopy in the 115-315 nm spectral range.

70. World Space Observatory-Ultraviolet would grant observing time to the world scientific community in the second year after its successful deployment. In coordination with the United Nations a proportion of that observing time would be granted to teams that propose collaborative projects involving scientists in developing countries, and dedicated workshops could be organized in support of this activity.

71. Participants also suggested that the Initiative may wish to consider the following topics for its future activities:

(a) Activities related to space science education;

(b) Special workshops on using data available from worldwide space science facilities, in cooperation with the owners of such facilities;

(c) Activities to facilitate the participation of developing countries in basic science and technology activities that underpin global space exploration efforts;

(d) Application of scientific methods to assess the effects of anthropogenic activities on the outer space environment.

72. The participants congratulated the Indian Space Research Organization on the successful Mars orbit insertion of their Mangalyaan Mars Orbiter Mission, which took place on 24 September 2014.

IV. Conclusions

73. The Symposium brought together renowned experts from a wide range of space science disciplines to discuss the role of space science in the United Nations, to review the achievements of the Basic Space Science Initiative and to consider its future.

74. Participants noted that the next activity under the Initiative would be the United Nations/Japan Workshop on Space Weather on the theme “Science and data products from International Space Weather Initiative instruments”, hosted by the International Centre for Space Weather Science and Education in Fukuoka, Japan, from 2 to 6 March 2015.

75. Member States interested in hosting future symposiums under the Initiative are requested to contact the Office for Outer Space Affairs.